Centre for Climate Repair at Cambridge

Carbon sequestration using Natural Buoyant Flakes

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What are Natural Buoyant Flakes?

Rice husk: Silicate source

Lignin

Natural buoyant flakes

Iron ore tailing

The Concept

Fe N_2

Endless source of nitrogen

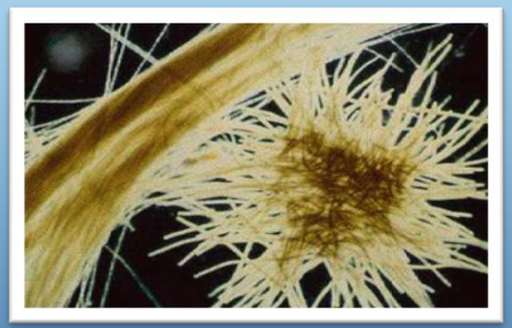
Atmosphere

Ocean

Diazotrophy

$N_2 + 8H^+ + 8e^- \rightarrow 2\ NH_3 + H_2$

NH_3



Diazotrophs (prokaryotes)

'New' Nitrogen

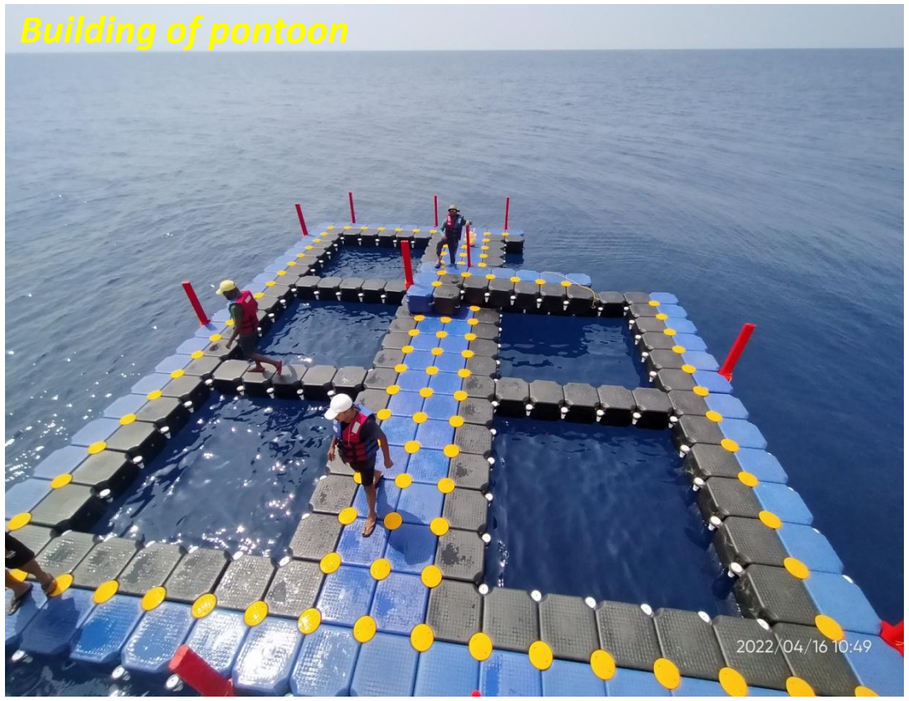
Diatoms

Objectives of the project

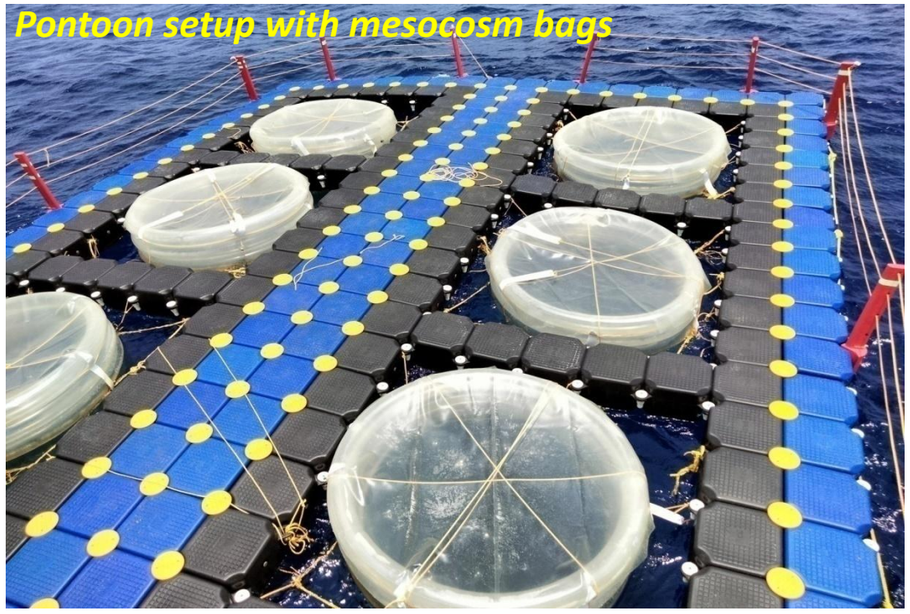
1. To test the efficacy of buoyant Flakes for CO_2 sequestration and carbon export to the deep ocean by conducting laboratory and mesocosm experiments.

2. To Investigate the adverse effects, if any, of such fertilization (e.g., obnoxious blooms and production of greenhouse gases).

Mesocosm Experiment site and setup



Bag	Buoyant Flakes Added	% of surface Area
1	Control (Zero flakes)	0
2	74	0.05
3	296	0.2
4	1483	1
5	2963	2
6	7409	5



About the experiment:

The mesocosm experiment was conducted at station G17, 220 nm outside the EEZ of India, with the addition of flakes between 20th and 28th April 2022. Sampling was carried out for temperature, salinity, total dissolved iron, Fe^{2+}, dissolved gases (DO, DMS, CH4 and N2O), nutrients (nitrate, nitrite, ammonium, phosphate and silicate), particulate phosphorous, pH and TA, Chl a and pigments (HPLC), phytoplankton and zooplankton and NifH gene.

While some of the results are available, the balance processing/analysis of the samples is in progress. Based on the findings of this pilot mesocosm experiment, the same will be fine tuned and repeated during the spring inter-monsoon of 2023

Thank you