Gabriel's Trumpet
Part 5 – The Lethal Bullet

"*There is no magic bullet for climate change, but there is a lethal bullet: coal*"
George Soros

Geoengineering Proposals for Cloud Seeding

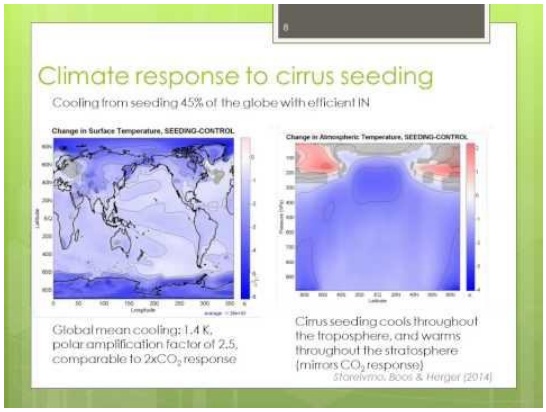
In 2009 Mitchell and Finnegan published a paper proposing an alternative form of geoengineering based **not** on Solar Radiation Management but on **Thermal** Radiation Management.

Modification of cirrus clouds to reduce global warming

The idea is **to mitigate global warming by reducing cirrus cloud coverage**. It targets **longwave IR** radiation rather than **shortwave Solar** radiation and thus differs from the usual geoengineering proposals.

The way it works is most clearly presented in this video:

On The Climate Response to Cirrus Cloud Seeding - WXMOD 2015



The **stated purpose** of the seeding would be to **convert the cirrus clouds** from those that consist of **many, smaller ice crystals that last longer** to those that consist of **fewer, larger ice crystals that precipitate out at a faster rate**, **reducing lifetime and coverage**.

Different concentrations of ice nuclei in the upper atmosphere were modelled and without the presenter specifying what the ice nuclei were, they were **very efficient**, **forming ice crystals at 10% supersaturation**. The actual paper specifies the chosen ice nuclei as **Bismuth tri-iodide** (**BiI3**).

Concentrations of **15 ice nuclei (IN) per litre were found to be the most effective** for **inducing precipitation**. They discovered a "**goldilocks**" phenomenon where:

IN concentrations of up to around **10 IN per litre had no effect on cirrus clouds,**

10 – 15 IN per litre was found to be **"just right"** producing cirrus clouds of **few** but **large ice crystals** leading to a **reduction in cirrus coverage** and a **resulting cooling effect.**

Concentrations of 16 IN and higher were found to lead to an **"over-seeding regime", r**esulting in **cirrus clouds of many** but **smaller IN and a consequent warming effect.**

The study also looked at the most efficient latitudes for cirrus cloud geoengineering.

Mid to high latitudes are proposed for targeting to **maximise the long wave effect**. It is interesting that the **correlation between air traffic and increases in cirrus cloud coverage since the 70's have occurred primarily at these latitudes in the northern hemisphere.**

When they modelled the cirrus seeding as a function of the solar zenith angle, they found that those regions of polar night or close to polar night in the higher latitudes were the most effective.

The **further poleward you go**, the **more pronounced the long wave forcing** and the **less pronounced the shortwave forcing.**

Around 8:40 *"Now going deeper into the climate response, you can see here the surface cooling that we could achieve with this cirrus seeding , and you can see that there's* ***a strong polar amplification*** *and if you do the ratio of high latitude to global cooling, you get a ratio of 2.5 which is actually* ***very similar to the kind of polar amplification you get from the greenhouse warming****, so in that sense this is probably a better compensation for CO2 warming than some of the SRM techniques that tend to overcool the tropics and undercool the high latitudes.*

In terms of the vertical temperature changes, we can see that there is ***a cooling*** *(in the model) happening* ***throughout the troposphere*** *and then a* ***warming in the stratosphere****, so again that* ***mirrors what happens in response to increased CO2 concentrations****."* Emphasis mine

Now it doesn't take a huge leap of logic to imagine what would happen if in the model, you **switched** the cirrus seeding to an **"overseeding regime".** You would get **warming at the poles** and **throughout the troposphere** and **cooling of the stratosphere.**

Apply the "**overseeding regime**", primarily to the **northern hemisphere** and the **north pole** and you arrive at what has **actually been happening since 1975**.

