

Restoring the Climate with “Ocean Iron Fertilization”

Ocean iron fertilization (OIF) appears to be the fastest, safest and most effective climate restoration solution although it was controversial for a time. OIF restores fisheries and other marine life while also reducing CO₂ levels at the scale needed to restore the climate. It requires little or no public funding: instead the process produces revenue and taxes from revived fisheries.

Simulating natural iron distribution, implementers mete out trace amounts of iron ore dust from aboard ship, in a carefully selected ocean or “pasture,” about 100 km in diameter. These ocean patches remain relatively self-contained. The quantities involved are minute: about one hundredth of a teaspoon of iron ore dust per square meter per year.

Full-scale implementation would require iron distribution in around 500 eddies each year (about 1% of the ocean’s area) to remove 60 Gt of CO₂ per year. No better alternatives have been proposed for restoring CO₂ to levels humans have actually survived.

Nature has used OIF ten times over the last million years to remove roughly a trillion tons of CO₂—the same quantity of CO₂ that needs to be removed to restore “safe-harbor” CO₂ levels of 280 ppm, typical in pre-industrial times.

Carefully administered OIF has the potential to

- Restore fisheries, both commercial and indigenous
- Restore populations of whales, seabirds and other marine life
- Restore global CO₂ levels that humans have survived long term, by 2050

OIF can be financed by investment

OIF will cost roughly \$2 million per eddy per year. This amounts to approximately 1% of the additional fishing revenue expected following the OIF. Payments for carbon offsets could further enhance returns for stakeholders

Next steps to enable OIF in 2022

- Launch climate restoration safety and governance board
- Fund several \$20M public/ private 3-year pilots
- Establish public movement for climate restoration

OIF impact timeline

The fertilization process takes about 3 weeks, including data collection. Results reported:

- 1 day - blue ocean turns green from photosynthesis
- 2-4 weeks - fish, whales & sea birds arrive
- 3-6 months - high ocean productivity continues
- 6-18 months - fishery yields significantly boosted
- 12-24 months - eddy left fallow before repeating the process



Skeptics' claims, with rebuttals

- “It sounds dangerous to apply OIF throughout the whole ocean.” Treating only 1% of the ocean is sufficient. No scientific study of OIF has found any evidence of harmful side effects. After all, dust storms and volcanoes have distributed iron dust over the ocean for millions of years. Like natural ocean fertilization, OIF is localized and intermittent.
- “We might see toxic algae blooms.” Harmful algae blooms occur only in coastal waters and lakes, mostly in response to significant nutrient runoff from farms. OIF is performed in the open ocean. In this environment, iron levels remain low: 1/10,000 the amount of iron found along the coast. No harmful blooms from OIF have been reported.
- “There could be deoxygenation and loss of nutrients downstream.”
Yes, these effects occur commonly in the ocean, and nature is adapted to it.
- “Fish won’t grow after OIF.” This concern is based on the lack of peer-reviewed papers. Annual reports of fisheries ministries show quadrupled catch in both Alaska and Canada in the wake of OIF. In any case, it is widely understood that fish grow and reproduce when fed.
- “Only 10% of the carbon reaches the seafloor.” Yes, this is true now, as it was during the ice ages; the carbon is mostly stored in the ocean depths.
- “Different algae species grow in different times and places and temperatures.”
Yes, species vary. OIF practitioners will optimize the process for the desired balance of species.