Using OOI data to investigate carbon cycling in the Irminger Sea

1. Annual Net Community Production and Inorganic Carbon Cycling in the Irminger Sea

2. Producing the inorganic carbon system time series needed to answer these research questions

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Seasonal cycle of organic carbon production and export in the Irminger Sea

Research Questions

How much carbon is removed from the mixed layer by biological processes each year (annual net community production, ANCP)?

How much does NCP vary seasonally and interannually?

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Data

Moorings

Near daily from summer 2015-2022

- pH and pCO_2
- Temperature, Salinity, Pressure
- Dissolved Oxygen
- Chlorophyll

Gliders and WFP

- Oxygen
- Temperature, Salinity, Pressure

Research cruises (annual)

- Bottle samples
  - Dissolved inorganic carbon
  - Total alkalinity
- Temperature, salinity, pressure, dissolved oxygen

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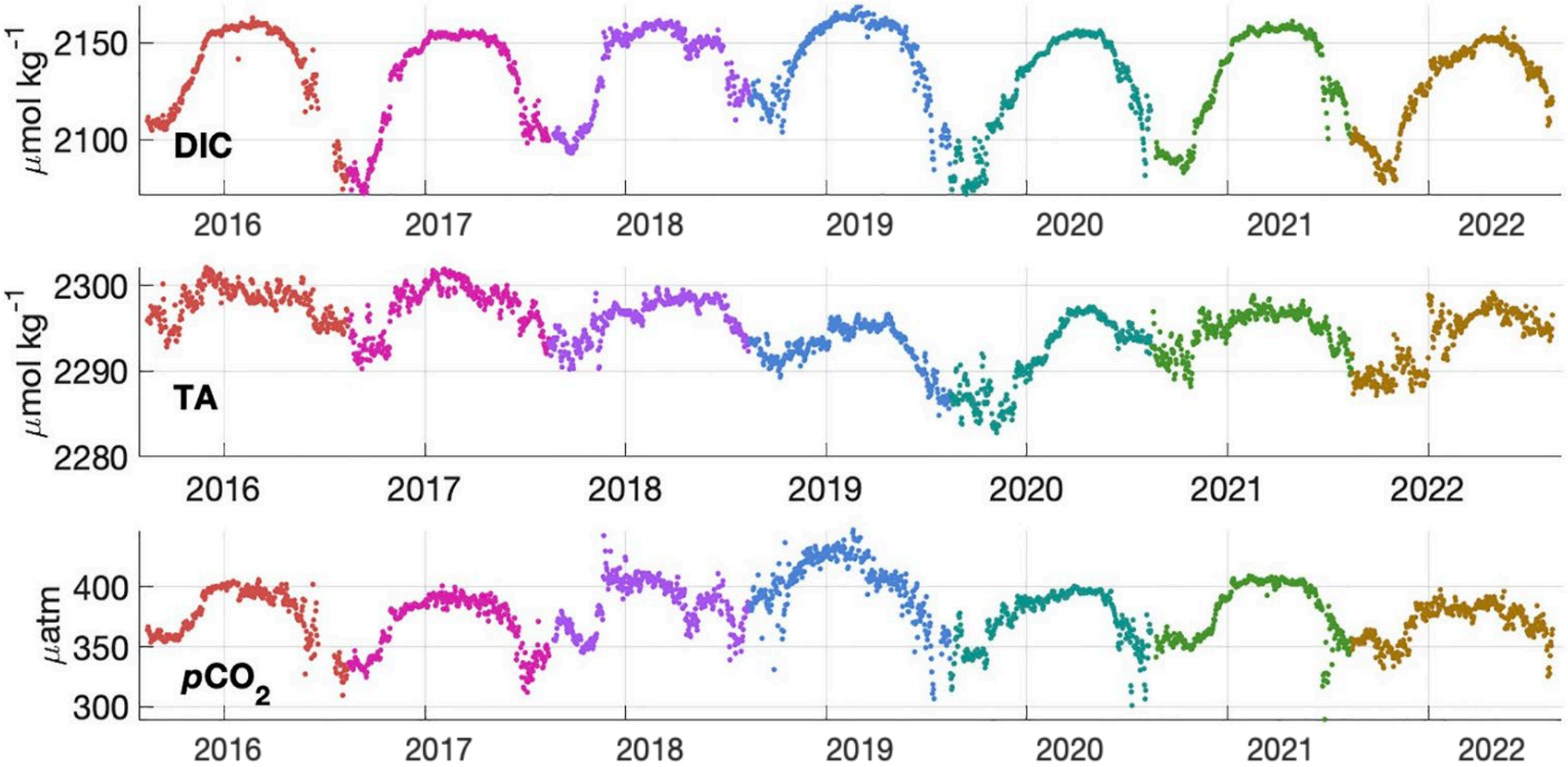
Mixed Layer DIC, TA, pCO_2 time series



