

This graph shows the projected growth in freight in freight ton kilometers (FTK), according to estimation from Boeing Corporation in 2002.⁴⁷

The predicted increase in air traffic for the year 2009 has been hampered by the worst financial crisis since the great depression in the thirties, but it still at its 2007 level – an increase of about 28% in comparison to the year when the above graphics have been designed.

According to the Quantify Project Group, which studies the climate impact of transport systems in Europe, the amount of Cirrus clouds tends in general to decrease on our planet, except in regions with high air traffic. For Europe it is estimated that the amount of Cirrus clouds, which can be attributed to air traffic increases by 1-2% per decade. Aviation induced cloud cover is maybe 3-5% over Europe.⁴⁸

According to the same source there are trends observed that increase in Cirrus cloud cover and in the fuel used by aircrafts go parallel. However, the consumed fuel increases over the years less fast (33% for 1992 to 2000) than the distance traveled by plane (+44%) since engines became more efficient. Military air traffic has also significantly increased since the second Gulf war and the subsequent 'war on terror' – putting reserve squadrons of the National Guard with older technology back in action.

Whiteleg and Cambridge from the Stockholm Environment Institute even expressively states that aviation poses a threat on different stakeholders:⁴⁹

- On global level: affecting whole eco-systems.
- Regional: e.g. the European theatre.
- Local: e.g. living in the vicinity of Frankfurt airport.
- Community: living in the immediate surrounding of Frankfurt airport.
- Health impact: possible diseases on all levels.

⁴⁷ Whiteleg J and Cambridge H, Aviation and Sustainability, Stockholm Environment Institute, 2004.

⁴⁸ EU FP6 Integrated Project Quantify, Quantifying the climate impact of global and European Transport Systems., 2006.

⁴⁹ Whiteleg J and Cambridge H, Aviation and Sustainability, Stockholm Environment Institute, 2004, page 15.

GLOBAL	REGIONAL	LOCAL	COMMUNITY	HEALTH IMPACT
Carbon Dioxide	Contrails	Sulphur Dioxide	Noise exposure	Pulmonary disease
Cirrus cloud formation	Acidification	Ozone	Sleep disturbance	DVT - Deep Vein Thrombosis
Nitrogen Oxides	Potential loss of habitat	Airport pollution	Building damage	Radiation exposure
Climate change	Reduction in biodiversity	Local traffic congestion	Rural disturbance	
Ozone depletion		Particulate matter (PM)	Poorer education performance	
Global warming				

Contrails and formation of Cirrus clouds were thus in 2004 already 'known' problems. However no action of any kind has been taken to solve this issue. The situation is even worse: international aviation emissions are excluded from the Kyoto Protocol and therefore aviation 'enjoys the freedom to continue to pollute the atmosphere'. It has now been recognized by the UK government (HMSO, 2004) that if aircraft emissions are taken into account, it will not be able to meet its target of 60% reduction in greenhouse gases by the year 2050.⁵⁰

There are other hints that any effort to reduce jet engine air emissions and subsequent pollution is systematically torpedoed for the sake of global economy. For instance the Reuters news agency reported on November 23rd 2004 that local air pollution agencies in the United States were pulling out of talks with the U.S. Environmental Agency and the Federal Aviation Administration after 5 years of work with no acceptable results. The aim of this voluntary program was to develop a scenario for reduction of pollution and particulate matter (PM) of jet aircraft.⁵¹ Recently some new surveys have been conducted in order to develop acceptable scenarios with a minimum financial impact on companies for contrail control. For instance Robert Sausen of the DLR-Institute for physics of the atmosphere in Germany suggested a change in cruising altitude of commercial airplanes, with the best option a reduction of 6000 ft.⁵² However reducing the cruising altitude would signify a noticeable increase in fuel consumption. It does not come as a surprise that these initiatives are kept silent for the sake of return on investment, which is very low to negative in the sector ('Start with a big fortune in aviation to acquire a small one').

It is undeniable that aviation has a significant impact on climate and some scientists agree that it has not been quantified. Sausen even describes in this survey the level of scientific

⁵⁰ Same source as footnote 48, page 17.

⁵¹ Truth in aviation: efforts to reduce jet engine air pollution take a set back, Newsletter of the Regional Commission on Airport Affairs, December 2004.

⁵² Sausen R, Climate impact by aviation and minimising it by operational means, DLR-Institut für Physik der Atmosphäre, Oberpfaffenhofen, Germany, meeting on environmental impact of air traffic, Brussels, May 3rd 2007.

knowledge on Cirrus clouds and contrails as 'poor'. Refer to appendix 5 for an updated aviation radiative forcing for the year 2000.

A different pathway is the introduction of a carbon tax on aviation operations. Besides the fact that it would be a very profitable operation for some interest groups it is clear that many airline companies would be forced to file for bankruptcy if a carbon tax would be levied on their operations, resulting in a net loss of 4 million jobs in the United States alone.⁵³ Also other countries such as Australia and India have objected against such tax and even if the European Community votes such a law it would not only be delayed significantly by rearguard battles, but low cost flying would certainly be a thing from the past.

Bearing in mind that the Copenhagen summit in 2009 was deliberately torpedoed by the main industrial nations with the United States on top one can only conclude that the ongoing scenario is to develop options that ensure 'Business as Usual'. Even the Kyoto Protocol can be considered as mere occupation therapy for the development of a lucrative cap & trade system.

4.2. EFFECT OF CONTRAILS ON TEMPERATURE:

4.2.1. Variations in the daily temperature range as a result of contrails:

Although it is clear that aircraft emissions have an impact on climate it is quite difficult to measure this, because aviation is just part of everyday life. However there has been one small window of opportunity to perform a reliable scientific survey, at the time that all commercial flights within the U.S. airspace were grounded for a period of 3 days after the events of 11 September 2001.⁵⁴

This survey, performed by David J. Travis, Andrew M. Carlton and Ryan G. Lauritsen, released in final form 2 years later (!), revealed a departure of average diurnal temperature range (DTR) from the normal values derived from the 1971 – 2000 climatology data for the indicated 3-day period in 2001. DTR values for 11 to 14 September during the grounding period, measured at stations across the United States, show an increase of about 1,1°C in comparison with the normal values.⁵⁵

This increase is larger than any during the 11–14 September period for the previous 30 years, giving ammunition to critics who state that weather conditions at this specific period were very extraordinary and no scientific based conclusions could be taken. However even more surprising is the fact that the 11-14 September increase in DTR was more than twice the national average for regions of the United States where contrail coverage has previously been reported to be most abundant, such as the Midwest, Northeast and Northwest regions.⁵⁶

In the subsequent days after September 14th when civil flight operations resumed there was a temperature drop of about 0,8°C, denoting the return to 'normal' conditions. This underlines the impact of contrails on global surface temperatures with a noteworthy cooling down effect, especially reducing the maximum day temperatures. A new proof that aviation significantly affects climate emerged after the massive grounding in Europe in

⁵³ Kreutzer D, Ph.D., The economic impact of cap and trade, testimony before the energy and commerce committee U.S House of Representatives, April 22, 2009.

⁵⁴ Nature, Volume 418, August, 8 2002, Contrails reduce the daily temperature range, a brief interval when the skies were clear of jets unmasked an effect on climate.

⁵⁵ Travis D.J., Carleton A.M. and Lauritsen R.G., Regional variations in U.S. diurnal temperature range for the 11-14 September 2001 aircraft groundings: evidence of jet contrail influence on climate, Journal of Climate, Volume 17, published March 1st 2004.

