Key environmental drivers of benthic flux variation and ecosystem functioning in Salish Sea and northeast Pacific sediments

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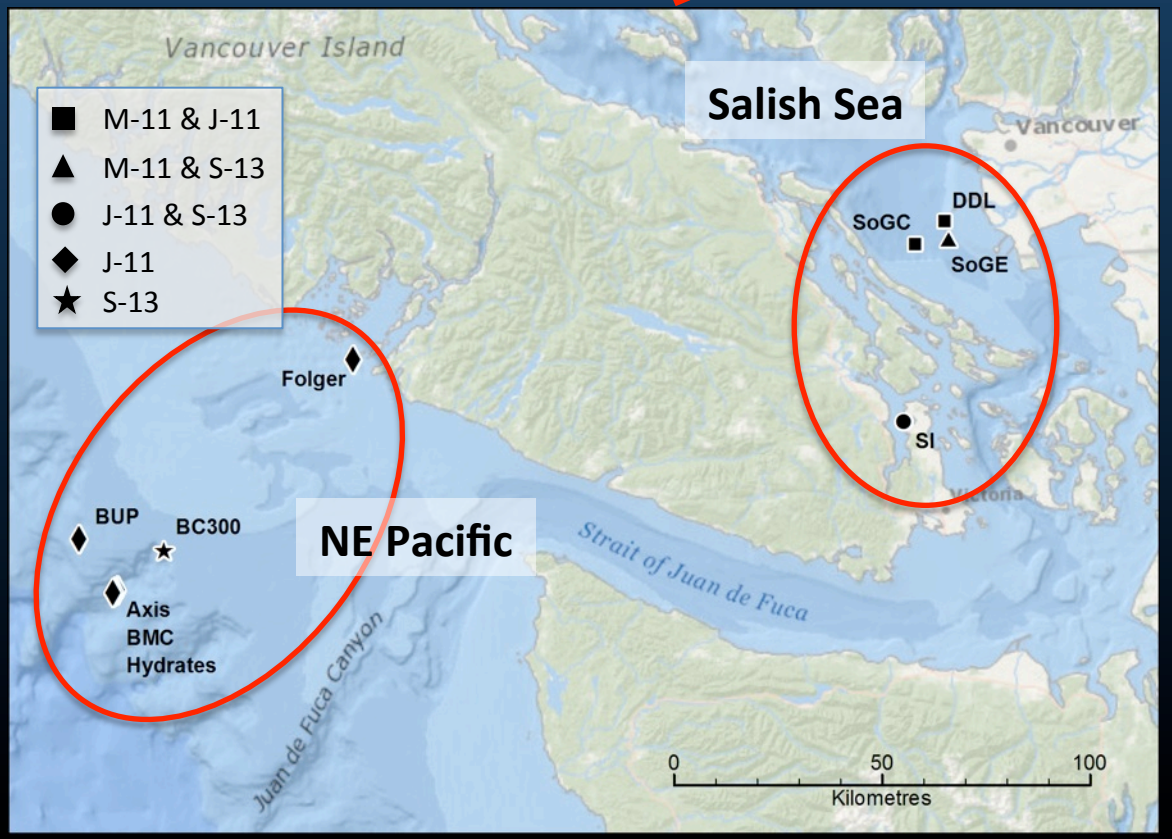
Introduction

- OM recycling utilizes O_2 and creates fluxes of nutrients between the seafloor and the water column
- Benthic flux of O_2 and nutrients can be measured and used as a measure of ecosystem functioning
- Objectives
  1. Study benthic fluxes - spatial and temporal variation in Salish Sea and NE Pacific sediments
  2. Determine environmental drivers of benthic flux variation

