

Geoengineering: A Half-Century of Earth System Experimentation

CO₂ = carbon dioxide, **FeSO₄** = iron sulfate, **ha** = hectare, **M** = million (1,000,000), **m** = meter, **m²** = square meter, **mi²** = square miles, **MW** = megawatt, **N** = nitrogen, **NO₂** = nitrogen dioxide, **NO_x** = nitrogen oxide, **O₂** = oxygen, **PO₄** = phosphate, **R&D** = research & development, **SO₂** = sulfure dioxide, **t** = tonne (1,000 kg)

| Geographic Information | | Description | | Participants | | Sources | |
|------------------------|-----------|---|---------------------------|---|--|--|--|
| Continent | State | Scale | Year | Type | Sponsor | Further Information | Sources |
| Africa | Algeria | 1 Mt/a of CO ₂ has been captured since 2004. 1M t/year of CO ₂ are currently being captured and re-injected | 2004 - ongoing (2012) | CCS | StatoilHydro and Sonatrach | BP (operator). Project name: In Salah. Located in Krechba. Onshore gas field with CO ₂ injection into saline formation below the reservoir. Project proponents seek to provide assurance that secure geological storage of CO ₂ can be verified as being cost effective. Short-term monitoring has been proposed as an option for providing long-term cost assurances and to demonstrate that industrial-scale geological storage of CO ₂ is a viable greenhouse gas-mitigating alternative. Precedents relating to the regulation and verification of the geological storage of CO ₂ (to allow the eligibility for greenhouse gas credits) are also being sought. | Global CCS Institute, http://www.globalccsinstitute.com/projects/12361 |
| S-America | Antigua | | 1984 | Increased Precipitation | | Name: Antigua Cloud Seeding Project, carried out by Weather Modification Inc.; with Aircraft for Cloud Seeding. | http://www.nawcinc.com/Wxmod.pdf |
| S-America | Argentina | R&D to produce Biodiesel and other products from algae | Ongoing in 2012 (since ?) | Algae schemes | | Private company "Oil Fox": Trials to extract oil from freshwater & brackish water algae to produce Biodiesel, Bioethanol, and proteins from animal and human consumption. Gas emitted from a thermal power station is used for algae cultures to improve productivity and to reduce emissions. | http://en.wikipedia.org/wiki/List_of_algal_fuel_producers ; http://www.oilfox.com.ar/ingles/index.htm |
| S-America | Argentina | 2 projects in the Province of Mendoza, >5,000 km ² | 1978 - 1993, 1998 - 2004 | Increased Precipitation & Reduced Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | WMO 1993 + 1994 + 2002 + 1984 and other sources, See Weather Modification Data for details, please. |

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| Asia | Armenia | 2 projects, Lake Sevan Area, Yerevan area, 15,000 km ² | 1964 - 1993 | Increased Precipitation & Reduced Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | WMO 1993/94+92 |
| Australia/Oceania | Australia | 3 pilot plants in Eastern Australia, each with the potential to grow to a commercial plant of 80 ha | Since 2009 | Algae schemes | In cooperation with Tarong Energy | Private company "MBD Energy": Binding agreement with Tarong Energy to deploy the company's first 1 ha plant at the Tarong Power Station (1,400 MW) in Queensland. Memorandum of understanding with both, the Loy Yang Power Station (2,200 MW) in Victoria and the Eraring Power Station (2,640 MW) in New South Wales. Company has also built a 5,000 m ² micro-algae R&D, and a pilot plant facility located at James Cook University in Townsville, Queensland. | http://www.powerplantccs.com/ccs/cap/fu/alg/alg_proj_mbd.html ; http://www.mbdenergy.com/our_projects.php |
| Australia/Oceania | Australia | 1 photo-bioreactor to convert CO ₂ into biomass and O ₂ at Linc Energy's site in Chinchilla | Since Nov 2007 | Algae schemes | Linc Carbon Solutions is a joint venture, 60% owned by Linc Energy, 40% remain with BioCleanCoal Ltd. | Linc Carbon Solutions: Algae-based CO ₂ sequestration with CO ₂ coming from industrial sources. R&D project to develop a bioreactor converting CO ₂ through a photosynthesis into O ₂ and solid biomass. "We expect to establish that our process of CO ₂ conversion is commercially scalable. » | http://www.oilgae.com/ref/report/co2_capture/co2_capture.html ; http://www.lincenergy.com/data/info_sheets/e4-fact.pdf ; http://www.abnnewswire.net/press/en/59649/Linc_Energy_Ltds_(ASX:LNC)_Annual_General_Meeting_by_the_Chief_Executive_Officer_Mr_Peter_Bond.html ; http://www.lincenergy.com/data/investor_linc/investor-linc-issue-6.pdf |
| Australia/Oceania | Australia | Trial algae photo-bioreactor plant established at Hazelwood | Since ~2006 ?, trials have been closed few years later | Algae schemes | Energetix is a division of the Victor Smorgon Group. | Energetix: The plant's technology was developed at Massachusetts Institute of Technology and is licensed from Greenfuels. Experimental plant covered about 60m x 10m. | http://www.theage.com.au/articles/2006/11/12/1163266412354.html ; http://en.wikipedia.org/wiki/Hazelwood_Power_Station ; http://www.ecosmagazine.com/?act=view_file&file_id=EC133p34.pdf |
| Australia/Oceania | Australia | Pilot plant to culture algae on Torrens Island | Since 2009 | Algae schemes | Supported by General Atomics, eventually as well by Exxon Mobil and Shell. | South Australian Research and Development Institute (SARDI) and Algal Fuels Consortium, a research consortium organized by CISRO (Commonwealth Scientific and Industrial Research) as the centre, jointly constructed a pilot plant to develop fuel from algae culturing. | http://www.asiabiomass.jp/english/topics/0911_07.html ; http://www.adelaidenow.com.au/business/sa-business-journal/algae-leads-way-to-sustainable-biofuel/story-e6fredel-1225778152739 |

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| Australia/Oceania | Australia | A national initiative of biochar research with pyrolysis trials. | 2009 - 2012 | Biochar | DAFF, CSIRO, Univ WA, UNE, UNSW, NSW DII, Univ Sydney, Univ Adelaide, Pacific Pyrolysis, Anthrotterra | Project title: "From source to sink". Research objectives: Biochar-soil interactions, Biochar and GHG mitigation, Biochar/bioenergy production and life-cycle assessment. Project led by CSIRO Land and Water. | http://www.anzbiochar.org/projects.html ; http://www.anzbiochar.org/projects.html#twelve |
| Australia/Oceania | Australia | Biochar producer (sales in kg and t) | Ongoing in 2012 | Biochar | | Private producer "BlackEarth Products Pty Ltd": Produces and sells biochar (made from Australian poultry manure mixes with sawdust). Producer supports biochar research in cooperation with the University of Queensland. | https://www.blackearthproducts.com.au/products-page/packaged-biochar/blackearth-biochar-4kg-2/ |
| Australia/Oceania | Australia | Mobile Biochar producer | Since 2009 | Biochar | | Private company "Black is Green Pty Ltd.": Produces and sells biochar to bulk users and collaborative researchers in Australia; "offers the equipment to generate BiGchar". | http://www.bigchar.com.au/bigchar.html ; http://www.bigchar.com.au/faq.htm#Can_I_buy_BiGchar_and_for_how_much |
| Australia/Oceania | Australia | Pacific Pyrolysis Demonstration Facility | Ongoing in 2012 | Biochar | NSW Department of Environment and Climate Change | Pacific Pyrolysis: Name of Biochar Project: Pacific Pyrolysis - Pyrolysis Demonstration Facility | http://www.anzbiochar.org/projects.html#seven |
| Australia/Oceania | Australia | Trials in habitat 141 (SA-Vic border region from the coast to southern NSW); a biodiversity hotspot in Australia | Since 2010 (at least) | Biochar | Alcoa Foundation, cooperation with Victorian Department of Sustainability and Environment | Greening Australia (environmental organization): Carries out the project "Bio4". Until 2011: trials - investigating potential benefits and potential to sequester carbon. | http://www.greeningaustralia.org.au/index |
| Australia/Oceania | Australia | Major agricultural regions of Australia (West, South, New South Wales, Queensland) | Since ~2007 | Biochar | CSIRO - Australia's national science agency | 2 national research projects, as well related to carbon sequestration; research partners: University of Western Australia, NSW Department of Industry and Investment, University of Sydney, University of New England, University of Adelaide | http://www.biochar-international.org/profiles/CSIRO ; http://www.csiro.au/science/Biochar-Overview ; http://www.csiro.au/files/files/pnzp.pdf |

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| Australia/Oceania | Australia | Production of Biochar in NSW, Central Coast | Field trials since 2006 | Biochar | | Private company Pacific Pyrolysis (PacPyro): provides biochar to research institutions and projects; e.g. involved in projects studying biochar's influence on the flux of N ₂ O and CO ₂ | http://www.biochar-international.org/profiles/pacificpyrolysis ; http://pacificpyrolysis.com/ ; http://pacificpyrolysis.com/agrichar.html |
| Australia | Australia | CO ₂ injection project | Construction underway in 2012 | CCS | | Global CCS Institute. Project name: Gorgon Carbon Dioxide Injection Project. This component of a larger gas production and LNG processing project will inject 3.4 to 4 M t of CO ₂ /year into a deep saline formation. Construction is under way after a final investment decision was made in September 2009. | http://www.globalccsinstitute.com/projects/map |
| Australia/Oceania | Australia | Biochar research, lab-scale, related to reduction of N ₂ O emissions | 2007 - 2009 | Major research project | NSW Department of Environment and Climate Change; Pacific Pyrolysis | Research Institution: NSW Department of Primary Industries. Project name: "NSW DPI - Reduction in N ₂ O Emissions" (from soils amended with Biochar). | http://www.anzbiochar.org/projects.html#seven |
| Australia/Oceania | Australia | Biochar research | Ongoing in 2012 (since ?) | Major research project | | Research Institution: University of Queensland: research related to biochar & carbon sequestration. | http://www.qaafi.uq.edu.au/professor-roger-s-swift |
| Australia/Oceania | Australia | Research related to carbon sequestration & biochar | 2010 - 2014 | Major research project | ARC Future Fellowship FT0991007 | Research Institutions: The Australian National University and CSIRO. Name of Biochar Project: "The CharXive Challenge". | http://www.anzbiochar.org/projects.html#three |
| Australia/Oceania | Australia | Research related to carbon sequestration & biochar | Ongoing in 2012 (since ?) | Major research project | | Research Institutions: Collaborative project between the NSW Department of Primary Industries (NSW DPI) and the Department of Environment and Climate Change (DECC). Project name: Land management to increase soil carbon sequestration. | http://www.dpi.nsw.gov.au/research/topics/biochar |
| Australia/Oceania | Australia | Queensland, Tasmania, Western Australia, Snowy Mountains and other regions (see details WM data) | 1955 - 1960, 1980, 1992, 1998 - 2009 | Increased Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |

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| Australia/Oceania | Australia | Participated in SOIREE | 1999 | Ocean fertilization + | Australian BHP Billiton Group [Carbon Steel/Petrol./Alum./Energy/Coal/Diamonds], CSIRO (among others) | Australia funded and was involved in the SOIREE experiment in the Southern Ocean | http://www.etcgroup.org/en/node/4913 (page 14); http://lgmacweb.env.uea.ac.uk/soiree/ |
| Asia | Azerbaijan | 10,000 km ² | 1967 - 1991, every year; e.g. in 1992: 105 seeding units (1 hour per unit) | Reduced Precipitation | Government | | WMO 1992 |
| S-America | Belize | 1,200 farmers close to Toledo | 2011 - 2012 (and probably longer) | Biochar | Kraft, Cadbury | Carbon Gold with Toledo Cacao Growers Association (TCGA): "The total available biomass of the area from the 1,200 farmer members of the cooperative is about 100,000 t, with an estimated yield of 30,000 t of carbon." | http://www.biochar-international.org/carbongold; http://www.biochar-international.org/9country |
| S-America | Brazil | Several experiments and research at several places | Since 2000 (at least) | Biochar | | Embrapa (Brazilian agricultural research corporation) : Includes charring studies of different biomass sources and field experiments in different Brazilian biomes: the Amazon, the Atlantic forest, the Cerrado and the transition zones between Cerrado-Amazon and Cerrado-Pantanal (wet-lands). | http://www.google.com.mx/search?client=safari&rls=en&q=Advances+in+Biochar+Research+in+Brazil/+2011&ie=UTF-8&oe=UTF-8&redir_esc=&ei=2opWT-CBE6GQsALy5_jeCQ |
| S-America | Brazil | See Weather Modification Data for details. | 1971 - 1980 | Increased Precipitation | Government | See Weather Modification Data for details, please. | WMO 1980 |
| Africa | Burkina Faso | Trials near Tiebele | Ongoing ? Reported in 2009 | Biochar | Same sponsors as for Cote d'Ivoire project ? | Centre for Rural Innovations (France): Jatropa, Moringa and planned biochar trials, linked to Cote d'Ivoire project. | http://www.biofuelwatch.org.uk/docs/biochar_africa_briefing.pdf |
| Africa | Burkina Faso | 15,000 km ² target area | 1998 - 1999, 2001 - 2011; e.g. 17 days in 1999 from Jun - Jul | Increased Precipitation | Government: Environmental Agency | Project Name: SAAGA; carried out by Weather Modification Inc. | http://www.weathermodification.com/projects.php?id=5 ; WMO report 1999; http://theblanketeffect.blogspot.com/search/label/African%20Programs |

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| Asia | Cambodia | Field trials | Report completed in 2011 | Biochar | ARTI, IRRI, SME Cambodia, University of Colorado; Asia Pacific Network for Global Change Research (APN). | UK Biochar Research Consortium: Report now available that includes information on the field trials with rice husk chars from small scale classifier systems in Cambodia. Study also included examination of potential for carbon financing. | https://spreadsheets.google.com/spreadsheet/pub?key=0AqK8nxi8zfEvdHdhQmpuZ1QtcINFZG9vdWVEaTFkOUE&single=true&gid=0&output=html ; https://docs.google.com/viewer?a=v&pid=explorer&chrome=true&srcid=0B3ZW1BCHOSzWNTk5YmY2NDgtOTRjNi00Nzk0LTg5ODItMmEyZm5NzBjMzk4&hl=en ; http://www.biochar.org.uk/project.php?id=13 ; http://www.biochar.org.uk/abstract.php?id=37 |
| Asia | Cambodia | Pilot project | Since 2011 | Biochar | \$4M grant from the Nordic Development Fund and \$600,000 from Vietnam, Laos and Cambodia governments | Carried out by Asian Development Bank: Pilot projects in biogas systems, biochar kilns and improved cooking stoves. "Promoting more efficient use of biomass can simultaneously address the goals of fighting climate change". | http://www.lankabusinessonline.com/indochina/fullstory.php?nid=1666004579 ; http://sea-biochar.blogspot.com/2011/07/adb-agrees-4-mln-grant-to-boost-biomass.html |
| Asia | Cambodia | | 1966 - 1972, 2005 | Increased Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Africa | Cameroon | SW Cameroon, near Kumba, see involved villages here: http://www.biofuelwatch.org.uk/wp-content/uploads/Biochar-Cameroon-report1.pdf | Trials 2009 - 2010 | Biochar | | Biochar Fund (Belgium): The project's focus is on 1,200 subsistence farmers practicing shifting cultivation. The project started with small field trial with around 50 farmers, and plans to expand to tap into carbon markets. Project area is located near pristine rainforests that are under pressure from slash-and-burn farming and increasing populations. Future plans: creating "biochar buffers" that help protect the forest and its ecosystem services." | http://www.biofuelwatch.org.uk/wp-content/uploads/Biochar-Cameroon-report-Executive-Summary1.pdf ; http://www.biochar-international.org/9country ; http://www.biofuelwatch.org.uk/docs/biochar_africa_briefing.pdf |

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| N-America | Canada | Industrial pilot plant capturing at least 10,000 t/year: of CO ₂ in preparation | 2011 - 2012 | Air capture | The current \$6M, 3-year R&D phase, is funded by angel investors including Bill Gates and Murray Edwards | Canadian Private company "Carbon Engineering" (Alberta, Calgary) develops a fully integrated industrial plant that absorbs up to 1M t of CO ₂ /year. Current R&D initiatives include laboratory research, process modeling and simulation, and fabrication and operation of pilot-scale equipment. | http://www.carbonengineering.com/ |
| N-America | Canada | Alberta: Installation of a photobio-reactor (made by Menova) to reduce CO ₂ emissions by algae growths | 2007 | Algae schemes | | Trident Exploration Corp: grew algae in Menova's photobioreactors (based in Ottawa, Canada) to reduce the net carbon impact of petroleum processing by 50% or greater. No up-to-date information could be found on their website. | http://www.powerplantccs.com/ccs/cap/fut/alg/alg_proj_trident.html ; http://www.airwaterland.ca/article.asp?id=1852 |
| N-America | Canada | Large scale facility, using CO ₂ derived from heavy industry to grow algae | Ongoing in 2012 (since ?) | Algae schemes | | Private company "Pond Biofuels": Converts raw smokestack emissions from heavy industry into algal biomass, e.g. using the exhaust gas from CO ₂ emitters in the coal, steel, refining, cement, and other process industries (e.g. the St. Mary's cement kiln). | http://www.oilgae.com/ref/report/co2_capture/co2_capture.html ; http://www.oilgae.com/algae/cult/cos/cem/cem.html ; http://www.pondbiofuels.com/ |
| N-America | Canada | Carbon Basis company has 400,000 ha of land in Western Canada | Company was founded in 2011 | Biochar | Biochar Solutions Canada Ltd is a partnership between Biochar Solutions and the company "Carbon Basis" | Private company "Biochar Solutions Canada Ltd": "will work to deploy carbon negative technologies to restore disturbed soils in the Canadian agriculture and mining sectors." | http://www.biocharsolutions.com/uploads/3/1/6/8/3168871/bsc_press_release_11.28.11.pdf |

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| N-America | Canada | Tests in BC, Quebec & Alberta | 2008 - 2012 | Biochar | Federal government funding; Alterna Energy; Sustainable Development Technologies Canada; Nova Green; Alberta innovates; Technology Futures Battle River Agri Ventures Cooperative NGC Inc. | BlueLeaf Inc: Various Biochar tests. Involved in tar sands; looking for carbon credits. | http://www.sdtc.ca/sdtc_projects/index_en.htm ; http://alternabiocarbon.com/applications/biochar ; http://www.biochar-international.org/blueleaf |
| N-America | Canada | 2 pyrolysis plants in West Lorne and Guelph (ON). Capacity: to process 130 - 200 t of dry biomass/day | Since 2007 involved in biochar | Biochar | | Dynamotive BioOil: "is positioned in the market as a replacement for fuel oils used in stationary applications like boilers and kilns to produce building or process heat"; "Dynamotive expects that it can now "deliver advanced (second generation) fuels from biomass at a cost of less than \$2/ gallon of ethanol-equivalent fuel in facilities processing about 70,000 t of biomass/year." | http://www.biochar-international.org/dynamotive |
| N-America | Canada | Use of biochar in greenhouses in Odessa (ON) | Ongoing in 2012 (since ?) | Biochar | | Burt's Greenhouse: heavy user of fossil fuels – usually in the form of natural gas or oil. By using biomass, these operations can come closer to being carbon neutral. By producing biochar in the process they could actually become carbon negative" | http://www.biochar-international.org/burtsgreenhouse |

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| N-America | Canada | > 20M t of CO ₂ have been stored in 2 fields since Oct 2000. Covering more than 53,000 acres in South-eastern Saskatchewan | Since Oct 2000 | CCS | | Cenovus Energy (Weyburn Field) and Apache Canada (Midale Field). Project name: Great Plains Synfuel Plant and Weyburn-Midale Project. Associated with a long-standing research project, the "IEAGHG Weyburn-Midale CO ₂ Monitoring & Storage Project", directed by the Petroleum Technology Research Centre. Testing and evaluation of monitoring methods including surface seismic, shallow groundwater, soil gas, and passive seismic. Project includes enhanced oil recovery. | Global CSS Institute, http://www.globalccsinstitute.com/projects/12366 |
| North America | Canada | CO ₂ Capture | Start date: 2014 | CCS | The \$1,24 billion government-industry partnership between the Government of Canada, Government of Saskatchewan, SaskPower and private industry. | SaskPower. Project name: Boundary Dam Integrated Carbon Capture and Storage Demonstration Project. | http://www.saskpower.com/sustainable_g |
| N-America | Canada | >50,000 km ² ; e.g. Southern Alberta, British Columbia | 1954 - 1960, 1974 - 1981, 1996 - 2003 | Increased Precipitation & Reduced Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| N-America | Canada | Participated in SOIREE and SOFEX | 1999, 2002 | Ocean fertilization + | Canadian NSERC, CFCAS, PERD and NSERC C-SOLAS (among others) | Canada funded and was involved in the ocean fertilization experiment SOIREE and SOFEX | http://www.etcgroup.org/en/node/4913 (page 14); http://lqmacweb.env.uea.ac.uk/soiree/ |

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| S-America | Chile | Development of N-fertilizers based on Biochar | Ongoing in 2012 (since ?) | Biochar | Supported by the government of Chile (CONICYT-Chile, through FONDEF Project N°: D0711096) and the following commercial entities: Commercial Agrofusión S.A., Soquimich Commercial S.A., Sociedad Forestal Santa Elena Ltda. and Eugene Thiers | Scientific and Technological Bioresource Nucleus and the Department of Chemical Engineering of Universidad de La Frontera in Temuco, Chile, is looking to determine the best operational conditions for the development of controlled-release N fertilizers using biochar as a basis. | http://www.biochar-international.org/profile/chile |
| S-America | Chile | Biochar research project | 2009 - 2013 | Major research project | Ministry of Agriculture | Research Institution: Tarapaca University. Business partner is the Chilean company Asitec Ltda. Cost: 466,681 USD / 299,800.000 Chilean pesos. | http://latercera.com/contenido/657_120330_9.shtml |
| S-America | Chile | >30,000 km ² , e.g. Cachapoal River Basin, Andean Sector | 1979 - 1980, 1990 - 1998 with interruptions, 2000 - 2002 | Increased Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | WMO 2000 + 2002 + 1980 + 1998 |
| Asia | China | Bioreactor with 10.4 km length, facility on 500 ha of land in Guandong Province, 80t/day of algae | Since 2008 or 2009 | Algae schemes | | Biocentric Energy Algae LLC (US-American company): Algae-based CO ₂ sequestration, absorbing CO ₂ emitted from factories of the nearby region. | http://www.oilgae.com/ref/report/co2_capture/co2_capture.html ; http://www.asiabiomass.jp/english/topics/0911_07.html ; http://biomassmagazine.com/articles/2091/biocentric-energy-to-produce-algae-oil-in-china |
| Asia | China | Pilot plant for algae culture | Since 2009, maybe longer | Algae schemes | | ENN (Chinese innovation group): plans to build a demonstration production plant within 3 years on 100 ha of land (reported in 2009). | http://biomassmagazine.com/articles/2091/biocentric-energy-to-produce-algae-oil-in-china ; http://www.greenmuze.com/blogs/ecogeek/1260-chinese-algae-farming.html |

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| Asia | China | >700,000 km ² , e.g. Hubei Province, Shaanxi Province, Jilin Province | 1958 - 2003, 2007 | Increased Precipitation & Reduced Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Central America | Costa Rica | Research & trials on Osa Peninsula | Ongoing ? | Biochar | | Forest Trends, an NGO based in Washington DC with offices in Costa Rica: "several national and international partners designed to assess the socio- economic and technical feasibility of using biochar". Main activities (among others): implementing a mini-scale biochar production pilot facility, establishing research plots, analyzing the potential biochar-related revenues such as carbon credits. | http://www.biochar- international.org/9country#costa_rica |

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| Africa | Cote d'Ivoire | 2,500 ha of biomass production for Biochar in Niambroun, office in Grand Bassam. | Ongoing ? reported in 2009 | Biochar | World Bank, AfDB, FAO, UNDP, UNEP, IFAD, UNIDO, West African Bank for Development, Ivorian National Bureau for technical Study and Development, National Agency for Rural development, Industrial Promotion Services West Africa, Union Bank of Africa, Pronatura international, Winrock, Mali Folkcenter, French Agency for environment and Energy, Kakute Tanzania, Burkina Centre of Forestry Seeds, Wageningen University from Holland, French Institute of research for Development, Brazilian EMBRAPA | Planet Action: "Biochar, a charcoal obtained from agricultural waste via pyrolysis, will offer carbon reduction when used as a combustible, and carbon sequestration when used to enhance soil productivity." Jatropha, moringa and biochar trials on 2,500 ha. | http://www.biofuelwatch.org.uk/docs/biochar_africa_briefing.pdf ; http://www.planet-action.org/web/85-project-detail.php?projectID=1390 |
| Africa | Cote d'Ivoire | South Coast, 9,000 km ² | 1986 - 1987 from Dec - Apr (further years planned according to WMO report) | Increased Precipitation | University | | WMO 1987 |
| Europe | Croatia | >24,000 km ² , Northern Croatia | 1970 - 2003 | Reduced Precipitation | Government | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |

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| S-America | Cuba | Camagüey and adjacent provinces, Eastern Cuba | 1982 - 1990, 2005 - 2011 | Increased Precipitation | Government | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| S-America | DomRep | 6,000 km ² target area | 1984, May-Aug | Increased Precipitation | Government (Energy) | Project name: Increased stream flow to dams. | WMO 1980 |
| Africa | DRC | Agricultural project in Pimu Region, Equator Province, in 10 villages | 2010 - 2013; "ten year project" | Biochar | ADAPEL; Congo Basin Forest Fund | Biochar Fund: Agricultural project, aims at "access to carbon market". | http://www.treehugger.com/green-food/biochar-fund-project-gets-big-financial-boost-from-congo-basin-forest-fund.html ; http://www.biofuelwatch.org.uk/docs/biochar_africa_briefing.pdf ; http://www.afdb.org/en/topics-and-sectors/sectors/climate-change/multimedia/biochar-forest-project-drc/ |
| S-America | Ecuador | Canton Pujili, Cotopaxi | at least since 2009 | Reduced Precipitation | Private company: Nintanga and Provefrut | Cloud bombing to diminish hail and rain, affecting local communities. | http://www.dailymotion.com/video/xeh7II_ecuador-danos-socio-ambientales-de_news , http://www.inredh.org/index.php?option=com_content&view=article&id=260%3Ademanda-a-brocolera&Itemid=151 |
| Africa | Egypt | Ongoing trials, demonstration and small pyrolysis plant | Ongoing in 2012 (since ?) | Biochar | ProNatura (France) | ProNatura (France): Development of biochar with smallholder farmers in developing countries; pronatura is working to get carbon credits | http://www.pronatura.org/?page_id=521&lang=en ; http://www.new-ag.info/en/focus/focusItem.php?a=963 |
| Africa | Eritrea | | 1994, 1995, 1997, 1998 | Increased Precipitation | Eritrean Ministry of Agriculture | rain enhancement with cloud bombing | http://www.bibliotecapleyades.net/ciencia/ciencia_reich07.htm ; http://panacea-bocaf.org/droughtrelief.htm ; http://www.orgonelab.org/ResearchSummary2.htm |
| Europe | European Union (16 countries) | Biochar research project, to summarize & connect research in Europe | 2012 - 2016 | Major research project | European Union | Project name: Biochar as option for sustainable resource management. "This COST Action connects scattered European Biochar research." | http://www.cost.eu/domains_actions/fa/Actions/TD1107 |

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| Europe | European Union (53 scientists from 14 institutions and 3 companies from 7 European countries & South Africa) | Southern Ocean, Atlantic, patch of 150 km ² | 2004, summer | Ocean fertilization + | European Union | Project name: EIFEX - European Iron Fertilization Experiment. Application of 2,820 kg of Fe (7 t FeSO ₄). Carried out by Alfred Wegner Institute (Germany), with national and international partners. | http://www.tos.org/oceanography/issues/issue_archive/issue_pdfs/22_3/22-3_strong.pdf , http://en.wikipedia.org/wiki/Fe_fertilization ; http://www.whoi.edu/oceanus/viewArticle.do?id=35609 ; http://www.cbd.int/doc/publications/cbd-ts-45-en.pdf ; http://epic.awi.de/15162/1/Ass2006c.pdf , http://cis.whoi.edu/science/bcodmo/project.cfm?flag=viewr&id=22&sortby=project ; http://www.etcgroup.org/en/node/4913 |
| N-America, Europe | European Union (Austria, Portugal) USA | R&D next generation biofuel | Ongoing in 2012 (since ?) | Algae schemes | Global Green Solutions, Oxford Catalysts Group PLC | SGC Energia: Transformation of biomass into Fischer-Tropsch products, transforming low value feedstock (algae) into advanced fuels. | ETC Group (2011): The New Biomasssters, page 63 http://www.biofuelsdigest.com/bdigest/tag/sgc-energia/ |
| Europe | European Union (Denmark, Belgium, Germany, The Netherlands, Norway, United Kingdom, Sweden) | Biochar: small-scale research plots (13 partners from 7 countries around the North Sea) | 2009 - 2013 | Major research project | Supported by European Union INTERREG IVb North Sea Region Steering Group. | Project name: "BioChar: Climate saving soils" aims at raising the awareness and building confidence in biochar as a way of capturing carbon in a stabilized form and increasing soil quality and 'health', with attendant benefits to agriculture. 13 partners from 7 countries around the North Sea work together. Partners: Netherlands: Province Groningen (lead partner), Productschap Akkerbouw/Kiemkracht, Nutrient management Institute, WUR-Alterra Belgium: ILVO, University Gent Germany: HAWK-Applied University, Göttingen; 3N-Werlte Denmark: Risoe University Sweden: University Uppsala Norway: Bioforsk United Kingdom : Scottish Crop Research Institute, university Edinburgh, (UKBRC, United Kingdom Biochar Research centre) | http://www.risoecampus.dtu.dk/Research/sustainable_energy/energy_systems/projects/ECO_BioChar_Interreg.aspx?sc_lang=en |