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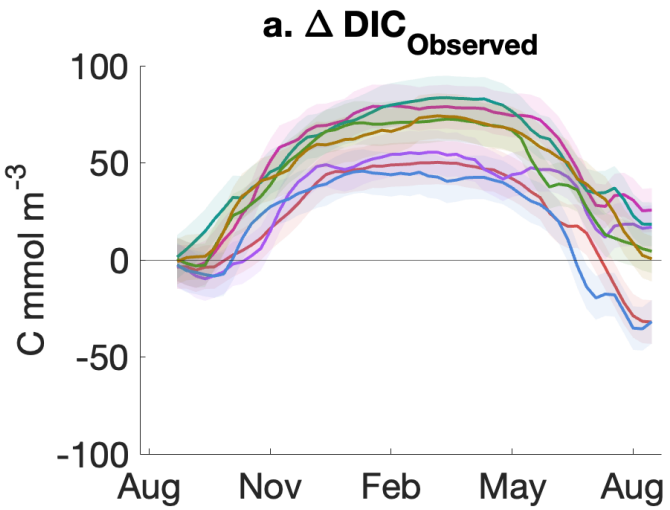
The primary drivers of the annual inorganic carbon cycle are biology and vertical mixing



2015-16 2016-17 2017-18 2018-19 2019-20 2020-21 2021-22

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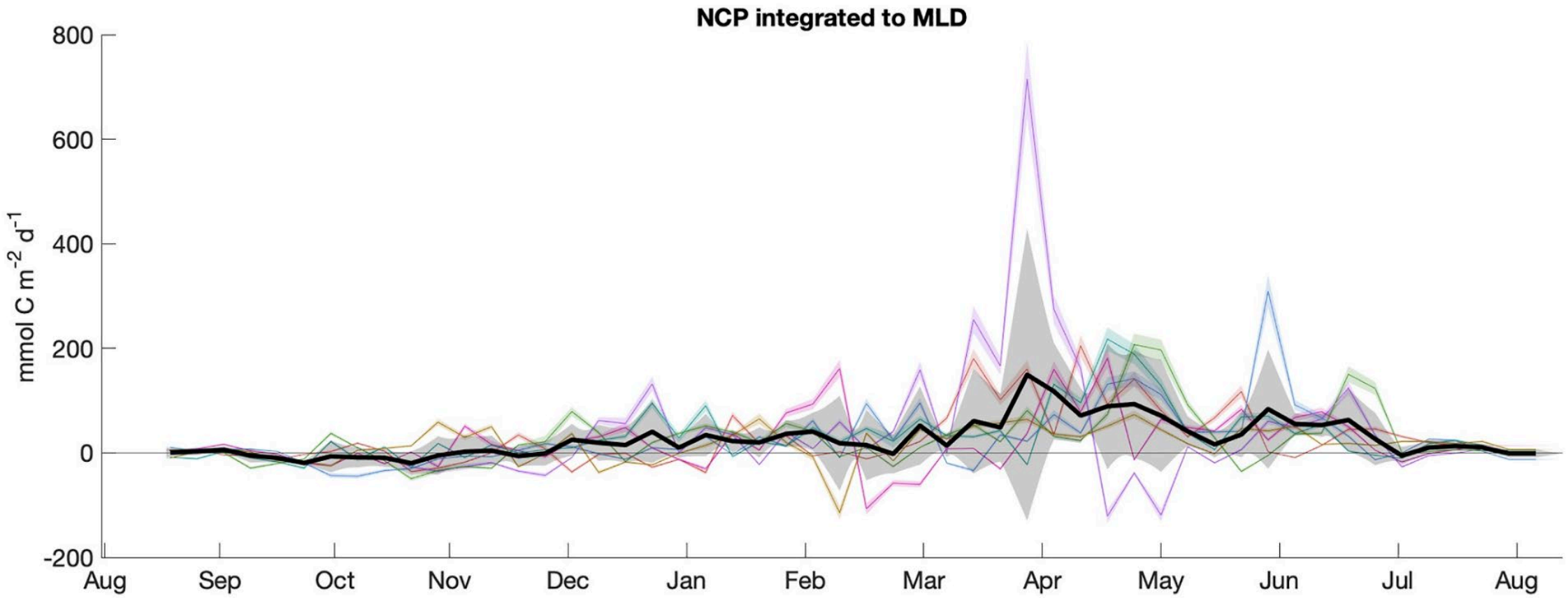
The majority of net community production occurs in early spring



