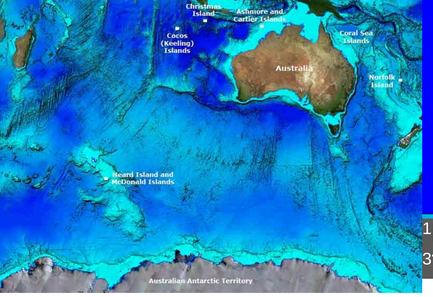

Copying Mother Nature to Cool the Planet

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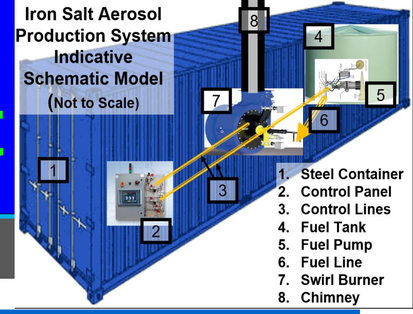


How Iron Salt Aerosol can help reverse climate change

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. Our analysis indicates that 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 requires positive results from proposed field trials.

ISA could become a game-changing method for climate restoration by copying how the planet cooled in the Ice Ages using iron dust. We seek agreement to plan 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. Immediate ISA cooling would help protect sensitive marine locations from dangers of global warming including coral bleaching, poleward migration, loss of biomass, cyclones and ocean acidification.

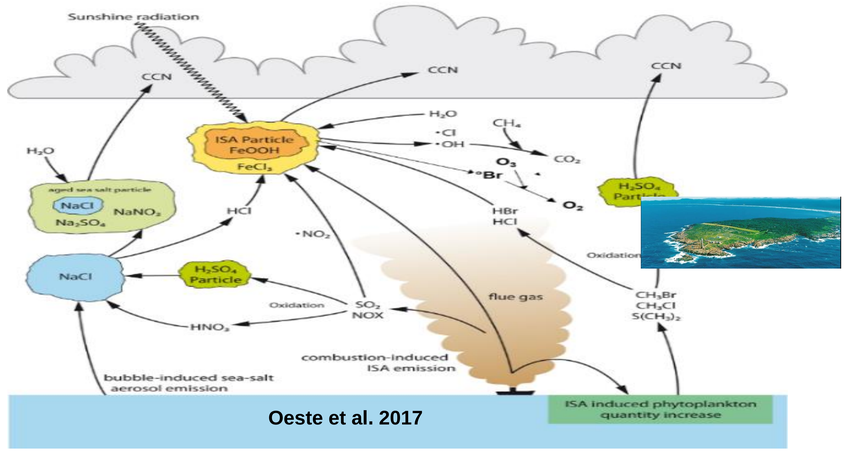
Modelling indicates that ISA climate benefits could be orders of magnitude superior to other proposed climate responses in terms of safety, speed, cost and effectiveness. Supporters of ISA testing will assist a practical innovative scientific proposal to reverse climate change and protect local environments.

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 on purpose-built platforms or in ship and power station fuel 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 can increase rain while reducing light and heat. Reacting with sunlight, ISA depletes methane and other potent greenhouse gases, 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) that are high in nutrients and low in chlorophyll, that can increase productivity 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 would to cool the air and sea, eventually helping to slow climate change. In addition, we expect ISA will help destroy marine plastic pollution and reduce the intensity of storms.



Oeste et al. 2017

Australian Field Trials

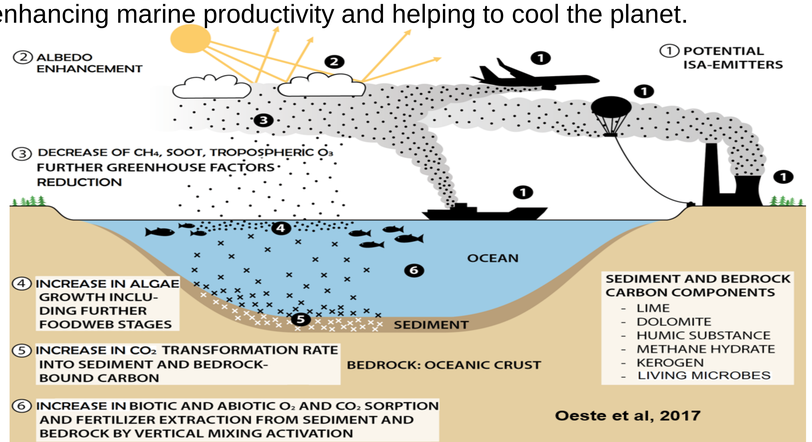
Australia could lead the way in developing Iron Salt Aerosol, fulfilling Paris Accord emission reduction commitments at a fraction of the current expected cost.

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 Gabo Island. The trial would run for one month and would comply with scientific and environmental advice.

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

Subject to agreement, further tests in the Southern Ocean could then show how ISA can boost plankton and fish life. The Southern Ocean has abundant natural nitrogen and phosphorus nutrients, but is anaemic, lacking iron. ISA deployment in the Southern Ocean would increase CO_2 conversion to stable chemical and biological forms, enhancing marine productivity and helping to cool the planet.



Safety

The small Bass Strait trial is designed to have minimal impact and to confirm the safety of possible further trials. It would only proceed following full approval from Australian authorities based on scientific modelling. The trial would comply with requirements of the London Protocol on Marine Pollution and the UN Convention on Biological Diversity. The small scale, coastal location and scientific focus would enable a high level of public transparency and accountability. The entire trial process requires strong governance, monitoring and safety systems to satisfy concerns raised by all stakeholders. Local computer modelling of effects of a proposed trial would be a prior requirement to enable decision on whether to proceed.

The ISA effects of reducing sunlight radiation and augmenting ocean productivity are expected to be entirely safe and protective for biodiversity. Scientific modelling indicates ISA will benefit ecosystems. Man-made and natural emissions already contain over 100,000 tonnes of iron per year and already provide many beneficial climate cooling and fertilization effects that ISA deployment will enhance. ISA trials aim to show how to replicate the natural cooling process from the Ice Ages, when iron dust blowing onto the oceans caused decline of CO_2 level by about 20% by increasing primary phytoplankton productivity. Existing data indicate that an enhanced ISA program would be safe for human and environmental health and for factors such as ocean oxygen levels, downstream plankton growth, stratospheric ozone, nutrient cycles and permanence of CO_2 removal.

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 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 over eighty times worse climate warming potential than CO_2 over twenty years.

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