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| Europe, Asia | European Union (Germany), Malaysia | Agricultural research (& feasibility study ?) | 2012 - 2015 | Biochar | German Federal Ministry of Education and Research (BMBF) | Project name: "biochar in agriculture - perspectives for Germany and Malaysia": questions effects on the environment and the potential to reduce CO ₂ in the atmosphere. Partners: ATB, ZALF Müncheberg, Humboldt-University Berlin, Technical University Berlin, University Putra Malaysia (UPM) | http://www.idw-online.de/pages/de/news456776 ; http://www.diw.de/sixcms/detail.php?id=diw_01.c.392453.de |
| Europe | European Union (Hungary, Netherlands, Denmark, Italy, Germany, Spain, United Kingdom, Poland, Slovenia, Ireland) | European Research Project related to Biochar | 2011 - 2015 | Major research project | European Union | Project name: Reducing mineral fertilizers and chemicals use in agriculture by recycling treated organic waste as compost and bio-char products. (REFERTIL). Project Coordinator: Terra Humana Ltd. - Hungary | http://www.3ragrocarbon.com/3r-project-references ; http://ec.europa.eu/research/bioeconomy/agriculture/projects/refertil_en.htm |
| Europe | European Union, Austria | >2,000 km ² , e.g. Lower Austria | 1981 - 1999, 2002 | Increased Precipitation & Reduced Precipitation | Private sponsor (agricultural field) | See Weather Modification Data for details, please. | WMO 1999+2002+1992+2003+2004 |
| Europe | European Union, Bulgaria | Pilot photobioreactor in Varna | Since 2009 | Algae schemes | | Private company "Greon LLC": provides a "green solution for industrial waste", including greenhouse and toxic gases, waste water and solid waste. Transformation of waste products into valuable products such as biomass, bioethanol, biodiesel, etc. Feeding flue gas (CO ₂ & NO _x) into a bioreactor. Production of microalgae-based oil as an alternative to fossil fuels. | http://www.greon.eu/ |
| Europe | European Union, Bulgaria | > 18,000km ² ; e.g. northern Danube plain and upper Tracian lowland | 1969 - 2003 | Increased Precipitation & Reduced Precipitation | Government (Agricultural department, Research and Weather Services) | See Weather Modification Data for details, please. | WMO and other sources; See Weather Modification Data for details, please. |

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| Europe | European Union, Czech Republic | Research project to decarbonize flue gas with a 55m ² culture area photobioreactor | | Algae schemes | In cooperation with the Fuel Research Institute | Czech Research Academy of Science: Outdoor cultivation of microalgae <i>Chlorella spp.</i> , in a thin-layer photobioreactor. Technologies for microalgal cultivation have been studied in the context of greenhouse gas mitigation. Utilization of CO ₂ in flue gases from various sources by means of microalgae reduce the impact of green-house gas on the environment and makes production of algal biomass cheaper. | http://www.oilgae.com/algae/cult/cos/flu/fl u.html |
| Europe | European Union, France | Indian Sector of the Southern Ocean (Kerguelen Plateau) | 2005, summer: Jan - Feb | Major research project | INSU-CNRS France | Project name: KEOPS 1 & 2 (Kerguelen Ocean and Plateau compared Study). Responsible institute: INSU-CNRS (France). Research related to natural Fe fertilization. Vessel with French, Belgian, Dutch and Australian researchers. | http://ecite.utas.edu.au/54193/ , http://www.insu.cnrs.fr/envFenement/keops2-kerguelen-ocean-and-compared-plateau-study ; http://www.obs-vlfr.fr/proof/vt/op/ec/keops/keo_obj.htm ; http://www.sciencedirect.com/science/article/pii/S096706450800009X ; http://www.techno-science.net/?onglet=news&news=5310 ; http://www.futura-sciences.com/fr/news/t/oceanographie-1/d/fertilisation-de-locean-contre-rechauffement-une-nouvelle-experience_17933/ ; http://www.futura-sciences.com/fr/news/t/vie-1/d/mission-keops-le-printemps-du-phytoplancton-en-pleine-tempete_5565/ |
| Europe | European Union, France | >60,000 km ² , e.g., region of Lucerne, Basin Aquitaine, Vallée de la Loire | 1952 - 2003 | Reduced Precipitation | Government and private sector (agriculture, insurances) | Project name: Grossversuch IV. | WMO 1980+2003+2004+1992+2002 |

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| Europe | European Union, Germany | 1,000 m ² photobioreactor and 2 pilot plants for research | 2008 - 2011 | Algae schemes | | Participants: RWE, University of Bremen, Forschungszentrum Juelich GmbH, Phytolutions GmbH. RWE aims to expand the electricity and gas business while reducing its own CO ₂ emissions. Flue gases from the Niederaussem power station are fed into an algae production plant in the vicinity of the station to convert the CO ₂ into algae biomass. | http://www.powerplantccs.com/ccs/cap/fut/alg/alg_proj_rwe.html ; http://www.rwe.com/web/cms/mediablob/en/247480/data/235578/1/rwe-power-ag/media-center/lignite/blob.pdf |
| Europe | European Union, Germany | Pilot plant using marine algae as CO ₂ sink; research with local partners | Since 2000 (starting with research) | Algae schemes | In cooperation with City of Hamburg & Fraunhofer Institute | EON Hanse (energy producer): Algae production with flue gases of a 350-MW coal-fired power station in Bremen. Goal: to capture 1% of the total emissions of this power station in a closed reactor system within five years. | http://www.powerplantccs.com/ccs/cap/fut/alg/alg_proj_e_on_hanse.html ; http://www.eon.com/en/businessareas/35157.jsp ; http://www.eon-hanse.com/pages/eha_de/Engagement/Green_Capital/Mikroalgenprojekt_Hamburg/Pilotanlage_in_Hamburg-Reitbrook/index.htm |
| Europe | European Union, Germany | Biochar production capacity 1,250m ³ /year, a larger plant is planned | Since 2009 | Biochar | | Private company "Palaterra": production and sales of biochar. Product is also used for research but mainly for agriculture; website mentions that product can be used to improve soil while protecting the climate. | http://www.palaterra.eu |
| Europe | European Union, Germany | Biochar production "in industrial quantities " | Since 2009 | Biochar | Schottorf Innovations is a subsidiary of Carbon Terra | Private company "Schottorf Innovations": Sales of biochar produced at their pyrolysis plant in Romania. | http://schottdorf.eu/ ; http://www.carbon-terra.eu/de/home |
| Europe | European Union, Germany | Biochar production and research | Since 2004 | Biochar | Cooperation with the University of Applied Sciences Bingen (Germany) and other research institutions | Private company "Pyreg GmbH": involved in 3 different research projects with University of Applied Sciences Bingen (Germany) and other research institutions, e.g. related to sequestration of CO ₂ or use of biochar in sewage plants. | http://www.pyreg.com/Forschung.html |

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| Europe | European Union, Germany | Sales of biochar production units (capacity up to 12,000 t/ year) | Since 2010 | Biochar | | Private company "Terra Nova Energy": Units use Hydrothermal Carbonization. Mass throughput of a TerraNova Energy system ranges from 1,200 t to 12,000 t of biomass/year. Since April 2010 sewage sludge is converted into a regenerative coal in the TerraNova Energy demonstration plant at the central sewage treatment plant in Kaiserslautern. Advertised as a medium to save around 2.5 t of CO ₂ emission certificates for each ton of biocoal. | http://www.terranoenergy.com/en/applications.php |
| Europe | European Union, Germany | Research, including field trials | 2009 - 2014 | Biochar | German Federal Ministry of Education and Research (BMBF) | Project name: APECS (Anaerobic Pathways to Renewable Energies and Carbon Sinks). Goal: develop a novel process that uses organic wastes to provide both – renewable energy and carbon sequestration. Carried out by ATB Potsdam-Bornim, together with University of Berlin, EU-AGRO-BIOGAS, Biogas Competence Network, Wissenschaftsgemeinschaft Gottfried Wilhelm Leibniz e.V.. | http://www.atb-potsdam.de/hauptseite-deutsch/Forschung/verbuende/apecs/apecs_start_eng.htm |
| Europe | European Union, Germany | >7,000 km ² | 1975 - 2009 | Reduced Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Europe | European Union, Greece | >5,000 km ² , different Greek provinces | 1982 - 2003, | Increased Precipitation & Reduced Precipitation | Public | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Europe | European Union, Hungary | >14,000 km ² , e.g. in Southern Hungary | 1976 - 1980, 1991 - 2003 | Reduced Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | WMO 2003 + 2004 + 2002 +1992 + 1980 |

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| Europe | European Union, Italy | Field trials with the goal to mitigate 15% of annual CO ₂ from a 500 MW power plant; "700 ha system" | 2007 | Algae schemes | EniTechnologie is the R&D arm of Eni (Italian oil & gas company) | EniTecnologie: CO ₂ uptake by <i>Tetraselmis suecica</i> supplied with CO ₂ from turbine flue gas in open and closed systems. Goal: to double biomass productivity. Eni plans to harvest and ferment the biomass (methane) to replace a fraction of fossil methane. | http://www.powerplantccs.com/ccs/cap/fut/alg/alg_proj_eni.html ; http://uregina.ca/ghgt7/PDF/papers/nonpeer/075.pdf |
| Europe | European Union, Italy | Eng Southern Italy | 1975 - 1980, 1985 - 1995, 2001 - 2005 | Increased Precipitation & Reduced Precipitation | Government | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Europe | European Union, Netherlands | Designs & manufactures algae growing equipment; cultivates algae at Yerseke. | Since 2007 | Algae schemes | KLM (Project for jet fuel from algae), RIG investment | Company AlgaeLink N.V.: Among the products are the following biofuels from algae : Green energy, biodiesel, bioethanol, biogas, bio-oil, and jet fuel. "Ability to sequester CO ₂ & implement as profit making plant. " | ETC Group (2011): The New Biomasssters |
| Europe | European Union, Netherlands | Demonstration scale project in Rotterdam: | Started in 2010 ? | BECCS | Abengoa Bioenergia. | Rotterdam Climate Initiative: Researching variety of carbon capture options, some are currently in operation. BECCS project: CO ₂ captured from ethanol plant and then pumped through greenhouses. | CO2 Capture and storage in Rotterdam - a network approach 2011 http://www.rotterdamclimateinitiative.nl/en/english_2011_design/50_reduction/projecten/?portfolio_id=70 |
| Europe | European Union, Portugal | Algae growing and production equipment | Since 2000 | Algae schemes | INETI (Portugal's National Institute of Energy, Technology and Innovation); Algafuel is a spinout form Necton S.A.; European Union for research purposes | Company Algafuel: "Develops solutions for the industrial production of microalgae. Technology provides CO ₂ mitigation and other greenhouse gases with biomass production." | ETC Group (2011): The New Biomasssters |
| Europe | European Union, Portugal | District Evora, Castelo Branco, Coimbra | February 2004 | Increased Precipitation | | | http://www.terradaily.com/2005/050223182149.f4orpp13.html |
| Europe | European Union, Slovenia | >9,000 km ² , e.g. Eastern Slovenia | 1972 - 1998, with interruptions | Reduced Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |

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| Europe | European Union, Spain | Large-scale algae farming plant adjacent to a CO ₂ -spewing cement plant near Jerez, Spain | 2001 - 2009 | Algae schemes | Principal investors: Access Private Equity, Draper Fisher Jurvetson, Polaris Venture Partners. With the Spanish renewable energy firm Aurantia | GreenFuel Technologies Corp. (Cambridge, Massachusetts): In collaboration with the Massachusetts Institute of Technology (MIT), developed a bioreactor to remove NO _x and CO ₂ from emissions. | http://www.ecoworld.com/energy-fuels/factory-farmed-biofuel.html ; http://en.wikipedia.org/wiki/GreenFuel_Technologies_Corporation ; http://gigaom.com/cleantech/15-algae-startups-bringing-pond-scum-to-fuel-tanks/ |
| Europe | European Union, Spain | >10,000 km ² ; e.g. Alava, La Rioja and Navarra Provinces | 1970 - 1999 with interruptions | Increased Precipitation & Reduced Precipitation | Government | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Europe | European Union, Sweden | Production of Bone Char | Ongoing in 2012 (since ?) | Biochar | | Private company "3R Agrocarbon": Pyrolysis with animal waste. Involved in a research project that aims to define improved compost and biochar standards in the EU27 (according to company website). | http://www.3ragrocarbon.com/bonechar ; http://www.3ragrocarbon.com/3r-project-references |
| Europe | European Union, Sweden | Field trials, Terra Pretra field (520 m ²), mobile pyrolysis plant, Uppsala | Since 2010 | Biochar | Mistra; EU North Sea Inter-regional project "Biochar - Climate saving soils" | University of Uppsala carries out research on a Swedish Terra Pretra field. Further field trials. Uses a mobile pyrolysis plant. | http://www.geo.uu.se/biokol/default.aspx?pageid=37&lan=0 ; http://www.holon.se/folke/carbon/carbon.shtml |
| Europe | European Union, Sweden | Field trial on carbon rich soils | 1996 - 2006 | Biochar | Swedish University of Agricultural Science | Responsible person for the field trials: David Wardle of the Swedish University of Agricultural Science. | http://voices.yahoo.com/david-wardle-vs-carbonscape-battle-5301397.html |
| Europe | European Union, United Kingdom | Pilot scale bioreactor, algae based CO ₂ sequestration demonstration project; 20t of CO ₂ /year | Since 2009 (phase 2 started in 2009) | Algae schemes | "With the support of Shell, Edrington Group and the Scottish Environmental Technology Network we have built Britain's first pilot scale bioreactor" | Glentureet Whisky Distillery & Scottish Bioenergy Ventures: Algae-based CO ₂ sequestration Started as a demonstration project. Expanded in 2009, producing about 6,000 l of biofuel/year - capturing 20 t of CO ₂ . "Commercial-sized" algae reactor system if the expanded demonstration is successful. | http://www.oilgae.com/ref/report/co2_capture/co2_capture.html ; http://www.scotlandwhisky.com/news-and-events/Famous-grouse-carbon-capture ; http://news.bbc.co.uk/2/hi/uk_news/scotland/tayside_and_central/8290266.stm |

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| Europe | European Union, United Kingdom | "UK-wide initiative"; "200 people testing biochar" | 2012 | Biochar | Earthwatch, the Environmental Change Institute (Oxford University), and the UK Biochar Research Centre | Oxford Biochar Ltd: Project name: The Big Biochar Experiment; largest study on the use of biochar on British allotments to date. | http://www.biochar-international.org/profile/bigbiochar ; http://www.oxfordtimes.co.uk/business/profiles/9536533.ls_this_the_answer_to_climate_change_/ ; http://www.bigbiocharexperiment.co.uk/ |
| Europe | European Union, United Kingdom | Research project, Pyrolysis plant under construction in 2012 | Since 2009 | Biochar | With core funding for five years, sponsored by the Engineering and Physical Sciences Research Council (EPSRC). | "UK Biochar Research Centre seeks to provide an evidence base to support the rational deployment of biochar for the primary purpose of climate change mitigation (particularly carbon abatement), while being driven by an understanding of how the most value can be added to it in terms of soil function." | http://www.biochar-international.org/ukbrc |
| Europe | European Union, United Kingdom | Pyrolysis plant & research | 2010 - 2012 (18 months project) | Biochar | A £180,000 grant from the Welsh Assembly Government. | Aberystwyth University's Institute of Biological, Environmental and Rural Sciences (IBERS): "Innovative strategies for organic waste management, sustainable land management and climate change mitigation are key areas of consideration." | http://www.walesonline.co.uk/go-green/go-green-climate/2010/01/27/aberystwyth-to-build-biochar-facility-91466-25689352/ |
| Europe | European Union, United Kingdom | Production & sales of biochar & biochar kilns | Since 2008, (maybe longer) | Biochar | | Private company "Carbon Gold": "Has developed the first ever biochar methodology for calculating emissions reductions from the production of biochar." | http://www.carbongold.com/the-principles |
| Europe | European Union, United Kingdom | Production and sales of biochar, based in Devon | Ongoing in 2012 (since ?) | Biochar | | Private company "Nutrichar": Lumpwood char from Devon trees, infused with certified organic seaweed fertilizer sourced from the UK. | http://www.nutrichar.co.uk/about.php |

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| Europe | European Union, United Kingdom | Climate Model Development | 2012-17 | Major research project | European Commission: PESH, Seventh Framework program. Project is worth €2,137,014. | Research Institution: Oxford University. Project name: "Towards the Prototype Probabilistic Earth-System Model for Climate Prediction". The development of the prototype Probabilistic Earth-System Model will open a new era of international scientific collaboration on climate model development, and has the potential to influence climate policy, on mitigation, adaptation and on geoengineering, at the highest governmental and intergovernmental levels. | http://cordis.europa.eu/projects/102370_en.html |
| Europe | European Union, United Kingdom | Research related to Ocean acidification & climate change | Since 2008 | Major research project | Shell Research | C-Quest rate : Their idea is to lime to oceans and to develop the technology in an open source way. The main person involved is Tim Kruger, also associated with the Oxford geoengineering institute. | http://www.cquestrate.com/about-us |
| Europe | European Union, United Kingdom | No testing | 2010 - 2012 | Major research project | Universities of Leeds, Bristol, Cardiff, Oxford, Lancaster, East Anglia, Met office, NERC, EPSRC | Project name: IAGP - Integrated assessment of Geoengineering Projects. Research carried out by: University of Leeds, Bristol, Cardiff, Oxford, Lancaster and East Anglia. | http://www.iagp.ac.uk/ |
| Europe | European Union, United Kingdom | Look at governance of research, up to and including testing and deployment | Since 2010 | Major research project | Royal Society with Environmental Defense Fund and Third World Academy of Science | Project name: SRMGI - Solar Radiation Management Governance Initiative | www.srmgi.org |

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| Europe | European Union, United Kingdom | First test cancelled (Skuthorpe) | 2011 - 2013 | Major research project | The £1,6 M project, funded by the Engineering and Physical Sciences Research Council (EPSRC) and the Natural Environment Research Council (NERC), supported by the Science and Technology Facilities Council (STFC) | Project name: SPICE-Stratospheric Particle Injection for Climate Engineering. First test of "Trojan Hose" to shoot particles to stratosphere cancelled following activist campaign. Projects aims to evaluate particles, delivery mechanisms and impacts of stratospheric particle injection (SRM). University of Bristol in collaboration with the Universities of Oxford, Cambridge and Edinburgh, as well as military contractor Marshall Aerospace. | http://www.handsoffmotherearth.org/hose-experiment/spice-opposition-letter/ ; http://gow.epsrc.ac.uk/ViewGrant.aspx?GrantRef=EP/I01473X/1 |
| Europe | European Union, United Kingdom | UK Parliamentary committee holds public hearings on the regulation of geoengineering | 2010 | Major research project | Government | UK committee advocated beginning an international discussion on the regulation of geoengineering, argued against the use of the precautionary principle and said that small scale SRM tests should be allowed! | http://www.publications.parliament.uk/pa/cm200910/cmselect/cmsctech/221/221.pdf |
| Europe | European Union, United Kingdom | Pilot plant in London (carbon negative cement) | Underway (beginning 2012) | Other | Laing O'Rourke, Rio Tinto Minerals, WSP Group, Imperial Innovations, the Royal Society Enterprise Fund and the London Technology Fund | Novacem: Developed a carbon negative cement. | http://novacem.com/wp-content/uploads/2010/12/Novacem-TSB-case-study_vF.pdf |
| Africa | European Union, United Kingdom | Crozet Islands, 2,222 km south-east of South Africa | 2004 - 2005 | Ocean fertilization + | NERC (Natural Environment Research Council, UK) | Project name: CROZEX (=CCROZet natural iron bloom and Export experiment). Application of iron. "At its peak the bloom covers a wide area (400 km x 400 km)." | http://en.wikipedia.org/wiki/Fe_fertilization , http://www.noc.soton.ac.uk/obe/PROJECTS/crozet/index.php |

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| Europe | European Union, United Kingdom | Building model ship, status | Since 2006 (ongoing ?) | SRM | University of Edinburgh building hardware: ships | Cloud Whitening. Work has begun at Edinburgh University in Scotland on the design of practical seagoing hardware for an initial field demonstration. The proposal is to use a fleet of unmanned, wind driven spray vessels equipped with satellite navigation, positioned at suitable points around the oceans. They would sail back and forth across the local wind and drag oversize propellers through the water to act as turbines to generate the energy for spray. Periodically, they would be directed to new positions. | http://event.arc.nasa.gov/main/home/reports/SolarRadiationCP.pdf , page 8 |
| Europe | European Union, United Kingdom | Skuthorpe Air field, Norfolk | 2011 - 2012 | SRM | The £1,6 million project is funded by the Engineering and Physical Sciences Research Council (EPSRC) and the Natural Environment Research Council (NERC), supported by the Science and Technology Facilities Council (STFC) | University of Bristol in collaboration with the Universities of Oxford, Cambridge and Edinburgh, and Marshall Aerospace. Project name: Stratospheric Particle Injection for Climate Engineering (SPICE). Engineering test hose to deliver particles to the stratosphere as an SRM technology. Test postponed due to civil society opposition. | Campaign website against the experiment: http://www.handsoffmotherearth.org/2011/09/press-release-no-spice-in-our-skies-say-environmental-justice-groups/ http://www.newscientist.com/article/mg21128294.000-geoengineering-trials-get-under-way.html |
| Europe | former Yugoslavia | >69,000 km ² , e.g. Serbia, Macedonia | 1967 - 1994 | Reduced Precipitation | Government | See Weather Modification Data for details, please. | WMO 1994 + 1980 |
| Africa | Gambia | Western Region, Bwiam | Ongoing ? | Biochar | Supported by "Concern Universal" | "Small biochar projects", e.g. with jatropha and vetivier grass | http://www.biofuelwatch.org.uk/docs/biochar_africa_briefing.pdf |

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| Europe | Ghana | Research project with field trials in Northern Ghana (Gbilugu, Tamale); former field trials in Okwabena (Southern Ghana) | Since 2009 | Biochar | Abokobi Society Switzerland; Rothamstead Research; Soil Research Institute of Kumasi; DeCo | Assessment of biochar's potential. | http://www.scribd.com/marylola/d/63513247-Ghana-Biochar-Production ; http://www.biochar-international.org/ghana ; http://www.biochar-international.org/node/923 ; http://www.biofuelwatch.org.uk/docs/biochar_africa_briefing.pdf ; http://www.deco-farming.com , http://www.ghananewsagency.org/details/Science/Organic-fertilizer-is-suitable-for-soils-in-the-north/?ci=8&ai=33241 ; http://www.abokobi.ch/47/PROJEKTE/Biochar.html |
| Africa | Ghana | Research & training farmers to use biochar | Since 2007 | Biochar | Council of Scientific and Industrial Research, Ghana; Arroz e Feijão (CNPAP); World Bank | Training local farmers in biochar production using available feedstock like rice husk, rice straw, sawdust, maize stover, and cocoa husk. Biochar workshop in 2011. Funding from World Bank for further research - project title: "Biochar for enhanced soil productivity". | http://www.biochar-international.org/ghana ; http://siteresources.worldbank.org/INTLAC/Resources/africabrazil_eligible_proposals-2010-11-02.pdf |
| S-America | Guatemala | Guatemala, C. A.: Chixoy River Drainage | 1991, 1992, 1994: summer | Increased Precipitation | Sponsor: Empresa Electrica and Instituto Nacional de Electrificación | carried out by North American Weather Consultants, Inc; for hydroelectric power production | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf |
| Africa | Guyana | Research | Since 2011 or 2012 | Biochar | University of Guyana, Faculty of Natural Sciences Department of Chemistry & Faculty of Agriculture and Forestry Department of Chemistry | University of Guyana: Research focus: utilization of biochar for carbon sequestration and land restoration (agricultural and mining sectors) | http://www.biochar-international.org/Guyana |

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| Australia/ Oceania | Hawaii | 6 acre demonstration facility in Kona, Hawaii. | Since 2007 | Algae schemes | Former joint venture between Shell and HRBP (HR BioPetroleum, Inc.). Since January 2011, HRBP is the sole owner of Cellana. Project stakeholders: University of Hawaii, Hawaiian Electric Company, Maui Electric Company, the National Alliance for Advanced Biofuels and Bioproducts consortium, the U.S. Department of Energy and others. | Cellana: Owns a demonstration facility to grow marine algae and produce vegetable oil for conversion into biofuel. Contract to establish commercial facility signed in 2008 with Hawaiian Electric and Maui Electric companies: CO ₂ from the Ma'alaea plant to an adjacent commercial algae facility. | http://www.oilgae.com/algae/cult/cos/cem/cem.html ; http://cellana.com/news/hr-biopetroleum-to-acquire-shells-shareholding-in-cellana-algae-joint-venture/ ; http://cellana.com/production-facilities/commercial-facility/ |
| S-America | Honduras | Agricultural area, El Cajon Drainage Basins | 1948, 1993, 1994, 1995, 1997: summer | Increased Precipitation & Reduced Precipitation | Empresa Nacional De Energia Electrica, United Fruit Company | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Europe | Iceland | Field scale injection of CO ₂ into basalts in Hellisheidi | January 2012 | CCS | A combined industrial and academic research program. | Project name: CarbFix. Enhanced weathering (CO ₂). Led by power and utility firm Orkuveita Reykjavikur and the University of Iceland. | http://www.or.is/English/Projects/CarbFix/AbouttheProject/ ; http://www.or.is/English/Projects/CarbFix/Readstory/2290 |
| Asia | India | R&D | Since 2002 ? | Algae schemes | Joint R&D with Renewed World Energies Co. | Company EBTI (Enhanced Biofuels & Technologies India Ltd.): discovered algae species with especially high productivity and oil content. | http://www.ebtiplc.com/ ; http://www.indiabizclub.com/qxzpmd/?q=1ox1susugi5o09qrt ; http://www.asiabiomass.jp/english/topics/0911_07.html |

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| Asia | India | R&D, industrial size planned for the future | Ongoing in 2012 (since ?) | Algae schemes | ACC India is part of the Holcim Group. | ACC India (formerly known as Associated Cement Company) has initiated a project to sequester CO ₂ generated by cement kilns to produce high energy algal biomass, which will then be reused as fuel in its cement kilns. Goal is to harmonize the algal production rate with the CO ₂ emission rates, and ensure recycling of CO ₂ and providing continuous algal biomass fuel for the kiln & power plants. | http://www.oilgae.com/algae/cult/cos/cem/cem.html ; http://www.acclimited.com/newsite/sitemap.asp ; http://www.holcim.com/en/case-studies/acc-india-industrial-farming-of-co2-into-algal-biomass-fuel.html |
| Asia | India | 20 different projects around the country | 2009 - 2012 | Biochar | Action carbonee, Good Planet; GEO (Geoecology Energy Organization); B*Capital (PNB Paribas); Econhoma; Sai Bhaskar Reddy; Biochar for Carbon Reduction, Sustainable Agriculture and Soil Management (BIOCHARM), UKBRC | There have been a variety of experiments, meetings and seminars and involvement of Indian non-profits with international biochar advocates but accurate information on the scope of activities is not easily accessible. | The summary of biochar projects in developing countries is supplied by the International Biochar Initiative, for a study that was supported by the World Bank, 11 May 2011. Summary available at http://www.biochar-international.org/sites/default/files/IBI_Survey_5-11-11_online.pdf ; http://www.biocharindia.com ; http://www.biocharsoc.org/ ; http://www.biochar-international.org/node/2044 |
| Asia | India | E.g. 1,600 km ² in Maharashtra State | 1967, 1973 - 1980, 2003, 2004 | Increased Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Asia | Indonesia | South Kalimantan, West Java, Soroako area | 1979 - 1980, 2005 - 2007 | Increased Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Asia | Iran | Eng Central Iran | 1974 - 1978, 1989 - 1996, 2004 - 2007 | Increased Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Asia | Iraq | 10,000 km ² target area; Mosul | 1983 | Increased Precipitation | Governmental research | Project name: Precipitation Enhancement in Mosul, Iraq | WMO 1980, http://www.wmo.int/pages/prog/arep/wmp/documents/Cloud%20seeding%20experiments%20in%20Arab%20countries.pdf |

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| Asia | Israel | 1,600 m ² pilot plant area within the campus of the Rutenberg power plant, close to Ashkelton | Since 2006 | Algae schemes | Land leased from Israel Electric Corporation (IEC) | Private company "Seambiotic Ltd.": Algae cultivation in open ponds using flue gas from the power station. Further pilot plants and larger facilities planned. | http://www.powerplantccs.com/ccs/cap/fu t/alg/alg_proj_seambiotic.html ; http://www.seambiotic.com/uploads/Seambiotic%20Ltd.%20-%20Algae%20Pilot%20Plant%20white%20paper.pdf |
| Asia | Israel | Develops/sells large-scale algae field technology | Ongoing (since ?) | Algae schemes | | Private company "Cequesta Alga Ltd.": Company is engaged in large-scale algae field (LSAF) technology. The company's ambition is to design Large-Scale Algae Technology growing micro-algae at very low cost. | http://www.oilgae.com/ref/report/co2_capture/co2_capture.html ; http://www.cequesta.com/component/content/article/42-general-info/48-cequesta-algae.html ; http://www.matimop.org.il/company.aspx?code=8635 ; http://www.aardvarkinvestments.com/investments.php |
| Asia | Israel | 16,000 km ² at least, e.g. in Northern Israel | 1960 - 2002 | Increased Precipitation | Government (Agriculture, Hydrology) | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| S-America | Jamaica | > 11,500 km ² , e.g. Central Jamaica | 1976, 1989 - 1991 | Increased Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Asia | Japan | R&D for a Biofuel plant of 80 t oil/year capacity | Since 2006 (probably longer) | Algae schemes | Thailand's Institute of Scientific and Technological Research (TISTR), DENSO Corporation (global automotive supplier headquartered in Japan) | The institutions mentioned to the left formed a Joint Research Agreement on the "Research and Development of Biofuel Production from Microalgae in Thailand." Plans to use the microalgae <i>Pseudochorocystis ellipsoidea</i> to capture CO ₂ emissions from DENSO factories and to recover biodiesel from the resulting algal biomass. | http://www.asiabiomass.jp/english/topics/0911_07.html ; http://www.plantresearch-bath.org/algae-biotechnology/prof-rod-scott/ ; http://algae-energy.co.uk/algae-companies/japan/ , http://www.denso.co.th/denso/en/news_article.jsp?lang=en&type=2&id=135 |
| Asia | Japan | Research activities | 2010 | Biochar | | Japan Biochar Association: Provides information, knowledge, technology and social science concerning biochar not only in agriculture, forestry and fishery but also in carbonizing technology, architecture and solution for environmental problems. "We also hope to contribute for the reduction of CO ₂ and pollutants in atmosphere with utilizing charcoal." | http://www.publish.csiro.au/?act=view_file&file_id=SR10006.pdf ; http://www.geocities.jp/yasizato/5subjects.htm |