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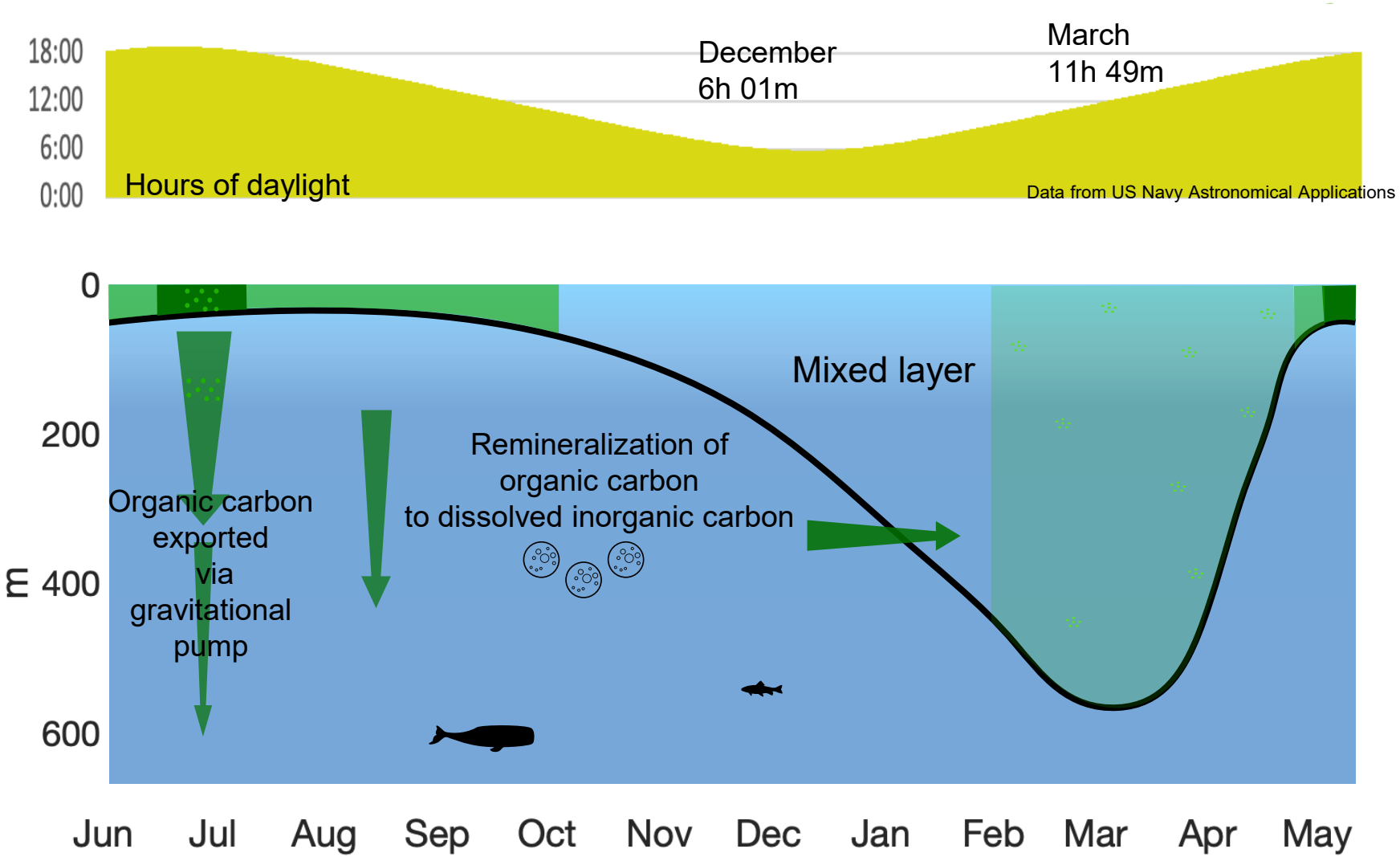
Seasonal cycle of organic carbon production and export, revisited