⁵⁶ DeGrand J., Carleton A.M., Travis D.J. & Lamb, P.J. Appl. Meteorol, 39, 1434-1459, published in 2000.

2010 due to the volcano eruption in Iceland. It is too early to assess the quality of the survey, but the Kings College in London claims that 'airports are air polluters'.

The full paper covering the regional variation in U.S. diurnal temperature range during the 9-11 events, the summary from the magazine 'Nature' as well as the press release of April 22nd, 2010 from the Kings College London can be viewed in appendix 6.

4.2.2. Global warming potential of aircraft engine emissions:

After the first reports of 'Climate Gate', the deliberate manipulation of weather data for IPCC purposes that emerged on the surface during the Copenhagen summit for climate change in 2009, one can even wonder if there is any global warming at all⁵⁷. Climate change is a more appropriate term.

Nevertheless the potential of global warming of gaseous emissions from aircraft engines is not to be neglected. Global warming potential (GWP) is the impact a greenhouse gas has on global warming expressed over a 100-year time period. The GWP of each greenhouse gas depends on its ability to absorb heat in the atmosphere. By definition, CO₂ is used as reference case, with a GWP of 1.

Global warming potential values enable an increase or reduction of any of the greenhouse gases to be expressed as an equivalent reduction of CO₂ over a 100-year period. Table 4.2.2-1 lists the GWP of the greenhouse gases covered by Kyoto as well as those others related to aviation emissions:⁵⁸

Greenhouse gas	Chemical formula	GWP 100 year time horizon
Carbon Dioxide	CO ₂	1
Methane	CH ₄	21
Nitrogen Oxide	N ₂ O	310
Perfluorobutane	C ₄ F ₁₀	7000
Perfluorocyclobutane	c-C ₄ F ₈	8700
Sulphur Hexafluoride	SF ₆	23900

The GWP of greenhouse gases is quite high. According to the study of the Stockholm Environmental Institute aviation emissions account for around 3.5 per cent of man's contribution to global warming from fossil fuel use. By 2050, this percentage could grow to between 4 per cent and 15 per cent (IPCC data from 1999 and provided the data is not corrupted by 'Climate Gate').⁵⁹

However this global warming potential is not realized as can be concluded in the post 9-11 survey. There are three possible reasons for this:

⁵⁷ Climate change: this is the worst scientific scandal of our generation, Daily telegraph, November 28th 2009.

⁵⁸ Intergovernmental Panel on Climate Change, Climate Change 1995: The Science of Climate Change (Cambridge, UK: Cambridge University Press, 1996), Table 2-9, "Radiative Forcing of Climate Change," p. 120.

⁵⁹ Whiteleg J and Cambridge H, Aviation and Sustainability, Stockholm Environment Institute, 2004, page 17

- The cooling down effect due to the formation of contrails and subsequent 'Cirrus' outweighs the Global Warming Potential of the gaseous engine emissions. There are no known scientific studies on this topic.
- Additional additives have been incorporated in jet fuel in order to counter global warming.
- A combination of both scenarios.

As will be explained in a different paragraph several patents and scientific research papers exist for cloud seeding in an attempt to counter global warming.

4.3. EFFECT OF CONTRAILS ON PRECIPITATION:

4.3.1. Precipitation principles:

Precipitation occurs when the following conditions are met:

- There must be moisture in the air. A cold parcel of air can contain less moisture than warm air. Relative humidity increases when the air parcel is adiabatically cooled (e.g. orographic lifting) or moisture is added to that parcel (e.g. air mass picking up moist from an ocean) or a combination of both.
- Condensation nuclei, such as dust particles, must be abundant.
- The droplets or ice crystals must be heavier than the updrafts. Mounting air currents are a result of instable air (cold air moving in over a warmer surface) and produce cumuliform clouds, the Cumulonimbus or Thunderstorm being its supreme form. The higher the updrafts the more violent the precipitation will be. In stable weather conditions the droplet tends to fall as soon as it is formed due to the limited updrafts.

Moreover precipitation is much more likely in low-pressure areas where frontal systems are allowed to slip in. However thermal thunderstorms may develop at any place on earth, except at the poles where temperatures do not permit this. A new development in climate change is the introduction of super cells with deep rotating updrafts that bust through the stratosphere, with extensive hail and extreme turbulence as a result. The crash of Air France flight 447 on its way from Rio de Janeiro to Paris in June 2009 with the loss of 224 lives is probably attributed to the presence of such cell on its flight path.

4.3.2. Relation between contrails, air temperature and precipitation:

The question arises if contrails and their switch into men made Cirrus have an impact on precipitation. In that respect 3 counter posing elements have to be distinguished:

- a) Jet engine emissions with extensive aerosol production deliver quite some condensation nuclei on which droplets can form. This increases the probability of additional precipitation.
- b) However as shown in the survey in paragraph 4.2.1 a significant temperature drop is noted due to the formation of contrails. As cold air can contain less moisture than a warm parcel of air precipitation could decrease.
- c) Because Contrails are formed in the upper part of the troposphere the subsequent reduction in temperature could trigger additional instability in the atmosphere. For example an ascending air particle in a Cumulonimbus cloud would indeed meet almost no resistance when nearing the tropopause because it is always warmer than the surrounding air. As a result it will bust through the tropopause and enter the stratosphere. Only the isothermal layer in the stratosphere prevents the thunderstorm shooting much higher. To put it in different words: contrails may induce the formation of super cells. Very limited scientific field research has been

performed on that topic, but this conclusion is only a matter of logic.

It is clear that there is a relation between these parameters, but scientists have failed to quantify the parameters. This is nothing new in meteorology: since the introduction of the Bergeron-Findeisen precipitation theory in 1935 it has been continuously evaluated and criticized⁶⁰, but scientists can still not determine why a single cumulus develops into a thunderstorm while its neighbor doesn't.

The same applies in this discussion. A survey by Yun Qian and his colleagues, published in 2009, revealed long-term observational data that both the frequency and amount of light rain have decreased in eastern China for 1956–2005 with high spatial coherency and this as a result of increased aerosol concentration in the atmosphere.⁶¹ Aviation has not been particularly targeted in this survey, but aircraft engine emissions have to be considered as a variant on this.

Professor D. Rosenfeld of the Institute of earth Sciences at the Hebrew university of Jerusalem (Israel) has come up with a surprising finding to the disputed issue whether air pollution increases or decreases rainfall. The conclusion of the study group is as follows: both can be true, depending on local environmental conditions. The amount of aerosols is the critical factor controlling how the energy is distributed in the atmosphere.⁶² According to this survey they followed the energy flow through the atmosphere and the way it is influenced by aerosols and other 'airborne' particles. On this planet there is indeed an interaction of energy between the different cells within the troposphere in order to obtain a life sustaining temperature (15°C in the International Standard Atmosphere at sea level).

Aerosols act twofold: on one hand they act like a sunscreen reducing the amount of energy reaching the ground. Accordingly less water evaporates and the air mass at ground level stays cooler and drier, with a reduced tendency to rise and form clouds.