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| Asia | Japan | NW Pacific Ocean, patch of 80 km ² , NE of Japan | 2001, summer | Ocean fertilization + | Japan's Global Environmental Research Fund with some Canadian support | Project name: SEEDS I (Subarctic pacific iron Experiment for Ecosystem Dynamics Study). Application of 350 kg of Fe. | http://en.wikipedia.org/wiki/Fe_fertilization , http://www.cbd.int/doc/publications/cbd-ts-45-en.pdf ; http://www.pices.int/meetings/workshops/2005_workshops/SEEDS%20II/SEEDS_f.pdf ; http://www.etcgroup.org/en/node/4913 |
| Asia | Japan | NW Pacific Ocean, patch of 64 km ² , NE of Japan | 2004, summer | Ocean fertilization + | see SEEDS I ?? | Project name: SEEDS II (Subarctic pacific iron Experiment for Ecosystem Dynamics Study). Application of 491 kg of iron. | http://www.tos.org/oceanography/issues/issue_archive/issue_pdfs/22_3/22-3_strong.pdf , http://en.wikipedia.org/wiki/Fe_fertilization ; http://www.pices.int/meetings/workshops/2005_workshops/SEEDS%20II/SEEDS_f.pdf ; http://www.cbd.int/doc/publications/cbd-ts-45-en.pdf |
| Asia | Japan | >500 km ² , e.g. Nigata and Gunma prefectures | 1993 - 2002 | Increased Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | WMO report 1999; 2002, 1996, 1993 |
| Asia | Jordan | >30,000 km ² , e.g. North & West Jordan | 1966 - 1999 | Increased Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Asia | Kazakhstan | Around Astana | 1998 | Reduced Precipitation | Probably Russia (through ROSHYDROMET) | Carried out by ROSHYDROMET (Russian Agency of Atmospheric Technology): to improve weather conditions for the city. | http://www.wmo.int/pages/prog/arep/wmp/documents/Koloskov_Russia.pdf |
| Africa | Kenya | Research project in Western Kenya, Nandi district | Since 2005 | Biochar | | Cornell University: "application for the project to be recognized for carbon trading under CDM or other schemes including the voluntary market" | http://www.biochar-international.org/9country#kenya ; http://www.biofuelwatch.org.uk/docs/biochar_africa_briefing.pdf |
| Africa | Kenya | Various projects in Bungoma District, Western Kenya | 2004 - 2012 | Biochar | African Christians Organization Network (ACON); Air Terra (Canadian, links to ConocoPhillips), National Geographic. | ACON: Field research. Goal: to train 1,000 farmers or more in biochar production and use. | http://www.biochar-international.org/profile/ACON/Kenya ; http://www.airterra.ca/about-us/team/http://stud.epsilon.slu.se/2572/1/alvum_toll_k_etal_110509.pdf |
| Asia | Korea, Republic of (South Korea) | > 2,000 km ² , e.g. Kyungnam Province, Gangneung | 1995 - 1996, 2000 - 2002, 2006 | Increased Precipitation & Reduced Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | WMO 2002, 1996 |

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| Asia | Laos | Pilot project | Since 2011 | Biochar | \$4M grant from the Nordic Development Fund and \$600,000 from Vietnam, Laos and Cambodia governments | Carried out by Asian Development Bank: Pilot projects in biogas systems, biochar kilns and improved cooking stoves. "Promoting more efficient use of biomass can simultaneously address the goals of fighting climate change " | http://www.lankabusinessonline.com/indochina/fullstory.php?nid=1666004579 ; http://sea-biochar.blogspot.com/2011/07/adb-agrees-4-mln-grant-to-boost-biomass.html |
| Africa | Libya | > 60,000 km ² , e.g. Northern Coastal areas | 1972 - 2002 with interruptions | Increased Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Europe | Macedonia | 8,000 km ² target area in 2003; in 1993+1994+1996+1999+2002: 25,000km ² | 1971 - 2003 every year; e.g. 20 days in 2003 from May - Sept; 27 days in 1993 from Apr - Oct, 29 days in 1996: from Apr - Oct | Reduced Precipitation | Sponsor: Government | Project name: Hail Suppression Project, no evaluation. | WMO 2003-2004 projects; WMO 1999; WMO 2002, 1993+94, 1996 |
| Africa | Madagascar | >10,000 km ² , e.g. Mahafaly and Androy regions | 1980 - 1999 with interruptions | Increased Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | WMO 1992, 1999, 1980 |
| Asia | Malaysia | Pilot & research project | 2008 | Biochar | | University of Putra Malaysia: Oil palm residues in the form of empty fruit bunches are successfully pyrolysed to produce biochar in a 20 t/day pilot scale "Carbonator". | https://spreadsheets.google.com/spreadsheets/pub?key=0AqK8nxi8zfEvdHdhQmpuZ1QtclNFZG9vdWVEaTFkOUE&single=true&gid=0&output=html |
| Asia | Malaysia | Research project | 2010 - 2012 | Biochar | | Malaysian Palm Oil Board: Production and characterization of biochar. | https://spreadsheets.google.com/spreadsheets/pub?key=0AqK8nxi8zfEvdHdhQmpuZ1QtclNFZG9vdWVEaTFkOUE&single=true&gid=0&output=html |

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| Asia | Malaysia | Research project | 2012 - 2015 | Biochar | German Federal Ministry of Education and Research (BMBF) | Carried out by Leibniz-Institute for Agricultural Engineering Potsdam-Bornim e.V. (ATB) in cooperation with other partners, e.g. University of Putra Malaysia. Project name: "Biochar in agriculture - perspectives for Germany and Malaysia": questions effects on the environment and the potential to reduce CO ₂ in the atmosphere. | http://www.biochar-international.org/node/2979 |
| Asia | Malaysia | >5,000 km ² , e.g. North Perak | 1977 - 1980, 1992, 1997 - 2005 | Increased Precipitation | Government | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Africa | Mali | Ongoing trials & demonstrations, small pyrolysis plant | Since 2011 at least | Biochar | Altran Foundation | ProNatura (France): "green charcoal project"; "Biochar raises agricultural yields and reverses climate change"; ProNatura works to receive carbon credits for putting CO ₂ "back to ground". | http://www.biofuelwatch.org.uk/docs/biochar_africa_briefing.pdf , http://www.pronatura.org/?page_id ; http://www.new-ag.info/en/focus/focusItem.php?a=963=521&lang=en |
| Africa | Mali | 332 flights since 2007, e.g. near the town of Mopti, close to Burkina Faso | 2006 - 2011 | Increased Precipitation | Government (\$32,5 million from 2006 to 2010); NCAR (National Center for Atmospheric Research) | Carried out by "American consultants", probably Weather Modification Inc. for most/all flights. | http://www.journaldumali.com/article.php?aid=1601 , http://waterlawblog.blogspot.com/2010/06/cloud-seeding-in-mali-multi-million.html , http://www.rap.ucar.edu/projects/westafri ca/http://www.weathermodification.com/projects.php?id=18 ; http://desertification.wordpress.com/2009/10/15/bio-precipitation-or-cloud-seeding-for-faking-snow-in-the-desert-to-boost-rain-irin/ ; http://www.hutchnews.com/Localregional/pilotseeds |
| Africa | Mauritania | Cloud seeding, e.g. over Nouakchott, Trarza, Adrar and Nouadhibou | reported for 1998, 2009 | Increased Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |

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| N-America | Mexico | Commercial scale production capacity planned for 2013 in Mexicali Valley | Since 2011 or 2012 | Algae schemes | Aquaviridis is backed by private sector funding and cooperates with OriginOils (technology provider) | Aquaviridis (Minnesota): R&D with plans to scale up to 10 acres of pilot algae production in 2012. Commercial scale production capacity in 2013. Aquaviridis selected the Mexicali Valley as a strategic location due to favorable growing conditions, strong local and governmental support, and available sources of CO2. | http://www.businesswire.com/news/home/20120203005236/en/Algae-Producer-Aquaviridis-OriginOil-Announce-Joint-Commercial |
| Central America | Mexico | Eng Northern Mexico | 1970 - 1984, 1996 - 1999, 2011 | Increased Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Central America | Mexico | Participated in IronEX-II | 1995 | Ocean fertilization + | Mexican CICESE-Centro de Investigación Científica y Edu. Superior de Ensenada (among others) | Mexico funded and was involved in IronEx-II | http://www.usc.edu/uscnnews/stories/2203.html ; http://www.etcgroup.org/en/node/4913 (page 14) |
| Europe | Moldavia | 21,250 km ² ; "60% of the national territory" | 1964 - 2000, every year; e.g. 31 days in 1999 from May - Aug | Reduced Precipitation | Sponsor: Government (agriculture) | Project name: Prevention of Hail Damage. | WMO 1999 projects; 2000 |
| Asia | Mongolia | Research project | Ongoing ? | Biochar | Partners include the NGOs People Centered Conservation in Mongolia (PCC); the Mongolian Women Farmers' Association (MWFA); and the Snow Leopard Conservation Fund (SLCF); Funding by Australian Embassy. | MoBI: Use of biochar producing stoves and examination of cooperative production of carbon credits from family units. | http://www.biochar-international.org/9country |

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| Asia | Mongolia | > 800 km ² | 1990 - 1996 | Increased Precipitation & Reduced Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | WMO 1996, 1993, 1994, 1992, 1996 |
| Africa | Morocco | >16,000km ² , e.g. High Atlas mountains | 1980 - 2003 | Increased Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Australia/Oceania | New Zealand | Future plans to cultivate algae for CO ₂ capture | Since 2010 | Algae schemes | In cooperation with UOP (Universal Oil Products). | Aquaflow: Announced project for industrial use of microalgae. Aquaflow has been harvesting wild algae from a municipal waste water site in Blenheim, New Zealand for over 5 years. | http://www.aquaflowgroup.com/projects/sequestering-industrial-waste-demonstration-project ; http://www.asiabiomass.jp/english/topics/0911_07.html |
| Australia/Oceania | New Zealand | Sales of biochar and pyrolysis plant | Since 2009 | Biochar | Ernslaw One (Malaysia), EECA (NZ) | Alternative Energy Solutions Ltd: New Zealand's first demonstration wood pyrolysis plant located in Pukehe. Capacity: up to 100t/day. | http://www.bioenergy.org.nz/documents/publications/Liquid%20Biofuels/KeyPlayers%20in%20NZ%20LiqBio/AES.pdf ; http://www.biochar-international.org/images/April_2009_newletter.pdf |
| Australia/Oceania | New Zealand | Production of Biochar in Marlborough region | Since 2006 | Biochar | | Private company "CarbonScape": aims to address the problem of CO ₂ release". | http://www.carbonscape.com/ |
| Australia/Oceania | New Zealand | Lab-research project | 2011 (already earlier ?) | Biochar | | Lakeland Steel: Pilot pyrolysis plant for sawmill residues at Rotura. Supplied biochar to at least one research project, by Landcare Research/University of Waikato. | http://www.biochar.co.nz/workshop.html ; http://www.lakelandsteel.co.nz/index.php?option=com_content&view=article&id=44&Itemid=73 ; http://www.plusgroup.co.nz/biochar-hydrological-properties.html |

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| Australia/Oceania | New Zealand | Research project: GHG mitigation and carbon trading | 2010 - 2013 | Biochar | Government (\$1M annually for 3 years) | Participants: NZ Biochar Research Centre at Massey University, with co-chairs Professor Jim Jones and Associate Professor Marta Camps, 6 PhD students and cross-disciplinary collaboration between GNS Science, Landcare Research, Plant and Food Research, AgResearch and the NZ Agricultural Greenhouse Gas Research Centre. | http://biochar.co.nz/Files/2011_Biochar_Final_programme_low_res.pdf ; http://www.waikato.ac.nz/news-events/media/2010/06/Biochar%20benefits%20for%20farmers.shtml ; http://www.nzfarmersweekly.co.nz/cgi-bin/article.cgi?cmd=show&article_id=8622&view=view_printable&border=none |
| Australia | New Zealand | Hawkei Bay, 400km ² | 1995 - 1996: Nov - Feb | Reduced Precipitation | Government | Project name: Small scale hail cannon. | WMO 1996 |
| Africa | Niger | Ongoing trials & demonstrations, small pyrolysis plant close to Niamey | Ongoing in 2012 (since ?) | Biochar | ProNatura (France) | ProNatura wants carbon credits for putting CO ₂ "back to ground". | http://www.biofuelwatch.org.uk/docs/biochar_africa_briefing.pdf , http://www.new-ag.info/en/focus/focusItem.php?a=963 |
| Europe | Norway | Research project | 2010 - 2013 | Biochar | The project is financed by the Norwegian Research Council - Program for renewable energy and capture and storage of CO ₂ (FRIENERGI) in cooperation with UMB, NTNU, and the Universities of Firenze and Zurich. | Bioforsk, in cooperation with University for Life Sciences (UMB): Using miscanthus to test ability of biochar to enhance soil carbon sequestration. | http://www.bioforsk.no/ikbViewer/page/prosjekt/tema?p_dimension_id=23800&p_menu_id=23810&p_sub_id=23801&p_dim2=23806 |
| Europe | Norway | ~ 0,7M t/year of CO ₂ have been injected and stored in the Tubåen sandstone | Since April 2008 | CCS | Statoil ASA, Petoro AS (Norwegian state direct interest), Total E&P Norge AS, GDF Suez E&P Norge AS, Norsk Hydro, Hess Norge | Global CCS Institute. Project name: Snohvit CO ₂ Injection. Location: Barents Sea, Norway. The project was among the first offshore hydrocarbon developments to entirely consist of sub-sea facilities. Liquefied natural gas is injected under seabed, some 2,600 m beneath the seabed, 45-75 meters thick. | Global CSS Institute, http://www.globalccsinstitute.com/projects/12406 |

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| Europe | Norway | ~ 1M t/year of CO ₂ is injected into a deep saline formation 8M t injected to date. | Since 1996 | CCS | | Statoil ASA. Project name: "Sleipner CO ₂ Injection". The world's 1st fully operational offshore gas field with CO ₂ injection and first CO ₂ storage project in a geological layer 1,000 m below the sea floor. CO ₂ is separated from produced gas at the Sleipner T platform and re-injected into the saline formation. Planned maximum injection: 20M t. | Global CCS Institute, http://www.globalccsinstitute.com/projects/12401 |
| Asia | Oman | Feasibility study & cloud seeding in the Dhahirah and Batinah regions | 2004, summer | Increased Precipitation | Oman's Ministry of Regional Municipalities, Water Resources and Environment (but NO information available on their website: http://www.omagnet.com/english/commerce/econ11.asp?cat=comm) | "Oman's Ministry announced that his country is exploring rainmaking technology to solve its severe water shortage. Working with the American Institute for Rain Enhancement, Al Sulaimani's department plans to try seeding clouds with silver iodide particles this summer" | http://www.asr.ucar.edu/2004/RAP/precipitation-enhancement.htm ; http://www.source.irc.nl/page/12809 ; http://www.source.irc.nl/page/22957 |
| Asia | Pakistan | Eng in Thar desert, Cholistan, Khuzdar and Baluchistan | 1953 - 1956, Jun 2000 – Mar 2001 | Increased Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| S-America | Panama | 2 target areas: 3,620 km ² & 3,290 km ² ; Panama canal, Bayano river | 1980 - 1983; e.g. 61 days in 1980 from Jun - Aug | Increased Precipitation | Government | Project name: Emergency project to increase rain in the Panama Canal & region of the Bayano river | WMO 1980 |
| International | Peru | No testing; Expert meeting in Peru | 2011, June | Major research project | IPCC, Working groups I, II, III | Joint IPCC Expert Meeting of WGI, WGII, and WGIII on Geoengineering: a platform for exchange and discussion among experts from the different disciplines | http://www.ipcc-wg3.de/meetings/expert-n |
| S-America | Peru | Upper and middle flow of Mantara River (1992), 9,000km ² (1993) | 1992 - 1993: 120 days in 1992, Jan - Mar in 1993 | Increased Precipitation | Government | Project name: Modification Artificial Del Tiempo | WMO 1992,WMO 1993 |

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| Latin America | Peru | 70 ha on 3 mountain tops (surface albedo) | 2010 | SRM | World Bank | Eduardo Gold, and his company Glaciares Peru won a World Bank competition by claiming that melting glaciers could be replaced by environmentally friendly white paint, in order to maintain the Earth's albedo (reflectivity). | |
| Asia | Philippines | Eng Visayas, northern Luzon, southern island of Mindanao | 1968 - 2005 (probably longer) | Increased Precipitation | Government | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Asia | Philippines | Sulu Sea, 1t of N (Urea) | 2007 - 2008 | Ocean fertilization + | Ocean nourishment Corporation (ONC) | A campaign by a coalition of civil society groups and Philippine government forced sponsors to cancel experiment but ONC is still open for business. | http://www.etcgroup.org/en/node/5081 ; http://en.wikipedia.org/wiki/Ocean_nourishment |
| S-America | Puerto Rico | Southern parts and watershed of the Carraizo Dam | 1965, 1974 | Increased Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Europe | Russia | Exact date and location not revealed | 2009 Results published | SRM | Institute of Global Climate and Ecology, Roshydromet, Russian Academy of Science, Taifun Scientific Industrial Organization; Central Aerological Observatory | Stratospheric aerosols from ground and helicopters in attempt to measure sunlight scattering for SRM. | < http://www.etcgroup.org/en/node/5073#_ednref > See Chris Mooney, "Copenhagen: Geoengineering's Big Break?" http://motherjones.com/Environment/2009/12/copenhagen-geoengineerings-big-break . See also Yu A. Izrael et al., "Field Experiment on Studying Solar Radiation Passing Through Aerosol Layers", Russian Meteorology and Hydrology, 2009, vol 34, no. 5, pp. 265-273; Chris Mooney, "Copenhagen: Geoengineering's Big Break?" http://motherjones.com/Environment/2009/12/copenhagen-geoengineerings-big-break . See also Yu A. Izrael et al., "Field Experiment on Studying Solar Radiation Passing Through Aerosol Layers", Russian Meteorology and Hydrology, 2009, vol 34, no. 5, pp. 265-273 |

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| Asia | Russian Federation - in this case Former Soviet Union | >30,000 km ² , e.g. Georgia, Moldavia, Northern Caucasus | 1960 - 2003 | Increased Precipitation & Reduced Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | WMO 1993, 1994, 1980 |
| Asia | Saudi Arabia | >130,000 km ² , e.g. Abha area, Siydah area | 1990 - 2011 (possibly with interruptions) | Increased Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Africa | Senegal | Field trials. Pyrolysis plant in Saint-Louis Region, Ross Bethio | Since June 2009 | Biochar | Société Generale, Green Charcoal International | ProNatura: Ongoing field trials, demonstration and small pyrolysis plant. ProNatura is working to get carbon credits. | http://www.new-ag.info/en/focus/focusItem.php?a=963 ; http://www.biofuelwatch.org.uk/docs/biochar_africa_briefing.pdf ; http://www.pronatura.org/wp-content/uploads/2011/12/Green-charcoal-Biochar-2010.pdf ; http://www.new-ag.info/en/focus/focusItem.php?a=963 ; http://www.biochar-international.org/VOA/Senegal ; http://www.biochar-international.org/Pronatura , http://www.steps-centre.org/PDFs/Biochar_web.pdf |
| Africa | Senegal | | 2005 - 2011 (possibly with interruptions) | Increased Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Europe | Serbia and Montenegro | Serbia, 77,134 km ² target area; 66,000km ² in 1993 & 1996 | 1967 - 2003 every year; e.g. 54 days in 2003 from Apr - Oct; 80 days in 1999 from Jul - Oct; 72 days in 2002; 39 days in 1993 | Reduced Precipitation | Private agricultural sponsor in 2003, Government in 1999, 1993, 1996 | Project name: Hail suppression system in Serbia. No Environmental Impact Assessment. Cost & benefit analysis available. | WMO 2003-2004 projects; WMO 1999: WMO 2002, WMO 1996, WMO 1993 |
| Asia | Singapore | Eng in West Kalimantan Province | 2006, 2011 | Increased Precipitation | Government | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |

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| Africa | South Africa | Various experiments in Mpumalanga Province; Southern Cape | Ongoing in 2012 (since ?) | Biochar | University of Western Cape; Stellenbosch University; University of Northern British Columbia, SANERI | Alterna Energy ("biocarbon manufacturer"): The study will contribute to scientific knowledge that is important for soil fertility management and improving soil quality and Carbon sequestration in South Africa." Small pyrolysis plants, field trial, feasibility study. | http://www.biofuelwatch.org.uk/docs/biochar_africa_briefing.pdf ; http://alternabiocarbon.com/applications/biochar ; http://academic.sun.ac.za/soil/research_projects_hard_hoff_ellis_harp.html |
| Africa | South Africa | >30,000 km ² , e.g. Nelspruit area | 1972 - 1980's, 1991 - 1999 | Increased Precipitation & Reduced Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Asia | Sri Lanka | Construction of a algae facility to sequester CO ₂ generated by cement kilns | Since 2011 | Algae schemes | In cooperation with Holcim Lanka | AlgaeTec Ltd.: To sequester CO ₂ generated by cement kilns to produce high energy algal biomass, which will then be reused as fuel in its cement kilns. Using a high-yield enclosed algae growth and harvesting system provided by AlgaeTec. Facility will be built in conjunction with Holcim Lanka Ltd, a cement and building materials company. | http://www.oilgae.com/blog/2008/11/holcim-spanish-cement-plant-gets.html ; http://algaenews.com/2011/12/holcim-lanka-and-algae-tec-launch-first-biofuels-production-facility-in-asia/ ; www.algaetec.com.au |
| Europe | Switzerland | Eng Lugano Region | 1986, around 2004 - 2005 | Increased Precipitation & Reduced Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Asia | Syria | Countrywide, 125,000 - 170,000 km ² , depending on year | 1991 - 2002 every year; e.g. In 50 days in 1999 from Jan - May & Nov - April or 18 days in 2002 | Increased Precipitation | Government (agriculture) | Project name: Precipitation enhancement project; partly with support from Russia. | WMO 1999 projects; 2000; http://theblanketeffect.blogspot.com/search/label/Middle%20East%20Programs , WMO 1993-94 |
| Asia | Taiwan | Central & Southern Taiwan, Tsengwen Dam Drainage | 1992, 1994 | Increased Precipitation | Sponsor: Taiwan Central Weather Bureau | Carried out by North American Weather Consultants, Inc: for irrigation water supplies. | http://www.nawcinc.com/Wxmod.pdf , http://www.nawcinc.com/NAWC%20Research.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , http://www.nawcinc.com/International.pdf |

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| Asia | Tajikistan | Gissar and Vakhsh Valleys | 1964 - 2000, every year: during agricultural growing period | Reduced Precipitation | sponsor: Government (Agriculture) | Project name: Hail in Tajikistan. | WMO 1999 projects; wMO 2000 |
| Africa | Tanzania | Field trial (enhanced weathering) | Ongoing according to Negatonnes report in 2011 | Other | | Shuiling's 'Olivine concepts company: Field trial in Tanzania is utilizing waste olivine from gemstone mining. Addition of ground olivine (or other silicate minerals) to soils (or surface water) to accelerate the natural process of carbonation through dissolution in the soil and in runoff. | http://www.foe.co.uk/resource/reports/negatonnes.pdf ; |
| Africa | Tanzania | | Since 1997 ? | Increased Precipitation | | Tanzania imported rain-making technology from Thailand. Aircraft used for cloud seeding. | http://www.weathermodification.com/projects.php?id=10 ; http://theblanketeffect.blogspot.com/search/label/African%20Programs |
| Asia | Thailand | On national scale | 1955 - 2007 with interruptions | Increased Precipitation | Government | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Europe | Turkey | Eng Istanbul watersheds | 1990 - 2002, possibly with interruptions | Increased Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| Africa | Uganda | | 1999 | Increased Precipitation | Government (Agriculture, Hydrology, Weather services) | Research project. | WMO 1999 projects |
| Europe | Ukraine | >14,000 km ² , e.g. Crimnea Peninsula, Odessa District | 1968 - 2000, every year; e.g. 6 days in 2000 from May - Sep | Reduced Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | WMO 2000, 1992 |
| Asia | United Arab Emirates | Abu Dhabi & various other places | 1982, 1990 - 1993, 2000 - 2007, maybe longer | Increased Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |

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| N-America | USA | R&D to develop materials and prototypes for CO ₂ capture | Since 2010 (at least) | Air capture | Columbia University, Arch Venture Partners, Comer Science and Research Foundation | The private company "Kilimanjaro Energy" (New York, San Francisco) is aiming for \$50/t of captured CO ₂ to compete in the enhanced oil recovery market | Negatonnes report p. 15; http://www.foe.c |
| N-America | USA | Pilot plant erected at SRI International in Menlo Park, California | Since 2009 | Air capture | Pilot plant was co-developed with Corning and BASF | Private company "Global Thermostat": Pilot plant captures 1,000 t/year of CO ₂ . Company is negotiating commercial plants with the largest users of CO ₂ for industrial gases and Enhanced Oil Recovery in the world. Plans to introduce its own brand of Renewable Gasoline in Northern America, Hawaii and China. | http://globalthermostat.com/news/sucking-carbon-from-air-carbon-negative-power-plants ; http://globalthermostat.com/news/sucking-carbon-from-air-carbon-negative-power-plants |
| N-America | USA | Pilot project in NE Oregon, Morrow County | Since 2008 | Algae schemes | Cooperation with Oregon State University | Columbia Energy Partners & Portland General Electric: CO ₂ captured from Boardman coal plant. Open algae production system. Plans for a 2 nd trial with a closed system (in cooperation with Oregon State University) | http://www.powerplantccs.com/ccs/cap/fullalg/alg_proj_cep.html ; http://www.portlandgeneral.com/community_environment/initiatives/docs/algae_pilot_project.pdf ; http://www.oilgae.com/blog/2008/09/portland-general-electric-algae-turns.html |
| N-America | USA | NE Arizona, Cholla Generation Station: 1,000m ² closed system. | Since 2006 (starting with trials) | Algae schemes | Grant from the US Department of Energy for trials to feed algae with CO ₂ coming from its coal-fired electricity plants (in 2009). | Arizona Public Service Company (APS). Project name: Power Plant Emissions to Biofuels. Future plans for an 8 acres algae farm. | http://www.powerplantccs.com/ccs/cap/fullalg/alg_proj_arizona_public.html ; http://www.nrel.gov/biomass/pdfs/sun.pdf ; http://www.greentechmedia.com/articles/read/aps-gets-70.5m-to-feed-captured-carbon-to-algae/ ; http://www.aps.com/_files/renewable/FF010EmissionstoFuelProject.pdf ; http://www.aps.com/main/news/releases/release_415.html |
| N-America | USA | California: 326 acres "algae centre" in Imperial Valley | Since 2005 | Algae schemes | | Private company "Carbon Capture Corporation": Company processes algal-derived renewable diesel, butanol, biomethane and jet fuel propellant. Production capacity: 660 pounds/day of dried algae biomass with 7% moisture content, can be expanded to 2,200 pounds/day. | http://www.powerplantccs.com/ccs/cap/fullalg/alg_proj_car_cap_corp.html ; http://www.carbcc.com/ |

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| N-America | USA | Colorado: pilot scale photo-bioreactor | Since 2008 (at least) | Algae schemes | | Private company "A2BE Carbon Capture LLC": Closed photo-bioreactor. "we expect to move from pilot scale to full scale bioreactor operation within 24 months with our first carbon capture projects within 48 months. " | http://www.oilgae.com/ref/report/co2_capture/co2_capture.html ; http://www.algaeatwork.com/ |
| N-America | USA | Louisiana (New Roads): field test at 1,489 MW coal-fueled power plant | Since 2007 | Algae schemes | | Private companies "NRG Energy, Inc" and "Green Fuel Technologies Corporation": Field testing GreenFuel's proprietary Emissions-to-Biofuels technology at NRG's Big Cajun II, a 1,489-net MW coal-fueled power plant in New Roads, Louisiana. Ultimate goal: construction of a commercial-scale facility, able to recycle enough CO ₂ to yield up to 8,000 gallons of biodiesel / acre annually. | http://www.oilgae.com/ref/report/co2_capture/co2_capture.html ; http://www.renewableenergyworld.com/renewable/news/article/2007/04/nrg-energy-testing-greenfuel-technologies-algae-bioreactor-system-48172 |
| N-America | USA | Colorado: Demonstration plant | Since 2007 | Algae schemes | | Private company "Solix Biofuels, Inc": Sells technology for industrial algae production. Outdoor Biosystem exceeded 3,000 gallons/acre & year in 2010. | http://www.oilgae.com/ref/report/co2_capture/co2_capture.html ; http://www.solixbiofuels.com/content/products |
| N-America | USA | Developed and constructed an operational photo-bioreactor | Since 2009 | Algae schemes | | RWE - Renewed World Energies Co: Large Scale Photo-Bioreactor System, commercially viable, fully automated, closed system for microalgae production. Using industrial plant emissions (No _x and CO ₂) as a nutrient. | http://www.rwenergies.com/news-events/latest-news/76-a-new-age-in-algae-energy.html |
| N-America | USA | Lab-scale photobioreactors in Anoka, Minnesota | Since 2008 (at least) | Algae schemes | | SarTec Corporation: trials for algae-based CO ₂ sequestration (using flue gas from carbon emitters). | http://www.oilgae.com/ref/report/co2_capture/co2_capture.html ; http://www.sartec.com/co2capture.pdf ; http://www.sartec.com/about.html |
| N-America | USA | Pilot plant in Morrisville since 2009; 3 commercial scale plants since 2011 in Calhoun and Dalton area, GA | Since 2007 | Algae schemes | | BARD (Biofuel Advance R&D): In-door facilities to produce algae biomass at commercial scale, using flue gas from carbon emitters, as well waste water as nutrient source. | http://www.oilgae.com/club/users/MiaFranceska/blogs/109 ; http://www.bardholding.com/ ; http://www.bardholding.com/?page_id=117 |

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| N-America | USA | Commercial biorefinery in Fort Myers, Florida. Capacity : 100,000 gallons of Ethanol/year. 3,000 photo-bioreactors on 17 acres. | Since 2006 | Algae schemes | \$25M from the US Department of Energy (2009) for a pilot-scale integrated biorefiner; \$10M economic development incentive grant from Lee County, Florida (2010). Additional \$90M from private funders (2011) | Algenol: patented its own DIRECT TO ETHANOL® technology. Company owns Cyano Biofuels GmbH (molecular biology laboratory) in Berlin, Germany since 2010. Algenol owns as well Algenol Biofuels Switzerland GmbH, located in Zug, Switzerland (research, development and finance). Completion in 2012 :Transforms its pilot-scale biorefinery into a commercial site with a capacity of 100,000 gallons of Ethanol/year. | http://www.algenolbiofuels.com/about-algenol/facilities-locations |
| N-America | USA | Research study (small-scale) | 1978 - 1996 | Algae schemes | U.S. Department of Energy's Office of Fuels Development funded a program to develop renewable transportation fuels from algae (Aquatic Species Program) | U.S. Department of Energy: Production of biodiesel from high lipid-content algae grown in ponds utilizing waste CO ₂ from coal fired power plants. The study demonstrated that more than 300 species of algae were well suited to the task. Project was abandoned because of the difficulty in harvesting algae and high cost of energy required to agitate the pond to ensure sufficient algal exposure to sunlight. | http://www.ecoworld.com/energy-fuels/factory-farmed-biofuel.html ; http://www1.eere.energy.gov/biomass/pdfs/biodiesel_from_algae.pdf |