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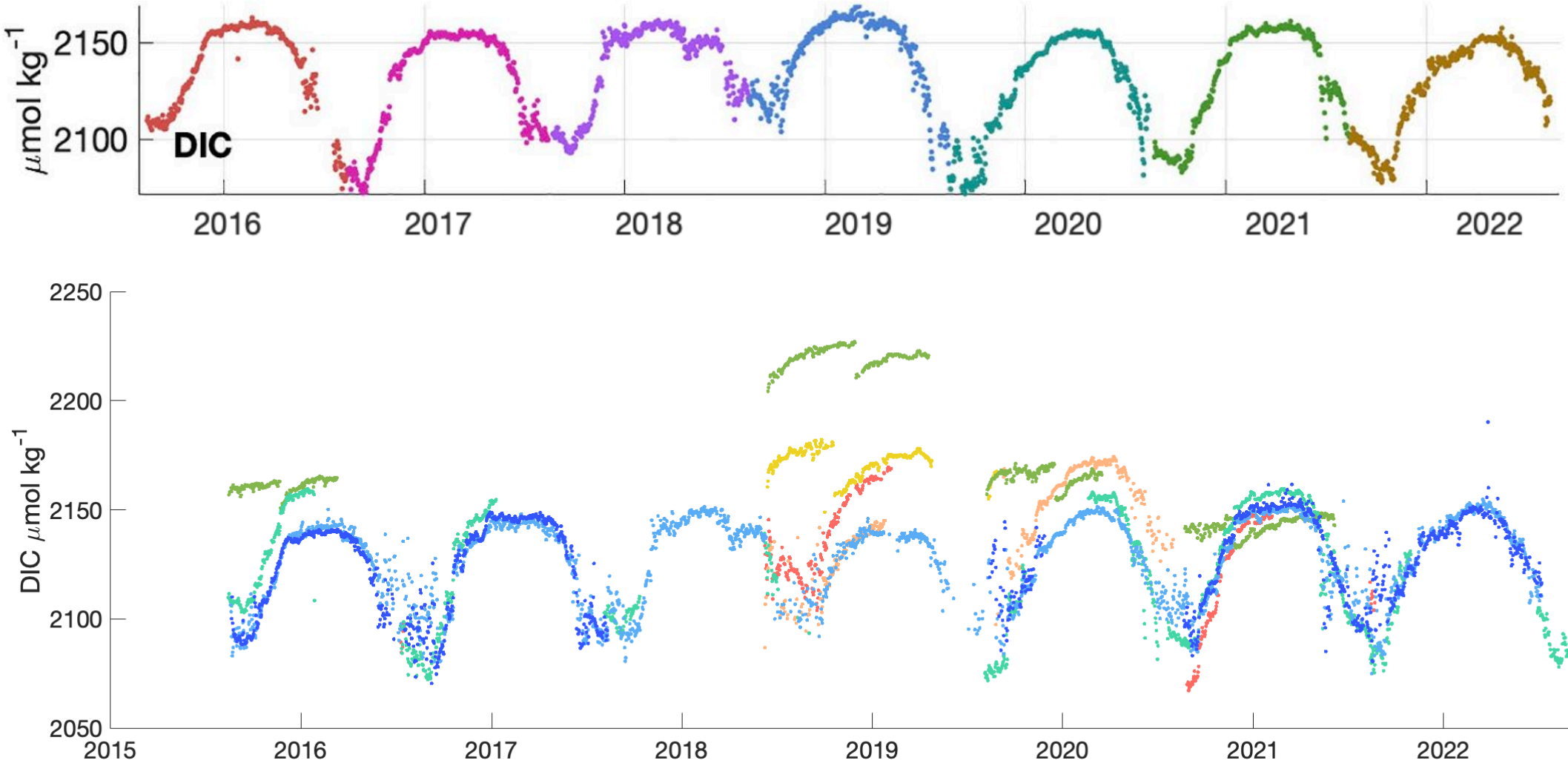
Calibrating the mixed layer DIC time series: a multi-pronged approach