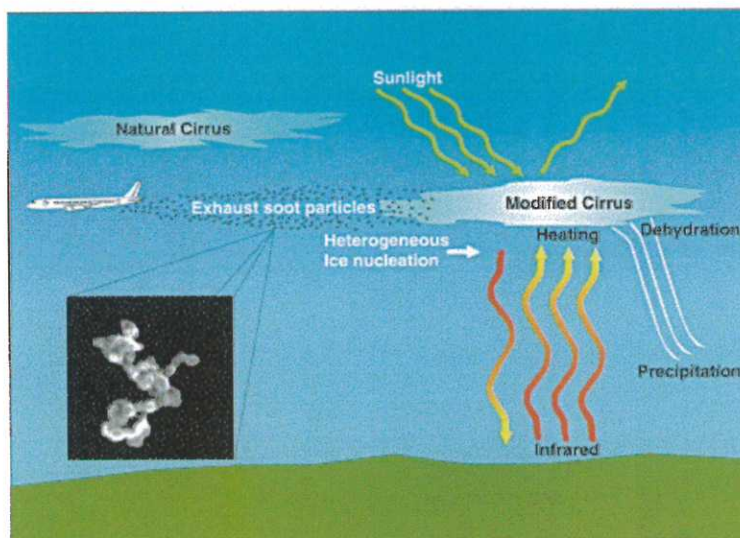


Figure 1: Ice cloud microphysical model

Aerosols act as a sunscreen with a subsequent reduction of energy reaching the ground. Some sources refer to this phenomenon as 'global dimming'.⁶³

⁶⁰ Stickley A.B., An evaluation of the Bergeron-Findeisen precipitation theory, Monthly Weather Review, October 1940.

⁶¹ Qian, Y., D. Gong, J. Fan, L. R. Leung, R. Bennartz, D. Chen, and W. Wang (2009), Heavy pollution suppresses light rain in China: Observations and modeling, *J. Geophys. Res.*, 114, D00K02, doi:10.1029/2008JD011575.

⁶² Rosenfeld D, Does air pollution increase rainfall?, Hebrew University of Jerusalem, September 5th 2009.

⁶³ geo.arc.nasa.gov/sge/jskiles/fliers/gif_folder/image10/image10a.gif

On the other hand, without natural aerosols such as dust particles there would be no cloud droplets because they act as gathering points for air humidity, the so called condensation nuclei as explained in the previous paragraph. When the droplet is formed, energy is released in the form of heat during the condensation process. This energy level for the evaporation – condensation process is significantly higher than during the freezing / melting process (540 Calories /g versus 80 Calories /g). Due to the released heat the air parcel gets lighter than the surrounding air and is allowed to rise further. However, if there is a surplus of these condensation nuclei as a result of natural activity (e.g. Vulcan eruption) or men's intervention (e.g. industrial pollution, contrails), the droplets never reach the critical mass needed to fall to earth as precipitation because there is just not enough water to share between all the aerosol particles. Furthermore with a rising number of droplets their overall surface increases, which on turn increases the amount of sunlight reflected back to space with subsequent cooling and drying of the Earth.

In a nutshell the study of Prof. Rosenberg shows the following: with rising pollution, the amount of precipitation at first rises, then maxes out and finally falls off sharply at very high aerosol concentrations. Of even more interest is his conclusion: 'The practical result is that in relatively clean air, adding aerosols up to the amount that releases the maximum of available energy increases precipitation. Beyond that point, increasing the aerosol load even further, lessens precipitation.' This opens of course an interesting window towards future climate control by regulating the amount of aerosols that are released in the upper troposphere. To put it in the words of Prof. Rosenberg: 'The determination of this issue is one with significant consequences in an era of climate change and especially in areas suffering from manmade pollution and water shortages, including Israel'. This is indeed very true: domestic water supplies are the emerging assets on Earth. The outline of the survey of Prof. Rosenberg can be found in appendix 7.

4.4. OTHER EFFECTS OF CONTRAILS:

4.4.1. Dehydration of the stratosphere due to contrails:

The extreme dryness of the stratosphere is believed being caused by freeze-drying of air as it enters the stratosphere through the cold tropical tropopause. Sedimentation of ice crystals in the thin Cirrus may provide a significant downward flux of water vapor. It has also recently been suggested that gravity waves generated by convection may drive the formation of ice clouds in the lower stratosphere and that precipitation of crystals in these clouds may serve as a stratospheric dehydration mechanism.⁶⁴

A quite intriguing article appeared on the USA Today website on January 28th 2010 in the very evening hours, stating that water vapor may flatten the global warming trend.⁶⁵

This statement has first been published in the Science Journal by senior scientist Susan Solomon of the National Oceanic and Atmospheric Administration in Boulder, Colo. Solomon was also a co-chair of one of the groups within the Intergovernmental Panel on Climate Change that put out the definitive forecast of global warming in 2007. The fact that the IPCC got stuck in one of the greatest climate scandals revealed by the Daily telegraph on November 28th 2009, also better known as 'Climate Gate' with huge fraud of climatologic data by Prof. Phil Jones of the University of east Anglia (UEA) over long years⁶⁶, does not improve credibility of any panel member.

In this respect it is noteworthy that the UK Information Commissioner's Office that leads

⁶⁴ Jensen, E. J., O. B. Toon, L. Pfister, and H. B. Selkirk (1996), Dehydration of the upper troposphere and lower stratosphere by subvisible Cirrus clouds.

⁶⁵ Doyle R., water vapor may flatten the global warming trend, USA Today with contribution of Associated Press, January 28th 2010.

⁶⁶ Booker C, Climate change: this is the worst scientific scandal of our generation, Daily Telegraph, November 28th 2009.

the investigation decided that the UEA failed in its duties but said that it could not prosecute those involved because the complaint was made too late.⁶⁷ Although it looks that 'Climate Gate' will end in the bin as a result of administrative red tape and carefully planned lobby work, a new leak has already emerged on January 30th 2010 when the Daily Telegraph (again) published that the UN expert panel claims on climate change are based on a student's dissertation and an article in a mountaineering magazine.⁶⁸

At a closer look the claim in Mrs. Solomon's '10/10/10 paper' goes even further: 10% decrease in water vapor at 10 miles above our heads during the last 10 years has slowed down the rate of earth's warming by 25%.⁶⁹ The question where the water vapor went to, remains open. But according to this survey it is surprising how big the impact is of such 'small change' (10%!) in water vapor on the surface climate. But according to that survey this isn't an indication that predictions on global warming are overstated: "This doesn't mean there isn't global warming," notes Solomon. "There's no significant debate that it is warmer now than it was 100 years ago, due to anthropogenic (man-made) greenhouse gases."

No one can be surprised that this survey has been ridiculed as a hoax in the aftermath of 'Climate Gate'. However when combining the study material obtained by Jensen in 1996 with the very recent survey by Mrs. Solomon it is obvious that there is a link between the occurrence of natural plus man made Cirrus clouds near the tropopause, the dehydration of the stratosphere and the flattening of the global warming trend. When this knowledge is linked with the surveys of previous paragraphs it becomes crystal clear that aerosols emitted by aircraft engines have a significant impact on precipitation patterns and surface temperatures.

4.4.2. Other factors affecting climate change:

Although changes in precipitation patterns, surface temperature and stability of the air mass are quite measurable parameters there might be other intangible factors:

- One of the most obvious side effects of the formation of contrails is the impact on astronomy. One has seldom a clear sky available for observation in areas with dense air traffic.
- With changing cloud cover and subsequent temperature drop in the upper layer of the troposphere, hurricane activity may be increased as a result of the released instability. It is noteworthy that storms and major floods have more than tripled since 1981.⁷⁰ No apparent relationship between aircraft engine emissions, aerosols, contrails and hurricane activity has been established yet on a scientifically basis.
- It is accepted that knowledge on man made Cirrus cloud is relatively poor and that study of the impact of contrails on the Stratosphere is only in its initial phases. However one can assume that it might have an impact on higher layers and the ozone layer. Ozone depletion does not only occur as a result of industrial activity, but also due to multiple nuclear tests conducted in the 20th century.