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| N-America | USA | Pilot plant in Alpharetta, GA | Ongoing in 2012 (since ?) | Algae schemes | Private company: Greenshift Corporation | GreenShift Corporation: acquired rights to Ohio University's patented <i>Cyanobacteria</i> based bioreactor process for reducing greenhouse gases emissions from fossil-fuel combustion processes. The algae also absorb NO ₂ and SO ₂ . Prototype is capable of handling 140 m ³ of flue gas per minute, an amount equal to the exhaust from 50 cars or a 3 MW power plant. Future research to determine the operational and economic feasibility of such systems for organic biomass production from the viewpoint of cement industry. This would lead to sequestration of CO ₂ produced from cement manufacturing and production of biofuel as an alternate fuel. | http://www.ecoworld.com/energy-fuels/factory-farmed-biofuel.html |
| N-America | USA | Algae to Biodiesel demonstration plant in New Port Richey, Florida | Since Nov 2011 | Algae schemes | European Union Funded Research Facility. | Private company "Culturing Solutions, Inc": "Implementing Carbon Capture from Ethanol Production, Power Generation, Concrete Manufacturing, and other industrial flue gasses for use in the Phyta-Platform Photobioreactor for cultivation enhancement of algae." | http://www.culturingsolutions.com/index.html?? |
| N-America | USA | Western USA: 5,000 acres for algae cultivation | Since 2008 | Algae schemes | | Private company "GEOVADA, LLC": 5,000 acres designated for growing algae for production of biodiesel. Local CO ₂ power plant emissions as a growth stimulant for the algae production together with geothermal heat. | http://www.geovada.com/page2/page2.html |

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| N-America | USA | Algae-to-biofuel facility in Rio Hondo, Texas with 1,100 acres of ponds | Since 2008 | Algae schemes | | Energy company "PetroSun": "Farm consists of 1,100 acres of saltwater ponds, of which all but 20 acres will be dedicated to producing biofuel from algae. The other 20 acres will be used to develop an experimental jet fuel. The facility is expected to produce some 4.4M gallons of algal oil, plus 110M pounds of biomass/year." Plans to expand to several US states, as well as Mexico, Brazil and Australia. | http://www.treehugger.com/renewable-energy/first-commercial-algae-to-biofuels-facility-goes-online.html |
| N-America | USA | Developed an industrial process to produce different fuels from algae | Since 2008 | Algae schemes | | Private company "Algaeon Inc (former Stellarwind Bioenergy LLC)": Involved in algae-based CO ₂ sequestration; production of fuels from algae oil with own technology. | http://www.oilgae.com/ref/report/co2_capture/co2_capture.html ; http://stellarwindbioenergy.com/?q=About%20Us ; http://www.algaeon-inc.com/?q=node/3 |
| N-America | USA | 160 acre development & production facility in Palm Springs, research lab in San Diego | | Algae schemes | Cooperation with Clemson University | Private company "Kent BioEnergy Corporation": commercially viable microalgae-based technologies for water pollution remediation, CO ₂ capture, landfill management, and the production of livestock feed additives, fertilizer, and biomass derived energy. Exclusive rights to Clemson University's patented technologies for harvesting and converting microalgae biomass to biolipids. | http://www.oilgae.com/ref/report/co2_capture/co2_capture.html ; http://kentbioenergy.com/index.html |
| N-America | USA | Technology to produce fuel from Biomass (algae) | Since 2006 | Algae schemes | Investors: biodiesel company Imperium Renewables, Cedar Grove Investments, Brighton Jones Wealth Management and undisclosed angel investors. | "Inventure Chemicals": "Algae produced from CO ₂ emissions" | http://gigaom.com/cleantech/15-algae-startups-bringing-pond-scum-to-fuel-tanks/ ; http://www.inventurechem.com/technology_and_services.html |

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| N-America | USA | Algae production in open ponds | Since 2006 | Algae schemes | Quercus trust (and others ?) | Private company "LifeFuels": Growing, harvesting and processing algal biomass into fuels and other valuable co-products. | http://gigaom.com/cleantech/15-algae-startups-bringing-pond-scum-to-fuel-tanks/ ; http://www.livefuels.com/pressreleases.htm |
| N-America | USA | Algae demonstration facilities in California, Florida, Mexico, and Australia | Since 2009 | Algae schemes | | Private company "Aurora": outdoor production of "highly productive algae" with "yield high concentrations of rich oil". | http://gigaom.com/cleantech/15-algae-startups-bringing-pond-scum-to-fuel-tanks/ ; http://www.aurorainc.com/technology/facilities/ |
| N-America | USA | Algae-to-biofuel factory in Rio Honda, Texas. 1,100 acres ponds | Since 2008 (probably longer) | Algae schemes | | Private company "Petro Sun": The algae farm with 1,100 acres ponds. Petro Sun thinks it will make 4.4M gallons of algal oil and 110M pounds of biomass/year. | http://gigaom.com/cleantech/15-algae-startups-bringing-pond-scum-to-fuel-tanks/ ; http://www.petrosuninc.com/ |
| N-America | USA | In California and Maryland | Ongoing in 2012 (since ?) | Algae schemes | BP plc; Biotechonomy LLC; Draper Fisher Jurvetson; Plenus, S.A. de C.V.; ACGT Sdn Bhd; and Meteor Group. ExxonMobil, Genting Group, Life Technologies, Novartis, Biotechonomy, Asiatic Centre for Tenome Technology. | Synthetic Genomics Inc.: Production of biocrude, biogasoline and jetfuel from algae | ETC Group (2011): The New Biomasters |
| N-America | USA | Total of 7,700 t of CO2 injected to a depth of 870 m in Russel county, Kansas | 2003 - 2005 | BECCS | University of Kansas, National Energy Technology Laboratory (research institute of the USA Department of Energy). | Final report about the project available on the website of the Kansas Geologic Survey. Considered a failure because of weak Enhanced Oil Recovery results. | Global Status of BECCS Projects 2010, p. 27: http://cdn.globalccsinstitute.com/sites/default/files/publications/13516/gccsi-biorecro-global-status-beccs-110302-report.pdf |

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| N-America | USA | 105,000 t of CO ₂ /year in Texas | 2009, ongoing in 2012 | BECCS | Cooperation with Conestoga Energy Partners | Private project run by Chaparral Energy. The only project injecting CO ₂ from a biotic source. CO ₂ from ethanol plant owned by Conestoga Energy Partners, injected into Texas oil field "Booker North Upper Morrow Field". Plans to expand Enhanced Oil Recovery with injection into more fields in the area. | Global Status of BECCS Projects 2010, p. 28 http://cdn.globalccsinstitute.com/sites/default/files/publications/13516/gccsi-biorecro-global-status-beccs-110302-report.pdf |
| N-America | USA | 140 t of CO ₂ /year in Kansas | Since 2011 | BECCS | | Ethanol plant "Bonanza Energy". Owned by Conestoga Energy Partners. Operated by PetroSantander Inc. | Global Status of BECCS Projects 2010, p. 29 http://www.globalccsinstitute.com/publications/global-status-beccs-projects-2010/online/27066 |
| N-America | USA | 1,000 - 5,000 t of CO ₂ /year | 2012 | BECCS | See Biorecro website for their partners. | Biorecro & Energy and Environmental Research Centre (at University of North Dakota): Gasification capture, injection into saline formation. Biorecro a leading firm in development of BECCS technologies. | http://www.globalccsinstitute.com/publications/global-status-beccs-projects-2010/online/27066 |
| N-America | USA | Ethanol storage in Illinois; 3,6M t in total, peak rate 1 M t/year, depth of 2,000 m | 2011 - 2015 | BECCS | Midwest Geologic Sequestration Consortium (MGSC); USDE (Regional Carbon Sequestration Partnership program) and "cost sharing portion by industry partners" | To test CO ₂ storage from Ethanol production. Large scale CO ₂ injection into Mount Simon sandstone formation. Involving 40 academic, industry and NGO partners. The project will not involve Enhanced Oil Recovery. | Global Status of BECCS Projects 2010, p. 30 http://www.globalccsinstitute.com/publications/global-status-beccs-projects-2010/online/27066 |

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| N-America | USA | Various producers of biochar or biochar-making technology | 2012 | Biochar | | Private companies: Agri-Tech Producers, Ambient Energy, LLC , Arizona Public Service Company, Avello Bioenergy, Biochar products, Biochar Solutions, Biz solutions, Brooks Pierce, Burdekin Bowen Integrated Floodplain Management Advisory Committee Inc. (BBIFMAC), Carbon Brokers International, Carbon Char.com, Carbon Resources, CoolPlanetBioFuels, Encendia™ Biochar , Eprida, GEK (BEK) Gasifier - All Power Labs, Genesis Industries, HM3, ICM, New Earth Renewable Energy, New England Biochar, Pyrolyzer LLC, Soil Reef , Three Dimensional Timberlands (3DT), Waste to Energy Solutions. | http://www.biochar-international.org/IBI-business-members ; http://terrapreta.bioenergylists.org/company |
| N-America | USA | 1st pilot plant on the forested coast of southwest Oregon | Plant should be running end of 2012 | Biochar | | Private company "Three Dimensional Timberlands (3DT)": they will construct a three-ton-per-hour fast pyrolysis unit using forest waste. | http://www.biochar-international.org/three_dimensional_timberlands |
| N-America | USA | Several experimental sites | 2011 | Biochar | USDA Research priority: Quantify impact of biochar amendments on C sequestration and GHG emissions at larger scale and evaluate interaction with environmental conditions. | Cornell, University of Iowa: "Currently we conduct experiments in the U.S. and Kenya, and through collaborators in China and Paraguay. We have largely completed our work in Colombia, Brazil, and Zambia." | http://www.usda.gov/oce/climate_change/techguide/Denef_et_al_2011_Review_of_reviews_v1.0.pdf ; See http://www.usda.gov/oce/climate_change/techguide/Denef_et_al_2011_Review_of_reviews_v1.0.pdf p. 43; http://www.css.cornell.edu/faculty/lehman/research/index.html |
| N-America | USA | Production of Biochar | Since 2010 | Biochar | In cooperation with Oregon State Uni | Private company "Mr. Miedema" Biochar production: 100 pounds/h --> source for USDA and Oregon State University to carry out experiments. Mr. Miedema plans a 1t/h biochar plant. | http://www.biochar-international.org/profiles/Thompson_Timber |

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| N-America | USA | 16 acres on 2 farms in southeastern North Carolina. | Since fall 2009 | Biochar | USDA grant, 2009 national Conservation Innovation Grant (CIG) | North Carolina Farm Center for Innovation and Sustainability: "Richard Perritt, the Farm Center's director, believes that acceptance of biochar as a mainstream agronomic practice will be most encouraged by showing improvement in soils and persuading farmers to engage in efforts to combat climate change by sequestering carbon." | http://www.biochar-international.org/profiles/northcarolinafarmcenter |
| N-America | USA | Biochar by one large-scale poultry producer | Since 2007/08 | Biochar | Grants and low-interest loans from several West Virginia state agencies such as the West Virginia Department of Agriculture | Private agricultural holding " Westside Energies": Burning chicken litter (800.000 chicken), producing about 30t of biochar and saving about 4,000 gallons of propane. | http://www.biochar-international.org/Frye/Poultry |
| N-America | USA | Research projects: field -, lab- and greenhouse experiments | Ongoing in 2012 (since ?) | Biochar | | University of Georgia: Research includes "Nutrient and carbon cycling aspects of biochar use". | http://www.biorefinery.uga.edu/carbon%20cycl%20apps%20main.html ; http://www.biorefinery.uga.edu/docs/Steiner%20FPPC2009%2009_10_09.pdf |
| N-America | USA | Research initiative with 33 members | Since 2011 or 2012 | Biochar | 3-year, \$500,000 grant from the College of Engineering | "A national panel led by Iowa State University engineers is launching an effort to research and develop technologies that capture, use and sequester carbon while enhancing food production, ecosystems, economic development and national security." Participants represented universities, companies, federal agencies and non-governmental agencies, including the Massachusetts Institute of Technology, ConocoPhillips, the National Renewable Energy Laboratory and the International Biochar Initiative. | http://www.biorenew.iastate.edu/research/icne/ ; http://www.news.iastate.edu/news/2011/nov/carbonnegativepanel , http://www.cset.iastate.edu/research/current-research/biochar/ |

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| N-America | USA | Research project including field trials | 2011 - 2016 | Biochar | | "Dr. East (Washington & Jefferson College) is leading a collaborative research effort between Washington & Jefferson College and the Rodale Institute to quantify the effects of biochar on soil biology/fertility and crop yields on the Rodale Institute's Kutztown farm. The first crop harvest is expected to occur in October and we'll be reporting our initial observations this fall/winter." | http://www.rodaleinstitute.org/20090605/biochar , http://www.rodaleinstitute.org/20110802_whats-the-big-deal-with-biochar |
| N-America | USA | Research projects in the Intermountain West | Since 2008 | Biochar | Colorado Department of Agriculture's Advancing Colorado's Renewable Energy - ACRE: in the framework of a program to develop biochar application techniques suitable for pastureland. | Flux farm. Project goal: "Developing biochar best management practices for the Intermountain West", relevant to renewable energy and carbon sequestration development. In collaboration with project partner: Colorado Department of Agriculture, Colorado State University, BEST Energies, Dynamotive Energy Corporation, Aspen Valley Land Trust, Flying Dog Ranch, and The Community Office of Resource Efficiency. | http://www.fluxfarm.com/current-research.html |
| N-America | USA | 680,000 t/year of CO ₂ are captured at Koch N's Enid fertilizer plant | Since 2010 | CCS | | Koch N Company. Project name: Enid Fertilizer. Location: Northern Oklahoma. CO ₂ is produced and captured at the plant during the fertilizer manufacturing process and then transported for use in Enhanced Oil Recovery. Supply of CO ₂ to the oil fields is being undertaken by Chaparral Energy and other off-take parties. | Global CCS Institute, http://www.globalccsinstitute.com/projects/12561 |

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| N-America | USA | Around 7 M t/year of CO ₂ are recovered in Shute Creek gas processing facility. A total of ~23-25 M t of CO ₂ has been injected at the Rangely Oil Field for enhanced oil recovery since 1986. | Since 1986. | CCS | ExxonMobil, ChevronTexaco, Anadarko Petroleum Corporation | Global CCS Institute. Project name: Shute Creek Gas Processing Facility. One of the largest Enhanced Oil Recovery projects in the USA. CO ₂ is recovered from ExxonMobil's Shute Creek gas processing facility and transported by pipeline to several oil fields in Wyoming for enhanced oil recovery. The larger volumes of CO ₂ from the plant are delivered to ChevronTexaco's Rangely Weber oil field (1Mtpa) and Anadarko's Salt Creek oil field (2.4Mtpa). Facility in Shute Creek opened in 2004, expanded in 2010; in 2012 5/18 phases are completed; completion due in 2023. | Global CCS Institute, http://www.globalccsinstitute.com/projects/16606 |
| N-America | USA | ~ 5M t/year of CO ₂ are captured from the 1st train of the plant. A total of ~8,5M t/year will be captured when the 2nd train becomes operational. | Since Fall 2010 | CCS | In cooperation with Sandridge Energy (gas supplier) | Occidental Petroleum (operator). Name: Century Plant. A total CO ₂ capture capacity of 8.5M t/year expected in 2012. Project includes enhanced oil recovery. 2nd train expected to be in operation in 2012. | Global CCS Institute, http://www.globalccsinstitute.com/projects/16626 |
| N-America | USA | Biochar research | March 2012 | Major research project | USDA | 32 research projects related to Biochar found, e.g. related to impacts on soil and GHG mitigation | http://www.ars.usda.gov/research/projects.htm (keyword "biochar") |

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| N-America | USA | Cloud Whitening Simulation (Computer Model) | 2010 | Major research project | Pacific Northwest National Laboratory and National Oceanic and Atmospheric Administration | The PNNL-NOAA research team ran model simulations of aerosol injection using a high-resolution version of the Weather Research and Forecasting (WRF) model to investigate how the injected particles are transported through the marine boundary layer and how they affect the microphysical processes inside clouds. Interactions of aerosols, clouds and rain were studied across several sets of experiments. Each set combined different meteorological and aerosol background conditions observed off the coast of California. The injection of seawater particles was simulated in the model using moving point sources, closely mimicking the behavior of the conceptual seawater spraying vessels. | http://www.physorg.com/news/2011-08-brightening-clouds-atmospheric-scientists-technique.html ; Wang H, PJ Rasch, and G Feingold. 2011. "Manipulating marine stratocumulus cloud amount and albedo: a process-modeling study of aerosol-cloud-precipitation interactions in response to injection of cloud condensation nuclei." Atmospheric Chemistry and Physics 11(9):4237-4249. doi: 10.5194/acp-11-4237-2011 |
| N-America | USA | No testing | 2008 - 2013 | Major research project | National Science Foundation grant to Rutgers University for \$622275 (Robock) | Evaluation of Suggestions to Geoengineer the Climate System Using Stratospheric Aerosols and Sun Shading, using Godard Space Model. | http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=0730452 |
| N-America | USA | R&D | Since 2006 | Major research project | NASA, Carnegie-Stanford Institute | Unclear what R&D exactly is going on; observation of stratospheric aerosols. Expert workshop on SRM in California in 2006. | http://event.arc.nasa.gov/main/home/reports/SolarRadiationCP.pdf ; http://www.kiss.caltech.edu/workshops/geoengineering2011/presentations/vernier.pdf |
| N-America | USA | No testing | Since 2007 | Major research project | Bill Gates Fund for Innovative Climate and Energy Research administered by David Keith and Ken Caldeira | A variety of projects, totally US \$4,600,000 in the following areas: climate related technology and policy analysis; modeling the climate system; developing technologies for removing CO2 from the atmosphere; researching approaches to reduce planetary absorption of solar radiation; and holding international workshops to discuss governance for climate intervention technology. | http://keith.seas.harvard.edu/FICER.html |

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| N-America | USA | No known testing | 2009 - 2010 | Major research project | US Global Change Research Program, which includes 13 US federal government departments (e.g. DOE, DOD, USAID, NASA, EPA, NSF, SI, USDA, DOI). | According to the GAO, \$1,866,000 was directly allocated to geoengineering research (2009 - July 2010), whereas an additional \$200 M was invested in research that was relevant to geoengineering. | http://www.gao.gov/assets/320/310105.pdf , pp 19-21 |
| N-America | USA | Research related to Space Mirrors in Arizona (no known testing) | Ongoing in 2012 (since ?) | Major research project | University of Arizona, with MIT and NASA | The plan would be to launch a constellation of trillions of small free-flying spacecraft a million miles above Earth. The spacecraft would form a long, cylindrical cloud with a diameter about half that of Earth, and about 10 times longer. About 10 % of the sunlight passing through the 60,000-mile length of the cloud, would be diverted away from our planet. | http://uanews.org/node/12812 ; |
| N-America | USA | No known testing, California | 2011 - 2012 | Major research project | KISS: Keck Institute for Space Studies | While some papers are available online the KISS won't tell workshop proceedings are confidential - but all participants need to agree to their release! Relates to US Global Change Research Program. Invitation only workshop to assess geoengineering research needs in order to advance technical development. | Very interesting presentation which reviews pertinence of several ongoing research programs see; http://www.kiss.caltech.edu/workshops/geoengineering2011/presentations/workshop_goals.pdf |
| N-America | USA | Public hearings in Washington | 2010 | Major research project | US Congressional Committee on Science and Technology | The US committee advocated more research and international coordination of geoengineering research as well as ongoing collaboration with the UK committee on such matters. | http://science.house.gov/hearing/subcommittee-energy-and-envFement-hearing-geoengineering ; http://science.house.gov/hearing/full-committee-hearing-geoengineering ; http://www.gpo.gov/fdsys/pkg/CHRG-111hrg62619/pdf/CHRG-111hrg62619.pdf |

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| N-America | USA | Marine manipulation experiments on open ocean with barrels and pipes | 2008 - 2010 | Other | Atmocean | Atmocean was working on ocean upwelling and downwelling as a geoengineering strategy (increasing plankton growth from mixing water layers rich in nutrients with layers poor in nutrients) until 2010 but seems to have converted its business into generating electricity from waves, using a similar technology. | http://www.youtube.com/watch?v=nidh8WcHs3s&context=C39dfc20ADOEgsToPDskIDvab5hr_Nmv8KyX60NDZB |
| North America | USA | Southern Ocean, New Zealand, South of AFP, patch of 225 km ² | 2002, summer | Ocean fertilization + | National Science Foundation, the Department of Energy, and the US Coast Guard | Project name: SOFEX-S (Southern Ocean) | http://www.tos.org/oceanography/issues/issue_archive/issue_pdfs/22_3/22-3_strong.pdf , http://en.wikipedia.org/wiki/Fe_fertilization ; http://www.whoi.edu/oceanus/viewArticle.do?id=35609 , http://www.cbd.int/doc/publications/cbd-ts-45-en.pdf ; http://www.mbari.org/expeditions/SOFEX2002/history&purpose.htm |
| North America | USA | Southern Ocean, New Zealand, North of AFP, patch of 225 km ² | 2002, summer | Ocean fertilization + | National Science Foundation, the Department of Energy, and the US Coast Guard | Project name: SOFEX-N (Southern Ocean) | http://www.tos.org/oceanography/issues/issue_archive/issue_pdfs/22_3/22-3_strong.pdf , http://en.wikipedia.org/wiki/Fe_fertilization ; http://www.whoi.edu/oceanus/viewArticle.do?id=35609 , http://www.cbd.int/doc/publications/cbd-ts-45-en.pdf ; http://www.mbari.org/expeditions/SOFEX2002/history&purpose.htm |
| N-America | USA | Between SOFEX in the Southern Ocean and SERIES in the Gulf of Alaska | 2002 | Ocean fertilization + | | Private company: Planktos Foundation: Dumped Fe containing paint pigments into the North Central Pacific along a 50 km transect East of Hawaii (Non - HNLC waters). | http://www.tos.org/oceanography/issues/issue_archive/issue_pdfs/22_3/22-3_strong.pdf |

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| N-America | USA | Alaska, Arizona, California, Colorado, Dakota, Georgia, Idaho, Illinois, Iowa, Kansas, Michigan, Montana, New Mexico, New South Wales, Nevada, Oklahoma, Oregon, Texas, Utah, Washington, Wyoming | 1911 - 1914, 1950 - 2012 | Increased Precipitation & Reduced Precipitation | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| N-America | USA | Developing hardware (nozzle) | 2010 | SRM | Armand Neukermann, Bill Gates | The Silver Lining Project. Status of project is following a wave of unwelcome publicity. | http://www.guardian.co.uk/env/Fement/2010/may/14/bill-gates-cloud-whitening-dangerous; http://www.handsoffmotherearth.org/2010/05/bill-gates-funds-field-trial-global-coalition-urges-immediate-halt-to-geoengineering/ |
| N-America | USA | California, off coast of Monterrey | 2011: July | SRM | | E-PEACE Eastern Pacific Emitted Aerosol Cloud Experiment. Lead Institution: University of California San Diego (UCSD), CoPIs and Collaborating Institutions: John H. Seinfeld, California Institute of Technology (CIT), Bruce Albrecht, University of Miami (UM), Armin Sorooshian, University of Arizona (UA), Center for Interdisciplinary Remotely-Piloted Aircraft Studies (CIRPAS). Twin Otter aircraft with a full payload of instruments to measure particle and cloud number, mass and composition distributions. | http://aerosols.ucsd.edu/E_PEACE.html |

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| N-America | USA | Biochar production in Golden, Colorado | Since 2009 | Biochar | | Private company "Biochar Engineering Corp": Development of smaller scale modular units to produce Biochar. "BEC's core mission is to accelerate the creation of the biochar industry. Fournier believes that it will take several years of field-scale agricultural trials before the biochar market will really take off and reach its full potential of gigaton-scale carbon sequestration." | http://www.biochar-international.org/BEC ; http://www.biocharengineering.com/ |
| N-America | USA | 1,3M t of CO ₂ is re-used. Enhanced oil recovery. | Since 1972 | CCS | | Val Verde Natural Gas Plants (formerly Sharon Ridge). Location: Texas. CO ₂ is captured from 5 gas processing facilities. Once captured, dehydrated and compressed, the CO ₂ is transported via the Val Verde and CRC pipelines to the Sharon Ridge oil field for enhanced oil recovery. Secondary sinks for the CO ₂ are the SACROC, Cogdell and Reinecke floods. | Global CCS Institute, http://www.globalccsinstitute.com/projects/16616 |
| N-America | USA (15 international research institutions involved, including 9 US & 2 British) | 64 km ² patch of near the Galapagos Islands (equatorial Pacific HNLC waters - 972 km west of Ecuador) | 1993, fall | Ocean fertilization + | US Office of Naval Research and the US National Science Foundation | Project name: IRONEX I; first open ocean fertilization experiment; 1 application of 450 kg of Fe. | http://chemoce.mlml.calstate.edu/past.htm#Feex1 ; http://www.cbd.int/doc/publications/cbd-ts-45-en.pdf (e.g. pages 24+53); http://www.tos.org/oceanography/issues/issue_archive/issue_pdfs/22_3/22-3_strong.pdf ; http://www.etcgroup.org/en/node/4913 |
| N-America | USA, Chile, Suriname | Bioreactor demonstration facility in Florida, Chile and Suriname. | Since 2006 | Algae schemes | Asesorias e Inversiones Quilicura (Chile), EcoFrontier (Korea), Foster Wheeler (USA) | Parabel (former PetroAlgae): Biocrude from algae for Diesel, Jet Fuel, Gasoline, Bunker Oil. | http://www.parabel.com/ , ETC Group (201 |
| N-America, S-America | USA, Ecuador | 100 t of Fe; Pacific Ocean, near Galapagos Islands | 2007 | Ocean fertilization + | | Private company: Planktos plan to dump Fe and then sell carbon offsets was scuttled by activists from Ecuador. | http://www.etcgroup.org/en/node/637 ; http://www.tos.org/oceanography/issues/issue_archive/issue_pdfs/22_3/22-3_strong.pdf |

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| N-America, Asia | USA, Israel | Main research centre in Ashdod. | Since 2008 | Algae schemes | Raanan, Endicott Biofuels, Israeli Electric Company | TransAlgae Ltd.: Oil from algae. Company is based in Texas. Most of the activities related to Algae in Asdod (Israel). Production of "enhanced algae". | ETC Group (2011): The New Biomasssters |
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| Europe | USA, Peru, Chile, United Kingdom | Experiment involving 5 aircrafts, 2 ships, 2 surface sites in Chile | 2008 | SRM | <p>Department of Atmospheric Sciences, University of Washington, Seattle, USA; UCLA, Los Angeles, USA; Woods Hole Oceanographic Institution, USA; University of Hawaii, Honolulu, USA; Rosenstiel School of Marine and Atmospheric Science, University of Miami, USA; School of Earth, Atmospheric and Environmental Sciences, University of Manchester, UK; Brookhaven National Laboratory, Upton, USA; NOAA Earth System Research Laboratory, Boulder, USA; Departamento de Geofisica, Universidad de Chile, Chile; Instituto del Mar del Peru, Peru; NOAA Pacific Marine Environmental Laboratory, Seattle, USA; Dept. of Applied Environmental Science (ITM), Stockholm University, Sweden; Scripps Institution of Oceanography, University of California, San Diego, USA; Oregon State University, Corvallis, USA; North Carolina State University, Raleigh, USA; Department of Meteorology, University of Reading, UK; L'Institut de Recherche pour le</p> | <p>Major experiment to understand aerosols and clouds that is directly relevant to geoengineering . The VAMOS Ocean-Cloud-Atmosphere-Land-Study-Regional-Experiment (VOCALS-REx VOCALS-REx) involved 5 research aircraft, 2 ships and 2 surface sites in northern Chile. VOCALS-REx took place during October and November 2008, engaging over 150 scientists from 40 institutions in 8 nations.</p> | <p>http://aerosols.ucsd.edu/papers/Wood2011.pdf</p> |
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| N-America | USA, South Africa | Biodiesel plant in Odessa. 500 acre Algae farm under construction. Biodiesel reactors in South Africa | Since 1990`s | Algae schemes | De Beer Fuels Ltd. | Green Star Products, Inc: Biodiesel from algae. Plans to establish a 500 acre algae farm (announced in 2008). 9 months of algae farming (trials) in 2007. Signed agreement with De Beers Fuel Ltd to build 90 biodiesel reactors in South Africa. | http://www.greenstarusa.com/ ; ETC Group |
| Europe; N-America | USA, United Kingdom | Laboratory ? | Since 2010 | SRM | Funded by Bill Gates | Cloud whitening: Armand Neukermans, an inventor and investor, is funded to develop a nozzle in order to spray sea water into clouds. | http://giving.stanford.edu/get/file/g2sdoc/highlights/W111_Neukermans_P4.pdf ; http://www.guardian.co.uk/envFement/2010/may/14/bill-gates-cloud-whitening-dangerous |
| Asia | Uzbekistan | >5,000 km ² , e.g. Kashkadarya River, Namangan District, Fergana Valley | 1969 - 2003 | Reduced Precipitation | Sponsor: Government (Agricultural department) | See Weather Modification Data for details, please. | See Weather Modification Data for details, please. |
| S-America | Venezuela | Venezuela's southeastern territories: Huri basin, Rio Uribante basin, Andes, Rio Tui basin | 2009 - 2011 | Increased Precipitation | Government | Project name: La siembra de nubes. Operator: Hidromet Chile. | http://www.globalpost.com/dispatch/venezuela/100202/rain-cloud-bombing , http://www.rnv.gov.ve/noticias/index.php?act=ST&f=14&t=117011; http://www.minamb.gob.ve/index.php?option=com_content&task=view&id=2195&Itemid=43 , http://www.hidromet.cl/experiencia.html , http://www.hidromet.cl/clientes.html |
| Asia | Vietnam | Pilot project | Since 2011 | Biochar | \$4M grant from the Nordic Development Fund and \$600,000 from Vietnam, Laos and Cambodia governments. | Carried out by Asian Development Bank: Pilot projects in biogas systems, biochar kilns and improved cooking stoves. "Promoting more efficient use of biomass can simultaneously address the goals of fighting climate change." | http://www.lankabusinessonline.com/indochina/fullstory.php?nid=1666004579 ; http://sea-biochar.blogspot.com/2011/07/adb-agrees-4-mln-grant-to-boost-biomass.html |
| Asia | Vietnam | | 1967 - 1972 | Increased Precipitation | US Department of State and Department of Defense | "Operation Popeye" used cloud seeding as a means of warfare during Vietnam war, to drown out transport and crops. | http://en.wikipedia.org/wiki/Operation_Popeye |