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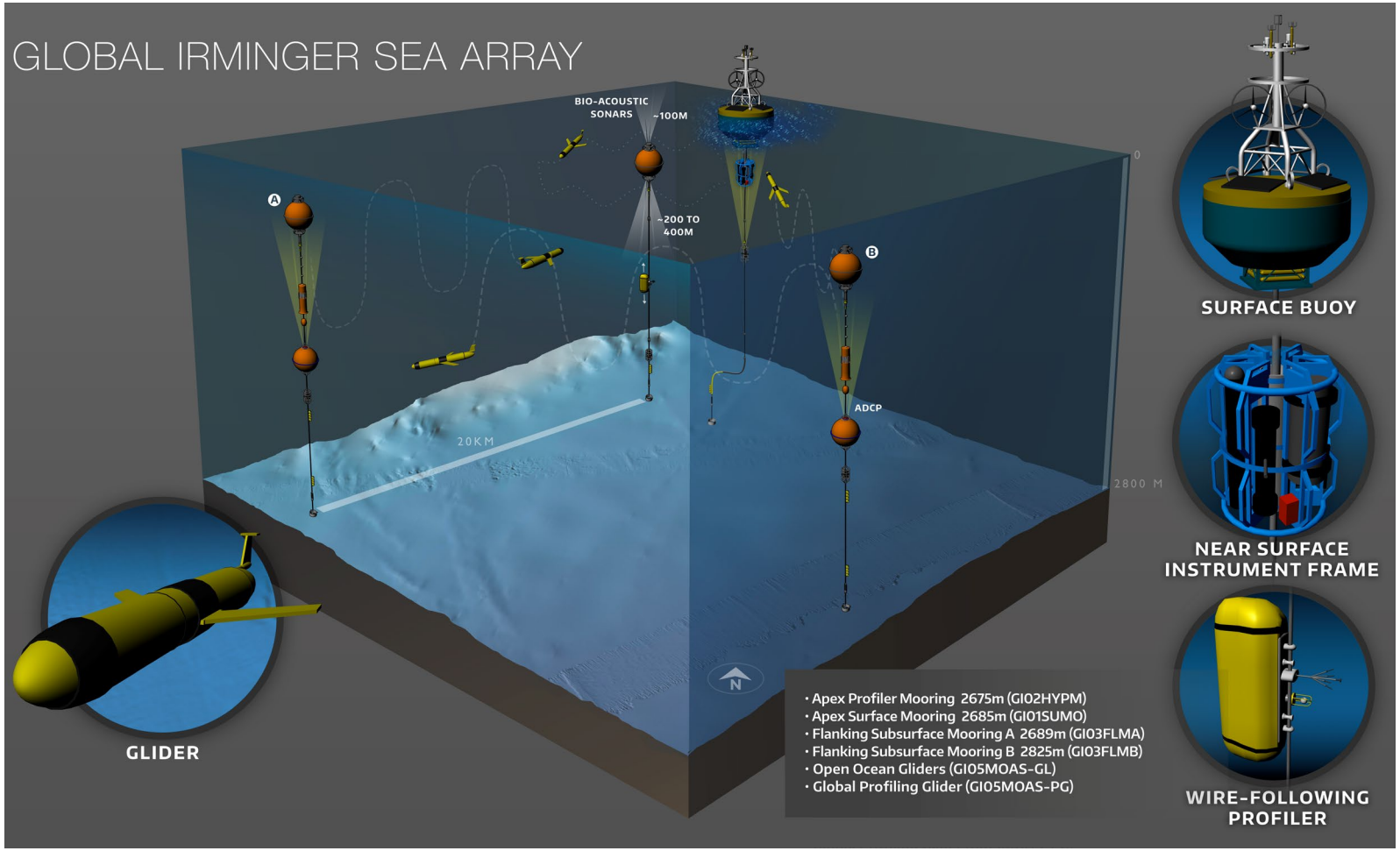
pH and pCO_2 sensor data