⁶⁷ Webster B., Scientists in stolen E-mail scandal hid climate data, London Times, January 28th 2010.

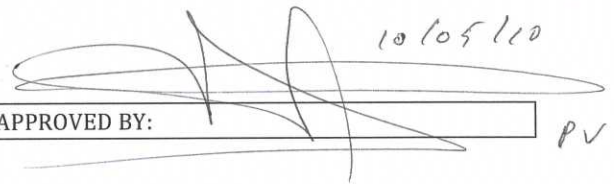
⁶⁸ Gray R. And Lefort R., UN Climate change panel based claims on student dissertation and magazine article, Daily Telegraph, January 30th 2010.

⁶⁹ Solomon S., ten percent decrease water vapor in the stratosphere slows earth's warming trend, the Science Paper, January 28th 2010.

⁷⁰ Global Environmental Outlook, GEO4 Environment for Development, United Nations Environmental Programme, 2007.

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5. CONTRAILS AND WEATHER MANIPULATION

"If the ionosphere is greatly disturbed, the atmosphere below is subsequently disturbed."

Charles A. Yost, author of "Electrical forces applied to basic weather phenomena", 1992.

5. CONTRAILS AND WEATHER MANIPULATION:

5.1. FROM 'CHEMTRAILS' TO GEO-ENGINEERING:

5.1.1. Scientific basis for a weather manipulation system:

In the previous paragraphs it has been clearly denoted that man made contrails do have a significant and measurable impact on temperature and precipitation on the planet. Especially the data obtained by Professor D. Rosenfeld (see paragraph 4.3.1) proves to be quite solid to sponsor a weather manipulation theory, since altering the aerosol doses in the atmosphere can either increase or decrease precipitation patterns.

This opens a window on a scientific basis in order to produce scenarios to counter global climate change, providing that the designers of that system bear the following considerations in mind:

- Development of a reliable matrix of aerosol ingredients versus field conditions.
- Engineering of a efficient, reliable but low cost system in order to seed the atmosphere.
- Sponsorship through government agencies with a far-reaching commitment of captains of industry.

Actually all elements – except the reliability factor - are in place in order to justify the creation or even the existence of such a system: advanced technology is at hand and financing the system through cap & trade systems ensures nearly unlimited funding. If operated for the benefice of mankind a weather modification could solve many environmental issues, such as reversing desertification and avoid the worst consequences of a global climate change.

However, from a military point of view the organization owning the property rights of such a system also has capability to manipulate temperature and precipitation patterns of other nations, and this at very low cost. Imagine what could happen if such a system falls in the hands of a 'rogue state': it would change global domination patterns. Therefore it is unimaginable that civilians run a weather modification system if it came into existence.

Conspiracy theories flourish nowadays as never before. It is of no surprise that stories of weather manipulation systems, such as 'chemtrails' and HAARP, already have found their way to the Internet. Policy makers write these off as a hoax, because there is no hard scientific evidence for their existence. And if they exist, they are kept secret – which is quite obvious. However it is common knowledge that government policy annex history is manipulated at the discretion of the manipulated state. There are countless examples of this in human history and 'Climate Gate' is without doubt also one of them. All these elements necessitate a closer look to the chemtrail phenomenon, starting from its origin. This is covered in the next paragraph.

This chapter will furthermore not only prove that weather manipulation through contrail formation is not that fictional, but will also produce evidence through patents and research documents that this system is in place and fully operational.

5.1.2. Conspiracy theory character of 'chemtrails':

With the huge explosion of aviation traffic during the last 10 years it was a matter of time before someone would question the ever-increasing amount of contrails. The first reference to production of contrails for specific purposes as described in paragraph 2.4, seems to date from an article by William Thomas dated January 8th, 1999. In that text the suspicious of three people about contrails is recounted. Soon afterwards this man was invited onto a popular radio show at that time (Art Bell), marking the beginning of a real

Internet phenomenon.⁷¹ Apparently it has cross-fertilized itself. A comparison of Internet hits for 'chemtrails' between the years 2004 and 2010 is as follows:⁷²

	2004	2010	Change in %
Google	791.000	1.260.000	+59,3%
Blogs	4828	152.000	+3148,3%
Images	9180	170.000	+1851,8%
Videos	2123	47.800	+2251,5%
News	5	22	+440%
Forums	38	110.000	+289.473,7%

This reveals a number of interesting developments:

- Attention by the general public for the 'chemtrail' phenomenon has increased significantly during recent years.
- Images on the Internet with contrails and / or 'chemtrails' have skyrocketed.
- Mainstream news does not hook in on the existence of 'chemtrails'.

The relative strength and importance of the 'chemtrail movement' becomes quite clear when it is compared with other popular topics, such as global warming, UFO's and 'morgellons' (polymers floating in the sky):⁷³

Google (total)	2004	2010	CHANGE in %
Tour de France	Unknown	788.000.000	Not applicable
UFO's	36.700.000	36.900.000	+0,5%
Global warming	67.500.000	32.400.000	-52%
'Climate gate'	0	12.100.000	Not applicable
'Chemtrails'	791.000	1.260.000	+59,3%
Morgellons	236.000	249.000	+5,5%

Google (news)	2004	2010	CHANGE in %
Tour de France	Unknown	21.600	Not applicable
Global warming	32.584	23.100	-29,1%
UFO's	929	1890	+203,4%
'Climate gate'	0	401	Not applicable
'Chemtrails'	5	22	+440%
Morgellons	4	9	+225%

⁷¹ Contrail science, a brief history of 'chemtrails', www.contrailscience.com

⁷² Combination of Contrail Science data and own investigation.

⁷³ Idem as footnote 72.

These tables denote clearly that 'chemtrails' are widely regarded by the general public as well as mainstream news agencies as a marginal, dubious phenomenon that is certainly not threatening everyday life and does not need further attention.

In this context it is noteworthy that attention for global warming has fallen dramatically over the last years. It is possibly a result of the ever-increasing controversy of that topic combined with a deep widening economic crisis, necessitating people to keep their feet on the ground. Or perhaps there is just a shift in nomenclature: global cooling, climate change... The sudden appearance of 'climate gate' related stories with high hit rates on the Internet might support this theory.

There is more: association with topics that are not backed by hard scientific evidence puts the 'chemtrail phenomenon' automatically in the esoteric or conspiracy theory corner. There are 4 logical reasons for this:

- Because the phenomenon is basically Internet driven, there is no support whatsoever from scientists, political parties or environmental organizations. It is striking that the representative of the ecologist party (Grüne) in Vienna even expletively states that the subject is a mere conspiracy theory and there is neither time nor resources available to study the subject.⁷⁴
- Most of the people posting the 'chemtrail' observations on the Internet are not academically qualified to do so. Estimating the cruising altitude of a jet airplane is indeed a tricky affair. Making the difference between contrails and 'chemtrails' is even more challenging. Last but not least posting pictures of grid-pattern contrails on the Internet without a valid caption does not promote any scientific seriousness towards the subject.
- Many websites that provide information about 'chemtrails' also cover other subjects, such as the existence of extra-terrestrial life on earth, global mind control programs and other stuff. As a result of this any story about 'chemtrails' is treated the same way as a hoax and this regardless the value of that information.
- Only a handful Internet sites are dedicated solely on 'chemtrails'. In fact they combine all 'chemtrail' reports within a single state and post it on the Internet. Examples of these are <http://arizonaskywatch.com/> and <http://www.chemtrails-info.de>. These websites often offer test analysis of water samples and reports of spraying actions. Sadly on many occasions the information presented contains scientific errors or wrong interpretations.
- Government instances officially decline in a systematic way the existence of 'chemtrails'. On the other hand all the available information on the Internet does not permit verification of any 'chemtrail' claim. Anonymous reports, such as the testimony of 'Agent Deep Shield' who claimed to be an insider in the 'chemtrail' business⁷⁵, does again not improve credibility.
- Last but not least there are a number of websites that deny the existence of 'chemtrails' in a quite cynical but scientific way. An example of this is <http://contrailscience.com/chemtrail-myths/>. Its Webmaster, known as 'Unicus', does actually hide his real identity – adding fresh meat for the conspiracy theory grinder that it might be a government agency. However it is significant that this website deals with any of the websites mentioned above, reducing the argumentation of 'chemtrail' protagonists to a piece of rubble.