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| Africa | Zambia | Eastern Zambia, 300 farmers involved | Since 2006 | Biochar | Cornell; WCS, COMACO | Scientific trials related to Biochar. | http://www.biofuelwatch.org.uk/docs/biochar_africa_briefing.pdf |
| Africa | Zimbabwe | 390,757 km ² target area, Harare in 2003; in 1999 countrywide | 1968 - 2003 with interruptions; e.g. 70 days from Dec 03 - March 04 | Increased Precipitation | Sponsor: Government (meteorological services) | Project name: NASCO - National Cloud Seeding Operation); "evaluation carried out before project implementation". | WMO 2003-2004 projects; WMO 1999 |
| | | Sub-tropical NE Atlantic ocean, 2 patches of 25 km ² | 2004, spring | Ocean fertilization + | | Project name: FeeP; 1,840 kg of Fe (5 t of FeSO ₄), 20 t of PO ₄ . | http://www.cbd.int/doc/publications/cbd-ts-45-en.pdf ; http://www.tos.org/oceanography/issues/issue_archive/issue_pdfs/22_3/22-3_strong.pdf |
| | | Eastern Mediterranean, patch of 16 km ² | 2002, spring | Ocean fertilization + | | Project name: CYCLOPS. Application of PO ₄ . | http://www.cbd.int/doc/publications/cbd-ts-45-en.pdf |
| International | USA, France, China, Netherlands | Research consortium with the intention to carry out ocean fertilization experiments in future | Since 2011 | Major research project | ISIS Consortium. Full list of universities participating: http://isisconsortium.org/fileserver.do?id=75364&pt=2&p=79886 | It is a research consortium to do in-situ ocean fertilization experiments. | http://groups.google.com/group/climateintervention/msg/448ee85ffb2670b0 ; http://www.who.edu/ocb-fert/page.do?pid=38315 |
| International | USA | No testing | 2010 - 2013? | Major research project | Rutgers; Stanford; Max Plank; Met Office; Lawrence Livermore; King Abdullah University; Exeter; LSCE: http://climate.envsci.rutgers.edu/GeoMIP/leaders.html | GeoMIP - Geoengineering Model Intercomparison Project: GeoMIP serves to organize geoengineering simulations by prescribing the experiments which all participating climate models will perform. | http://climate.envsci.rutgers.edu/GeoMIP/publications.html ; http://climate.envsci.rutgers.edu/GeoMIP/about.html |

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| International | West Africa, Australia, India, USA (Florida), and other countries | Implementation phase | Ongoing in 2012 (since ?) | Other | | The global cooling project: Cooling the plant by increasing size of clouds, "most promising region is West Africa". Supported by Peter Cox, Exeter University. In cooperation with University of Wales, Centre for Ecology and Hydrology, People and Water (NGO) | http://www.theglobalcoolingproject.com/project/project.shtml |
| International | European Union (Germany); India (with 50 scientists from Germany, India, Italy, Spain, Chile, France and Britain) | Scotia Sea; patch of 300 km ² of the SW Atlantic Ocean (between Argentina & Antarctic Peninsula) | 2009: 39 days, spring | Ocean fertilization + | Alfred Wegner Institute (Germany). Further sponsors? | Project name: LOHAFEX. Application of 10 t of FeSO ₄ . | http://www.etcgroup.org/upload/publication/pdf_file/etcspecialreport_rsgeoeng28aug09.pdf ; http://en.wikipedia.org/wiki/Fe_fertilization ; http://www.nature.com/news/2009/090109/full/news.2009.13.html , http://ksjtracker.mit.edu/2009/01/28/telegraph-deutsche-welle-times-of-india-off-antarctica-a-team-gets-a-green-light-to-grow-algae-to-sop-up-co2-other-geoengineering-news/ ; http://www.cbd.int/doc/publications/cbd-ts-45-en.pdf ; http://www.tos.org/oceanography/issues/issue_archive/issue_pdfs/22_3/22-3_strong.pdf |
| International | 13 institutions | East Equatorial Pacific: 72 km ² patch | 1995, summer | Ocean fertilization + | Britain, Mexico and the USA with the majority of resources provided by the US government – the National Science Foundation (NSF) and the US Office of Naval Research | Project name: IRONEX II, total of 450 kg of Fe; fertilized serially 3 times during 1 week. | http://en.wikipedia.org/wiki/Fe_fertilization , http://chemoce.miml.calstate.edu/past.htm#Feex1 ; http://www.cbd.int/doc/publications/cbd-ts-45-en.pdf ; http://www.usc.edu/usnews/stories/2203.html ; http://www.etcgroup.org/en/node/4913 |

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| International | Researchers from ~ 20 organization | Sub-Antarctic ocean, 250 km from New Zealand, 50 (100?) km ² test area | 2004, fall | Ocean fertilization + | Diverse international sponsors, e.g. "The New Zealand component of this work is sponsored by the Foundation for Research, Science and Technology". | Project name: SAGE (SOLAS Air-sea Gas Experiment). Addition of 2.100 kg of Fe (5,4 t FeSO ₄). | http://www.tos.org/oceanography/issues/issue_archive/issue_pdfs/22_3/22-3_strong.pdf , http://www.pices.int/meetings/workshops/2005_workshops/SEEDS%20II/SEEDS_f.pdf ; http://www.cbd.int/doc/publications/cbd-ts-45-en.pdf ; http://www.niwa.co.nz/oceans/research-projects/sage ; http://www.niwa.co.nz/our-science/oceans/research-projects/all/sage/sage |
| International | Australia, Canada, European Union (United Kingdom), New Zealand, USA | Southern Ocean, Australian Sector, patch of 50 km ² | 1999: Jan - Mar (summer) | Ocean fertilization + | European Union's CARUSO (Uptake Southern Ocean) project and 2 CO ₂ private companies (UK & Australia) | Project name: Southern Ocean Iron Release Experiment – SOIREE. Application of 1,740 kg Fe. Original patch of 50 km ² expanded to 150 km ² . | http://www.tos.org/oceanography/issues/issue_archive/issue_pdfs/22_3/22-3_strong.pdf , http://en.wikipedia.org/wiki/Fe_fertilization ; http://tracer.env.uea.ac.uk/soiree/ ; http://www.cbd.int/doc/publications/cbd-ts-45-en.pdf ; http://www.etcgroup.org/en/node/4913 |
| International | Scientists from 15 different countries | Southern Ocean, Atlantic Sector, close to Cape Town (South Africa), patch of 38,5 km ² | 2000, spring | Ocean fertilization + | German Ministry of Research and Technology (BMBF), along with the European Union, the Netherlands and the UK | Project name: EisenEX; application of 2,350 kg Fe (4 t of FeSO ₄). | http://en.wikipedia.org/wiki/Fe_fertilization ; http://www.cbd.int/doc/publications/cbd-ts-45-en.pdf ; http://www.etcgroup.org/en/node/4913 |
| International | Among the countries involved: Canada (4 universities), New Zealand, China and Japan. | NE Pacific Ocean (Gulf of Alaska), patch of 77 km ² | 2002, summer | Ocean fertilization + | | Project name: SERIES (Subarctic Ecosystem Response to Fe Enrichment Study); 490 kg of Fe. | http://en.wikipedia.org/wiki/Fe_fertilization ; Boyd et al., 2004; http://www.cbd.int/doc/publications/cbd-ts-45-en.pdf ; http://www.etcgroup.org/en/node/4913 ; http://www.tos.org/oceanography/issues/issue_archive/issue_pdfs/22_3/22-3_strong.pdf |

WEATHER MODIFICATION

CO₂ = carbon dioxide, **FeSO₄** = iron sulfate, **ha** = hectare, **M** = million (1,000,000), **m** = meter, **m²** = square meter, **mi²** = square miles, **MW** = megawatt, **N** = nitrogen, **NO₂** = nitrogen dioxide, **NO_x** = nitrogen oxide, **O₂** = oxygen, **PO₄** = phosphate, **R&D** = research & development, **SO₂** = sulfure dioxide, **t** = tonne (1,000 kg)

| Geographic Information | | | Description | | Participants | | Sources |
|------------------------|-----------|---|---|-------------------------|--|---|--|
| Continent | State | Scale | Year | Type | Sponsor | Further Information | |
| S-America | Antigua | | 1984 | Increased Precipitation | | Project name: Antigua Cloud Seeding Project. Carried out by Weather Modification Inc. With aircraft for cloud seeding. | http://www.nawcinc.com/Wxmod.pdf ; http://www.weathermodification.com/projects.php?id=3 |
| S-America | Argentina | | 1991 | Increased Precipitation | | Tests carried out by Electrification Local Atmospheric Terrestrial. | http://theblanketeffect.blogspot.com/search/label/North%20American%20Programs |
| S-America | Argentina | Province of Mendoza, 1,500 - 1,950 km ² | 1978 - 1993, e.g. in 1993: Nov - Dec | Reduced Precipitation | Agricultural Industry | Against hail. carried out by Russian experts. | WMO reports 1993, 1994, 1984 |
| S-America | Argentina | Province of Mendoza; 3,200 km ² | 1998 - 2004; between 1999 - 2003, 60 days / year, Oct - Mar | Reduced Precipitation | Government & University | Against hail. Carried out by Weather Modification Inc. Project name: Mendoza hail suppression programme. With Aircraft for Cloud Seeding & Atmospheric Assessment and Evaluation. | WMO report 2002; http://www.weathermodification.com |
| S-America | Argentina | Anquincila, Catamarca | at least since 2004 | Reduced Precipitation | Private company | Bombing clouds to diminish hail. Carried out by big private fruit producers. Program provokes drought in small peasant communities. | http://urgente24.com/areax/2012/03/rompiendo-torres |
| Asia | Armenia | Mountainous terrain in the Lake Sevan Area, 5,000 km ² | 1978 - 1990, summer & winter | Increased Precipitation | probably public | | WMO reports 1993, 1994 |
| Asia | Armenia | 10,000 km ² ; Yerevan area | 1964 - 1993, every year | Reduced Precipitation | Government (Agricultural department) | Against hail. Project name: Modification of hydrometeorological processes. | WMO reports 1992, 1993, 1994 |
| Australia/Oceania | Australia | Feasibility Study, Queensland | 2008 | Increased Precipitation | Queensland Environmental Protection Agency | Carried out by Weather Modification Inc. Feasibility study for the augmentation of rain & air chemistry monitoring. Instrumented aircraft & crew for cloud seeding. | http://www.weathermodification.com/projects.php?id=25 |

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| Australia/Oceania | Australia | New South Wales Snowy Mountains | 2004 – 2009: winter | Increased Precipitation | Commonwealth Government and Snowy Mountain Company | Operator: Snow Hydro Limited. Project name: Snowy Precipitation Enhancement Research Project (SPERP). | http://theblanketeffect.blogspot.com/search/label/Australian%20Programs |
| Australia/Oceania | Australia | New South Wales Snowy Mountains. | 1955 – 1960: winter | Increased Precipitation | | | http://theblanketeffect.blogspot.com/search/label/Australian%20Programs |
| Australia/Oceania | Australia | Tasmania, 3,000 km ² target area; Central Plateau | 1992 (and probably longer); e.g. in 1992: May - Oct, 19 days | Increased Precipitation | Government (energy department) | Project name: DICSE - Tasmanian Cry-Ice Cloud Seeding Experiment, Stage III. | WMO report 1992 |
| Australia/Oceania | Australia | Tasmanian Central highlands, 8,233 km ² | 1998 - 2003 every year; e.g. in 2003: Apr - Nov, 28 days; in 2002: 244 days | Increased Precipitation | Government (energy department) | Project name: TASCO - Tasmanian Area Cloud Seeding Operation. Environmental Impact Study; Cost & Benefits Study. | WMO report 2003-2004, 2002 |
| Australia/Oceania | Australia | West Australian wheat belt, Morowa to Ballidu | 1980: May- Oct | Increased Precipitation | Government and Private Sector | Project name: Northern Wheat belt Cloud Study. | WMO report 1980 |
| Asia | Azerbaijan | 10,000 km ² | 1967 - 1991, every year; e.g. 105 hours of seeding in 1992 | Reduced Precipitation | Government | Against hail. Carried out by Kansas International Corporation later becoming CloudQuest. | WMO report 1992 |
| S-America | Brazil | State of Ceará | 1973 - 1980; e.g. in 1980: 175 days | Increased Precipitation | Government | Project name: Artificial Seeding Programme of the State of Ceará. | WMO report 1980 |
| S-America | Brazil | 400 km ² target area; 40°30'W; 9°24'S | 1971 - 1980; e.g. in 1980: 260 days, Jan - Jun, Nov - Dec | Increased Precipitation | Government | | WMO report 1980 |
| Africa | Burkina Faso | 15,000 km ² target area | 1998 - 1999, 2001 - 2011? ("present"); e.g. 17 days in 1999 | Increased Precipitation | Government | Project name: SAAGA; carried out by Weather Modification Inc. | WMO report 1999; http://www.weathermodification.com |

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| Asia | Cambodia | | 2005 | Increased Precipitation | Government | Cambodia has asked Bangkok for support to carry out cloud seeding (due to 14 of its 24 provinces hit by a drought). | http://theblanketeffect.blogspot.com/search/label/Asian%20Programs |
| Asia | Cambodia | | 1966/67 – 1972 | Increased Precipitation | US-army ? | "The US military admits to "Operation Popeye", a cloud seeding program in Cambodia, Laos, North and South Vietnam. The Pentagon says Popeye ran from 1966 through 1972. At least 2,600 flights spent over 47,000 units of cloud-seeding materials." | http://www.sunshine-project.org/enmod/chron.html ; http://globalresearch.ca/articles/GIL401A.html |
| N-America | Canada_Alberta | 48,000 km ² target area; Red Deer Industrial Airport | 1974 - 1980; e.g. In 1980: 25 days, May- Aug | Increased Precipitation | Government | Project name : Alberta Hail Project. | WMO report 1980 |
| N-America | Canada_Alberta | 26,000 km ² ; Lacombe to High River ("priority given to cities of Calgary and Red Deer") | 1996 – 2003, every year; e.g. in 2003: Jun-Sep, 27 days; in 2002: 43 days | Reduced Precipitation | Private insurance company | Against hail. Carried out by Weather Modification Inc. Project name: Alberta Hail Suppression Project. | http://www.weathermodification.com/projects.php?id=37 ; |
| N-America | Canada_BC | Campbell River Drainage | 1954 - 1960: winter | Increased Precipitation | British Columbia Hydro Company | Carried out by North American Weather Consultants, Inc. Enhanced winter precipitation for hydroelectric power production. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | Canada_BC | Ocean Falls | 1955 - 1957: winter | Increased Precipitation | Crown-Zellerbach Paper Company | Carried out by North American Weather Consultants, Inc. Enhanced winter precipitation for hydroelectric power production. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| S-America | Chile | 1,000 km ² , Cachapoal River Basin | 2000 - 2002, every year; e.g. in 2002: Apr – Sep, 16 days; in 2000: 12 days | Increased Precipitation | Government (Agriculture) | Project name: Precipitation Enhancement Programme Cahapoal River Basin. | WMO reports 2002, 2000 |

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| S-America | Chile | 30,000 km ² target area; Andean Sector | 1979 - 1980; e.g. in 1980: 14 days, May – Sep | Increased Precipitation | Air company | Project name: Precipitation Stimulation Project. | WMO report 1980 |
| S-America | Chile | 50 km ² | 1990 - 1998 with interruptions; e.g. in 1998: May – Sep: 60 days on average | Increased Precipitation | Government and private sector | Project name: Programa de Estimulacion de Precipitaciones CHI2. | WMO report 1998 |
| Asia | China | 80 km-radius area, above Hohhot, capital city of north China's Inner Mongolia Autonomous Region | 2007 | Increased Precipitation | | 3 planes, spreading silver iodide and 2.800 kg of diatomite into the clouds, to avoid rain during Olympic game opening ceremony | http://www.weathermodification.com/projects.php?id=66 |
| Asia | China | Hebei Province, 100,000 km ² | 1990 - 2002; e.g. 180 days from Mar - Oct in 2002 | Increased Precipitation | Government | Project name: Precipitation enhancement and research aspect of hail suppression (part I: precipitation). | WMO report 2002 |
| Asia | China | Hubei Province, 2,500 km ² target area | 1996 - 1999 every year; e.g. Jun - Sep in 1999 | Increased Precipitation | Government (research) | Project name: The experiment of precipitation enhancement with rockets. | WMO report 1999 |
| Asia | China | 10,000 km ² target area, Shaanxi Province | 1988 – 1999, every year; e.g. 70 days in 1999 (Mar - Jun & Sep - Oct) | Increased Precipitation & Reduced Precipitation | Government & Private sector (agricultural field) | Project name: Project of Precipitation Enhancement and Hail Suppression of Shaanxi Province. | WMO report 1999 |
| Asia | China | 100,000 km ² target area, Liaoning | 1992 – 1999, every year; e.g. Apr - Aug in 1999 | Increased Precipitation & Reduced Precipitation | Government (Agriculture) | Project name: National Precipitation Enhancement and Hail Suppression. | WMO report 1999 |
| Asia | China | 150,000 km ² | 1999, 160 - 200 days, from Apr - Aug | Increased Precipitation & Reduced Precipitation | Government (Agriculture, Weather Services, Research) | | WMO report 1999 |

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| Asia | China | 150,000 km ² ; all regions of Shandong province | 1967 - 2002, every year; e.g. 157 days from Mar - Oct in 1999, 52 days in 2002 | Increased Precipitation & Reduced Precipitation | Government (Weather Services) | Project name: Project of Precipitation Enhancement and Hail Suppression of Shandong Province. | WMO reports 1999, 2002 |
| Asia | China | 6,800 km ² target area, catchments of 2 reservoirs in Beijing province | 1990 - 2003, every year; e.g. Jan - Dec in 2002 for precipitation & 50 days from May - Oct for hail | Increased Precipitation & Reduced Precipitation | Government (Agriculture) | Project name: Precipitation enhancement / Hail suppression. | WMO reports 1999, 2003 |
| Asia | China | Anhui Province; 125,000 km ² | 1958 - 2002 with interruptions; e.g. 150 days in 2002 | Increased Precipitation & Reduced Precipitation | Government | Project name: Project of Precipitation Enhancement and Hail Suppression. | WMO report 2002 |
| Asia | China | Guangxi Province, 150,000 km ² target area | 1990 - 1999 every year; e.g. 40 days in 1999 for precipitation, 30 days for hail (Mar - Jun & Sept - Oct) | Increased Precipitation & Reduced Precipitation | Government (Agriculture and Hydrology) | Project name: Precipitation enhancement in spring. | WMO report 1999 |
| Asia | China | Henan province, 167,000 km ² target area | 1988 - 2002 every year; e.g. 57 days from Mar - Nov in 1999, 150 days from Mar - Oct in 2002 | Increased Precipitation & Reduced Precipitation | Government (Agriculture) | Project name: Weather modification and hail suppression optimal technical research. | WMO reports 1999, 2002 |
| Asia | China | Jilin Province, 200,000 km ² target area in 1999, 12,000 km ² in 2002 | 1958 - 2002 every year; e.g. 100 days from Apr - Jul in 1999, 150 days from Apr - Sep in 2002 | Increased Precipitation & Reduced Precipitation | Government (Agriculture, Forestry, Hydrology, Weather Services). | Project name: Weather modification operation. | WMO reports 1999, 2002 |

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| Asia | China | Qinghai Province, 75,000 km ² | 217 days in 2002: Mar - Nov for precipitation, Jun - Sep for hail | Increased Precipitation & Reduced Precipitation | Government | Project name: Precipitation enhancement over the upper yellow river and Eastern Qinghai. Hail Suppression in Northern and Eastern Qinghai. | WMO report 2002 |
| Asia | China | Target Area 3,500 km ² | 240 days from May - Oct in 1999 | Increased Precipitation & Reduced Precipitation | Government & private sector (both agricultural field) | | WMO report 1999 |
| Asia | China | Xinjiang Province, Northern Mountain area of Urungi | 240 days from May - Sept, 2001 - 2002. Some areas all year around. | Increased Precipitation & Reduced Precipitation | Government and Private Sector | Project name: Technical research in precipitation enhancement in Tian Shan Mountain area. | WMO report 2002 |
| Asia | China | Yunnan, target area 10,000 km ² | 1960 - 1999 every year; e.g. 150 days from May - Oct in 1999 | Increased Precipitation & Reduced Precipitation | Government (Agriculture, Forestry, Hydrology, Weather Services) | Project name: Yunnan Weather Modification. | WMO report 1999 |
| Asia | China | | 1959 - 1999 with interruptions; e.g. From Apr - Sept in 1999 | Increased Precipitation & Reduced Precipitation | | | WMO report 1999 |
| Asia | China | Hebei Province, 100,000 km ² | 1996 - 2002; e.g. 180 days from Mar - Oct in 2002 | Reduced Precipitation | Government | Against hail. Project name: Precipitation enhancement and research aspect of hail suppression (part II: hail). | WMO report 2003 |
| Central America | Costa Rica | 600 km ² , Laguna Arenal | 1994: Jul - Nov, 120 days | Increased Precipitation | Government | Project Name: Programa de Siembra de Nubes sobre Embalse Arenal. | WMO report 1994 |
| Africa | Cote d'Ivoire | South Coast, 9,000 km ² | 1986 - 1987, Dec - Apr | Increased Precipitation | University | According to the WMO report further years were planned | WMO report 1987 |
| Europe | Croatia | 11,000 km ² , Northern Croatia | 1970 - 1994 every year; e.g. in 1994: Jul - Oct, 102 days | Increased Precipitation | Government | Against hail. Project name: Hail Suppression (CR-2). | WMO report 1994 |

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| Europe | Croatia | 24,100 km ² , North Croatia between Sava and Drava rivers (11,000 km ² mentioned in 1992 & 1993) | 1971 - 2003 every year; e.g. in 2003: May – Sep, 153 days; in 2002: 44 days; in 2000: 54 days; in 1992: 13 days | Reduced Precipitation | Government (agricultural department) & private insurance company | Against hail. Project name: Croatian Hail Suppression System (CR-1). About 530 hail suppression stations. | WMO reports 2003-2004, 2002, 2000, 1992, 1993 |
| S-America | Cuba | Implemented in Camaguëy and the adjacent provinces of Ciego de Ávila and Las Tunas | 2005 - 2007, 2010 - 2011; e.g. in 2005: Aug - Oct, 21 days; in 2006: Sep - Oct; in 2007: Aug - Oct; in 2010: Sep – Oct | Increased Precipitation | Government | Project name: EXPerimento aleatorizado de siembra de nubes en AREas EXTensas, EXPAREX. | http://www.wmo.int/pages/prog/arep/wwrp/new/documents/OBS.Martinez_Cuba.pdf |
| S-America | Cuba | Eastern Cuba, mainly Holguín and Santiago de Cuba | 2005 - 2011 | Increased Precipitation | Government | Operator: Hidromet Chile. | http://www.hidromet.cl/experiencia.html |
| S-America | Cuba | In Camaguëy province and adjacent provinces: Ciego de Ávila, Las Tunas. Applications in a circular area (150 km) around the Camaguëy radar site | 1982 - 1990 | Increased Precipitation | Government | Project name: PCMAT - Proyecto Cubano de Modificación Artificial del Tiempo. | http://www.wmo.int/pages/prog/arep/wwrp/new/documents/OBS.Martinez_Cuba.pdf ; http://www.wmo.int/pages/prog/arep/wmp/documents/Martinez_et_al_Cuba_Russia3.pdf |
| S-America | DomRep | 6,000 km ² target area | 1984: May - Aug | Increased Precipitation | Government (Energy) | Project name: increased stream flow to dams. | WMO report 1980 |
| S-America | Ecuador | Canton Pujili, Cotopaxi | at least since 2009 | Reduced Precipitation | Private company: Nintanga and Provefrut | Cloud bombing to diminish hail and rain, affecting local communities. | http://www.dailymotion.com/video/xeh7ll_ecuador-danos-socio-ambientales-de_news , http://www.inredh.org/index.php?option=com_content&view=article&id=260%3Ade-manda-a-brocolera&Itemid=151 |

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| Africa | Eritrea | | 1994, 1995, 1997, 1998 | Increased Precipitation | Eritrean Ministry of Agriculture | rain enhancement, cloud bombing | http://www.bibliotecapleyades.net/ciencia/ciencia_rieich07.htm ; http://panacea-bocaf.org/droughtrelief.htm ; http://www.orgonelab.org/ResearchSummary2.htm |
| Europe | European Union, Austria | 1,800 km ² | 1985 - 2003 every year; e.g. in 2003: May - Aug, 24 days; in 2002: 16 days; in 1992: 30 days, May - Aug | Increased Precipitation | Private sponsor (agricultural field) | Project name: Hail test project Styria. | WMO reports 2003-2004, 2003, 1992 |
| Europe | European Union, Austria | 500 km ² , Lower Austria; Krem District | 1981 – 1999, every year; e.g. in 1999: Apr - Sep, 19 days; in 2002: May - Aug, 11 days; in 1992: 25 days | Reduced Precipitation | Private sponsor (agricultural field) | Against hail. Project name: Hail test project Lower Austria (HTP-NOE). | WMO reports 1999, 2002, 1992 |
| Europe | European Union, Bulgaria | 2,000 km ² , Southern Bulgaria | 1990 – 1993, every year; e.g. in 1992: 11 days, May – Sep | Increased Precipitation | Government (Research and Weather Services) | Project name: B-2. | WMO reports 1992, 1993, 1994 |
| Europe | European Union, Bulgaria | 16,683 km ² ; Northern Danube Plain and Upper Tracian Lowland 15,000 km ² in 1993 | 1969 - 2003; every year until 1992; e.g. in 2003: May - Sept, 36 days; in 2002: 48 days, Apr - Sep, 1993: May - Aug, 17 days | Reduced Precipitation | Government (Agricultural department) | Against hail. Project name: Bulgarian Hail suppression project; cost & benefit study. | WMO reports 2003-2004, 1999, 2002, 1992, 1993, |
| Europe | European Union, France | 60,000 km ² , Basin Aquitaine, Basin Rhodanien, Vallée de la Loire | 1952 - 2003 every year; e.g. in 2003: Apr - Oct, 59 days; in 1992: 50 days | Reduced Precipitation | Agricultural Association ("sans but lucrative") | Against hail. Environmental impact study and cost & benefits analysis. Project name: ANELFA - Association Nationale d'Etude et de lutte contre les fléaux Atmosphériques. | WMO reports 2003-2004, 1992 |

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| Europe | European Union, France | Department Tam et Garonne, Montauban, target area 400 km ² | 1995 - 2002 every year; e.g. in 2002: Apr-Sep; average 16 days | Reduced Precipitation | Private Sponsor: AEAG | Against hail. Project name: Test de lutte antigréle utilisant sels hygros copiques. | WMO report 2002 |
| Europe | European Union, France | 1,000 km ² , region of Lucern | 1974 preparation, 1977 – 1981 field operation; e.g. in 1980: 120 days, May to Sep | Reduced Precipitation | Government and private sector (agriculture, insurances) | Against hail. Project name: Grossversuch IV. | WMO report 1980 |
| Europe | European Union, Germany | Berlin | 1999: November | Reduced Precipitation | Research (University of Cottbus) | Against fog. | WMO report 1999 |
| Europe | European Union, Germany | Mountainous to hilly terrain on Northern side of Alps; 4,400 km ² , Rosenheim & Miesbach | 1975 – 2003, every year; e.g. in 2003: Apr - Sep, 19 days; in 2002: May - Sep, 19 days; in 1992: 23 days | Reduced Precipitation | County | Against hail. Project name: Hagelabwehr Hagelforschung Rosenheim. | WMO reports 2003-2004, 2002, 1992 |
| Europe | European Union, Germany | Oberschwaben, Southern Germany, Ravensburg | 1978 - 1980; e.g. in 1980: 30 days, May – Sep | Reduced Precipitation | Public and private sponsors | Against hail. Project name: Hail suppression in Oberschwaben. | WMO report 1980 |
| Europe | European Union, Germany | Stuttgart area, 2,500 km ² | 1979 - 1998 with interruptions; e.g. in 1980: 27 days, Apr-Oct; in 1992: 31 days | Reduced Precipitation | Public and Private sponsors | Against hail. Project name: Hail prevention project - Stuttgart area. | WMO reports 1998, 1980, 1992 |
| Europe | European Union, Greece | Mornos River Drainage | 1992 - 1993: winter | Increased Precipitation | Greater Athens Water Authority | Carried out by North American Weather Consultants, Inc. Precipitation for municipal water Supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |

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| Europe | European Union, Greece | 5,000 km ² target area, NW Greece in 2003; 2,350 km ² in 2002, | 1984 - 2003, with interruptions; e.g. in 2002: May – Sep, 24 days; in 1992: 121 days | Reduced Precipitation | Government (agricultural sector) | Against hail. Project name: Greek National Hail Suppression Program (ELGA). EIA and cost & benefit studies carried out. | WMO reports 2003-2004, 2002, 1992; http://www.w |
| Europe | European Union, Greece | 56 km ² target area in 5 different Greek provinces | 1982 – 2002, every year; e.g. in 2002: Apr - Oct; about 25 days/ year | Reduced Precipitation | Government (Agriculture) | Against hail. | WMO report 2002 |
| Europe | European Union, Hungary | 13,000 km ² target area in Southern Hungary, Baranya, Somogy, Tolna counties | 1991 - 2003 every year; e.g. in 2003: May – Sep, 40 days; in 2002: 39 days; in 1992: 35 days | Reduced Precipitation | Government & Private | Against hail. Project name: NEFELA Hail Suppression Association. | WMO reports 2003-2004, 2002, 1992 |
| Europe | European Union, Hungary | 1,500 km ² in Baranya county | 1976 - 1980; e.g. In 1980: 36 days, Apr - Oct | Reduced Precipitation | Government | Against hail. | WMO report 1980 |
| Europe | European Union, Italy | Mediterranean area and Southern Italy | 1985 - 1995 | Increased Precipitation | Government | Project name: Italian Rain Enhancement Project. | http://theblanketeffect.blogspot.com/search/label/European%20Programs |
| Europe | European Union, Italy | Southern Italy | since 1985, at least until 90s, ongoing ? | Increased Precipitation | Private and public | Project name: Progetto Pioggia. | http://theblanketeffect.blogspot.com/search/label/European%20Programs |
| Europe | European Union, Italy | Puglia region | 1 Nov 2004 - 30 Apr 2005 | Increased Precipitation | Research project | project name: FSPE - Feasibility Study for Precipitation Enhancement. | http://theblanketeffect.blogspot.com/search/label/North%20American%20Programs |
| Europe | European Union, Italy | 1,200 km ² target area; Central Switzerland | 1975 - 1980 (no field work in 1980) | Reduced Precipitation | Government | Against hail. Project name: Grossversuch IV. | WMO report 1980 |
| Europe | European Union, Italy | 2,000 km ² target area, Provincia di Vicenza | 1980: 42 days, Jun - Sep | Reduced Precipitation | Government | Against hail. Project name: Vicenza. | WMO report 1980 |
| Europe | European Union, Italy | Southern Italy | 2001 – 2003 | Reduced Precipitation | Government | Against hail. Project name: Climagri. | http://theblanketeffect.blogspot.com/search/label/European%20Programs |

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| Europe | European Union, Italy | Venice–Trieste Motorway | 1995 – 1998 | Reduced Precipitation | Public, in cooperation with Slovenian Government | Against fog. operator: TECNAGRO. | http://theblanketeffect.blogspot.com/search/label/European%20Programs |
| Europe | European Union, Portugal | District Evora, Castelo Branco, Coimbra | Feb.04 | Increased Precipitation | | | http://www.terradaily.com/2005/050223182149.f4orpp13.html |
| Europe | European Union, Slovenia | 9,700 km ² in 1992 & 1996; 3,000 km ² in 1993, Eastern Slovenia or NE Slovenia | 1972 – 1992 every year; e.g. in 1992: 20 days; in 1993: 13 days, Jun-Aug; in 1996: May-Sep, 19 days | Reduced Precipitation | Government (Agriculture + weather services) | Against hail. Project name: Hail suppression system of Slovenia. | WMO reports 1992, 1993, 1996 |
| Europe | European Union, Slovenia | Venice–Trieste Motorway | 1995 – 1998 | Reduced Precipitation | Public, in cooperation with Italian Government | Against fog. operator: TECNAGRO. | http://theblanketeffect.blogspot.com/search/label/European%20Programs |
| Europe | European Union, Spain | Duero River Basin | 1976 - 1983 | Increased Precipitation | Government | Project name: WMO Precipitation Enhancement Project or PEP. | http://theblanketeffect.blogspot.com/search/label/European%20Programs |
| Europe | European Union, Spain | 10,000 km ² ; Alava, La Rioja and Navarra Provinces | 1974 – 1998, with interruptions; e.g. in 1997: 42 days, May to Sep | Reduced Precipitation | Government (Agriculture) | Against hail. Project name: Interprovincial Project on Hail Suppression. | WMO report 1998 |
| Europe | European Union, Spain | Various township in Zaragoza and Teruel, 2,500 km ² in 1999; in 2000 350,000 ha in the same region (Aragon) | 1970 – 1999, every year; e.g. in 1999: May – Sep, 49 days | Reduced Precipitation | Government (Agriculture) | Against hail. Project name: 1999 Hail suppression project in Aragon. | WMO report 1999 |

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| Europe | former Yugoslavia | 69,509 km ² target area : Slovenia, North Croatia, SR of Bosnia & Herzegovina, Serbia, Macedonia | 1980: "15 - 72 days" | Reduced Precipitation | Government | Against hail. Project name: Hail suppression project. | WMO report 1980 |
| Europe | former Yugoslavia | Serbia, 66,000 km ² | 1967 - 1994 every year; e.g. in 1994: Apr – Oct | Reduced Precipitation | Government (agriculture) | Against hail. Project name: Hail suppression in Serbia. | WMO report 1994 |
| S-America | Guatemala | Guatemala, C. A.: Chixoy River Drainage | 1991, 1992, 1994: summer | Increased Precipitation | Empresa Electrica and Instituto Nacional de Electrificacion | Carried out by North American Weather Consultants, Inc. For hydroelectric power production. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/Wxmod.pdf |
| S-America | Honduras | Project Area: El Cajon Drainage Basins | 1993, 1994, 1995, 1997: summer | Increased Precipitation | Empresa Nacional De Energia Electrica | Carried out by North American Weather Consultants, Inc. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/Wxmod.pdf |
| S-America | Honduras | Agricultural area | 1948 | Reduced Precipitation | United Fruit Company | Seeding thunderclouds with dry ice to protect banana plantations. | http://books.google.ca/books?id=h_Mwgj_olHQC&pg=PA224&lpg=PA224&dq=Honduras+cloud+seeding&source=bl&ots=-89X4Mw8Bf&sig=Xci70JUhXXxQECzq2fSs30NynxY&hl=fr&sa=X&ei=NfpbT5e3K6Xz0gHE7qGIDw&ved=0CFgQ6AEwBQ#v=onepage&q=Honduras%20cloud%20seeding&f=false |
| Asia | India | 1,600 km ² target area in 1980; Maharashtra State | 1973 - 1980, 2003, 2004; e.g. 26 days from Jul - Sep in 1980 | Increased Precipitation | Government (1973 - 1980) | Project name: Warm cloud modification experiment, Maharashtra State, India. Carried out by Weather Modification Inc. In 2003 – 2004, under the project name "Prakalpa Varsha - Maharashtra Rainfall Enhancement Project". With aircraft for cloud seeding. | WMO reports 1980, 1992; http://www.weathermodification.com/projects.php?id=12 |
| Asia | India | | 2003 - 2004 | Increased Precipitation | | Carried out by Weather Modification Inc.; Project name: Andhra Pradesh Rainfall Enhancement Project. With aircraft for cloud seeding | http://www.weathermodification.com/projects.php?id=12 |

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| Asia | India | | 2003 | Increased Precipitation | | Carried out by Weather Modification Inc. Project name: Varuna - Karnataka Rainfall Enhancement Project. | http://www.weathermodification.com/projects.php?id=14 |
| Asia | India | Bihar (Eastern India) | 1967 | Increased Precipitation | CIA (USA) | Project name: Gromet; secret experiment to mitigate drought by cloud seeding. | Kristine Harper, "Climate control: United States weather modification in the cold war and beyond," Endeavour, Volume 32, Issue 1, March 2008, Pages 20–26: http://www.sciencedirect.com/science/article/pii/S0160932708000045 ; http://www.jstor.org/discover/10.2307/4129755?uid=3739448&uid=2129&uid=2&uid=70&uid=3737720&uid=4&sid=47698844184637 ; http://books.google.ca/books?id=zmdBon09PY0C&pg=PA182&lpg=PA182&dq=1.+India:+Project+GROMET+(1967),+weather+modification+(rainmaking)+to+end+Bihar+famine&source=bl&ots=WEjsCvIUu2&sig=WzSsDK4sIOlyXv3Zal8hEruontc&hl=fr&sa=X&ei=lw99T_-cKIGe8gTu-bDaDA&ved=0CDcQ6AEwAg#v=onepage&q=1.%20India%3A%20Project%20GROMET%20(1967)%2C%20weather%20modification%20(rainmaking)%20to%20end%20Bihar%20famine&f=false |
| Asia | Indonesia | 1,000 km ² target area; South Kalimantan & West Java | 1979 - 1980; e.g. 21 days in each operational months in 1980 (May, Jun, Sep, Dec) | Increased Precipitation | Government (research) | Project name: Rainmaking Experiment Project. | WMO report 1980 |
| Asia | Indonesia | Soroako area | 15. Apr - 30. May 2005 | Increased Precipitation | Public research project ? | Indonesia Feasibility Study | http://theblanketeffect.blogspot.com/search/label/North%20American%20Programs |
| Asia | Indonesia | | 2005 - 2007 | Increased Precipitation | | Carried out by Weather Modification Inc. Project name: BPPT Weather Modification Program. Rainfall enhancement and atmospheric assessment, and evaluation with aircraft for cloud seeding. | http://www.weathermodification.com/projects.php?id=15 |

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| Asia | Iran | Central Iran Yazd Kerman Esfahan Chahamahal; 300 km radius | 1999 - 2002; e.g. 90 days from Jan - Mar in 2002 | Increased Precipitation | Ministry of Energy | Project name Yazd 2001. | WMO report 2002; http://theblanketeffect.blogspot.com/search/label/Middle%20East%20Programs |
| Asia | Iran | Central part | 2004 - 2007 | Increased Precipitation | Government | | http://theblanketeffect.blogspot.com/search/label/Middle%20East%20Programs |
| Asia | Iran | Latian & Karaj dams located near Tehran | 1974 - 1978 | Increased Precipitation | Ministry of Energy | Carried out by a Canadian company. | http://theblanketeffect.blogspot.com/search/label/Middle%20East%20Programs |
| Asia | Iran | Yazd region, on the slopes of Shirkuh Mountains | 1989 - 1996 | Increased Precipitation | Ministry of Energy | | http://theblanketeffect.blogspot.com/search/label/Middle%20East%20Programs |
| Asia | Iraq | 10,000 km ² target area; Mosul area | 1983 | Increased Precipitation | Government (research) | Project name: Precipitation Enhancement in Mosul, Iraq. | WMO report 1980; http://www.wmo.int/pages/prog/arep/wmp/documents/Cloud%20seeding%20experiments%20in%20Arab%20countries.pdf |
| Asia | Israel | 5,000 km ² target area in WMO report 1999 & 2002, 16,000 km ² in 1980; in Northern Israel during operational phase, in Central & Southern Israel during experimental phase | 1960 - 1975 experimental, 1975 - 2002 operational, e.g. 180 days in 1992, 100 days in 1993, 1994 & 1996 | Increased Precipitation | Government (Agriculture, Hydrology) | Name: Israel Enhancement Project (EMS - Rain Enhancement). | WMO reports 1999, 2002, 1980, 1992, 1993, 1994, 1996 |
| Asia | Israel | Catchment area of Lake Kinneret | 1969 - 1975, during each rainfall seasons from Nov - Apr | Increased Precipitation | Government (Agriculture, Hydrology) | | http://theblanketeffect.blogspot.com/search/label/Middle%20East%20Programs |
| S-America | Jamaica | 11,500 km ² | 1989 – 1991, monthly | Increased Precipitation | Governmental project | Initiated due to drought problems. | WMO report 1991 |

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| S-America | Jamaica | Heritage and Mona Reservoir Areas, Central Jamaica | 1976: summer | Increased Precipitation | Kingston Water Commission | Carried out by North American Weather Consultants, Inc. For municipal water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/International.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| Asia | Japan | 1 - 10 km ² , over sea near Japanese Island | 1 day in Feb 1993 | Increased Precipitation | Research (weather services) | Feasibility study. Project name: Study of precipitation formation in snow clouds and feasibility of snow cloud modification by seeding. | WMO report 1993 |
| Asia | Japan | 500 km ² , Nigata and Gunma prefectures | 1994 - 2002 every year; e.g. 30 days in 1993 | Increased Precipitation | Government (Weather Services) | Project name: Study on feasibility of orographic snow cloud modification by seeding. | WMO reports 1999, 2002, 1996 |
| Asia | Jordan | 14,500 km ² ; Marka Airport | 1986 - 1998; e.g. 27 days in 1992 | Increased Precipitation | Heshamite Kingdom of Jordan | Project name: PEPG - Jordan Precipitation Enhancement Program; carried out by Weather Modification Inc. With aircraft. | WMO reports 1998, 1992; http://www.weathermodification.com/projects.php?id=17 |
| Asia | Jordan | Bought equipment (no data on its use) | 2003 | Increased Precipitation | | Carried out by Weather Modification Inc. Project name: Arab Automated Systems. Ground-based cloud seeding. | http://www.weathermodification.com/projects.php?id=16 |
| Asia | Jordan | North and West Jordan, 23,000 km ² | 1966 - 1999, every year; e.g. In 1999 from Jan - May & Oct - Dec | Increased Precipitation | Government | Project name: Jordan Precipitation Enhancement Project - PEPJ. | WMO report 1999; http://www.wmo.int/pages/prog/arep/wmp/documents/Cloud%20seeding%20experiments%20in%20Arab%20countries.pdf |
| Asia | Jordan | | 1987 - 1992 | Increased Precipitation | Jordanian Meteorological Department | Carried out by North American Weather Consultants, Inc. Research and training | http://www.nawcinc.com/International.pdf |
| Asia | Kazakhstan | Around Astana | 1998 | Reduced Precipitation | Probably Russia (through ROSHYDROMET) | Carried out by ROSHYDROMET (Russian Agency of Atmospheric Technology). To improve weather conditions for the city. | http://www.wmo.int/pages/prog/arep/wmp/documents/Koloskov_Russia.pdf |
| Asia | Korea, Republic of (South Korea) | 1,962 km ² , Mid-Eastern Korea: Andong catchment area | 1995 - 1996; e.g. 20 days from Jan - Nov in 1996 | Increased Precipitation | Research | Project name: Experimental Research of cloud seeding. | WMO report 1996 |

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| Asia | Korea, Republic of (South Korea) | 400 km ² target area, Kyungnam Province | 2000 - 2002, every year; e.g. 2 days in Mar 2001 | Increased Precipitation | Government | Project name : Development of Weather Modification Techniques in Korea. | WMO report 2002 |
| Asia | Korea, Republic of (South Korea) | Gangneung | 13 experiments, Jan - Feb 2006 | Reduced Precipitation | Government | | http://theblanketeffect.blogspot.com/search/label/Asian%20Programs |
| Africa | Libya | 60,000 km ² target area in 2002; 25,000 in 1993 & 1996, Northern Coastal areas in 2002, western coastal areas (Tafara Plain) in 1993 & 1996 | 1980 - 1996, every year, from 1996 - 2002 with interruptions; e.g. Oct - Dec 1996, Jan - Mar & Oct - Dec 1993 | Increased Precipitation | Government | Project name: National Cloud Seeding Research Centre | WMO reports 2002, 1993+94, 1996 |
| Africa | Libya | | Since 1972 | Increased Precipitation | | | http://theblanketeffect.blogspot.com/search/label/Middle%20East%20Programs |
| Europe | Macedonia | 8,000 km ² target area in 2003; in former years 25,000 km ² | 1971 – 2003, every year; e.g. in 2003: May – Sep, 20 days; in 1999: Jun - Oct; in 1993: 27 days, Apr-Oct, in 1996: 29 days, Apr - Oct | Reduced Precipitation | Government | Against hail. Project name: Hail suppression project. No evaluation. | WMO reports 2003-2004, 1999, 2002, 1993, 1994, 1996 |
| Africa | Madagascar | 1,000 km ² , SW, flat terrain | Dec - Mar 1992 | Increased Precipitation | Government | Project name: Augmentation of rainfall from convective and frontal clouds | WMO report 1992 |
| Africa | Madagascar | 10,000km ² in 1999; 40,000 km ² in 1980; Mahafaly and Androy regions | 1980 - 1999 (interrupted); e.g. 30 days Jul - Aug, Dec - Mar, in 1980 | Increased Precipitation | Government (Weather Services) | Project name: Combat drought | WMO reports 1999, 1980 |

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| Asia | Malaysia | | 1997 - 2005, every year; e.g. 58 days in 2003, 86 days in 2002 | Increased Precipitation | Government (Weather Services) | Project name: Drought Operation, no evaluation. | WMO reports 2003-2004, 2002; http://theblanketeffect.blogspot.com/search/label/Asian%20Programs |
| Asia | Malaysia | Kedah; 1,139 km ² target area | 1977 - 1980; e.g. 185 days in 1980 from Mar - Jul & Sep - Dec; 106 days in 1992 | Increased Precipitation | Government | Project name: Pedu Muda cloud seeding. | WMO reports 1980, 1992 |
| Asia | Malaysia | Mountainous terrain, 1,445 km ² | 1992; 3,5 months | Increased Precipitation | Government | | WMO report 1992 |
| Asia | Malaysia | North Perak, 3,356 km ² target area | 1979 - 1980; in 1980 328 days, Jan - Dec | Increased Precipitation | Government | Project name: Tememgor cloud seeding. | WMO report 1981 |
| Africa | Mali | 332 flights since 2007, e.g. near the town of Mopti, close to Burkina Faso | 2006 - 2011 | Increased Precipitation | Government (\$32,5 million from 2006 to 2010"); NCAR (National Center for Atmospheric Research) | Carried out by "American Consultants", probably Weather Modification Inc. for most/all flights. | http://www.journaldumali.com/article.php?aid=1601, http://waterlawblog.blogspot.com/2010/06/cloud-seeding-in-mali-multi-million.html, http://www.rap.ucar.edu/projects/westafrica/http://www.weathermodification.com/projects.php?id=18; http://desertification.wordpress.com/2009/10/15/bio-precipitation-or-cloud-seeding-for-faking-snow-in-the-desert-to-boost-rain-irin/; http://www.hutchnews.com/Localregional/pilotseeds |
| Africa | Mauritania | Over Nouakchott, Trarza, Adrar and Nouadhibou | Reported in 2009 | Increased Precipitation | | Cloud seeding | http://www.magharebia.com/cocoon/awi/xhtml1/en_GB/features/awi/newsbriefs/general/2009/09/23/newsbrief-06, http://desertification.wordpress.com/2010/01/13/mauritania-seeds-clouds-to-combat-desertification-google-magharebia/ |
| Africa | Mauritania | Desert area | Reported for 1998 | Increased Precipitation | Mauritius Research Council?? (reports a completed cloud seeding project on its website) | Article mentions cloud seeding with airplane from Morocco: "En 1998, l'avion ALGHAI a traversé les déserts de la mauritanie" | http://www.aeronautique.ma/AL-GHAIT-l-avion-qui-fait-la-pluie-et-le-beau-temps_a816.html; http://www.mrc.org.mu/LProjects.htm#WR |

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| Central America | Mexico | 20,000 km ² in Pueblo | 1971 - 1984 with interruptions in 1976, 1983, e.g. May – Oct in 1984 | Increased Precipitation | Government | With aircraft for cloud seeding. | WMO report 1984 |
| Central America | Mexico | 20,000 km ² target area in the State of Mexico | 1982 – 1984: May - Oct | Increased Precipitation | Government | With aircraft for cloud seeding. | WMO report 1984 |
| Central America | Mexico | Insisa, Port of Ensenada, Mexico | 1970 - 1976: winter | Increased Precipitation | Insisa | Carried out by North American Weather Consultants, Inc. Enhanced winter precipitation for municipal water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/International.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| Central America | Mexico | States of Coahuila and Durango in the North of Mexico | 1996 - 1999: summer | Increased Precipitation | Local government & Altos Hornos de México (steel factory) & the National Centre for Atmospheric Research in USA (NCAR). | Carried out by Weather Modification Inc. Project names: Program for the Augmentation of Rainfall in Coahuila (PARC) and the Durango Rainfall Induction Program (DRIP). With aircraft for cloud seeding. | http://www.nawcinc.com/Wxmod.pdf ; http://theblanketeffect.blogspot.com/search/label/African%20Programs ; http://ams.confex.com/ams/annual2001/techprogram/paper_18513.htm |
| Europe | Moldavia | 21,250 km ² ; "60% of the national territory" | 1964 – 2000, every year; e.g. in 1999: May - Aug, 31 days | Reduced Precipitation | Government (Agriculture) | Against hail. Project name: Prevention of Hail Damage. | WMO reports 1999, 2000 |
| Asia | Mongolia | Regions with forest fires | 1996: May - Sep, 10 days | Increased Precipitation | Government (research) | Project Name: Precipitation 3. | WMO report 1996 |
| Asia | Mongolia | 300 km ² | 1990 - 1992: e.g. 100 days in 1992 | Reduced Precipitation | Government | Against hail. Project name: "Hail". | WMO report 1992 |
| Asia | Mongolia | Agricultural region, 500 km ² | 1991 - 1996, every year; e.g. in 1996: May - Sep, 21 days; in 1994: 100 days | Reduced Precipitation | Private sector (Agriculture) & Government | Against hail. Project name: Hail suppression 7, Hail 94. | WMO reports 1996, 1993, 1994 |

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| Africa | Morocco | 14,300km ² , High Atlas mountains, central basin of Oum - Rbia basin oued el abid (16,400 km ² in 1993, 1996, 1999) | 1984 - 2003, every year; e.g. 30 days from Nov 2002 - Apr 2003, 17 days in 1992 | Increased Precipitation | Government (Weather Services) | Project name: ALCHAIT. Environmental Impact Assessment and cost & benefit studies. With Aircraft for Cloud Seeding. | WMO reports 2003-2004, 2002, 1992, 1993, 1994, 1996; http://www.weathermodification.com/projects.php?id=4 |
| Africa | Morocco | Probably in ALCHAIT area (see ALCHAIT project) | 1980 - 1985, e.g. 8 days from Jan - Jun in 1980 | Increased Precipitation | Bureau of Reclamation; Funding provided through USAID. | Project name: El Ghait. Morocco Air Traffic Control Training carried out by North American Weather Consultants, Inc. Training of Moroccan staff in controlling cloud seeding aircraft, training in field and classroom. | WMO report 1980; http://www.nawcinc.com/NAWC%20Research.pdf |
| Australia/Oceania | New Zealand | Hawkei Bay, 400 km ² | 1995 – 1996: Nov-Feb | Reduced Precipitation | Government | Against hail. Project name: Small scale hail cannon. | WMO report 1996 |
| Asia | Oman | Feasibility study & cloud seeding in the Dhahirah and Batinah regions | 2004, summer | Increased Precipitation | Oman's Ministry of Regional Municipalities, Water Resources and Environment (but NO information available on their website: http://www.omanet.om/english/commerce/econ11.asp?cat=comm) | "Oman's Ministry announced that his country is exploring rainmaking technology to solve its severe water shortage. Working with the American Institute for Rain Enhancement, Al Sulaimani's department plans to try seeding clouds with silver iodide particles this summer" | http://www.asr.ucar.edu/2004/RAP/precipitation-enhancement.htm ; http://www.source.irc.nl/page/12809 ; http://www.source.irc.nl/page/22957 |
| Asia | Pakistan | "A total of 48 experiments was conducted", e.g. in Thar desert, Cholistan, Khuzdar | Jun 2000 - Mar 2001 | Increased Precipitation | Pakistan Meteorological Department (PMD) | Tests to evaluate the potential for cloud seeding in Pakistan. | http://www.sciencevision.org.pk/BackIssues/Vol7/Vol7No3-4/Vol7No3&4_7_Feasibility_Augmenting_AnjumFarooqi.pdf ; http://theblanketeffect.blogspot.com/search/label/Middle%20East%20Programs |
| Asia | Pakistan | Baluchistan, NWFP, Punjab | 1953 - 1956 | Increased Precipitation | | | http://www.sciencevision.org.pk/BackIssues/Vol7/Vol7No3-4/Vol7No3&4_7_Feasibility_Augmenting_AnjumFarooqi.pdf |

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| Asia | Pakistan | In drought-hit Thar desert, Cholistan, Khuzdar and other area; 50 km ² radius | 2000: "24 cloud-seeding experiments conducted during Jul - Aug" | Increased Precipitation | Pakistan's Meteorological Department | | http://theblanketeffect.blogspot.com/search/label/Middle%20East%20Programs |
| S-America | Panama | 2 target areas: 3,620 km ² and 3,290 km ² ; Panama canal, Bayano river | 1980 - 1983; e.g. in 1980: 61 days, Jun - Aug | Increased Precipitation | Government | Project name: Emergency project to increase rain in the Panama Canal & region of the Bayano river. | WMO report 1980 |
| S-America | Peru | Upper and middle flow of Mantara River (1992), 9,000km ² (1993) | 1992 - 1993: 120 days in 1992, Jan - Mar in 1993 | Increased Precipitation | Government | Project name: Modification Artificial Del Tiempo. | WMO reports 1992, 1993 |
| Asia | Philippines | In the Visayas in 1997, later-on in major farming areas such as northern Luzon and the Southern Island of Mindanao. | 1997 - 2005 (probably longer) | Increased Precipitation | Government | | http://theblanketeffect.blogspot.com/search/label/Asian%20Programs |
| Asia | Philippines | Nationwide, depending on requests; 3,166 km ² per operation | 1968 - 1998; every year; e.g. in 1998: at least 20 days at each site /year; throughout the year | Increased Precipitation | Government (Agriculture) | | WMO report 1998 |
| S-America | Puerto Rico | Southern parts | Apr - Jul 1965: 2,557 hours from the soil during 47 days, 35 days with 90 hours from air. | Increased Precipitation | Government | | http://journals.ametsoc.org/doi/pdf/10.1175/1520-0450(1966)005%3C0692%3ACSI%20SPR%3E2.0.CO%3B2 ; http://adsabs.harvard.edu/abs/1966JApMe...5..692H |

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| S-America | Puerto Rico | Watershed of the Carraizo Dam | 6. Aug 1974 - 5. Sep 1974 | Increased Precipitation | | | http://books.google.ca/books/about/The_Puerto_Rico_Weather_Modification_Pro.html?id=UZr7PAAACAAJ&redir_esc=y |
| Asia | Russian Federation - in this case Former Soviet Union | Dnepropetrovsk region (Ukrainian territory); Armenian SSR, St. Petersburg region, Kashkadarinska ya region (Uzbekistan); target areas 100 - 5,000 km ² | 1978 - 1983; until 1980: 6 - 40 days | Increased Precipitation | Government | Project name: Precipitation enhancement. | WMO report 1980 |
| Asia | Russian Federation - in this case Former Soviet Union | Mountainous terrain in Yory River and Paravany Lake Basins, Two target areas: 1,000 km ² (Yory River Basin) 2,200 km ² (Paravany Lake Basin) | 1978 - 1990; Apr - Oct | Increased Precipitation | Government | Project name: Yory Project. | WMO reports 1993, 1994 |

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| Asia | Russian Federation - in this case Former Soviet Union | Several hail suppression projects in Uzbek SSR, Azerbaijan SSR, Crime region, Georgian SSR, Armenian SSR, Moldavian SSR, Odessa region; Tajik SSR, North Caucasus; target areas between 1,000 - 19,700 km ² | 1965 - 1980 (not in all areas for the entire period): Apr - Oc; 15 - 86 days | Reduced Precipitation | Government | Against hail. Project name: Hail Suppression. | WMO report 1980 |
| Asia | Russian Federation - in this case Former Soviet Union | Eastern Georgia; Two targets: 7,500 km ² , 4,500 km ² | 1978 - 1983; May - Sep | Reduced Precipitation | Government | Project name: Suppression of lightning from convective and frontal clouds. | WMO reports 1993, 1994 |
| Asia | Russian Federation - in this case Former Soviet Union | Eastern Georgia; Two target areas: 7,500 km ² , 4,500 km ² | 1961 - 1990: Apr - Oct; Seeded units: 1.420 days | Reduced Precipitation | Government | Against hail. Project name: Suppression of hail from convective and frontal clouds. | WMO reports 1993, 1994 |
| Asia | Russian Federation/Former Soviet Union | Southern part of Russia (Region of Stavropol and in Kalmik Republic) target area 90,000 km ² in 2003; 60,000 in 2002 | 1986 - 2003, every year; e.g. in 1999: May - Oct, 60 days; in 2003: Apr - Sep, 97 days | Increased Precipitation | Government (Agricultural and Meteorological Services) | Project name: Regulation of precipitation Airplane laboratory. EIA and cost & benefit analysis. | WMO report 2003-2004, 1999 |

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| Asia | Russian Federation/Former Soviet Union | Northern Caucasus | 1960 - 1999, every year; e.g. in 1999: Apr - Sep, 40 days; in 1980: 43 days, May - Sep | Reduced Precipitation | Government (Agricultural and Meteorological Services) | Against hail. Project name: "Hail Suppression". To protect crops. | WMO reports 1999, 1980 |
| Asia | Saudi Arabia | 130,000 km ² | 1998, 1999, 2004, 2006, 2007 - 2011: during winter | Increased Precipitation | Government (Weather Services) | Carried out by Weather Modification Inc. Project name: Saudi Arabia Rain Enhancement Project. With Aircraft for Cloud Seeding. | WMO report 1999; http://www.weathermodification.com/projects.php?id=18 |
| Asia | Saudi Arabia | Abha area | 2004: July - Aug | Increased Precipitation | Public research project ? | Project name: SAREFS - Saudi Arabia Rainfall Enhancement Feasibility Study. | http://theblanketeffect.blogspot.com/search/label/North%20American%20Programs |
| Asia | Saudi Arabia | Siydah area | 2006 - 2007: Nov - Nov | Increased Precipitation | Public research project ? | Project name: KPASA - Program for assessment of rainfall augmentation. | http://theblanketeffect.blogspot.com/search/label/North%20American%20Programs |
| Asia | Saudi Arabia | | since 1990 | Increased Precipitation | | | http://theblanketeffect.blogspot.com/search/label/Middle%20East%20Programs |
| Africa | Senegal | 35 interventions in Linguere and Kounghoul | after SENREP (SENREP was carried out until 2006) | Increased Precipitation | Government | Project name: BAWAAN. Cloud-seeding ground- and air-based. | ftp://ftp.wmo.int/Documents/PublicWeb/arep/Weather_Mod_Bali/SEE%20stasenko/SEE.Mamina_Camara_Senegal.pdf ; http://www.wmo.int/pages/prog/arep/wwrp/new/documents/OBS.Sarr_Senegal.pdf |
| Africa | Senegal | Southern parts | 2005 – 2006, Jun – Oct | Increased Precipitation | Government | Project name: SENREP | http://www.wmo.int/pages/prog/arep/wwrp/new/documents/OBS.Sarr_Senegal.pdf |
| Africa | Senegal | | 2011 | Increased Precipitation | Ministry of Armed Forces, Senegal | Carried out by Weather Modification Inc. with aircraft for Cloud Seeding | http://www.weathermodification.com/projects.php?id=5 |
| Europe | Serbia and Montenegro | Serbia, 77,134 km ² target area; 66,000 km ² in 1993 & 1996 | 1967 - 2003 every year; e.g. in 2003: Apr - Oct, 54 days; in 1999: Jul-Oct, 80 days; in 2002: 72 days; in 1993: 39 days | Reduced Precipitation | Private agricultural sponsor in 2003, Government in 1999, 1993, 1996 | Against hail. Project name: Hail suppression system in Serbia. | WMO reports 2003-2004, 1999, 2002, 1996, 1993 |