Depth	Sensor	Location
1m	Pro-Oceanus Air-Sea pCO_2	Apex Mooring-Surface Buoy
12m	SAMI pCO_2	Apex Mooring-Near Surface Instrument Frame
30m	SAMI pH (2)	Flanking Moorings A and B
40m	SAMI pCO_2	Apex Mooring
80m	SAMI pCO_2	Apex Mooring
100m	SAMI pH	Apex Mooring
130m	SAMI pCO_2	Apex Mooring



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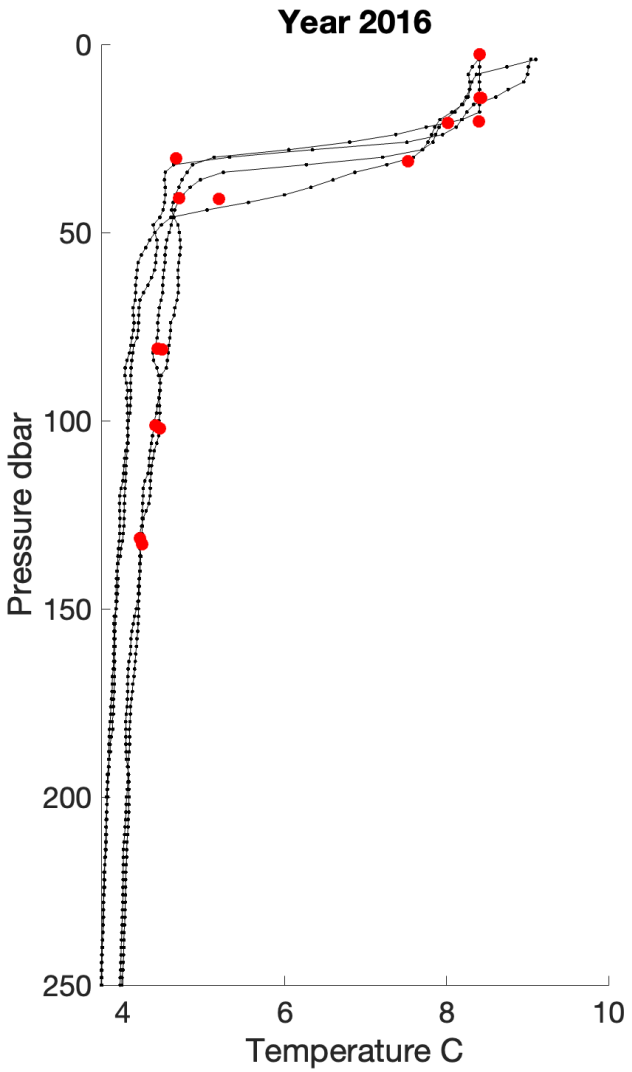
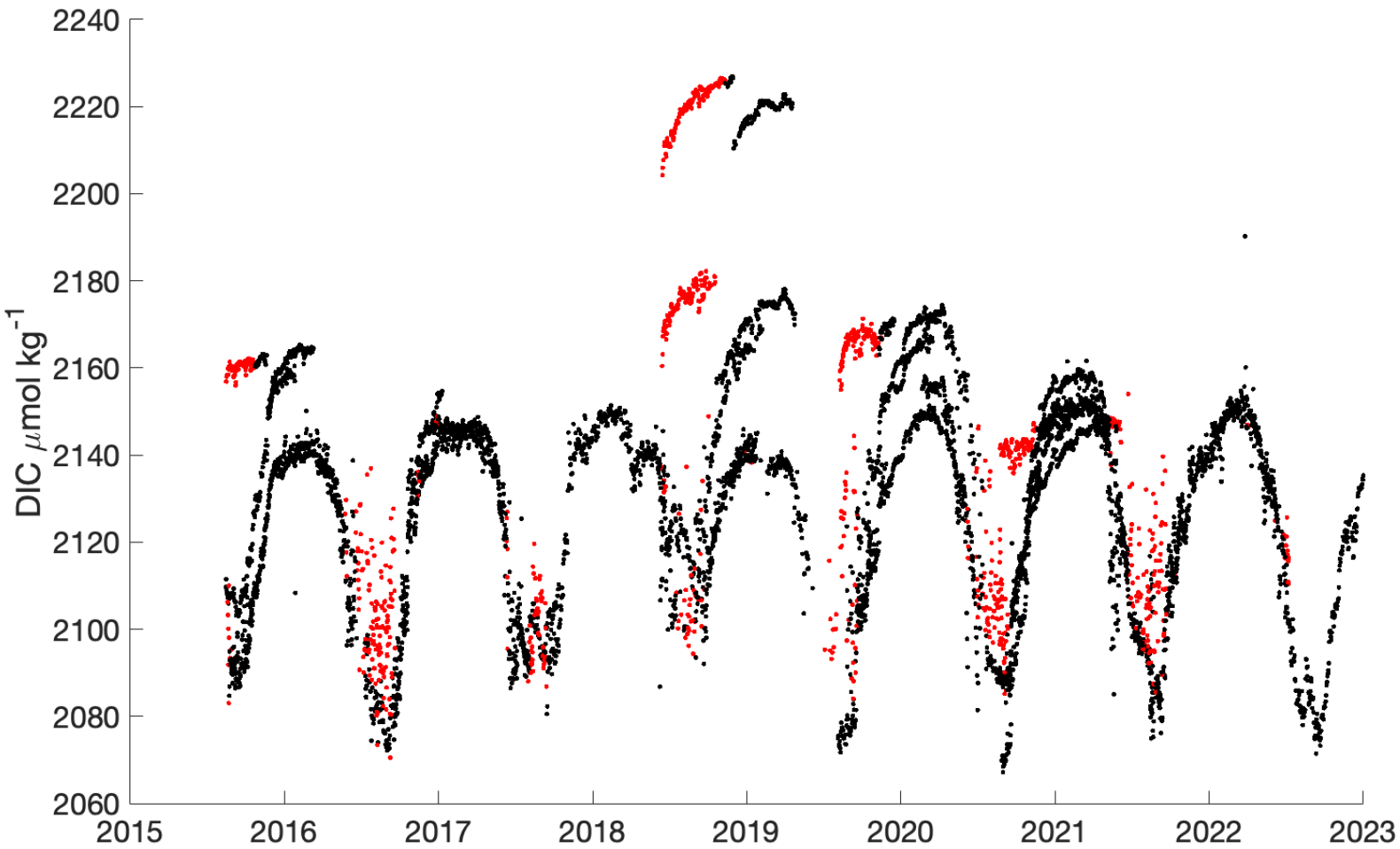
pH and pCO_2 sensors aren't always in the mixed layer, particularly during turn-around cruises