The presenter also looked at the **modelling of precipitation changes to the climate**. They found a pattern of **"wet gets drier**" and "**dry gets wetter".**

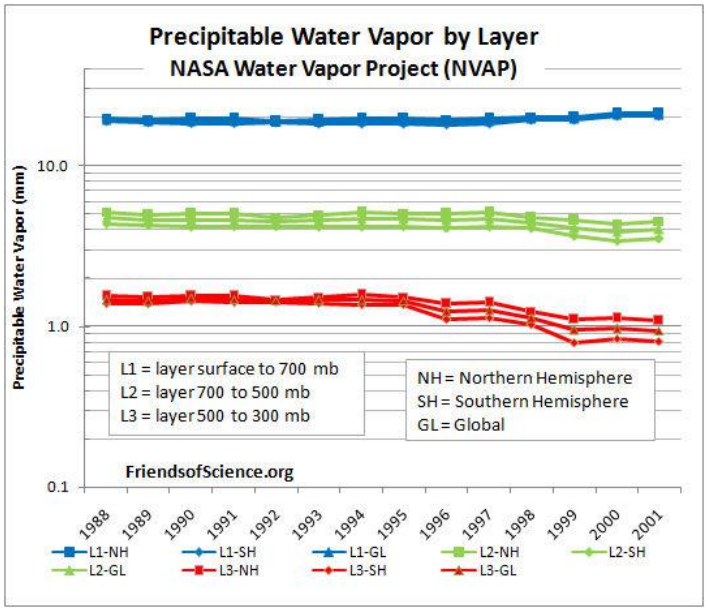
Of course again, reversing this to an **"overseeding regime"** we get "**wet gets wetter** and **dry gets drier**" which is what James Hansen predicted in his book "Storms of My Grandchildren" but from CO2.

Around 12:30 *"...it is not entirely clear how you would build up this optimal seeding concentration, but even if you knew exactly what the seeding ice nuclei concentration should be, it's not obvious how you would achieve that, people have proposed* ***drones or commercial aircraft*** *but that's still an unanswered question"* Emphasis mine

Given that, a potential **8% global increase in cirrus cloud cover over 4 decades**, resulting in a global forcing of **1.6 W m−2**, has been correlated with air traffic, it could well be that international aviation has **already set up an over-seeding regime on a global scale**, rendering attempts to maintain a "goldilocks" range futile.

The optimum number of ice nuclei of the suggested aerosol **Bismuth tri-iodide** (**BiI3**) for inducing cirrus cloud precipitation was in the range of **10 to 15 ice nuclei per litre**, whilst the number that would bring about an **over-seeding regime** was **above** 15 ice nuclei per litre. The ice nuclei concentration of an aviation-induced cirrus cloud at its greatest extent of 50,000 km2 after around 7 hours would be in the range of **1000 – 2000 ice nuclei per litre**.

This aerosol fingerprint is observed in the record of upper atmospheric humidity, revealing a decline, counter to a CO2 induced warming but in line with aerosol induced cirrus cloud formation entraining water from the surrounding atmosphere.



The reason that humidity readings are so low in the upper atmosphere is because of the ubiquitous presence of cirrus clouds and the over-seeding regime of aerosols that forms them. Aerosols by entraining water, reduce humidity. This is why, on those rare occasions when a region of the upper atmosphere is free from aerosols, the humidity readings jump up.

The **warming due to this cloud configuration** also **adds to positive water vapour and cloud feedback** with the difference being that, provided enough aerosols are present and **continually replenished**, the negative feedback of precipitation is **impeded** resulting in a lack of rainfall, **amplifying and pro-longing the cycle**. This makes (phil)anthropogenically induced clouds a **forcing** in addition to a feedback.

It remains to identify this elusive aerosol, traces of which, it would be logical to assume, are detectable in the cirrus clouds themselves.

Of Particular Importance

We know that cirrus clouds, natural and artificial, require very specific particles that act as ice nuclei.
A study led by Daniel J. Cziczo and published in **2013,** found that two specific kinds of ice nuclei, those from **mineral dust** and **metallic particles** are favoured as ice nuclei for **61% of all cirrus clouds**, despite the fact that other, less favoured aerosols, are more abundant.
The **vast majority** of **atmospheric** aerosols consist of **sulphates** and **organic molecules**. They were **underrepresented** as the nuclei for **14%** of cirrus clouds, whilst carbon and biological material were essentially absent. Again, this also speaks volumes about the value of emplacing sulphates at this level for mitigating warming.

Metals found as favoured ice nuclei included **lead, zinc, tin, copper and silver.**

Lead, in particular, has been shown, in addition to being an ice nucleus itself, to have the effect of **"supercharging" pre-existing particles**, making even more highly efficient nuclei.