⁷⁴ Haderer C and Hies P., Chemtrails, Verschwörung am Himmel?; VF Sammler Verlag 2005, Graz, Austria.

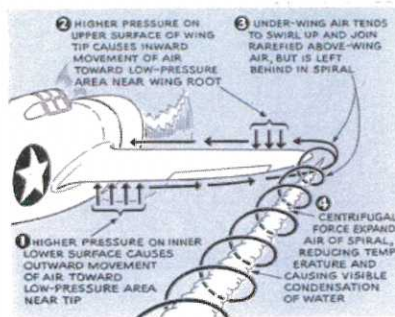
⁷⁵ Idem as footnote 74.



AIRPLANES leave trails in the atmosphere that can be picked up, if a spotter is quick enough, like those of game sought by a hunter. Some of them, especially trails left by a plane's exhaust at high, cold altitudes, endure for some time, while those made by wing tips creating vortices are audible as well as visible.

Both of these types of airplane trails are

explained by condensation. Invisible water vapor in a plane's exhaust condenses into a visible cloud when the vapor reaches an excess of what the atmosphere will hold. Wing-tip trails add no water to the air, but as their vortices expand, the air temperature in them drops and the dew point is reached if the vortices are strong enough and humidity is high.



MARCH, 1943



Noise like the whistle of a falling object may be heard when a heavily loaded plane pulls out of a low dive. It is from the wing-tip trail illustrated at left, and is audible after that of the motor dies away

55

Home page illustration of the 'contrail science' website. Contrails already exist since the beginning of aviation.⁷⁶

All these elements induce that a scientific approach to 'chemtrails' automatically would compromise researchers and their career. Moreover, who wants to 'chemtrail' the population after all and for what sake? So in the best case the word is badly chosen, because public health is supposed to be one of the backbones of our consumer driven society. Nevertheless it comes as a surprise that some lone authors were able to persuade their editor to publish their book about 'chemtrails' — maybe because it has such a high conspiracy theory level that sells well. Although it is impossible to review all publications, here is a selection of them:

⁷⁶ www.contrailscience.com, Popular Science, March 1943, Page 55.

AUTHOR	TITLE	COMMENT
Chris Haderer Peter Hiess	Chemtrails, Verschwörung am Himmel? ⁷⁷	Rather chaotic book, with a separate chapter about other conspiracy theories. Well documented with ample photographic material, but without any hard scientific evidence. Contains a copy of a letter from a member of the German parliament (Bundestag), in which the limited spraying of barium and aluminum in the atmosphere is acknowledged.
Dr. Leonard G. Horowitz	Death in the air: globalism, terrorism & toxic warfare ⁷⁸	The author is a graduate of the Harvard School of Public Health. Chemtrails are linked with jeopardize of public health and CIA's population control projects. Contains many traceable references on bioterrorism.
Jeane Manning Dr. Nick Begich	Angels don't play this HAARP. ⁷⁹	Publication solely dedicated to HAARP. Describes the system as an extension of president's Reagan 'star wars project' with the ability to manipulate weather patterns and even produce earthquakes.

5.1.3. Establishment of a reliable research protocol:

Despite some interesting elements in the publications mentioned above and the numerous Internet articles It is quite clear that due to environmental bias it is impossible to analyze 'chemtrails' in a profound and scientific way.

The only option to approach this subject in a serene way is to restart investigation from zero, with new nomenclature and an acceptable research protocol that includes the following:

- History tracking of atmosphere and weather modification programs in Europe, the United States of America, the People Republic of China and Russia / former USSR with new searching tools, such as cloud seeding, geo-engineering and weather force multiplication. The term 'geo-engineering' fits best, because it encompasses all sorts of human intervention to manipulate climate patterns: atmosphere seeding, marine cloud whitening research⁸⁰, carbon storage research and even cooling down the earth with a cloud of spaceships (!).⁸¹
- In-depth study of pending patents covering weather- or atmosphere alteration: patent holder identity, application field, a feasibility study and implementation records.

⁷⁷ Haderer C and Hies P., Chemtrails, Verschwörung am Himmel?; VF Sammler Verlag 2005, Graz, Austria, ISBN 3-85365-213-1.

⁷⁸ Horowitz L.G., d.m.d., m.a., m.p.h., Death in the Air: globalism, terrorism & toxic warfare, Tetrahedron LLC, Sandpoint, U.S.A, 2009, ISBN 978-0-923550-30-1.

⁷⁹ Manning J., Begich N. Dr., Angels don't play this HAARP: advances in Tesla technology, Earthpulse press, Anchorage, Alaska, U.S.A, second edition, 2007, ISBN 0-9648812-0-9.

⁸⁰ Copenhagen Consensus Center, press release: top economists recommend climate engineering, September 4th 2009, Copenhagen / Washington.

⁸¹ Angel R., Feasibility of cooling down the earth with a cloud of small spacecraft near the inner Lagrange Point (L1), University of Arizona, 17184-17189 PNAS November, 14th 2006, Vol. 103, N°46.

- Analysis of recent scientific and military surveys regarding climate control or climate change mitigation by means of cloud seeding.
- Search through all available channels to obtain actual solid evidence of weather modification programs through reverse engineering: the existence of associations (academic, political, IPCC) that support such programs, order sheets of seeding material on behalf of government agencies and operational charts.

Witness reports, whether anonymous or not, that do not include a valid reference for crosscheck will not be included in the report. Photographic material in the context of this research protocol shall only be released when the probability of error is close to zero.

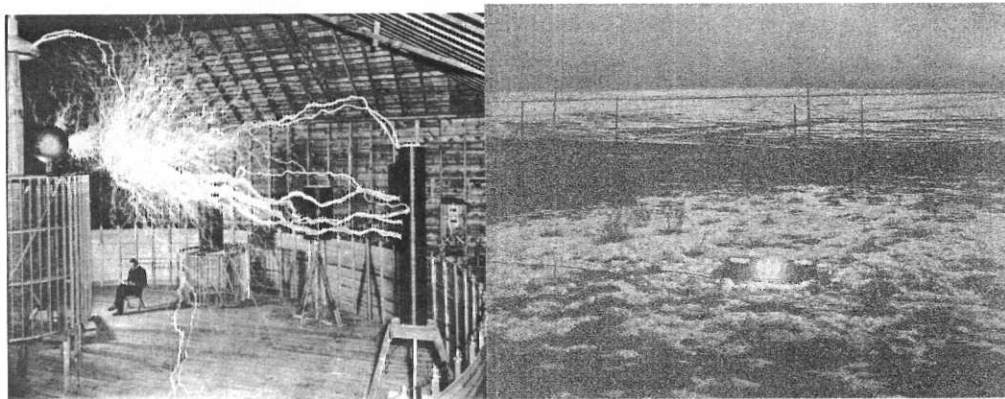
5.2. HISTORY OF GEO-ENGINEERING:

5.2.1. Period 1899-1940: the research work of Nicolas Tesla:

From an agricultural point of view mankind has always wished to intervene in weather patterns to avoid long periods of drought or adverse weather. The first known research in the field of engineering of nature forces is attributed to Nicolas Tesla (1856-1943), a brilliant but still underestimated inventor in established academic circles.