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| Asia | Singapore | 6 spots in a wildlife reserve in Kendawangan, Ketapang District, West Kalimantan Province in 2006 | 2006: from September on | Increased Precipitation | Public | To trigger rain in forest fire areas. | http://theblanketeffect.blogspot.com/search/label/Asian%20Programs |
| Asia | Singapore | Sumatra, Singapore | 2011 | Increased Precipitation | Government | Against fires. | http://forum.prisonplanet.com/index.php?topic=217255.0 |
| Africa | South Africa | 10,000 km ² | 1991 - 1999 (not every year); e.g. Oct - Dec in 1999 | Increased Precipitation | Government (Hydrology, Research, Weather services) | Project name: South African Rainfall Enhancement Programme (SAREP). With aircraft for cloud-seeding. | WMO report 1999; http://www.weathermodification.com/projects.php?id=6 ; http://theblanketeffect.blogspot.com/search/label/African%20Programs ; http://old.weathersa.co.za/Projects/CloudDetail.jsp |
| Africa | South Africa | 20,000 km ² | 1992, Jan - Mar & Oct - Dec | Increased Precipitation | | | WMO report 1992 |
| Africa | South Africa | | 1971 - 80's | Increased Precipitation & Reduced Precipitation | SA Weather Service (crop insurance company), Water Research Commission | Project name: Bethlehem Precipitation Research Project. | http://old.weathersa.co.za/Projects/BPRPBackground.jsp |
| Africa | South Africa | Nelspruit area | 1972 - 80's | Reduced Precipitation | | Against hail. Carried out by Kansas International Corporation later becoming CloudQuest. | http://old.weathersa.co.za/Projects/CloudDetail.jsp |
| Europe | Switzerland | Lugana region | Probably around 2004-05 | Increased Precipitation | Research project | AEROTECH SA (involved as operator?). Feasibility study. | http://theblanketeffect.blogspot.com/search/label/North%20American%20Programs |
| Europe | Switzerland | | 1986 | Reduced Precipitation | | "Some people use hail canons in an attempt to suppress hail but there is no control or collection of information concerning these activities" | WMO report 1986 |

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| Asia | Syria | Countrywide, 125,000 – 170,000 km ² - depending on year | 1991 - 2002, every year; e.g. in 1999: Jan - May, Nov - Apr, 50 days; in 2002: 18 days | Increased Precipitation | Government (agriculture) | Project name: Precipitation enhancement project. Partly with support from Russia. | WMO reports 1999, 2000, 1993, 1994 http://theblanketeffect.blogspot.com/search/label/African%20Programs |
| Asia | Taiwan | Central and Southern Taiwan, Tsengwen Dam Drainage | 1992, 1994: summer | Increased Precipitation | Taiwan Central Weather Bureau | Carried out by North American Weather Consultants, Inc. For irrigation water supplies. | http://www.nawcinc.com/Wxmod.pdf , http://www.nawcinc.com/NAWC%20Research.pdf , http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , http://www.nawcinc.com/International.pdf |
| Asia | Tajikistan | Gissar and Vakhsh Valleys | 1964 - 2000 every year: during agricultural growing period | Reduced Precipitation | Government (Agriculture) | Against hail. Project name: Hail in Tajikistan. | WMO reports 1999, 2000 |
| Africa | Tanzania | | Since 1997? | Increased Precipitation | | Tanzania imported rain-making technology from Thailand. With aircraft for cloud seeding. | http://www.weathermodification.com/projects.php?id=10 ; http://theblanketeffect.blogspot.com/search/label/African%20Programs |
| Asia | Thailand | 5,080 - 12,000 km ² target area | 1971 - 1980; e.g. In 1980: 100 - 200 days in Mar - Oct | Increased Precipitation | Government | Project name: Royal Rainmaking Operational Research & Development Project. | WMO report 1980 |
| Asia | Thailand | Minister Thira said that the Bureau has established 8 regional rainmaking operations centers covering 76 provinces in 25 major water basins. | since 2007 | Increased Precipitation | Bureau of Royal Rainmaking and Agricultural Aviation | | http://theblanketeffect.blogspot.com/search/label/Asian%20Programs |

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| Asia | Thailand | National scale - over the important water basins and agricultural areas of Thailand | since Nov 1955 (until ?): Feb - Oct | Increased Precipitation | Government | Cloud seeding | http://jcsepa.mri-jma.go.jp/outreach/20070131/Abstracts/S3_Khantiyanan.pdf |
| Asia | Thailand | | 1996 – 1998 | Increased Precipitation | Bureau of Royal Rainmaking and Agricultural Aviation (BRRAA) | Carried out by Weather Modification Inc. Cloud seeding with aircraft. | http://www.weathermodification.com/projects.php?id=19 ; http://theblanketeffect.blogspot.com/search/label/Asian%20Programs |
| Europe | Turkey | Istanbul watersheds | 1990 - 1991, 2001 - 2002, ongoing ?; during winter months | Increased Precipitation | Government, National Centre of Atmospheric Research (NCAR) | Project Names: Iski Rain Enhancement Program (WMO). Later-on Precipitation Augmentation Program and Research on Istanbul Clouds and Aerosols (PAPRICA); carried out by Just Clouds | WMO report 1991; http://www.weathermodification.com/projects.php?id=27 ; http://www.just-clouds.com/istanbul.asp |
| Europe | Turkey | | 1991 – 1994 | Increased Precipitation | | Carried out by Weather Modification Inc. Project name: ISKI Rain Enhancement Program. With aircraft for cloud seeding. | http://www.just-clouds.com/istanbul.asp |
| Europe | Turkey | | 1993 – 1995 | Increased Precipitation | Petkim Petrokimya Holding, A.S. | Carried out by Weather Modification Inc. Project name: Petkim Petrokimya Holding, A.S. Rain Enhancement Program. With aircraft for cloud seeding. | http://www.weathermodification.com/projects.php?id=28 |
| Africa | Uganda | | 1999 | Increased Precipitation | Government (Agriculture, Hydrology, Weather services) | Research project | WMO report 1999 |
| Europe | Ukraine | 5,000 km ² ; Dnepropetrovsk district | 1960 – 1992, every year; e.g. in 1992: 38 days | Increased Precipitation | Government (Agriculture) | Project name: Precipitation Enhancement Dnepropetrovsk district. | WMO report 1992 |
| Europe | Ukraine | Crimnea Peninsula; 5,010 km ² target area | 1968 – 2000, every year; e.g. in 2000: May-Sep, 6 days | Reduced Precipitation | Government (Agriculture) | Against hail. Project name: Hail Neutralization. | WMO reports 2000, 1992 |

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| Europe | Ukraine | Odessa District; 4,000 km ² | For 13 years until 1992; e.g. in 1992: May – Sep | Reduced Precipitation | Government (weather service) | Against hail. | WMO report 1992 |
| Asia | United Arab Emirates | Abu Dhabi | 1982: winter | Increased Precipitation | Abu Dhabi Municipality | Carried out by North American Weather Consultants, Inc. For agricultural water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/International.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| Asia | United Arab Emirates | Abu Dhabi and various other places | 2000 - 2007 and maybe longer | Increased Precipitation | Public research project ? | UAE Field Project - UAE Rainfall and Air Chemistry Project. Feasibility study for the potential for rainfall enhancement via cloud seeding. | http://theblanketeffect.blogspot.com/search/label/North%20American%20Programs |
| Asia | United Arab Emirates | Oman Mountains, southeast of Al Ain and northward | 2001 – 2002: winter and summer | Increased Precipitation | Government | Carried out by Weather Modification Inc. Project name: U.A.E. Rainfall Enhancement and Air Chemistry Studies – DWRS. With Aircraft for Cloud Seeding. | http://www.weathermodification.com/projects.php?id=21 , http://theblanketeffect.blogspot.com/search/label/Middle%20East%20Programs |
| Asia | United Arab Emirates | | 1990 – 1993 | Increased Precipitation | Government | Carried out by Weather Modification Inc. Project name: U.A.E. Rain Enhancement Program. With aircraft for cloud seeding. | http://www.weathermodification.com/projects.php?id=20 , http://theblanketeffect.blogspot.com/search/label/Middle%20East%20Programs |
| N-America | USA | Western USA | 1966 – 1969: winter | Increased Precipitation | Bureau of Reclamation | Carried out by North American Weather Consultants, Inc. Research on Large Scale Effects of Cloud Seeding. | http://www.nawcinc.com/NAWC%20Research.pdf |
| N-America | USA-Alaska | Elmendorf, AFB Alaska | 1971 - 1980; e.g. In 1979/80: 10 days, Nov- Feb | Reduced Precipitation | Military | Against fog. Project name: Cold Fog dissipation system. | WMO report 1980 |

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| N-America | USA-Arizona | Lower Colorado basin & adjacent basins in Arizona & Central Arizona Project Canal | 60's, 70's, 80's | Increased Precipitation | Public project (BuRec) | BuRec weather modification program (USA bureau of Reclamation = BuRec) for arid regions in US, in 17 western states. | http://ag.arizona.edu/azwater/arroyo/061wthr.html |
| N-America | USA-Arizona | Salt and Verde Watersheds; 13,000 mi ² watershed | During 1950' and 60': "a series of ground-based seeders was set up" | Increased Precipitation | Public project | Project name : Salt River Project (SRP). | http://ag.arizona.edu/azwater/arroyo/061wthr.html |
| N-America | USA-Arizona | | Since 1989 | Increased Precipitation | Public sponsor: AMP- Federal-State Cooperative Atmospheric Modification Program. | Project name: National Oceanic and Atmospheric Administration (NOAA) - Atmospheric Modification Program. Cloud seeding & later-on computer modeling. Sponsoring goes to the University of Arizona's, Department of Atmospheric Physics to do the scientific work for the project. | http://ag.arizona.edu/azwater/arroyo/061wthr.html |
| N-America | USA-California | "From a mountaintop" | 1989 – 1993: winter | Increased Precipitation | California Department of Water Resources | Carried out by North American Weather Consultants, Inc. Sulphur Hexafluoride Tracer Tests. | http://www.nawcinc.com/NAWC%20Research.pdf |
| N-America | USA-California | Catalina Island | 1977 - 1978: winter | Increased Precipitation | Southern California Edison, Co. | Carried out by North American Weather Consultants, Inc. Enhanced winter precipitation for municipal water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-California | Crane Valley in the Central Sierra Nevada of California | 1954 - 1959: winter | Increased Precipitation | Pacific Gas and Electric Company | Carried out by North American Weather Consultants, Inc. Enhanced winter precipitation for hydroelectric power production. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |

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| N-America | USA-California | Kings River area; 2,225 mi ² (Upper Kings River Drainage in the Southern Sierra Nevada of California) | 1989 - 1993; 2007-2011: winter | Increased Precipitation | Kings River Conservation District and Kings River Water Users Association | Carried out by North American Weather Consultants, Inc. For irrigation and hydroelectric power generation. | http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-California | Lake Almanor Drainage, in the Northern Sierra Nevada of California | 1952 - 1960: winter | Increased Precipitation | Pacific Gas and Electric Company | Carried out by North American Weather Consultants, Inc. For hydroelectric power production. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-California | Lake Spalding Drainage, in the Northern Sierra Nevada of California | 1976 -1977: winter | Increased Precipitation | Pacific Gas and Electric Company | Carried out by North American Weather Consultants, Inc. For hydroelectric power production. | http://www.nawcinc.com/Wxmod.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-California | Mokelumne & Stanislaus Rivers, in the Central Sierra Nevada of California | 1952 - 1960: winter | Increased Precipitation | Pacific Gas and Electric Company | Carried out by North American Weather Consultants, Inc. For hydroelectric power production. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-California | San Benito County | 1964 - 1966: winter | Increased Precipitation | San Benito County | Carried out by North American Weather Consultants, Inc. For irrigation water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-California | San Diego County | 1950 - 1951; 1956 – 1957: winter | Increased Precipitation | San Diego County Weather Corporation | Carried out by North American Weather Consultants, Inc. For municipal water supplies. | http://www.nawcinc.com/Wxmod.pdf http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-California | San Gabriel Mountains | 1959 - 1973, 1991 - 1993, 1997 - 2001; e.g. from Oct 1968 - Sep 1969 | Increased Precipitation | Los Angeles County Flood Control District | Carried out by North American Weather Consultants, Inc. For municipal and irrigation water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |

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| N-America | USA-California | Santa Ana River Basin | 1956 - 1960: winter | Increased Precipitation | Santa Ana River Weather Corporation | Carried out by North American Weather Consultants, Inc. For municipal water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-California | Santa Barbara County | 1998 - 2001: winter | Increased Precipitation | Santa Barbara County Water Agency | Carried out by Weather Modification Inc. | http://www.weathermodification.com/projects.php?id=31 ; North American Weather Consultants Operational cloud seeding programs through April 2011 |
| N-America | USA-California | Santa Barbara County | 1967 - 1974, winter | Increased Precipitation | Naval Weapons Centre at China Lake | Carried out by North American Weather Consultants, Inc. Design, operation, and evaluation of a randomized winter research with groundbased and airborne cloud seeding methods tested. | http://www.nawcinc.com/NAWC%20Research.pdf |
| N-America | USA-California | Santa Barbara, 500 mi ² | 1950 - 1953; 1955; 1956 - 1960; 1978; 1982 - 1997; 2002 - 2007; 2008 - 2011: winter | Increased Precipitation | Santa Barbara County and California Department of Water Resources | Carried out by North American Weather Consultants, Inc. For municipal and agricultural water supplies. | http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed ; http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Research.pdf |
| N-America | USA-California | Santa Clara County | 1992: winter | Increased Precipitation | Santa Clara Valley Water District | Carried out by North American Weather Consultants, Inc. For municipal and agricultural water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-California | Sierra Nevada, Tahoe & Truckee Basins | 2011 - 2012: winter | Increased Precipitation | no sponsor mentioned (costs covered by DRI?) | DRI (Desert Research Institute) Cloud Seeding Program. Ground-based and aircraft. | http://www.dri.edu/current-operations/2340-cloud-seeding-tahoe-truckee |
| N-America | USA-California | Stanislaus | 2007 - 2011: winter | Increased Precipitation | | Carried out by Weather Modification Inc. Project name: Stanislaus Weather Modification Program. | http://www.weathermodification.com/projects.php?id=53 |
| N-America | USA-California | Upper American River; 190 mi ² | 2008 - 2011: Nov 15 - May 15 | Increased Precipitation | Sacramento Municipal Utility District | Carried out by Weather Modification Inc. Project name: Upper American River Cloud Seeding Project. With aircraft for cloud seeding. | http://www.weathermodification.com/projects.php?id=41 ; http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed |

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| N-America | USA-California | Upper Feather River Drainage in the Northern Sierra Nevada | 1989: winter | Increased Precipitation | California Department of Water Resources | Carried out by North American Weather Consultants, Inc. For municipal and irrigation water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf |
| N-America | USA-California | Upper San Joaquin River Drainage, Southern Sierra Nevada of California | 1951 - 1987 & 1990 - 1992: winter | Increased Precipitation | Southern California Edison Company | Carried out by North American Weather Consultants, Inc. For hydroelectric power production. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf ; North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-California | Upper Tuolumne River | 2007 - 2011: winter | Increased Precipitation | | Carried out by Weather Modification Inc. Project name: Upper Tuolumne River Weather Modification Program. With aircraft for cloud seeding. | http://www.weathermodification.com/projects.php?id=55 |
| N-America | USA-California | Ventura County | 1957 - 1960: winter | Increased Precipitation | Ventura County | Carried out by North American Weather Consultants, Inc. For irrigation and municipal water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-California | Walker Basin: Lyon, Douglas and Mineral counties in Nevada and in Mono and Tuolumne counties in California | 2011 – 2012: winter | Increased Precipitation | no sponsor mentioned (costs covered by DRI ?) | Project name: DRI (Desert Research Institute) Cloud Seeding Program. Walker River Basin Cloud Seeding Project. Ground based and aircraft. | http://www.dri.edu/current-operations/2408-cloud-seeding-operations-walker-basin ; http://www.usbr.gov/newsroom/newsrelease/detail.cfm?RecordID=34342 |
| N-America | USA-Colorado | Upper Roaring Fork Basin | 2011 – 2012: winter | Increased Precipitation | Colorado Springs Utilities | Project name: Upper Roaring Fork Basin Program. | http://cwcb.state.co.us/water-management/water-projects-programs/Pages/PermitAreas.aspx |

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| N-America | USA-Colorado | Western San Juan Mountains; > 2,200 mi ² (Eastern and Western program) | 2011 - 2012 (and several years before): winter | Increased Precipitation | Colorado Water Conservation Board, South-western Water Conservation Dist., New Mexico Interstate Stream Commission E. San Juan - SWCD, Pine River Irrigation Dist., Pagosa Area W & S, San Juan WCD W. San Juan - SWCD, Dolores WCD, Durango Mtn. Resort, Animas La Plata WCD, City of Durango | Project name: Western San Juan Mountains Program. | http://cwcb.state.co.us/water-management/water-projects-programs/Pages/PermitAreas.aspx , http://cwcb.state.co.us/water-management/water-projects-programs/Documents/WeatherModification/PermitAreas/SanJuanMountainsTargetAreas.pdf ; http://cwcb.state.co.us/water-management/water-projects-programs/Pages/PermitAreas.aspx |
| N-America | USA-Colorado | Arapahoe Basin, Keystone, Winter Park, and Breckenridge (central Colorado mountains) | 2011 - 2012: winter | Increased Precipitation | Among others: Denver Water | Carried out by Western Weather Consultants. | http://www.adventure-journal.com/2011/11/let-it-snow-colorado-cloud-seeding-bets-on-make-it-snow/ |
| N-America | USA-Colorado | Central Colorado Rockies | 2011 - 2012: winter | Increased Precipitation | Denver Water and Winter Park | Project name: Central Colorado Rocky Mountains Program. | http://cwcb.state.co.us/water-management/water-projects-programs/Pages/PermitAreas.aspx |

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| N-America | USA-Colorado | Central Colorado Rockies (blue, upper blue, snake, williams fork and upper south plate drainage river basin), 3,700 km ² | 2002 - 2003: Nov - Apr | Increased Precipitation | Denver Water | Project name: Denver Water Cloud Seeding Program. Operator: Western Water consultants. | http://cwcbweblink.state.co.us/weblink/0/doc/105271/Page1.aspx?searchid=ec50a821-e00e-47b6-97db-11954927908a ; http://www.denverwater.org/docs/assets/971EA1F4-9F8E-1C76-10AB2BDB2FD71046/102809_2a1.pdf ; |
| N-America | USA-Colorado | Colorado River Basin; in Southwestern Colorado | 1972 - 1976: winter | Increased Precipitation | Bureau of Reclamation | Carried out by North American Weather Consultants, Inc. Program name: Colorado River Basin Pilot Project (CRBPP). research project. | http://www.nawcinc.com/NAWC%20Research.pdf |
| N-America | USA-Colorado | Eastern San Juan Mountains, Pagosa Area Water and Sanitation District, San Juan WCD, Southwestern WCD, > 2200 mi ² | 2011 - 2012 (and several years before): winter | Increased Precipitation | Colorado Water Conservation Board, Southwestern Water Conservation Dist., New Mexico Interstate Stream Commission E. San Juan - SWCD, Pine River Irrigation Dist., Pagosa Area W & S, San Juan WCD W. San Juan - SWCD, Dolores WCD, Durango Mtn. Resort, Animas La Plata WCD, City of Durango | Project name: Eastern San Juan Mountains Program. | http://cwcb.state.co.us/water-management/water-projects-programs/Pages/PermitAreas.aspx ; http://cwcb.state.co.us/water-management/water-projects-programs/Documents/WeatherModification/PermitAreas/SanJuanMountainsTargetAreas.pdf ; http://cwcb.state.co.us/water-management/water-projects-programs/Pages/PermitAreas.aspx |

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| N-America | USA-Colorado | Grand Mesa and West Elk Mountains of Western Colorado | 1990 - 1991: winter | Increased Precipitation | Grand Mesa Water Users Association | Carried out by North American Weather Consultants, Inc. For irrigation water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Colorado | Grand Mesa area of Colorado and the Mogollon Rim Area of Arizona. | 1985 - 1987: winter | Increased Precipitation | Bureau of Reclamation; | Carried out by North American Weather Consultants, Inc. Program name: CRADP (Colorado River Augmentation...). Atmospheric tracer studies utilizing sulphur hexafluoride. | http://www.nawcinc.com/NAWC%20Research.pdf |
| N-America | USA-Colorado | Grand Mesa area of Colorado; 869 mi ² | Since ~ 2002 - 2011: winter | Increased Precipitation | Water Enhancement Authority which is comprised of Collbran WCD, Fruitland Mesa WCD, Crawford WCD, Grand Mesa Pool | | http://cwcb.state.co.us/water-management/water-projects-programs/Documents/WeatherModification/PermitAreas/GrandMesaTargetAreas.pdf ; http://cwcb.state.co.us/water-management/water-projects-programs/Pages/PermitAreas.aspx |
| N-America | USA-Colorado | Gunnison County: Upper Gunnison River WCD, 3,000 mi ² | 2003 - 2011; e.g. in 2010/11: Nov - Mar | Increased Precipitation | Dos Rios Water System, Upper Gunnison WCD, Crest Butte Mountain Resort, Town of Creste Butte, Scenic River Tours, City of Gunnison, Gunnison County Stock Growers Association, Crested Butte South Metro District | Carried out by North American Weather Consultants, Inc. Project name: Gunnison River Basin Program. For irrigation water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf ; http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed ; http://cwcb.state.co.us/water-management/water-projects-programs/Documents/WeatherModification/PermitAreas/GunnisonTargetAreas.pdf ; North American Weather Consultants cloud seeding programs through April 2011; http://cwcb.state.co.us/LoansGrants/weather-modification-grants/Pages/main.aspx |
| N-America | USA-Colorado | Upper South Plate River | 1950 - 1951: winter | Increased Precipitation | Among others Denver Water | | http://www.denverwater.org/docs/assets/CED64855-FAB0-1D82-B3D48E3786B65967/DroughtResponsePlanAppendices.pdf |

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| N-America | USA-Colorado | Upper South Plate River | 1981 - 1982: winter | Increased Precipitation | Among others Denver Water | | http://www.denverwater.org/docs/assets/CED64855-FAB0-1D82-B3D48E3786B65967/DroughtResponsePlanAppendices.pdf |
| N-America | USA-Colorado | Vail Ski Resort | 1977 - 2005: winter | Increased Precipitation | Sponsor: Washington Water and Power Company | | http://www.denverwater.org/docs/assets/CED64855-FAB0-1D82-B3D48E3786B65967/DroughtResponsePlanAppendices.pdf |
| N-America | USA-Colorado | Vail, Beaver Creek and Upper Arkansas (Three Summit County ski areas); 272 mi ² | 2010 - 2011: winter | Increased Precipitation | Denver Water and Colorado Springs Utilities | Project name : Vail/Beaver Creek Program | http://cwcb.state.co.us/water-management/water-projects-programs/Pages/PermitAreas.aspx ; http://cwcb.state.co.us/water-management/water-projects-programs/Documents/WeatherModification/PermitAreas/VailUpperArkTargetAreas.pdf ; http://www.denverwater.org/docs/assets/CED64855-FAB0-1D82-B3D48E3786B65967/DroughtResponsePlanAppendices.pdf ; http://summitcountyvoice.com/2010/11/30/cloud-seeding-under-way-for-3-summit-county-ski-areas/ ; http://www.scribd.com/doc/44369192/Colorado-Cloud-seeding-Map |
| N-America | USA-Colorado | Willow Creek Drainage | 1992 - 1995: winter | Increased Precipitation | Northern Colorado Water Conservancy District | Carried out by North American Weather Consultants, Inc. For irrigation water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Colorado | Winter Park Resort (Intrawest /Winter Park Operations Corporation IWPOC) | 2009 - 2011: Nov - Jan | Increased Precipitation | Denver Board of Water, IWPOC | Operator: Western Weather Consultants. | http://www.denverwater.org/docs/assets/971EA1F4-9F8E-1C76-10AB2BDB2FD71046/102809_2a1.pdf ; http://www.denverwater.org/docs/assets/CED64855-FAB0-1D82-B3D48E3786B65967/DroughtResponsePlanAppendices.pdf ; http://cwcb.state.co.us/LoansGrants/weather-modification-grants/Pages/main.aspx |

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| N-America | USA-Colorado | Central Colorado Rockies (blue, upper blue, snake, williams fork and upper south plate drainage river basin), 3,700 km ² | 2003 - 2004: winter, 30 days (Nov - Mar) | Increased Precipitation & Reduced Precipitation | State government, federal funds (Bureau of Reclamation) | Project name: Colorado Weather Damage Modification Program (WDMP). Operator: Western Water consultants --> connected to Dever Water Cloud Seeding Program. | http://cwcwebweblink.state.co.us/weblink/0/doc/105271/Page1.aspx?searchid=ec50a821-e00e-47b6-97db-11954927908a ; http://www.denverwater.org/docs/assets/971EA1F4-9F8E-1C76-10AB2BDB2FD71046/102809_2a1.pdf ; http://www.denverwater.org/docs/assets/CED64855-FAB0-1D82-B3D48E3786B65967/DroughtResponsePlanAppendices.pdf |
| N-America | USA-Colorado, New Mexico, Texas, Nevada, Utah, North Dakota, Oklahoma | | 2002 – 2005 | Increased Precipitation & Reduced Precipitation | Cooperative state/federal research program conducted through the US Bureau of Reclamation | Project name: Weather Damage Modification Program WDMP. | http://www.swc.nd.gov/4dlink9/4dcgi/GetSubCategoryRecord/Atmospheric%20Resources/Atmospheric%20Research ; http://ams.confex.com/ams/Annual2005/techprogram/paper_82476.htm ; http://agriculturedefensecoalition.org/sites/default/files/pdfs/5P_2008_Weather_Modification_Damage_Program_U.S._Bureau_of_Reclamation_2008_Hunter.pdf |
| N-America | USA-Dakota | North Dakota | 1980 – 1994 | Increased Precipitation | Utah Division of Water Resources; Funding provided by the National Oceanic and Atmospheric Administration (NOAA). | Carried out by North American Weather Consultants, Inc. Project name: NOAA Atmospheric Modification Program. Data collection and analysis: determination of the availability of super cooled liquid water for operational cloud seeding potential and the transport and diffusion of seeding material utilizing sulphur hexafluoride tracer techniques. | http://www.nawcinc.com/NAWC%20Research.pdf ; http://www.swc.nd.gov/4dlink9/4dcgi/GetSubCategoryRecord/Atmospheric%20Resources/Atmospheric%20Research |
| N-America | USA-Dakota | South Dakota | 1997 – 2000 | Increased Precipitation | | Carried out by Weather Modification Inc. Project name: Texas Central High Plains Rainfall Enhancement Program. | http://www.weathermodification.com/projects.php?id=56 |
| N-America | USA-Dakota | Western Dakota | 1989: winter | Increased Precipitation | | Carried out by Weather Modification Inc. Project name: Western Dakota Water Development District - Black Hills Council of Local Government. With aircraft for cloud seeding. | http://www.weathermodification.com/projects.php?id=64 |

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| N-America | USA-Dakota | North-western South Dakota | 1975: summer | Increased Precipitation & Reduced Precipitation | South Dakota Weather Control Commission | Carried out by North American Weather Consultants, Inc. For agricultural crops. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Dakota | over the central and western plains of North Dakota | 1989: Jun – Jul | Increased Precipitation & Reduced Precipitation | Dakota State Water Commission; funded by NOAA and the State of North Dakota through the Federal-State Cooperative Program in Atmospheric Modification Research (NOAA/AMP) | Carried out by Weather Modification Inc. Project name: North Dakota Thunderstorm Project - North Dakota Atmospheric Resource Board. | http://www.swc.nd.gov/4dlink9/4dcgi/GetContentRecord/PB-309 ; http://www.swc.nd.gov/4dlink9/4dcgi/GetSubCategoryRecord/Atmospheric%20Resources/Atmospheric%20Research |
| N-America | USA-Dakota | Western North Dakota: Counties currently participating in the program are Bowman, McKenzie, Mountrail, Ward, Williams, and part of Slope; 9,006 mi2 target area in Project District 2; Target Area in District 1 = 1,419 mi2 | 1961 - 2011: annually between Jun 1 - Aug 31 | Increased Precipitation & Reduced Precipitation | North Dakota State Water Commission, North Dakota Weather Modification Board, | Carried out by Weather Modification Inc. and ND Atmospheric Resource Board (contact: Darin Langerud, see swc's website for further information on history and research). Project name: North Dakota Cloud Modification Project (NDCMP). Ground-based research was already carried out in the 1950s | http://www.swc.nd.gov/4dlink9/4dcgi/GetContentRecord/PB-310 , http://www.weathermodification.com/projects.php?id=48 ; http://swc.nd.gov/4dlink9/4dcgi/GetSubCategoryRecord/atmospheric%20resources/ND%20Cloud%20Modification%20Project ; http://swc.nd.gov/4dlink9/4dcgi/GetContentPhoto/PB-30/640/480 ; http://swc.nd.gov/4dlink9/4dcgi/GetContentPDF/PB-2055/2011%20NDCMP%20Final%20Report.pdf |

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| N-America | USA-Dakota | | 2006: Jul - Aug | Increased Precipitation & Reduced Precipitation | Cooperative Venture between NDARB, UND; Weather Modification Inc., and Ice crystal Engineering | Project name: POLCAST - Polarimetric clod Analysis and Seeding Test. Research project. | http://www.swc.nd.gov/4dlink9/4dcgi/GetSubCategoryRecord/Atmospheric%20Resources/Atmospheric%20Research |
| N-America | USA-Dakota | | 2008: Jun – Jul | Increased Precipitation & Reduced Precipitation | Cooperative Venture between NDARB, UND; Weather Modification Inc., and Ice crystal Engineering & NCAR | Project name: POLCAST2 - Polarimetric clod Analysis and Seeding Test 2nd Phase; research project. | http://www.swc.nd.gov/4dlink9/4dcgi/GetSubCategoryRecord/Atmospheric%20Resources/Atmospheric%20Research |
| N-America | USA-Dakota | over the central and western plains of North Dakota | 1993: Jun – Jul | Reduced Precipitation | Dakota State Water Commission; funded by NOAA and the State of North Dakota through the Federal-State Cooperative Program in Atmospheric Modification Research (NOAA/AMP), with supplemental investigations funded by the National Science Foundation | against hail and hurricane, Project Name: North Dakota Tracer Experiment (NDTE); designed to examine thunderstorm and hailstorm characteristics and evolution, with emphasis on the transport of tracers within the studied storms, and the development of precipitation and hail | http://www.weathermodification.com/projects.php?id=51 ; http://www.swc.nd.gov/4dlink9/4dcgi/GetSubCategoryRecord/Atmospheric%20Resources/Atmospheric%20Research |
| N-America | USA-Dakota | | 1974, 1975 | Reduced Precipitation | State of South Dakota - Department of Natural Resources Division of Weather Modification | Against hail. Carried out by Weather Modification Inc. | http://www.weathermodification.com/projects.php?id=58 |

