

Dataset(s):

- Series 4: Aggregation of *Thalassiosira weissflogii* as a function of pCO₂, temperature and bacteria: Acclimatisation Phase - Carbonate System
- Series 4: Aggregation of *Thalassiosira weissflogii* as a function of pCO₂, temperature and bacteria: Acclimatisation Phase - Cell Counts
- Series 4: Aggregation of *Thalassiosira weissflogii* as a function of pCO₂, temperature and bacteria: Aggregation Phase - Carbonate System + TEP
- Series 4: Aggregation of *Thalassiosira weissflogii* as a function of pCO₂, temperature and bacteria: Aggregation Phase - Sinking Velocity

Project(s): Will Ocean Acidification Diminish Particle Aggregation and Mineral Scavenging, Thus Weakening the Biological Pump? (OA - Ocean Acidification and Aggregation)

Abstract:

Increasing Transparent Exopolymer Particle (TEP) formation during diatom blooms as a result of elevated temperature and pCO₂ have been suggested to result in enhanced aggregation and carbon flux, therewith potentially increasing the sequestration of carbon by the ocean. We present experimental results on TEP and aggregate formation by *Thalassiosira weissflogii* (diatom) in the presence or absence of bacteria under two temperature and three pCO₂ scenarios. During the aggregation phase of the experiment TEP formation was elevated at the higher temperature (20°C vs. 15°C), as predicted. However, in contrast to expectations based on the established relationship between TEP and aggregation, aggregation rates and sinking velocity of aggregates were depressed in warmer treatments, especially under ocean acidification conditions. If our experimental findings can be extrapolated to natural conditions, they would imply a reduction in

carbon flux and potentially reduced carbon sequestration after diatoms blooms in the future ocean.

Keywords: ocean acidification, temperature, transparent exopolymer particles (TEP), marine aggregates, climate change, diatom, *Thalassiosira weissflogii*, *Marinobacter adhaerens* HP15

The Series 4 Experiment, Aggregation of *Thalassiosira weissflogii* as a function of pCO₂, temperature and bacteria, is made up of 2 phases. The Acclimatisation Phase and the Aggregation Phase.

The Acclimatisation Phase has two components – The Carbonate System data and the Cell Counts Data. The Aggregation Phase also has two components – The Carbonate System + TEP data and the Sinking Velocity data.

Note: For a complete list of measurements, refer to the supplemental document 'Series4_Field_names.pdf'.

Funding:

This research was supported by NSF Grant: OCE-0926711