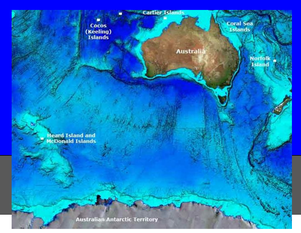

Copying Mother Nature to Cool the Planet

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How Iron Salt Aerosol can help reverse climate change

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 potentially remove 12 gigatonnes of CO_2 and equivalents each year,** double the expected abatement rate of the whole Paris Accord. ISA could be implemented safely, quickly, at low cost and large scale, **for below a dollar per tonne of abated CO_2.** Proof of concept depends on positive results from proposed field trials.

ISA could become a game-changing method for climate restoration by copying how Mother Nature cooled the planet in the Ice Ages using iron dust. **We seek investment for a world-first trial** in Australian waters under scientific supervision, in cooperation with the marine biology community, with potential support from industries such as insurance, fishing, tourism, energy and shipping. ISA field trials could show how **to protect sensitive locations like the Great Barrier Reef** from dangers of global warming including coral bleaching, cyclones and ocean acidification.

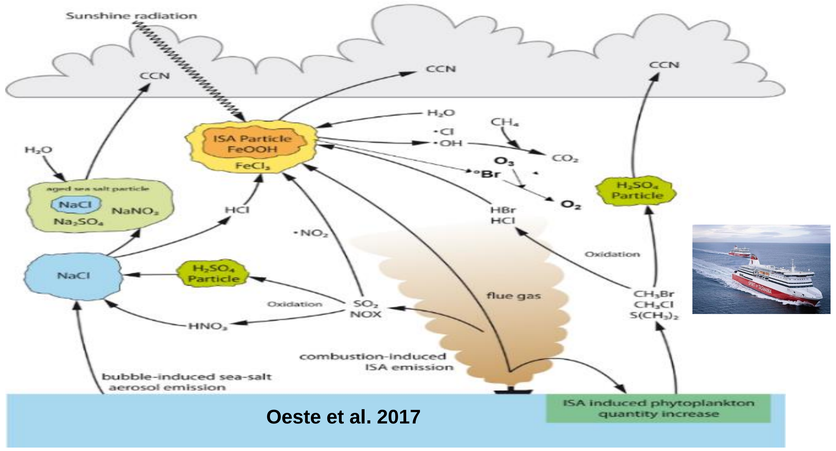
ISA climate benefits could be orders of magnitude superior to other available climate responses in terms of safety, speed, cost and effectiveness. Supporters of ISA testing will assist a practical innovative scientific method to reverse climate change and protect local environments.

Iron Salt Aerosol Chemistry

As shown in diagrams here from our scientific journal article published by the European Geophysical Union (Oeste et al 2017), burning iron compounds in ship and power station fuel or on purpose-built platforms will lift iron oxide to about one kilometre high, where the **iron oxide reacts with sea-spray chemicals to make iron chloride, an ISA with at least twelve identified natural cooling effects, detailed at ironsaltaerosol.com.**

ISA makes Cloud Condensation Nuclei (CCN) that increase rain while reducing light and heat. Reacting with sunlight, ISA **depletes methane** and other potent greenhouse gasses, and then falls with the rain as a safe, widely dispersed natural fertilizer, **removing CO_2 by plankton photosynthesis at the base of the food chain.**

The world ocean has vast anaemic regions (>60 million km^2), high in nutrients and low in chlorophyll, that can bloom with tiny amounts of added iron. **Each atom of added iron can enable plankton to use up to 100,000 atoms of carbon.** By enhancing ocean productivity and removing greenhouse gases from the atmosphere, the ISA method will cool the air and sea in a safe and low-cost way, slowing climate change. In addition, we expect ISA will help destroy marine plastic pollution and reduce the intensity of cyclones and hurricanes.



Oeste et al. 2017

Australian Field Trials

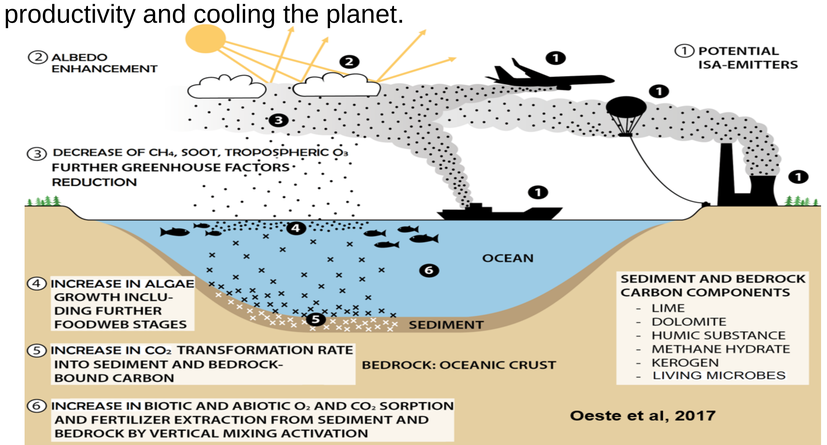
Australia could lead the way in developing Iron Salt Aerosol, meeting our full Paris Accord emission reduction commitments at a tiny fraction of the current expected cost.

ISA field trials, managed in close cooperation with scientific and regulatory partners, have high potential rewards and very low risk. ISA trials will only proceed with full approval from local authorities.

A first field trial in Bass Strait could produce ISA from platforms on the Spirit of Tasmania ferries. The trial would run for one month and would be perfectly safe.

Satellite monitoring, possibly by the ESA Sentinel 5P, can show how ISA improves the chemistry of the atmosphere.

Further **tests in the Southern Ocean** could then show how well ISA can boost plankton and fish life. The Southern Ocean has abundant natural nitrogen and phosphorus nutrients, but is anaemic, lacking iron. An ISA field trial in the Southern Ocean would convert CO_2 to stable chemical and biological forms, enhancing marine productivity and cooling the planet.



Safety

In the Ice Ages, iron dust blowing onto the oceans removed about 20% of the CO_2 from the air, 50 parts per million. This main cooling process increased primary productivity from phytoplankton growth. ISA trials aim to show how we can safely and rapidly replicate this natural process, to prove that large scale addition of ISA will be safe for factors such as ocean oxygen levels, downstream plankton growth, ozone, nutrient cycles and permanence of CO_2 removal.

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. The entire trial process requires strong governance and safety systems to satisfy concerns raised by all stakeholders.

The ISA effects of reducing sunlight radiation and augmenting ocean productivity are expected to be entirely safe and **protective for biodiversity**. Scientific analysis indicates ISA will only benefit ecosystems. Man-made and natural **ISA emissions now total over 100,000 tonnes per year** and already provide the many beneficial climate cooling and fertilization effects that ISA causes.

The ISA trials will highlight the benefits and identify any risks to determine how much and where iron should be increased. The small Bass Strait trial is designed to have minimal impact and to confirm the safety of possible further trials. It will only proceed following full approval from Australian authorities based on scientific studies.

Comparison to Other Methods

ISA integrates lessons from research on cooling the ocean. 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 prevent coral bleaching and other risks of ocean warming and acidity. Atmospheric dispersal spreads iron about 1000 times more widely than adding iron sulphate directly to the ocean as previously proposed. ISA's ability to remove methane is important, since methane has about thirty times worse climate warming potential than CO_2 over a century.

References

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 for free at http://www.earth-syst-dynam.net/8/1/2017/esd-8-1-2017.pdf