He was one of the most important contributors to the birth of commercial electricity (AC) and is best known for his revolutionary developments in the field of electromagnetism in the late 19th and 20th century. He clashed continuously with Edison's insistence that the United States should stick to his DC-technology for power distribution and electrical lighting – knowing that his system was far more efficient. The fact that only Thomas Edison appears in history records and schoolbooks will become quite obvious.

In 1899 Tesla performed wireless power experiments near Colorado Springs and was able to produce a 30-second golf ball sized lightning.



Left: publicity picture of a participant sitting in Tesla's laboratory in Colorado Springs, circa 1900. Right: actual photo of an experiment in Colorado Springs, during which the bank of light is receiving power from a distant transmitter.⁸²

J.P. Morgan, still one of the most important banks on the globe, heavily financed his projects. The majority of the money was spent in the construction of the Warden-Cliff tower, which would be able to create voltages of 15 million Volt and 40-ft lightning-like discharges.⁸³

⁸² Both pictures in public domain.

⁸³ Cheney M., Tesla: man out of time. Simon and Schuster, 2001, ISBN 0743215362.



Actual photograph of the Warden-Cliff tower, prior to its demolition in 1917⁸⁴

However, just as Victor Schauburger was in search of free energy through water vortices⁸⁵, Tesla was pursuing electric energy without wires. He patented this invention on April 8th, 1905.⁸⁶ Results were satisfactory, but after Tesla admitted to his financiers that an experimental power station on Long Island was to send wireless electrical power as well as messages his public career ended. Although he continued to invent and depose further patents, he was kicked out of the spotlight for the sake of economic interests of J.P. Morgan's shareholders.⁸⁷ This is also the reason why Edison was lionized in mainstream history books.

Just before the destruction of the Warden-Cliff tower in 1917, Tesla offered his services for the development of a 'particle beam weapon' to the U.S. department of war and was subsequently kicked out of their office. Persuading people at that time that a magnifying transmitter could beam up electrical energy to the stratosphere and bounce it back to a predetermined place on earth was indeed hopeless, given the level of technology at that time.⁸⁸ Nevertheless if this proves to be true Tesla did excite the Schumann cavity (Earth's resonance frequency 7,83 Hz) already in 1899 – 53 years before W.O. Schumann identified it scientifically. He also had a deep insight in the behavior of the ionosphere, more precisely the existence of a skip zone – the extension of a radio signal well beyond the horizon after reflection in the Heaviside layers (invention officially attributed to Tellegen in 1933). A variant of Tesla's idea of the 'magnifying transmitter' has been put in practice in the HAARP-system for study and manipulation of the Aurora Borealis, although its designers repeatedly stress that there is no analogy with Tesla's theories.⁸⁹

Tesla's research work is quite remarkable. In respect of this research one can conclude that he was the first to perform experiments to produce lightning at will and to offer it for both civil and military purposes. Similar projects to trap the enormous reserve of electrical current of a single thunder flash have been undertaken since then, but apparently without success. In Switzerland the test facility burned even down. An Egyptian company, Logico in Cairo, is one of the first enterprises that seem to specialize exclusively in the collection of renewable electrical energy from lightning.

⁸⁴ By courtesy of the Nikole Tesle Museum, Belgrade, Serbia

⁸⁵ Schauburger V., *das Wesen des Wassers*, AT Verlag, München, 2006.

⁸⁶ US patent 787,412, art of transmitting electrical energy through natural mediums, through U.S. patent office.

⁸⁷ Idem as footnote 82.

⁸⁸ Seifer M. Dr., *Nikolas Tesla: the history of lasers and particle beam weapons*, proceedings of the international Tesla symposium, 1988.

⁸⁹ <http://www.haarp.alaska.edu/haarp/faq.html>

5.2.2. Period 1940-1945: first atmospheric seeding:

In both World Wars weather was a considerable and sometimes decisive factor for success or disaster. Parallel to this armies started to rely heavily on camouflage after the stalemate that followed the initial German dash on Paris in 1914. Already less than one year later the German field army developed man-made fog through smokescreens in order to dissimulate troop movements or to go into the offensive through nerve gas attacks, although there are historical references to 'deliberate obscurity' dating back to at least 1565.⁹⁰

The aerial bombing campaigns in World War II, first by the Luftwaffe and followed by very aggressive daylight raids by the 8th Air Force and the Royal Air Force at night marked the first deployment of what later would be known as ECM – Electronic Counter Measures. Although radar was only in its childhood stage during this conflict, it faltered the German 'Blitz' on England. The subsequent struggle between the belligerents was to become known as 'the battle of the beams'. Despite the fact that British intelligence had broken the German Enigma code, they allowed the mass destruction of Coventry by raiders equipped with the 'Knickebein System' in 1941 in order to keep the Germans unaware of this security breach.

In July 1943 the Royal Air Force made one of its most successful sorties by deliberately seeding the atmosphere with masses of small-aluminized paper strips, coded 'Window', to garble German radar. That night Hamburg was flattened with great loss of life. The Luftwaffe operated a similar system in 1944, called Düppel, for disturbing air traffic in the vicinity of allied aerodromes over South East England.⁹¹



The crescent-shaped white cloud on the left is formed by massively seeding the atmosphere with aluminum particles, thus jamming the German radar and rendering their defense useless, July 1943.⁹²

This development is important in the context of this survey, because 'Chaff' as it is called in NATO-nomenclature today is still part of the ECM-defense system and there is evidence that it is tested on a regular basis. On July 19th, 2005 'Düppel' has been used during air exercises over Germany and the Netherlands, causing major disruption on weather radars.⁹³

⁹⁰ The American Heritage® Dictionary of the English Language, Fourth Edition, 2009, Houghton Mifflin Company.

⁹¹ The history of radar, BBC maths, science and technology, July, 14th 2003.

⁹² United Kingdom Government through IWM, public domain.

⁹³ RTL, programm 'Guten Abend', Kartsen Brandt: Bundeswehr manipuliert Wetterkarte, July, 19th 2005.



Hardcopy from the RTL-broadcasting, with the 'Chaff' clearly visible in the area of Kassel. Meteorologists were 'not amused' at that time.

5.2.3. Period 1945-1950: operation Cirrus:

The Second World War ended with the atomic bomb tests, during which uncountable magnetic pulses were released in the atmosphere. As a result of this the U.S. was not only confirmed in its role as world leader, but unlimited funding became available for different projects, including the first weather manipulation programs.

The project, later called Cirrus, originated in 1947 and was led by Nobel laureate Dr. Irving Langmuir and his protégé Dr. Vincent Schaefer in co-operation with the U.S. Army, Navy, Air Force and General Electric. Dr. Schaefer was the man who dropped 1,4 kg of ice pellets on November 13th, 1946 into a super stratus cloud near Schenectady, New York and snow fell. This is the first known fruitful attempt to induce precipitation from a cloud.

To test his theories Schaeffer created a 'cold box' in a laboratory to recreate the same conditions. Breathing into the box produced a tiny cloud of super cooled water droplets, just as in real conditions in the upper part of a cloud. Furthermore Schaeffer discovered that the addition of any substance with a temperature below -40°C would cause million of ice crystals to form in the cloud.⁹⁴

For actual cloud seeding the U.S. Signal Corps became involved in February 1947 and it earned the name Project Cirrus. 37 experimental flights took place in the first half-year that did not always produce the expected results, mainly due to the inherent variability of the weather. Modification of tropical typhoon through dispersion of 80 lbs dry ice in 1947 ended with major flooding in the Savannah area with damage totaling \$20 million as a result of a sudden course change.⁹⁵ Officially it was classified as an act of God.