Mineral dust is mainly composed of the oxides (SiO_2, Al_2O_3, FeO, Fe_2O_3, CaO, and others) and carbonates ($CaCO_3$, $MgCO_3$) that constitute the Earth's crust.

Of vital importance, is a class of ice nuclei obtained from cirrus clouds that is **very difficult to distinguish from mineral dust and tends to be coupled with it by scientists**. This is **coal fly ash**, the particles of which, like mineral dust, are excellent cirrus cloud seeds. One study on cirrus cloud conditions found, using Single Particle Mass Spectrometry, that 33% of the ice crystal residues were "mineral dust/fly ash". Then they used electron microscopy to show that 20 % of the particles in this category had a high degree of sphericity which indicated that they were fly ash. Therefore, **a significant quantity of "mineral dust" particles that form the ice nuclei for cirrus clouds are actually fly ash.**

Ice nucleation by combustion ash particles at conditions relevant to mixed-phase clouds

That's around **7%** of cirrus clouds formed on **anthropogenic fly ash**. This figure is curiously close to the 8% increase estimated due to aviation.

Jet engine emissions

The next step would be to look at the contribution of aircraft to the upper atmosphere. These include **sulphates**, **soot** and **metal particles** in addition to carbon dioxide**, water vapor**, nitrogen oxides (NOx), carbon monoxide, and hydrocarbons such as methane.

Soot and **sulphates**, the usual suspects for contrail formation, which are more abundant in the atmosphere than the favoured ice nuclei, have been found to be **insignificant contributors to cirrus cloud formation.**

Logic suggests that the metal particles in the jet exhaust are, in alignment with Cziczo's findings, major players in contrail formation. These particles are found in the ash residue of jet fuel combustion.

Certainly, jet fuel exhaust emits about 0.01% ash, the US EPA standard being 0.02% ash. About 0.045kg of ash is produced for every 450kg of fuel burned.

This works out as around **254,276 x 10^{12} submicron particles emitted per metre of flight**. Those particles entrain water vapour and grow rapidly to ice crystal sizes that are visible as contrails. As they spread out and (given enough atmospheric water vapour) grow in size, they form aviation induced cirrus clouds as previously outlined.

Although the fuel additives contain trade secret substances, we know that these include aluminium and barium.

Lead, which was found by Cziczo to be among the most common ice nucleating agents found in cirrus clouds, is also a component of coal fly ash.

Lead iodide, along with **silver iodide**, were the ice nuclei that were determined in the mid-40s to be the most effective candidates for **artificial cloud seeding**. **lead oxides** and mixtures with **ammonium iodide** were later found to be similar, if not better, ice nuclei. Later still, it was found that pure lead-containing materials were not required for ice nucleation; instead, **lead need only be present as a surface inclusion on an inert core.**

A study found and posted by researcher **Jim Lee** reveals the trace element component of three types of jet fuel:

Trace Element and Polycyclic Aromatic Hydrocarbon Analyses of Jet Engine Fuels: Jet A, JP5, and JP8:

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EXECUTIVE SUMMARY

For this study, one sample of commercial Jet A (Jet Aviation) fuel, one sample of JP8 fuel, and two samples of JP5 fuel were analyzed for elements and Polycyclic Aromatic Hydrocarbons (PAHs). Table ES-2 is a summary of elements detected in the fuels. Shaded elements were detected at the highest concentrations. More data are needed to determine a typical composition for each fuel type.

Table ES-1. Elements detected in jet fuel.

Element	Jet A (ppb)	JP5* (ppb)	JP8 (ppb)
Aluminum	ND	2144	9360
Barium	3	9	38
Calcium	555	5256	31120
Chromium	26	9	18
Copper	5	82	6
Iron	210	210	1144
Lead	11	5	10
Magnesium	ND	1056	5840
Manganese	6	10	25
Nickel	ND	6	6
Niobium	ND	ND	2
Potassium	ND	118	207
Scandium	11	12	11
Selenium	ND	ND	21
Strontium	12	70	351
Sulfur	1220	450	1690
Tin	10	48	102
Titanium	100	35	1056
Vanadium	ND	3	18
Zirconium	16	14	39

*JP5 values shown are the higher of two JP5 sample values.
ND = No Detect

Elements not detected in any fuels were antimony, arsenic, cadmium, cobalt, gallium, gold, indium, mercury, molybdenum, palladium, platinum, rhodium, ruthenium, silver, tellurium, thallium, thorium, uranium, and zinc.

