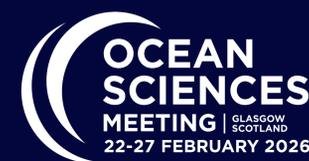


Permitting and international governance of ocean iron fertilization mCDR field research



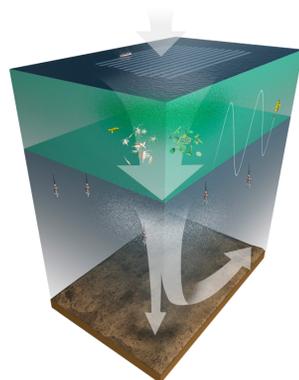
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OCEAN IRON FERTILIZATION FOR mCDR

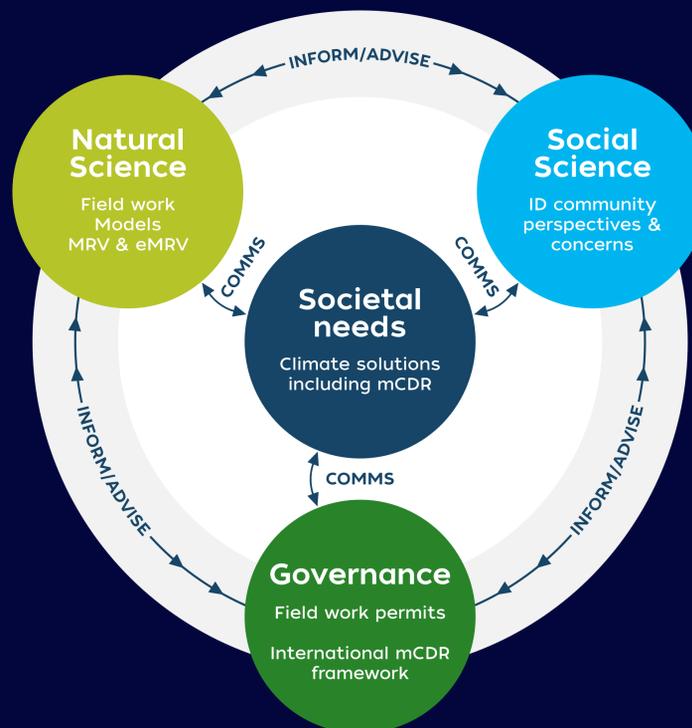
A potential approach to effectively, durably, and safely store carbon

- Together with emissions reductions, marine carbon dioxide removal (mCDR) research is needed now to inform future decision-making on at-scale deployment
- OIF benefits: low cost, relatively small amount of iron needed, scalable to 1-4 Gt carbon per year in HNLC regions, experience from 13 past field trials
- OIF potential risks: ecological shifts in phytoplankton leading to harmful algal blooms or trophic impacts, reduced oxygen or increased greenhouse gas production from sinking organic matter, nutrient robbing



Field experiments are a priority

- Need to be larger (>1000 km²) and with longer observational period (3-6 months) than past experiments to capture bloom decline and export
- Leverage state-of-the-art autonomous platforms and observing tools
- Designed to mitigate risks to the environment and to monitor all ecosystem impacts



WHAT IS ExOIS?

- ExOIS is a non-profit program dedicated to studying OIF for mCDR through rigorous, transparent, and responsible research designed with community input
- Multidisciplinary, international consortium of oceanographers, engineers, social scientists, community engagement specialists, and governance experts

ExOIS is an independent program housed at the not-for-profit Woods Hole Oceanographic Institution, USA.

60 members (and growing) 37 institutions 9 countries

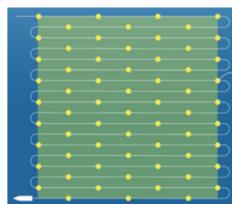
Guiding principles for ocean carbon dioxide removal studies

1. Prioritize collective benefit for humans and the environment
2. Establish clear lines of responsibility to oversee studies
3. Commit to open and cooperative research, including risk assessments
4. Perform evaluation and assessment in an iterative and independent manner
5. Engage the public in consideration of climate intervention options

PERMITTING FOR FIELD RESEARCH

U.S. regulatory frameworks for mCDR field research

- In the U.S., mCDR field research involving the release of material into the ocean is permitted by the Environmental Protection Agency (EPA) under the Marine Protection, Research, and Sanctuaries Act (MPRSA)
- Process includes consultation of other federal and international agencies, as well as a public comment period



Example iron deployment layout over a 30x30 km patch

Permit application components



GOVERNANCE IN INTERNATIONAL WATERS

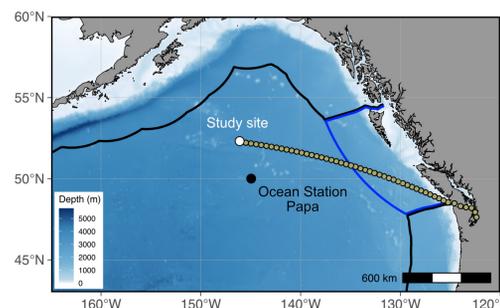
Responsible & transparent research in accordance with international governance frameworks must lead the way

London Convention and London Protocol
Governs ocean dumping, including beyond national EEZs, and allows iron fertilization for “legitimate scientific research,” not commercial or profit-driven activities.

- The U.S. is a party to the LC. It is implemented domestically via the MPRSA, with oversight by the EPA.
- To qualify as “legitimate scientific research,” there should be no economic or financial gain arising from the project.

Legal experts at the Sabin Center for Climate Change Law examined the LC/LP Assessment Framework for application to OIF field trials

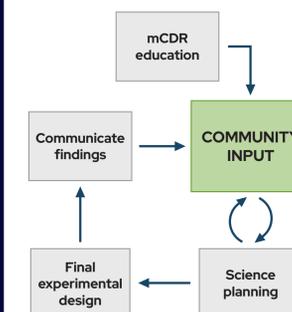
COLUMBIA LAW SCHOOL
SABIN CENTER FOR CLIMATE CHANGE LAW



Proposed research site in the Subarctic Northeast Pacific, northwest of Ocean Station Papa. U.S. and Canadian EEZs shown with black and blue lines respectively.

COMMUNITY ENGAGEMENT & CO-DESIGN

Meaningful engagement with rightsholders & interested parties



Development of an mCDR management framework

- Collaboration with Global Ocean Health and the Institute for Responsible Carbon Removal
- Regular meetings with the ExOIS science team, Pacific Northwest & Alaska indigenous leaders, fishermen, industry experts, community members
- Focus on co-design & community concerns



Regional commentaries

Discussions with coastal community leaders in Alaska via the Climate Leaders and mCDR (CLaM) project housed at the Alaska Ocean Acidification Network



Social science recommendations

ExOIS Social Science and Governance working group released a report of guiding recommendations

Access “The case for ocean iron fertilization field trials” in Dialogues on Climate Change



Access all ExOIS reports

Including social science and governance guiding recommendations



Get involved with ExOIS

Visit poster CM14B-0779 for more info on ExOIS’s research activities



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