After this the lawyers of General Electric told Dr. Langmuir not to discuss the hurricane case until the statute of limitations ran out for prosecution. Fear for a legal case necessitated further operation out of public eyes and the project was closed in 1950 due to a shift in government with different priorities. In 1958 three nuclear bombs were detonated in the Van Allen radiation belt (protective zone of charged particles trapped in the Earth's magnetic field starting around 2000 miles altitude), starting to deplete the ozone layer with each further attempt by the United States, the former USSR and

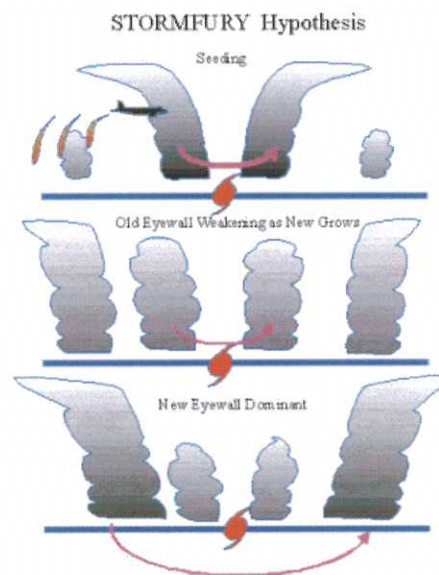
⁹⁴ Reilly C., Staff Historian, Rain men: scientists here tried to change the weather, Monmouth Message, February 20th 2009, U.S.A.

⁹⁵ Idem as footnote 94.

France.⁹⁶ This information will be of major importance in the next chapter. Nevertheless project Cirrus is the first confirmed cloud seeding program in history. The full outline of this program can be found in appendix 8.

5.2.4. Start of operation Storm Fury (1962) and Popeye (1967):

Project 'Storm Fury' continued on the knowledge obtained during operation Cirrus, with its main objective to weaken tropical cyclones by flying aircraft into them and seeding with silver iodide.⁹⁷ The partners were the U.S. Department of Commerce and the U.S. Navy. The hypothesis was that the silver iodide would cause super cooled water in the storm to freeze and subsequently disrupt the inner structure of the hurricane. Although this hypothesis proved to be incorrect the cloud seeding project continued officially until 1983 with the last experimental flight in 1971.



The hypothesis of operation Storm Fury was incorrect because tropical cyclones seem not to contain that much super cooled water to make cloud seeding effective. Additionally unseeded hurricanes often undergo the same structural changes as the 'treated' ones.⁹⁸



The crew enlisted in Operation 'Stormfury' in 1963. Note the special belly of the Douglas DC6-B on the background for cloud seeding purposes.

⁹⁶ National Academy of Sciences, Long time effects of multiple nuclear weapon detonation, 1975, pages 6-7.

⁹⁷ Willoughby, H. E., D. P. Jorgensen, R. A. Black, and S. L. Rosenthal, 1985: Project STORMFURY, A Scientific Chronicle, 1962-1983, *Bull. Amer. Meteor. Soc.*, 66, 505-514.

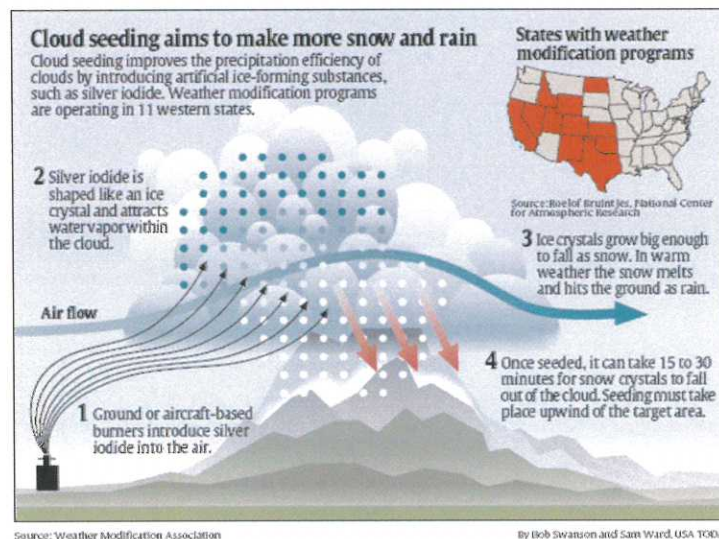
⁹⁸ Atlantic Oceanic and Meteorological Laboratory, Hurricane Research Division, Operation Storm Fury research paper.

In the wake of operation Storm Fury there was also a less known military application during the Vietnam War. From March 1967 until July 1972 the U.S. military cloud seeded 47,409 units of silver iodide to extend the monsoon over North Vietnam and especially in the vicinity of the Ho Chi Min trail. The objectives of this operation, called Popeye, was to deny the enemy the use of roads by softening road surfaces, causing landslides, washing out river crossings and to maintain saturated soil conditions beyond normal time span. It actually resulted in the targeted areas seeing an extension of the monsoon by an average of 30 to 45 days.⁹⁹ The full transcription of a U.S. senate hearing about weather modification in S.E. Asia is included in appendix 9.

Operation Popeye proves that weather modification explicitly forms part of the U.S. weapon portfolio ('make mud, not war'), shining new light on the Advisory Committee on Weather Control, which was created in 1953 under direct Federal Government control with Captain H.W. Orville as chairman. Its mission was to study weather-making activities with emphasis on rain making to 'benefit water supplies and land utilization'.¹⁰⁰ Despite the mixed results obtained during operation Storm Fury and Popeye it gave way to a very profitable but controversial business with companies offering local weather modification for agricultural purposes through hail cannons and cloud seeding by small aircraft. The successful outcome of such an operation is at least to say doubtful.



Cessna 210 with a device for cloud seeding with silver iodide.



Nowadays there are still several states in the U.S. running cloud seeding programs.

⁹⁹ Top secret hearing held on March 20, 1974 made public on May 19, 1974 weather modification, SEASIA rain making

¹⁰⁰ Substantially increased research programs needed in meteorology to benefit water supplies and land utilization, Journal of Agriculture and Food Chemistry, Page 1192, December 1953.

After the Chernobyl disaster in 1986 major A. Grusin described how the Soviet air force created rain clouds to protect Moscow from radioactive fall out. Sadly the population in Belarus was exposed to radiation doses 20 to 30 times higher than normal, causing intense radiation poisoning in children.¹⁰¹ The article is included in appendix 10.

Silver iodide is still used on a large scale by the Russian and the Chinese air force for generation of clear skies during military parades or major sports events, such as the Olympic games.¹⁰² In 2009 the mayor of Moscow was planning to spend several million Dollars to pay the Russian Air Force and spray a fine mist of particulate matter (cement dust in 2007, silver iodide or new chemicals) in the clouds. The ideas of operation Cirrus and Storm Fury still stand: seeding the clouds would increase moisture and thus force the clouds to release their precipitation before they reached the capital – ‘thus saving the city millions in snow removal costs’.¹⁰³

Preliminary tests revealed strange hole punched clouds over Moscow that worried its inhabitants.



This strange cloud over Moscow in November 2009 is attributed to a cloud seeding test.

