Using cruises and Bio-Argo floats data to estimate dissolved organic carbon in the Northeast Pacific Ocean

Mariana B. BiFi, Dennis A. Hansell

Rosenstiel School of Marine and Atmospheric Sciences, University of Miami, Miami, FL 33149, USA

1. Overview and motivation

- Measurements of dissolved organic carbon (DOC) in the ocean still require ships, and the chemical analysis is very time-consuming.
- DOC concentrations can be estimated from net community production (NCP) if a constant fraction of NCP seasonally accumulates as DOC, called Net Dissolved Production Ratio (NDPr).
- NCP can be calculated for a region using nitrate profiles collected through seasons.
- Cruises in the NE Pacific are carried out seasonally, and the last station (Papa) is nearby Bio-Argo floats equipped with nitrate sensors.
- We calculated NDPr from seasonal DOC concentrations in NE Pacific (Line P seasonal cruises from 2017), and applied to NCP derived from Bio-Argo floats data in order to estimate DOC.
- Data is shown from years from 2009 to 2018.

2. Approach

- DOC concentrations (TOC analyzer)
- \[ \text{NCP} = \Delta \text{NO}_3^- \times 6.6 \] Estimated for spring and summer/2017
- \[ \text{NDPr} = \frac{\Delta \text{DOC}}{\text{NCP}} \]
- NDPr is constant nearby Papa, NDPr = 0.26 ± 0.2

3. Seasonal cruises: DOC, NCP, NDPr

- Seasonal NCP along Line P:
  - Spring
  - Summer

- Integrated NCP and net dissolved production ratio (NDPr):
  - Spring
  - Summer

- Stability of NDPr nearby Station Papa:
  - Cruise
  - NCP (mol C m⁻²)
  - \[ \Delta \text{DOC} \] (mol C m⁻²)
  - NDPr

- Year
  - Seasonal NCP spring/summer (mol C m⁻²)

- Data is shown from years from 2009 to 2018.

4. Estimated DOC nearby Station Papa

- Years
  - Seasonal NCP
  - DOC estimated (mol C m⁻²)

Acknowledgements