



Iron Salt Aerosol

Copying Mother Nature to Cool the Planet

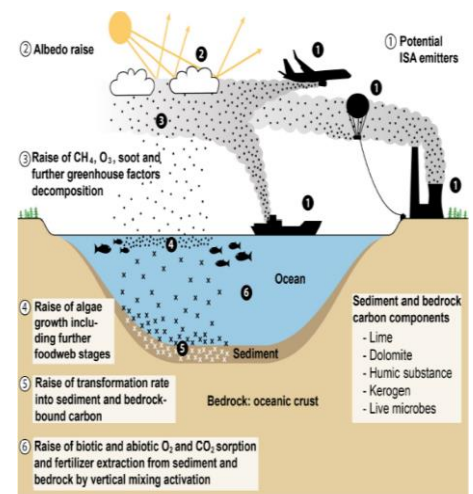
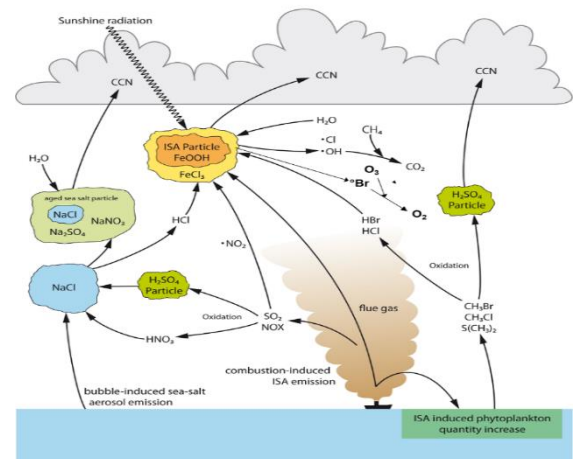
Iron Salt Aerosol (ISA) could be the single best way to help stop global warming. Adding 200,000 tonnes of iron to the air could remove 12 gigatonnes of CO₂ and equivalents each year, double the abatement of the whole Paris Accord over the next decade. ISA could be implemented safely, quickly and at low cost, below a dollar a tonne of abated CO₂, if we get positive results from field trials. ISA could become a game-changing method for climate restoration, copying how Mother Nature cooled the planet in the Ice Ages using iron dust. We seek funding for a world-first trial in Australian waters under scientific supervision, in cooperation with the marine biology community and with industries including insurance, fishing, tourism, energy and shipping. An ISA field trial could show how to protect sensitive locations such as the Great Barrier Reef from the dangers of coral bleaching.

How ISA works

ISA plumes can be made by burning iron compounds in ship and power station fuel or from purpose-built platforms, as shown in these pictures from our scientific journal article published by the European Geophysical Union.¹ Tiny particles of iron oxide added to flue gas will rise to about one kilometre high. The iron will react with sea-spray chemicals to make iron chloride, an ISA with many cooling properties. ISA makes clouds that reduce light and heat and increase rain, reacts with sunlight to deplete methane and other potent greenhouse gasses, and falls with the rain as a safe, widely dispersed natural fertilizer. The world ocean has massive regions that can bloom with tiny amounts of added iron. By enhancing ocean productivity, the ISA method will remove CO₂ from the air and sea as a safe and low-cost way to slow climate change.

A Bass Strait Field Trial

Australia could lead the way in developing ISA, meeting our full Paris Accord climate commitments at a tiny fraction of their current expected cost. A field trial could produce ISA in the ship exhausts of the Spirit of Tasmania ships which travel daily across Bass Strait. The trial would be performed over a period of one month and would be perfectly safe. Satellite monitoring would show how the ISA changes the chemistry of the atmosphere. Further tests, for example in the Southern Ocean, could then show how well ISA can boost plankton and fish life.



¹ Scientific details including bibliography are at a peer reviewed article in the journal *Earth System Dynamics*, titled 'Climate engineering by mimicking natural dust climate control: the iron salt aerosol method', by Oeste, F. D., De Richter, R., Ming, T., & Caillol, S. (2017), available at <http://www.earth-syst-dynam.net/8/1/2017/esd-8-1-2017.pdf>

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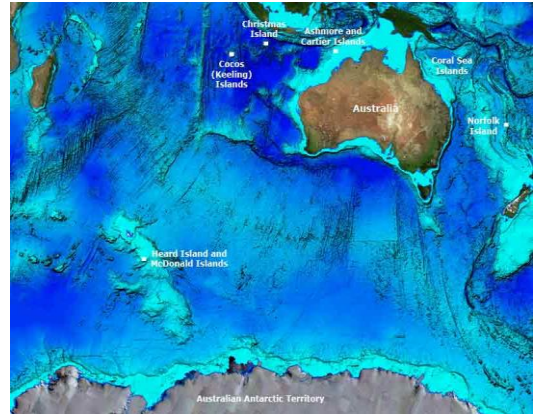


Southern Ocean

The Southern Ocean has abundant natural nitrogen and phosphorus nutrients, but is anaemic, lacking iron. The shortage of iron is a key factor which limits plankton growth. Every atom of added iron can enable photosynthesis of up to 100,000 carbon atoms. An ISA field trial in the Southern Ocean would convert CO₂ to stable chemical and biological forms, enhancing marine productivity and cooling the planet.

Satellite Monitoring of ISA Field Trials

We are liaising with the European Space Agency to arrange monitoring of the ISA field trials using their Sentinel 5P satellite. Launched in October 2017 to map and measure atmospheric and marine chemicals, this satellite can observe ISA plumes with high precision and quantify their depletion effects, including on methane, ozone and clouds, matched to sea surface data.



Precautions

Scientific analysis indicates ISA will only benefit ecosystems. Current man-made and natural ISA emissions total over 100,000 tonnes and have many beneficial climate effects. The ISA trials will highlight the effects of this natural process and determine how much and where it should be increased. The small Bass Strait trial will confirm the safety of possible further trials, and will only proceed if Australian authorities and scientific desktop and laboratory studies give the go ahead. Topics requiring precautionary analysis include the effects on ocean oxygen levels, downstream plankton growth, nutrient cycles and permanence of CO₂ removal. ISA will not rise to the stratosphere so has no effect on the ozone layer. Reducing sunlight impact and augmenting dispersed ocean productivity is entirely safe and protective for biodiversity.

ISA is a major technical advance from previous proposals to add iron sulphate to the water, having atmospheric cooling effects that equal or surpass the oceanic cooling effects. By directly copying the main planetary cooling mechanism from the ice ages, ISA has at least twelve identified cooling effects, presenting a balanced natural process. Ability to remove methane is especially important, since methane has nearly thirty times worse climate warming potential than CO₂. The iron in ISA is bio-available and very dilute, aiming to add about three grams per square kilometre per day. We expect ISA will prove an optimal method to protect the Great Barrier Reef from coral bleaching and other risks of warming water and acidity. ISA trials will comply with international precautions agreed under the London Protocol on Marine Pollution and the UN Convention on Biological Diversity. The small scale and scientific focus of ISA trials will enable a high level of public transparency and accountability. We encourage close analysis of the entire trial process, to satisfy concerns raised by all stakeholders.

Summary Vision Statement

Field trials of Iron Salt Aerosol, managed in close cooperation with scientific and regulatory authorities, have high potential rewards and very low risk. ISA trials will only proceed if local authorities are in support. ISA climate benefits could be orders of magnitude superior to other available climate responses in terms of safety, speed, cost and effectiveness. Supporters of this trial will assist a practical innovative scientific method to reverse climate change and protect local environments.

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