Unfortunately the ‘experiment’ proved to be a huge failure with 417.000 cubic meters snow shoveled between February 21st and 22nd 2010 – breaking the record of 1966.¹⁰⁴ It has not been determined if there is any correlation between the harsh winter conditions in Moscow or the rest of Europe in this period and any cloud seeding initiatives.

However, it is clear that extensive hard evidence exists of weather manipulation for both civil and military purposes on micro- and macro scale since the Eisenhower administration, with ever changing seeding material ranging from dry ice over silver iodide to cement and particulate matter. However one must bear in mind that mechanical cloud seeding is quite expensive and it was a matter of time before alternative and more efficient ways of manipulation of the atmosphere were to be developed.

¹⁰¹ Gray R., How we made the Chernobyl rain, Daily telegraph, April 22nd 2007.

¹⁰² Michaels J., China may attempt to alter weather for Olympics, Meteorology news, July 15th, 2008.

¹⁰³ Michaels J., Moscow testing cloud seeding; promises winter without snow, Meteorology News, October, 19th 2009.

¹⁰⁴ Moskou onder een dik pak sneeuw, De telegraaf, 22 Februari 2010.

5.2.5. U.S. and Soviet 'proof of concept' ELF-projects (1975 to 1995):

A 'proof of concept' project is one where advanced research experiments are designed to test, usually on a smaller scale, specific applications of research. These tests allow researchers to extrapolate results, which can be used to engineer full size technology systems. Within the scope of this survey a 'proof of concept' project for weather modification is the last step before full weapon system development (military applications) or geo-engineering around the planet (civil and military applications).

After the American debacle in Vietnam the two opposing blocks shifted to a more silent cold war and this despite extensive strategic arms limitations talks (SALT). Instead of dropping masses of silver iodide in the atmosphere and battering the troposphere with atomic tests –already totaling 400 kilotons at that time - a subtle battle of the frequencies between U.S. and opposing Soviet forces made its headway. Its ultimate target: replacing thermonuclear weapons by 'non lethal' electro pulses through manipulation of the ionosphere and the magnetosphere.¹⁰⁵

Development of such devices started quite a long time ago. Already in 1966 Anthony Ferraro at the Penn State University performed the first military funded experiments with a 500kW ionosphere heater.¹⁰⁶ A high-power transmitter would heat a region of the lower ionosphere while a weaker transmitter was pulsing. Thus the experimenters could study wave interaction within that specific layer of earth's atmosphere. They had to shut down the project some years later because there was an unacceptable interference with air traffic control and other types of radio communication. As a result of this, military decision makers decided that all future projects would be located in remote places on the globe.

In 1974 Dr. R. Helliwell and J. Katsufakis of the Stanford University's Radio Science Laboratory showed that a very low frequency radio wave (VLF) could vibrate the magnetosphere¹⁰⁷ (The region above the ionosphere in which the magnetic field of the earth has a dominant control over the motions of gas and fast charged particles), thus confirming the research work of Anthony Ferraro.

Exact one year later in 1975 the U.S. Navy launched an ELF-facility (Extreme Low Frequency) capable to radio-contact deep running Polaris or Poseidon ICBM missile carrying submarines in case of extreme national disaster. This operation, with code name Project Sanguine, consisted of the development of a communication network in the 45 to 75 Hz frequency range plus a grid of deeply buried cables covering 1250 square miles. In this system, sited in specially selected rock and ground formations, the earth acts as a conductor, with the rock formations forcing the radio waves outward into the ionosphere instead of inward toward the earth's core.¹⁰⁸ The saturation of the ionosphere forces some of these ELF signals underwater to a considerable depth, enabling submerged submarines to receive and react to messages from a distance of over 2500 miles even if normal communication channels should be destroyed in a preemptive attack. A similar system, called ZEVS with its transmitter located near Murmansk, is still in use in Russian Navy.¹⁰⁹

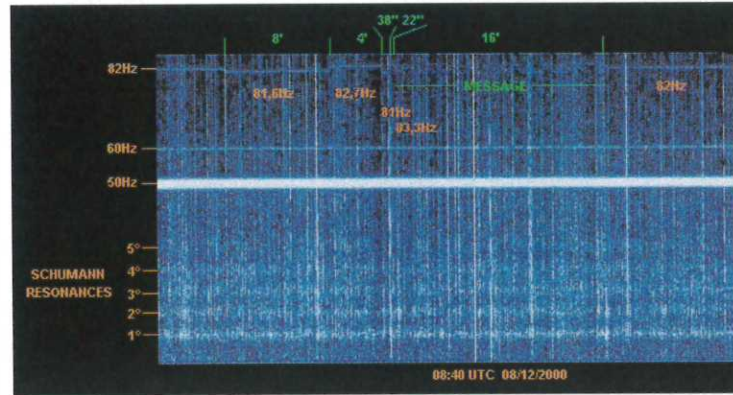
¹⁰⁵ U.S. patent 4,686, 605 – issued August 11th 1987 to Bernard J. Eastlund and assigned to APTI inc., Method and apparatus for altering a region in the Earth's atmosphere, Ionosphere and/or Magnetosphere.

¹⁰⁶ Ferraro A.J., Reflections on 40+ years of ionospheric research, Communication & Space Science Laboratory, Penn State University, United States

¹⁰⁷ Stanford University VLF group website <http://www.star.stanford.edu/people/rah.html>

¹⁰⁸ Wallechinsky D. And Wallace I., Major engineering events in history: Project Sanguine nears operation, 1981.

¹⁰⁹ Jacobsen T., ZEVS, the Russian 82 Hz ELF transmitter, Norway.



A ZEVS transmission recorded in Italy by Renato Romero on the 8th of December 2000, at 08:40 UTC. The "message waiting" signal, 81.6 Hz low for 8 minutes, 82.7 Hz high for 4 minutes is easily detected in the spectrogram. After the 16 minutes long message sequence of the transmission is again the carrier at 82 Hz. Because of the long exposure are the Schumann resonance bands easily visible at the bottom of the spectrogram.

However in the field of ELF-transmitters the Soviets proved to be far superior to the Americans at that date with significant amount of manpower and resources attributed for the development of a fully operational ionospheric heater in Zelanogradskaya near Moscow, which was completed in 1981. There are reports that the device was not only used for ionosphere study and modeling, but also for pulsing of ELF-waves on a 10 Hz frequency in the form of a 'woodpecker signal' –just above the natural Schumann resonance frequency of the earth of 7.83 Hz - in order to disturb communication and to resonate with neurons of human brains at key brainwave rhythms.¹¹⁰ The existence of a U.S. radio frequency radiometry handbook, which contains mathematics for calculation of the dosages of radio frequency radiation necessary to cause changes in animals and humans, is a silent witness of the battle of the frequencies between the United States and the former Soviet Union.¹¹¹ After the collapse of the U.S.S.R. many projects were abandoned and the Americans took the lead in the research. Today 10 known ionosphere heaters or research facilities are operative around the globe (4 U.S. staffed, 1 in Norway operated by the German Max Planck Institute since 1991 and 5 Russian).



This 'ionosphere study station' at Zmiev, currently in the Ukraine, has been abandoned after the demise of the Soviet Union.¹¹²

¹¹⁰ Dr. Begich J & Manning J., Angels don't play this HAARP, advances in Tesla technology, page 17, Earthpulse press, Anchorage, ninth printing, 2007.

¹¹¹ Radio frequency radiation dosimetry handbook, U.S. Air Force School of Aerospace medicine, Brooks Air Force Base, October 1986.

¹¹² Picture by courtesy of the Pravda, <http://english.pravda.ru/img/idb/photo/5-67.jpg>