There were no high Molecular Weight (MW) PAHs in the jet fuels. In general, the higher MW PAHs biodegrade more slowly and have higher carcinogenic potential. Jet A and JP8 fuels had more PAHs than JP5 fuels. Jet A fuel had more mid-range MW PAHs than the military fuels.

This Technical Report analyzes four fuel samples. A larger data base would enable definition of a range of typical element and PAH values in jet fuel. It would also help determine which elements in the fuels are present as delivered from the refinery, or are introduced as storage and delivery system contaminants.

Jet A is fuel for commercial aircraft in the US

In Europe, **Jet A-1** is used for commercial aircraft. It differs from Jet A by its lower freezing point and the addition of anti-stative agents which impart electrical conductivity.

JP5 is fuel for military aircraft.

JP-8 is a jet fuel, specified and used widely by the U.S. military. It was first introduced at NATO bases in **1978** and is projected to remain in use at least until 2025.

Jet fuel - Wikipedia

Let us look at the total proportion of elements found in each type:

Jet A (and presumably Jet A-1) has a total of	**2185 ppb**	or **0.000002185%**
JP5 -	**9537 ppb**	or **0.000009537%**
JP8 -	**91606 ppb**	or **0.000091606%**

It is clear that the military fuels, particularly JP8, contain the greatest component and it is interesting that the commercial fuels contain no aluminium but more lead than the military fuels.

However, the most important feature is that **all these fuels seem to have a far smaller proportion of elements than the 0.01% ash usually emitted by jet aircraft.**

Where does the all the rest of the combustion ash come from?

Prominent Geologist, **J. Marvin Herndon**, suspects that **coal fly ash and additives to keep it suspended may be added to the fuel at a stage after it is produced and before it is delivered to the airports**.

Prime Suspect – Coal Fly Ash

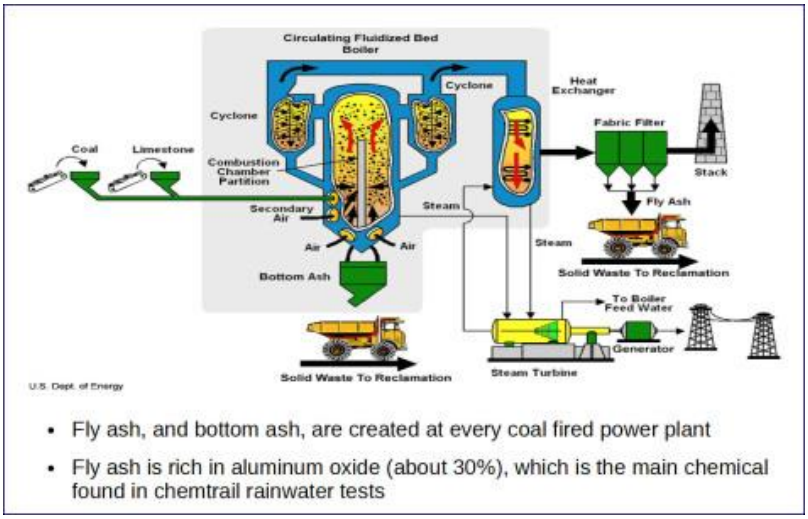
On August 11, **2015**, Herndon published a paper of the utmost importance:

Evidence of Coal-Fly-Ash Toxic Chemical Geoengineering in the Troposphere: Consequences for Public Health

Refreshingly, this scientist, in an official publication, makes no bones about the fact that particulates are being deliberately emplaced into the upper levels of the troposphere for the purposes of geoengineering and that this has gone unidentified and unremarked in the scientific literature for years.

Considering the costs and logistics of annually producing vast quantities of the particulates in question, Herndon settled on coal fly ash as the most likely candidate.

Coal Ash (CA) is commonly defined as the combination of two sources of "ash" in a coal-powered generator: (1) **fly ash (FA)** that goes up the stack and (2) **bottom ash (BA)** that falls to the bottom of the boiler.



Coal fly ash, which consists of micron and sub-micron particles, is light and would travel along with the water vapour up smokestacks were it not for the fact that western nations mandate that it be captured and stored by means of electrostatic precipitators.

This stored coal ash, which is rich in aluminium oxide (about 30%), is used for numerous applications including being added to cement, road base, drywall, bauxite and as Herndon would suggest, **geoengineering particulates**, either dispersed directly or as an additive to jet fuel.

Herndon applied two methods to investigate his hypothesis.