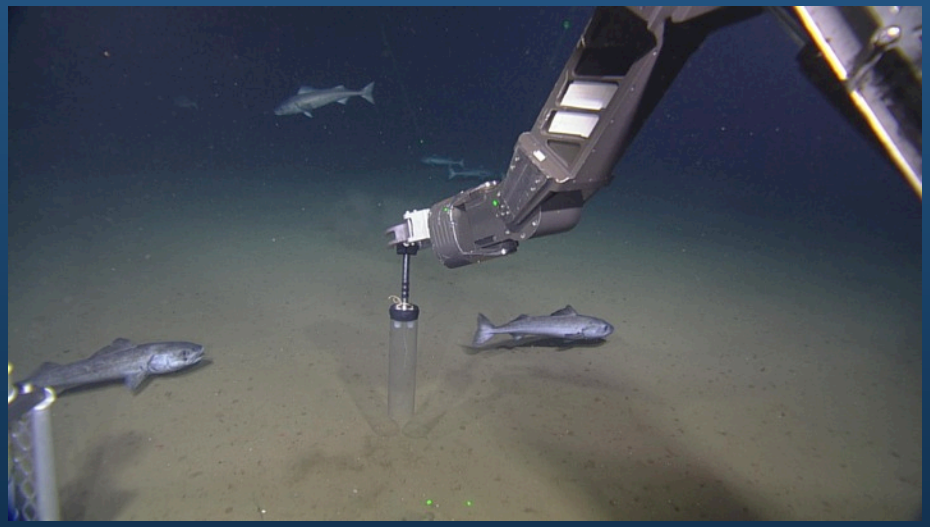
Methods: Study sites

- ONC subsea installations
  - Salish Sea (VENUS)
  - NE Pacific (NEPTUNE)
- 3 sampling times
  - May 2011
  - July 2011
  - Sep 2013



Methods: Incubations

- Sediment cores collected with ROV ROPOS
- On board incubations
  - *In situ* temp + dark
  - 12-24 hrs
- Measurement of:
  - O_2 uptake
  - Nutrient flux
    - Ammonium
    - Nitrate
    - Nitrite
    - Silicate
    - Phosphate



Methods: Environmental variables

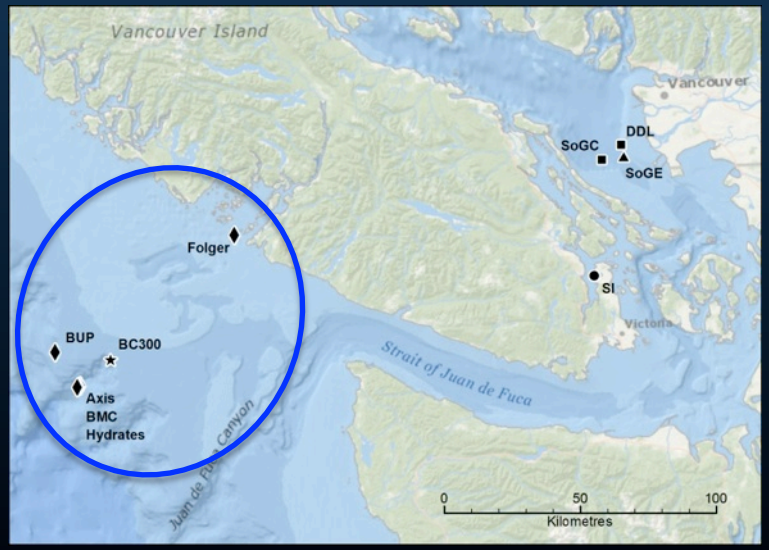
O_2 micro-profiles (OPD)

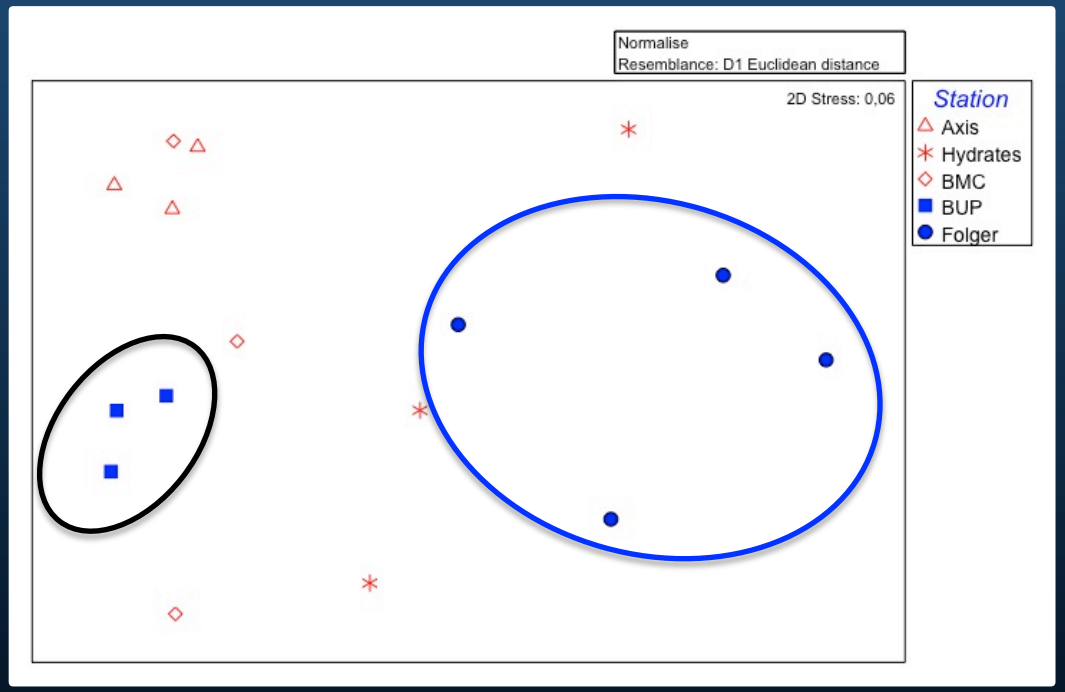
Prokaryote and sediment characteristics

Results: NE Pacific spatial variation

NE Pacific fluxes-July 2011:

- Deep Barkley fluxes significantly smaller than upper slope and Folger
- Some small significant differences in fluxes between deep Barkley sites

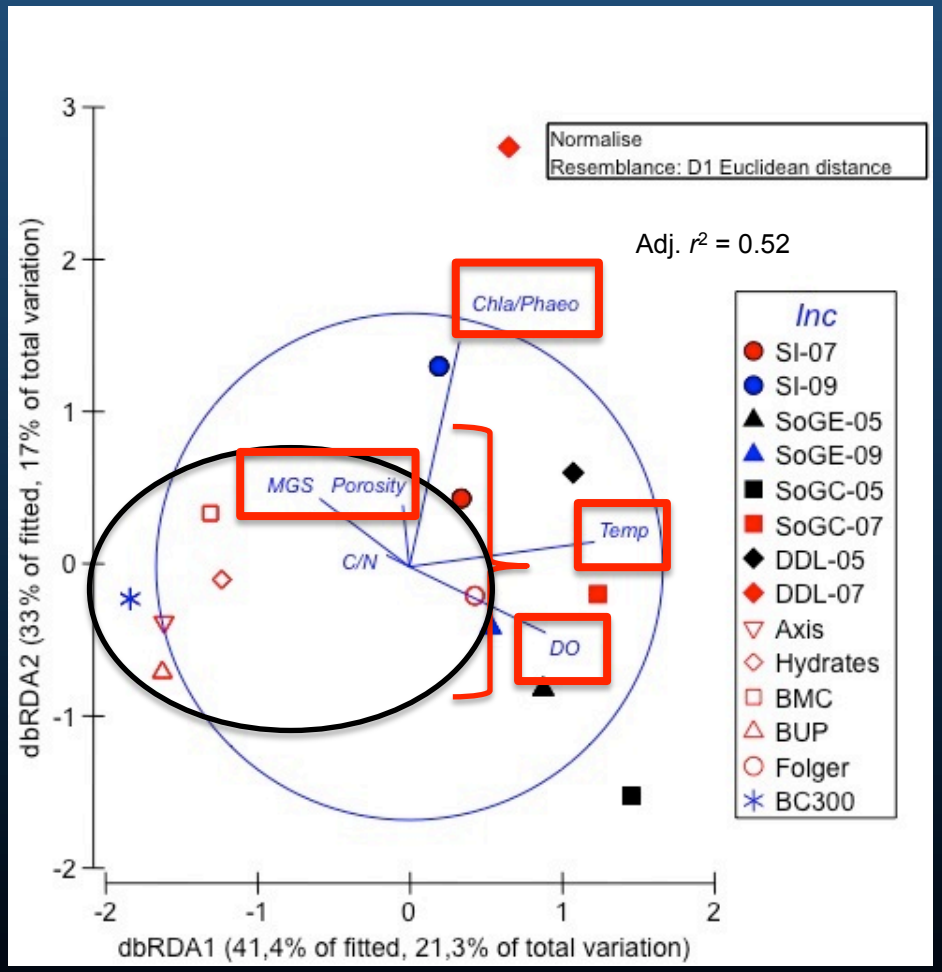




Results: NE Pacific spatial variation

Redundancy analysis indicates that:

- Barkley Canyon benthic fluxes influenced by cold water temp and low DO
- Flux variation between Barkley Canyon nodes mostly due Chl*a*/Phaeo content, and sediment MGS and porosity



Conclusions

- Lower benthic flux measured at deep Barkley sites (i.e. Axis, Mid Canyon and Hydrates) than upper slope and shelf (i.e. Folger) sites
  - Explained by differences in bottom water characteristics (i.e. lower temp and DO at Barkley deep sites)
- Moreover, small benthic flux variation observed between deep Barkley sites
  - Explained by local variation in food quality (Chl *a*/Phaeo) and sediment characteristics (MGS and porosity)
- Environmental variables explain ~ 52% of benthic flux variation
- Bottom water temperature is the most important environmental driver of benthic flux variation
  - Explains alone ~16% of benthic flux variation

Future research interests

- Actually looking for a postdoc for early 2016
- Interested in food supply utilization by benthic community
- Possible manipulative experiment could require to install a small setup in front of a Barkley Canyon camera and collect samples by ROV during a later cruise

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