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| N-America | USA-Delaware | Southern Delaware | 1985: summer | Increased Precipitation | State of Delaware, Department of Agriculture | Carried out by Weather Modification Inc. and North American Weather consultants. For agricultural purposes. | http://www.weathermodification.com/projects.php?id=54 ; http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Georgia | Bulloch County, Eastern Georgia | 1977: summer | Increased Precipitation | Drought Relief Fund; Burke County | Carried out by North American Weather Consultants, Inc. For agricultural water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Georgia | Southern Georgia | 1977: summer | Increased Precipitation | Southern Georgia Rain Gain | Carried out by North American Weather Consultants, Inc. For agricultural water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Idaho | Bannock, Portneuf and Bear River Mountain Ranges of Southeastern Idaho | 1988 - 1989, 1992 - 1993: winter | Increased Precipitation | Bear River RC&D and Bannock, Bear Lake, Caribou, Franklin, and Oneida Counties | Contractor: North American Weather consultants. For irrigation water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Idaho | Boise River Drainage; 3,500 mi2 | 1992 - 1996, 2002 - 2005, 2007 - 2011: winter | Increased Precipitation | Boise Project Board of Control | Contractor: North American Weather consultants. For irrigation water supplies and hydroelectric power production. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed ; http://wtwma.com/ , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Idaho | Coeur D'Alene Lake Watershed, Northern Idaho | 1950 - 1951; 1952 - 1960; 1966 - 1971; 1973 - 1974: fall - early winter | Increased Precipitation | Washington Water and Power Company | Contractor: North American Weather consultants. For hydroelectric power production. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |

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| N-America | USA-Idaho | Owyhee Reservoir, South-western Idaho | 1954 - 1956; 1959 - 1962: winter | Increased Precipitation | Board of Control - Owyhee Project | Carried out by North American Weather Consultants, Inc. For irrigation water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Idaho | Snake River Basin | 2007 - 2011: winter, e.g. Nov 2010 - Apr 2011 | Increased Precipitation | High Country Resource Conservation and Development Council + several donations (see 1st source mentioned) | Operator: Clark Country & Let it snow Inc. | http://www.hcountryrcd.org/cloud%20seeding.htm |
| N-America | USA-Idaho | South-eastern Idaho | 1953 - 1955: winter | Increased Precipitation | Salmon River Canal Company, Oakley Canal Company, Cedar Mesa Reservoir and Canal Company | Carried out by North American Weather Consultants, Inc. For irrigation water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Idaho | Upper Payette River Basin; 938 mi ² | 2002 - Present: winter | Increased Precipitation | Idaho Power Company | Carried out by Weather Modification Inc. Project name: Upper Payette River Basin Cloud Seeding Program. | http://www.weathermodification.com/projects.php?id=41 ; http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed |
| N-America | USA-Illinois | St. Louis | 1989: summer | Increased Precipitation | | | http://www.isws.illinois.edu/pubdoc/CR/ISWSCR-577.pdf ; |
| N-America | USA-Illinois | The primary study area was located within a 100 mile radius of Champaign-Urbana. | Since 1978 until ? | Increased Precipitation | Illinois State Water Survey | Project name: Precipitation Augmentation for Crops Experiment (PACE). | http://www.isws.illinois.edu/pubdoc/CR/ISWSCR-609.pdf |
| N-America | USA-Illinois | | 1977 | Increased Precipitation | | Carried out by Weather Modification Inc. Project name: Illinois Weather Modification Projects. | http://www.weathermodification.com/projects.php?id=44 |

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| N-America | USA-Illinois | | Since 1989 until ? | Increased Precipitation | Public sponsor: AMP- Federal-State Cooperative Atmospheric Modification Program. | Project name: National Oceanic and Atmospheric Administration (NOAA) - Atmospheric Modification Program. | http://ag.arizona.edu/azwater/arroyo/061wthr.html |
| N-America | USA-Iowa | Dallas County | 1957: summer | Increased Precipitation | Dallas County Weather Modification Group | Contractor: North American Weather consultants. For agricultural water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Iowa | Decatur and Clarke Counties | 1957: summer | Increased Precipitation | The Decatur County Weather Modification Association | Contractor: North American Weather consultants. For agricultural water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Iowa | Greene, Boone and Story Counties | 1957: summer | Increased Precipitation | Central Iowa Modification Association | Contractor: North American Weather consultants. For agricultural water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Kansas | | 1975 – 2008 | Increased Precipitation & Reduced Precipitation | | The weather modification program that was implemented in 1975 was first known as the Muddy Roads Program. Later, it was changed to the present Western Kansas Weather Modification Program (WKWMP). | http://users.pld.com/wkwmp/WKWMPpage.htm |
| N-America | USA-Kansas | SW Kansas, 23,717 km ² target area | 1975 – 1980; e.g. in 1980: 46 days, May – Aug | Increased Precipitation & Reduced Precipitation | Private agricultural sponsor | Project name: Muddy Road Project. | WMO report 1980; http://users.pld.com/wkwmp/WKWMPpage.htm |
| N-America | USA-Kansas | 8,125 mi ² in Western Kansas | 2008: 35 days, Apr - Sep | Reduced Precipitation | Western Kansas GMD #1 | Against hail. Operator: Western Kansas GMD #1. | "A SUMMARY OF WEATHER MODIFICATION ACTIVITIES REPORTED IN 2008" (pdf document); http://users.pld.com/wkwmp/WKWMPpage.htm |
| N-America | USA-Kansas | West Kansas, 41,605 km ² | 1999: Apr – Sep, 68 days | Reduced Precipitation | West Kansas Ground-Water Management District I | Against hail. Project name: NOAA 99-1016 | WMO report 1999 |

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| N-America | USA-Michigan | | 1977 | Increased Precipitation | | Carried out by Weather Modification Inc. Project name: Gratiot Weather Modification Project. With Aircraft for Cloud Seeding. | http://www.weathermodification.com/projects.php?id=42 |
| N-America | USA-Montana | Hungry Horse Reservoir Area, North-western Montana | 1966 - 1971: winter | Increased Precipitation | Bonneville Power and Light Company | Contractor: North American Weather consultants. For hydroelectric power generation. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Montana | Rocky Mountains | 70s: winter | Increased Precipitation | | Project name: Bridger Range Experiment (BRE). | http://www.naiwmc.org/4dcgi/GetContentPDF/PB-896/Research_snowfall_augmentation_NAIWMC2.pdf |
| N-America | USA-Nevada | 2,790 km ² | 1999: Jan - Mar, Nov - Dec, 18 days | Increased Precipitation | Municipality | Project name: NOAA / Trackee Tahoe Project. | WMO report 1999 |
| N-America | USA-Nevada | 8,235 km ² | 1998, 1999; e.g. in 1999: Jan - Jun, Nov - Dec, 37 days | Increased Precipitation | Municipality | Project name: NOAA / Carson-Walker Project. | WMO report 1999 |
| N-America | USA-Nevada | Humboldt Basin (NorthEast Nevada) | 2011 - 2012: winter | Increased Precipitation | no sponsor mentioned (costs covered by DRI ?) | Project name: DRI (Desert Research Institute) Cloud Seeding Program. | http://www.dri.edu/current-operations/2341-cloud-seeding-ruby-mts |
| N-America | USA-Nevada | | 1961 - 1968: winter | Increased Precipitation | Nevada State Department of Conservation and Natural Resources | Carried out by North American Weather Consultants, Inc. Project name: Nevada Atmospheric Research Project. Operations & evaluation of winter cloud seeding programs using a randomized crossover design. | http://www.nawcinc.com/NAWC%20Research.pdf |
| N-America | USA-Nevada | | 1987 - 1988, 2002 - 2009: winter | Increased Precipitation | State of Nevada | Carried out by Weather Modification Inc. Project name: Nevada State Cloud Seeding Program. With Aircraft for Cloud Seeding. | http://www.weathermodification.com/projects.php?id=50 , http://www.swc.nd.gov/4dlink9/4dcgi/GetSubCategoryRecord/Atmospheric%20Resources/ND%20Cloud%20Modification%20Project |
| N-America | USA-New Mexico | Northern Part | until 2003 | Increased Precipitation | New Mexico Interstate Stream Commission | | http://www.nytimes.com/2003/10/14/science/can-rain-be-bought-experts-seed-clouds-and-seek-answers.html?ref=vailresortsinc&pagewanted=1 |

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| N-America | USA-New Mexico | South-eastern Part | until 2003 | Increased Precipitation | New Mexico Interstate Stream Commission | | http://www.nytimes.com/2003/10/14/science/can-rain-be-bought-experts-seed-clouds-and-see-answers.html?ref=vailresortsinc&pagewanted=1 |
| N-America | USA-New South Wales | Snowy Mountains; target area of approximately 1,000 km ² | 2004 - 2009: winter | Increased Precipitation | Snowy Hydro Limited | Project name: Snowy Precipitation Enhancement Research Project ("SPERP"). Undertaken by Snowy Hydro Limited. | http://www.snowyhydro.com.au/levelTwo.asp?pageID=85&parentID=6 ; http://www.snowyhydro.com.au/LevelThree.asp?pageID=258&parentID=85&grandParentID=6 |
| N-America | USA-Oklahoma | 178,960 km ² | 1999: Sep – Dec, 19 days | Increased Precipitation | "Oklahoma Wea Mod" | Project name: NOAA 99-1014. | WMO report 1999 |
| N-America | USA-Oklahoma | 3,874 km ² target area; Cetton and Tillman counties | 1980: 32 days, Aug - Oct | Increased Precipitation | Private sponsor | | WMO report 1980 |
| N-America | USA-Oklahoma | South Central Texas county in Oklahoma; 218 km ² target area | 1997 – 1980: 133 days, Mar - Oct | Increased Precipitation | Private sponsor | | WMO 1980 |
| N-America | USA-Oregon | Deschutes River Drainage, Central Oregon | 1964 - 1965; 1974 - 1976: winter | Increased Precipitation | Portland General Electric Company | Carried out by North American Weather Consultants, Inc. For hydroelectric power production. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Oregon | Polk County | 1977: summer | Increased Precipitation | Polk County Technique: Airborne dry ice seeding | Carried out by North American Weather Consultants, Inc. For agricultural water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Oregon | Southern Cascades | 1951 - 1960: winter | Increased Precipitation | California-Oregon Power Company | Carried out by North American Weather Consultants, Inc. For hydroelectric power production. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |

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| N-America | USA-Texas | ~4 M acres; in the North Plains Groundwater Conservation District (NPGWCD) | 2000 – ongoing (2011) | Increased Precipitation | North Plains Groundwater Conservation District (NPGWCD) | | http://www.license.state.tx.us/weather/weatherfaq.htm |
| N-America | USA-Texas | 17 counties | 1997 – 2002 | Increased Precipitation | High Plains Underground Water Conservation District (HPUWCD) | Project name: Seeding Operations and Atmospheric Research (SOAR) Program. | http://www.license.state.tx.us/weather/weatherfaq.htm |
| N-America | USA-Texas | 5,1 M acres, along and west of the Pecos River, in the region between El Paso and Midland | 2003 – ongoing (2011) | Increased Precipitation | Trans-Pecos Weather Modification Association (TPWMA); consists of the Ward County Irrigation District and other political subdivisions within Culbertson, Loving, Reeves, and Ward counties | Program Name: Trans-Pecos Weather Modification Association (TPWMA). | http://www.pgcd.us/programs/faq_precipitation_enhancement.php ; http://www.license.state.tx.us/weather/weatherfaq.htm ; http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed ; http://www.weathermodification.com/projects.php?id=59 ; http://www.license.state.tx.us/weather/summary.htm#tpwma |
| N-America | USA-Texas | 2,6 M acres; West Texas between the Permian Basin and the South Plains, in the CRMWD between Lubbock and Midland | 1971 - 2011; every year: Apr - Oct | Increased Precipitation | Colorado River Municipal Water District (CRMWD) | Carried out with own equipment. | http://water.utah.gov/cloudseeding/history/ |

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| N-America | USA-Texas | 6,6 M acres: target area extending from the base of the Edwards Plateau to near the coastal bend area of Texas | 1997 - 2011 (year-round applications) | Increased Precipitation | STWMA (South Texas Weather Modification Association) was formed by several counties south of San Antonio; Edwards Aquifer Authority (EAA) contracts with the STWMA | For few years carried out by Weather Modification Inc. Project name: Edwards Aquifer Authority. Later-on South Texas Weather Modification Association. | http://www.weathermodification.com/projects.php?id=43 ; http://www.license.state.tx.us/weather/summary.htm#tpwma ; http://www.license.state.tx.us/weather/weatherfaq.htm ; http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed ; http://southtexasweathermodification.com/ |
| N-America | USA-Texas | Below and along the Caprock | 1911 – 1914 | Increased Precipitation | | By C. W. Post and a team of researchers; experiments with explosives. | http://texasweathermodification.com/History.html |
| N-America | USA-Texas | Edwards Plateau Northwest of San Antonio | 1985, 1986: summer | Increased Precipitation | Edwards Underground Water District, San Antonio, Texas | Carried out by North American Weather Consultants, Inc. For municipal water supplies. | http://www.license.state.tx.us/weather/weatherfaq.htm ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Texas | Near Midland | 1981 | Increased Precipitation | \$2,000 grant by the U.S. Congress | | http://texasweathermodification.com/History.html |
| N-America | USA-Texas | Nearly 4,1 M acres; all or portions of the 9 counties making up the Panhandle Groundwater Conservation District | 2000 - 2011; e.g. in 2011: Apr - Sep | Increased Precipitation | Panhandle Groundwater Conservation District (PGWCD), funded through the district's regular budget | Contractor in the first year, own equipment since 2001. Project name: Panhandle Groundwater Conservation District Precipitation Enhancement Program. For groundwater recharge. | http://www.license.state.tx.us/weather/summary.htm#tpwma ; http://www.pgcd.us/programs/faq_precipitation_enhancement.php ; http://www.license.state.tx.us/weather/weatherfaq.htm |
| N-America | USA-Texas | San Angelo, Uvalde, Corpus Christy, San Antonio Reservoir Areas | 1985 – 1989 | Increased Precipitation | City of San Angelo | Carried out by Weather Modification Inc. Project name: Texas Weather Modification Program. With aircraft for cloud seeding. | http://www.license.state.tx.us/weather/summary.htm#tpwma ; http://www.swtrea.org/ ; http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed ; http://www.license.state.tx.us/weather/weatherfaq.htm |

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| N-America | USA-Texas | South Central Texas North of Corpus Christi | 1985: summer | Increased Precipitation | City of Corpus Christi, Texas | Carried out by North American Weather Consultants, Inc. For municipal water supplies. | http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed ; http://www.license.state.tx.us/weather/summary.htm#tpwma ; http://www.license.state.tx.us/weather/weatherfaq.htm http://www.just-clouds.com/southern_ogallala_operational_summary.asp ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Texas | 3 counties along the Rio Grande | 1998 - 2011 | Increased Precipitation | Texas Border Weather Modification Association | Carried out with own equipment. | http://www.license.state.tx.us/weather/weatherfaq.htm |
| N-America | USA-Texas | Up to 3,8 M acres in Texas: Sandy Land Underground Water Conservation District, Terry & Yoakum counties. In New Mexico up to 2 M acres | 2002 - 2011: May - Sept | Increased Precipitation | Sandy Land Underground Water Conservation District, South Plains Underground Water Conservation District, and the Llano Estacado Underground Water Conservation District | Carried out by Seeding Operations & Atmospheric Research (SOAR). Project name: Southern Ogallala Weather Modification Program. | http://www.weathermodification.com/projects.php?id=32 ; http://www.license.state.tx.us/weather/weatherfaq.htm |
| N-America | USA-Texas | West Central Texas | 2001 – 2003 | Increased Precipitation | State of Texas, council of government | Carried out by Weather Modification Inc. Project name: West Central Texas Council of Governments Rainfall Enhancement Program. With Aircraft for Cloud Seeding. | http://www.weathermodification.com/projects.php?id=52 |

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| N-America | USA-Texas | West Central Texas near San Angelo | 1985 – 1988: summer | Increased Precipitation | City of San Angelo, Texas | Carried out by North American Weather Consultants, Inc. For municipal water supplies. | http://water.utah.gov/cloudseeding/CurrentProjects/Default.asp ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed ; http://www.nawcinc.com/Wxmod.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Texas | | 2005: "several hygroscopic seeding experiments" | Increased Precipitation | SOAR ? | Project name: SPECTRA II. Participants: Drs. Woodley and Rosenfeld together with the SOAR crew. Research project. | http://www.just-clouds.com/about_us.asp ; |
| N-America | USA-Texas | 6,5 M acres, counties: Zavalla, Dimmitt, LaSalle, Uvalde, Webb | 1999 - 2011; every year: Mar - Nov | Increased Precipitation & Reduced Precipitation | Southwest Texas Rain Enhancement Association (SWTREA); Edwards Aquifer Authority (EAA) contracts with the SWTREA | Carried out with own equipment. | http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed ; http://www.nawcinc.com/Wxmod.pdf |
| N-America | USA-Texas | 5,5 - 6,4 M acres in West Central Texas between Midland and San Angelo | 1996 - 2011; every year: Mar – Oct | Increased Precipitation & Reduced Precipitation | Water-conservation districts finance the cost of a cloud-seeding operation through ad valorem taxes. West Texas Weather Modification Association (WTWMA) = the association formed by these districts | Company operating the project: West Texas Weather Modification Association (WTWMA). | http://www.license.state.tx.us/weather/summary.htm#tpwma ; http://www.license.state.tx.us/weather/weatherfaq.htm ; http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed ; http://wtwma.com/ ; http://texasweathermodification.com/index.html |

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| N-America | USA-Utah | Grouse Creek, Raft River, Wellsville and Wasatch Mountains of Northern Utah | 1989 - 1997, 2001 - 2011: winter | Increased Precipitation | Utah Water Resources Development Corporation, Utah Division of Water Resources, and Cache and Box Elder Counties | Contractor: North American Weather consultants. For irrigation water supplies. | http://water.utah.gov/cloudseeding/CurrentProjects/Default.asp ; http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed ; http://www.nawcinc.com/Wxmod ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf |
| N-America | USA-Utah | In 29 different counties; in 12 of the counties more than 20 years of activities, see: http://water.utah.gov/cloudseeding/history/ | 1973 - 2011: winter | Increased Precipitation | Utah Water Resources Development Corporation Utah Division of Water Resources, 13 Utah counties | Organized by: Utah Division of Water resources. For irrigation water Supplies. | http://water.utah.gov/cloudseeding/CurrentProjects/Default.asp ; http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed ; http://www.nawcinc.com/Wxmod ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf |
| N-America | USA-Utah | Little Cottonwood Canyon: Alta and Snowbird Ski areas | 1996 – 2011: winter | Increased Precipitation | Alta and Snowbird Ski Areas | Project name: Little Cottonwood Canyon. Contractor: North American Weather Consultants. For skiing. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf ; North American Weather Consultants cloud seeding programs through April; 2011 http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed |
| N-America | USA-Utah | Mountain Watersheds Central/Southern Utah, 10,000 mi ² , 13 Utah Counties | 1973 - 1983, 1987, 1988 - 2011: during winter months; 32 seeded seasons | Increased Precipitation | Utah Water Resources Development Corporation | Contractor: North American Weather Consultants. Project Name: Central/Southern Project (CSPU). For irrigation water supplies. | http://water.utah.gov/cloudseeding/CurrentProjects/Default.asp ; http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed ; http://www.nawcinc.com/utcsprog.pdf ; North American Weather Consultants cloud seeding programs through April 2011 |

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| N-America | USA-Utah | Northern Areas: East Box Elder & Cache County; 1,250 mi ² | 1989 - 2011, every year: winter | Increased Precipitation | Bear River Water Conservancy District and Cache County | Project Name: East Box Elder/Cache County Project. | http://www.nawcinc.com/Wxmod.pdf |
| N-America | USA-Utah | Northern Areas: West Box Elder county | 1989 - 2011: winter, 17 operating seasons | Increased Precipitation | Bear River Water Conservancy District and Cache County | Project Name: West Box Elder County Project. | http://www.nawcinc.com/Wxmod.pdf |
| N-America | USA-Utah | Pine Valley Mountains in South-western Utah | 1985 – 1987: winter | Increased Precipitation | Washington County Water Conservancy District and Utah Division of Water Resources | Carried out by North American Weather Consultants, Inc. For municipal and irrigation water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Utah | Tooele County | 1976 - 2011; every year | Increased Precipitation | Utah Water Resources Development Corporation | Contractor: North American Weather Consultants. Project Name: Tooele county Project. | http://www.nawcinc.com/Wxmod.pdf ; http://water.utah.gov/cloudseeding/currentprojects/ ; http://www.nawcinc.com/utcsprog.pdf |
| N-America | USA-Utah | Uinta Mountains, 1,000 mi ² | 1975 - 1987, 2003 - 2009, 2011: winter | Increased Precipitation | Central Utah, Duchesne County, and Uintah Water Conservancy Districts. | Project name: Uinta Mountains. Contractor: North American Weather Consultants. | http://water.utah.gov/cloudseeding/CurrentProjects/Default.asp ; http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/Wxmod.pdfhttp://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed ; http://www.nawcinc.com/Wxmod.pdf |
| N-America | USA-Utah | Upper Ogden River and Lost Creek Watersheds, | 1991 - 1993: winter | Increased Precipitation | Weber Basin Water Conservancy District and Utah Division of Water Resources | Contractor: North American Weather consultants. For irrigation water supplies. | http://water.utah.gov/cloudseeding/CurrentProjects/Default.asp ; http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed ; North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Utah | Utah | 1981 - 1982 | Increased Precipitation | National Science Foundation, University of Utah | Carried out by North American Weather Consultants, Inc. Experimental seeding tests. | http://www.nawcinc.com/NAWC%20Research.pdf |

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| N-America | USA-Utah | Wasatch Mountains in Eastern Salt Lake County | 1989 – 1996: winter | Increased Precipitation | Utah Water Resources Development Corporation; Utah Division of Water Resources; Salt Lake City Water Division; and Alta, Brighton, and Snowbird Ski Areas | Contractor: North American Weather Consultants. For municipal water supplies. | http://water.utah.gov/cloudseeding/CurrentProjects/Default.asp ; http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Utah | Wasatch Plateau above Joes Valley Reservoir; portions of San Pitch River Drainage. "small-scale project" | 1999 – 2012 | Increased Precipitation | Emery Water Conservancy District | Project Name: Emery and Sanpete Project. Using liquid propane. Plans to enlarge the project area. . | http://water.utah.gov/cloudseeding/CurrentProjects/Default.asp , http://www.emerycounty.com/publiclands/ECGenPlan/GenPlan10-99.pdf |
| N-America | USA-Utah | Wellsville and Wasatch Mountains of Northern Utah | 1997 - 2000, 2002 - 2011: winter | Increased Precipitation | Utah Division of Water Resources, and Cache County | Contractor: North American Weather Consultants. Technique: Ground based silver iodide seeding. Project name: Northern Utah Project – NUP. For irrigation water supplies. | http://water.utah.gov/cloudseeding/CurrentProjects/Default.asp ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf ; http://www.nawcinc.com/utcsprog.pdf ; North American Weather Consultants cloud seeding programs through April 2011 |

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| N-America | USA-Utah | West Uintas, 600 mi ² : Provo and Weber River Drainages | 1989 - 1995, 2000 - 2011: winter | Increased Precipitation | Utah Water Resources Development Corporation, Utah Division of Water Resources, Provo River Water Users Association and Weber Basin Water Conservancy District | Project name: Western Uintas. Contractor: North American Weather Consultants. For irrigation water supplies. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf ; North American Weather Consultants cloud seeding programs through April; http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed |
| N-America | USA-Utah | Uinta Mountains of North-eastern Utah | 1977, 1989, 2003 – 2011: winter, spring, summer | Increased Precipitation & Reduced Precipitation | Uinta County, Duchesne County and Utah Division of Water Resources | Carried out by North American Weather Consultants, Inc. For irrigation water supplies. | http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Washington | Baker River Drainage, Northern Washington | 1976 – 1977: winter | Increased Precipitation | Puget Power Company | Carried out by North American Weather Consultants, Inc. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Washington | Chelan Lake Drainage, Central Washington | 1976 - 1977: winter | Increased Precipitation | Chelan Public Utility District | Carried out by North American Weather Consultants, Inc. For hydroelectric power production. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Washington | Skagit River Drainage, Northern Washington | 1976 - 1977: winter | Increased Precipitation | Seattle City Light Company | Carried out by North American Weather Consultants, Inc. For hydroelectric power production. | http://www.just-clouds.com/ ; http://www.nawcinc.com/NAWC%20Operational%20Programs.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Washington | Spokane, Washington | 1979 – 1980: 19 days, Dec - Feb | Reduced Precipitation | Private (transport company) | Against fog. Project name: Airport Fog Dispersal Project. | WMO report 1980 |

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| N-America | USA-Wyoming | Upper Snake River Basin and those watersheds draining into Water Basin 31; Area, 5,161 mi ² | 2007 - 2011: winter, Nov - Apr | Increased Precipitation | High Country Resource Conservation and Development (RC&D) Council & local districts, counties, cities and companies, see: http://www.hcountryrcd.org/cloud%20seeding.htm | Company operating project: Clark County and Let it Snow, Inc. | http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=210263860280044943005.00047f6342c83772ab091&ll=36.575469,-106.867725&spn=15.220428,16.763863&source=embed ; http://www.hcountryrcd.org/cloud%20seeding.htm |
| N-America | USA-Wyoming | Wind River Wyoming | 1999: Jan, 4 days | Increased Precipitation | Eden Valley Irrigation and Drainage District | Project name: Wind River Wyoming. | WMO report 1999 |
| N-America | USA-Wyoming | | 2005 - 2011: winter | Increased Precipitation | | Carried out by Weather Modification Inc. Project name: Wyoming Weather Modification Pilot Program. Snowpack Augmentation and Atmospheric Assessment and Evaluation. | http://www.just-clouds.com/SOAR_pioneers_cloud_seeding_milled_salt.asp |
| N-America | USA-Wyoming/Idaho | Higher Elevation Watersheds of Nine Eastern Idaho Counties and One Western Wyoming County | 1993, 1995: winter | Increased Precipitation | High Country RC&D | Carried out by North American Weather Consultants, Inc. For irrigation water supplies. | http://www.nawcinc.com/Wxmod.pdf , North American Weather Consultants cloud seeding programs through April 2011 |
| N-America | USA-Wyoming/Idaho | South-western Wyoming and South-eastern Idaho (Bear Lake Drainage, Smith & Thomas Forks) | 1954 - 1970; 1979 - 1982, 1989 - 1990: winter | Increased Precipitation | Utah Power and Light Company | Carried out by North American Weather Consultants, Inc. For hydroelectric power production. | http://www.nawcinc.com/Wxmod.pdf ; http://www.nawcinc.com/NAWC%20Research.pdf , North American Weather Consultants cloud seeding programs through April 2011 |

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| Asia | Uzbekistan | 1,900 km ² Kashkadarya River in K, District | 1979 – 1992 every year; e.g. in 1992: 7 days | Reduced Precipitation | Government (Agricultural department) | Against hail. Shahrissyabz Project. | WMO report 1992 |
| Asia | Uzbekistan | 3,130 km ² target area; Namangan District, Fergana Valley | 1969 - 2003 every year; e.g. in 2003: April - Aug, 37 days; in 1999: April - Aug, 22 days; in 2002: 18 days | Reduced Precipitation | Government (Agricultural department) | Against hail. Namangan Project. | WMO report 2003-2004, 1999, 2002, 1992 |
| Asia | Uzbekistan | 800 km ² , Andijan District, Eastern Fergana Valley | 1981 - 1992 every year; e.g. In 1992: 7 days | Reduced Precipitation | Government (Agricultural department) | Against hail. Andijan Project. | WMO report 1992 |
| Asia | Uzbekistan | 800 km ² , Samarkand District, Zarafshan Valley | 1983 – 1992 every year; e.g. in 1992: 7 days | Reduced Precipitation | Government (Agricultural department) | Against hail. Samarkand Project. | WMO report 1992 |
| S-America | Venezuela | San Cristobal region (SW) | 2009 - 2011 | Increased Precipitation | CORPOELEC (electricity company) | Operator: Hidromet Chile. | http://www.hidromet.cl/clientes.html |
| S-America | Venezuela | Venezuela's South-eastern territories: Huri basin, Rio Uribante basin, Andes, Rio Tui basin | 2009 - 2011 | Increased Precipitation | Government | Project name: La siembra de nubes. Operator: Hidromet Chile. | http://www.globalpost.com/dispatch/venezuela/100202/rain-cloud-bombing , http://www.rnv.gov.ve/noticias/index.php?act=ST&f=14&t=117011; http://www.minamb.gob.ve/index.php?option=com_content&task=view&id=2195&Itemid=43 , http://www.hidromet.cl/experiencia.html , http://www.hidromet.cl/clientes.html ; http://www.msnbc.msn.com/id/34191035/ns/weather/t/venezuela-bombard-clouds-fight-drought/ |
| Asia | Vietnam | | 1967 - 1972 | Increased Precipitation | US Department of State and Department of Defense | "Operation Popeye" used cloud seeding as a means of warfare during Vietnam war, to drown out transport and crops. | http://en.wikipedia.org/wiki/Operation_Popeye |

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| Africa | Zimbabwe | 390,757 km ² target area, Harare in 2003; countrywide in 1999 | 1968 - 2003, with interruptions; e.g. 70 days from Dec 03 - Mar 04 | Increased Precipitation | Government (meteorological services) | Project name: NASCO - National Cloud Seeding Operation). | WMO report 2003-2004, 1999 |
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