One involved comparing the proportions of the elements, aluminium (Al), barium (Ba), strontium (Sr), iron (Fe), calcium (Ca), (S), manganese (Mg), and boron (B) contained in the **rainwater** subjected to trailing and collected by concerned individuals, with the corresponding proportions of elements leached from coal ash into water.

The second involved comparing the proportions of the elements contained in dust from the **air** collected outdoors on a HEPA filter situated in regions subjected to trailing with the corresponding proportions in the coal ash.

It was found that the San Diego **trailed rainwater** contained the **same elements in similar proportions to coal ash**. Like a fingerprint, the 8 element

ratios match element by element, strong evidence indeed that the aerosolized substance is coal ash.

It was also found that the **14 element ratios contained in the HEPA dust matched**. Two fingerprints.

Identification was made of a 3 element fingerprint of aluminium, barium and strontium in trailed rainwater to a global extent, including countries such as the United States, Canada, France, Portugal, Germany, Australia, and New Zealand where samples were taken by people who had no idea of the connection to fly ash and were testing for those 3 elements only.

Herndon's research was correlated with that of concerned individuals and groups around the world who have been finding aluminium, barium and strontium in the rain, snow, soil and air for some time now. These samples have been collected in a scientific fashion, corroborated by professional scientists and confirmed in numerous independent lab tests.

Prominent among these is California based **Francis Mangels**, forestry expert, professor and master gardener, who worked several years with the USDA Soil Conservation Service as a soil conservationist.

Fingerprints in the Rain

In his backyard **rain gauge samples** Mangels has regularly found around **1000 ppb** (parts per billion) **aluminium** and **8 ppb barium**.

The **normal** concentration of aluminium in the **rain** should be from **0 – 0.5 ppb**. Barium should not be there in any amount. This is **2020 times** the normal levels of aluminium.

There is **no heavy industry in the Mt. Shasta area**. **These samples are correlated with persistent trailing occurring 3-4 days beforehand**, the length of time for the particles to reach the ground. The figure jumps to **50 – 3000 ppb**.

Up to 3000 ppb has been found in the soil in Mangel's gardens. In the **mountains**, levels from around **10,000 to 61,000 ppb** have been found in the **Snowpack**. This is dangerous to drink.

Skeptics often claim contamination of the rain gauge with soil. The figure should be **zero or single digits if contamination occurs** (for example the jar not being clean). Mangels calls this "background chatter".

Fingerprints in the Soil

It is important to recognise that aluminium does indeed occur in soils and that the amount of aluminium deposited via aircraft is relatively small in comparison. However, it is more important to note that **aluminium should not be occurring in rainwater at levels above the range 0 – 0.5 ppb**.

Normal levels in the **soil** for the California region are around **13,000 ppb**.

Since the increased trailing, levels have reached **20,000 ppb and over**. The rain has been gradually building up the levels of aluminium in the soil.

In **2003**, Mangels tested his soil (not touched with compost) and found the **pH to be 5.5**.

In **2012 the pH was 6.8**, **a tenfold increase in alkalinity**.

These metals are not naturally occurring in the atmosphere, except for small quantities of dust. Dust from Africa does occasionally reach Florida. It is even rarer for dust from Asia to cross the Pacific into the west coast of America. Recall that anthropogenic coal fly ash is often categorised by scientists together with mineral dust and has been found to provide the nuclei for 7% of cirrus clouds.

Coal-Fired Fingerprints

Aluminium, barium, strontium, boron and arsenic are showing up in the US West.

They are also showing up in the Midwest and Eastern US. However, in these regions there are numerous coal-fired plants. Skeptics, in cynical fashion, often refer to rain water samples contaminated with aluminium and collected downwind of heavy industrial areas, from the period before the clean air regulations act, as a supposed baseline level to attempt to discredit the notion that rainwater should have 0 – 0.5 ppb levels. Even the sources that provided these readings, admit that the aluminium levels are elevated and by no means normal.

If these toxins show up in the rainwater in these areas, efforts to explain them away as by-product of coal combustion are hampered by an important fact. Fly ash, which is a perfect match for these toxins in such combinations, and which shows up hundreds of miles and more away from coal-fired plants, is purportedly captured electrostatically in the smokestack. Coal contains about 10% ash, on average. After combustion about 80% of the ash becomes fly ash, the other 20% becomes bottom ash. Modern systems capture **99.9%** of this fly ash.

Sulphate emissions have also, supposedly, been reduced by 50% since the clean air regulations act.

The number of coal-fired plants in the western US is far smaller, and sulphate levels in the rainwater should be zero on the West Coast, unless there has been a volcanic eruption somewhere in the Pacific. Tellingly, sulphates are **not** showing up in the tests in the West.

What can we deduce from the information gleaned thus far?

- We have observed **warming primarily in the northern hemisphere and particularly, the Arctic** and **throughout the troposphere** and a **cooling of the stratosphere.**
- We have seen **dry regions getting drier** as the innumerable aerosols locked up the sparse amount of water, not reaching precipitation size for long periods until finally, they come down in the form of deluges **so that wet regions have become wetter**. The precipitation cycle has been distorted.
- **Cloud feedback occurs when more water vapour** leads to **more clouds** in the atmosphere. Low clouds which have an overall cooling influence are a negative feedback. High clouds which have an overall warming influence are a positive feedback.
- **Low clouds**, which **would be a negative feedback**, have **decreased** globally on average.
- **High clouds**, which **are a positive feedback**, have **increased** globally on average.
- This shift from **lower to higher clouds** having had an overall **warming** influence comparable to that induced by CO2, may be in part a feedback response to rising temperatures affecting the altitude at which clouds form but there also may be a correlation between an **increasing quantity of aerosols at upper levels leading to more high clouds** and a **decreasing quantity of aerosols at lower levels leading to fewer low clouds.**
- This **aerosol fingerprint** is observed in **the record of upper atmospheric humidity**, revealing a **decline**, counter to a CO2 induced warming but **in line with aerosol induced cirrus cloud formation** entraining water from the surrounding atmosphere.
- The **warming due to this cloud configuration** also **adds to the positive water vapour and cloud feedback** with the difference being that, provided enough aerosols are present and continually replenished, the negative feedback of precipitation is **impeded** resulting in a lack of rainfall, **amplifying and pro-longing the cycle**.

- This would make (phil)anthropogenically induced clouds a **forcing** in addition to a feedback.
- **Soot** and **sulphates**, the usual suspects for contrail formation, although abundant in the atmosphere, have been found to be **relatively insignificant contributors to cirrus cloud formation.**
- Two specific kinds of ice nuclei, those from **mineral dust** and **metallic particles** are favoured, constituting the nuclei for **61% of all cirrus clouds**, despite the fact that other, less favoured aerosols, are more abundant.
- **Metallic particles originating from the ash residue of jet fuel combustion** are candidates for the aerosols of choice in contrail formation.
- It has been established that around **7%** of cirrus clouds may be formed on **anthropogenic coal fly ash particles** which are usually classified together with mineral dust. This figure of 7% matches well with the 8% increase in cirrus cloud cover over 4 decades correlated with air traffic.
- **Lead**, among the most common ice nucleating agents found in cirrus clouds, is also **a common component of coal fly ash**.
- Cloud seeding scientists discovered that lead need only be present as a surface inclusion on an inert core to act as efficient ice nuclei.
- Discussions in the 50's suggested that coke furnaces, presumably emitting fly ash, and acting as ground-based seeders, would be more effective for seeding lower clouds than aircraft.
- The correlation between air traffic and the 8% rise in cirrus cloud cover taken together with the 7% of cirrus clouds formed on coal fly ash, including lead, the most effective candidate for cloud seeding, suggests that **fly ash may be the aerosol of choice for deliberate deployment**.
- This is further supported by the correlation between regulation of coal fly ash emissions and the reduction in lower cloud cover taken together with the increase in upper cirrus cloud cover matched with coal fly ash particulates.
- This suggests that **fly ash has been removed from the lower atmosphere** and **emplaced in the upper atmosphere for the purposes of warming the climate.**
- The constituents of **Coal Fly Ash** have been shown to match in perfect proportion with the elements found in rain water and air samples that are correlated with persistent trailing occurring 3-4 days beforehand.
- In addition to **rain water** and **air**, these fingerprints have also been found in **surface water**, **snow**, and **soil**.
- Coal Fly Ash found during periods correlated with persistent trailing, in regions far away from coal-fired plants, and in the upper atmosphere

when ground emissions have supposedly been reduced significantly, cannot be explained **except by emplacement by means of aircraft.**

- This is reinforced by the fact that **sulphates**, also produced from coal combustion, are **not** showing up in the tests in the West.
- **Coal Fly Ash is the most likely candidate for the aerosol of choice** for a clandestine climate modification campaign.

In part 6, the conclusion to this series, we shall again widen our gaze to encompass this postulated, clandestine, climate-modification campaign, the very antithesis of David Keith's vision, and the true cause of the weather-weirded world we live in today.