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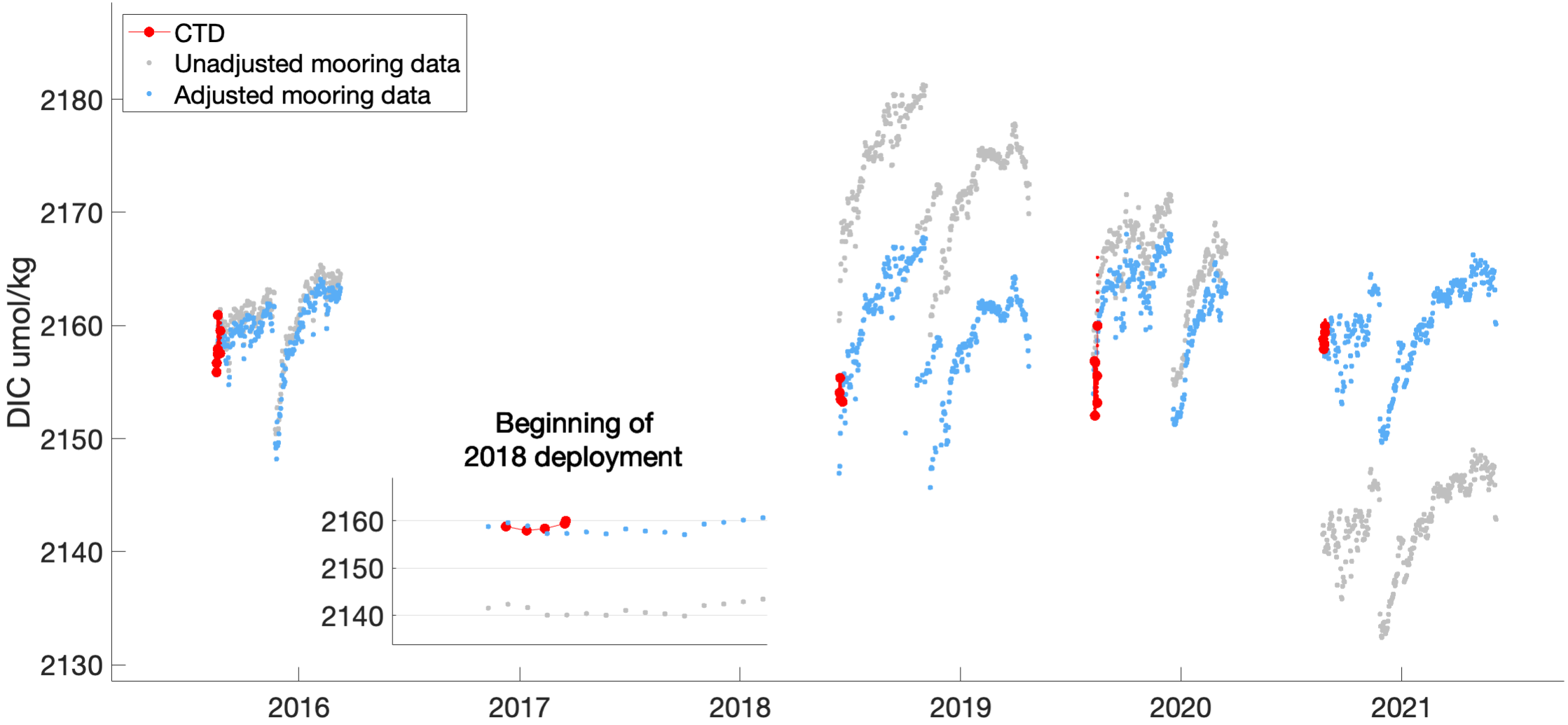
80 and 130m sensors can be calibrated using estimated DIC from CONTENT model (Bittig et al. 2018)



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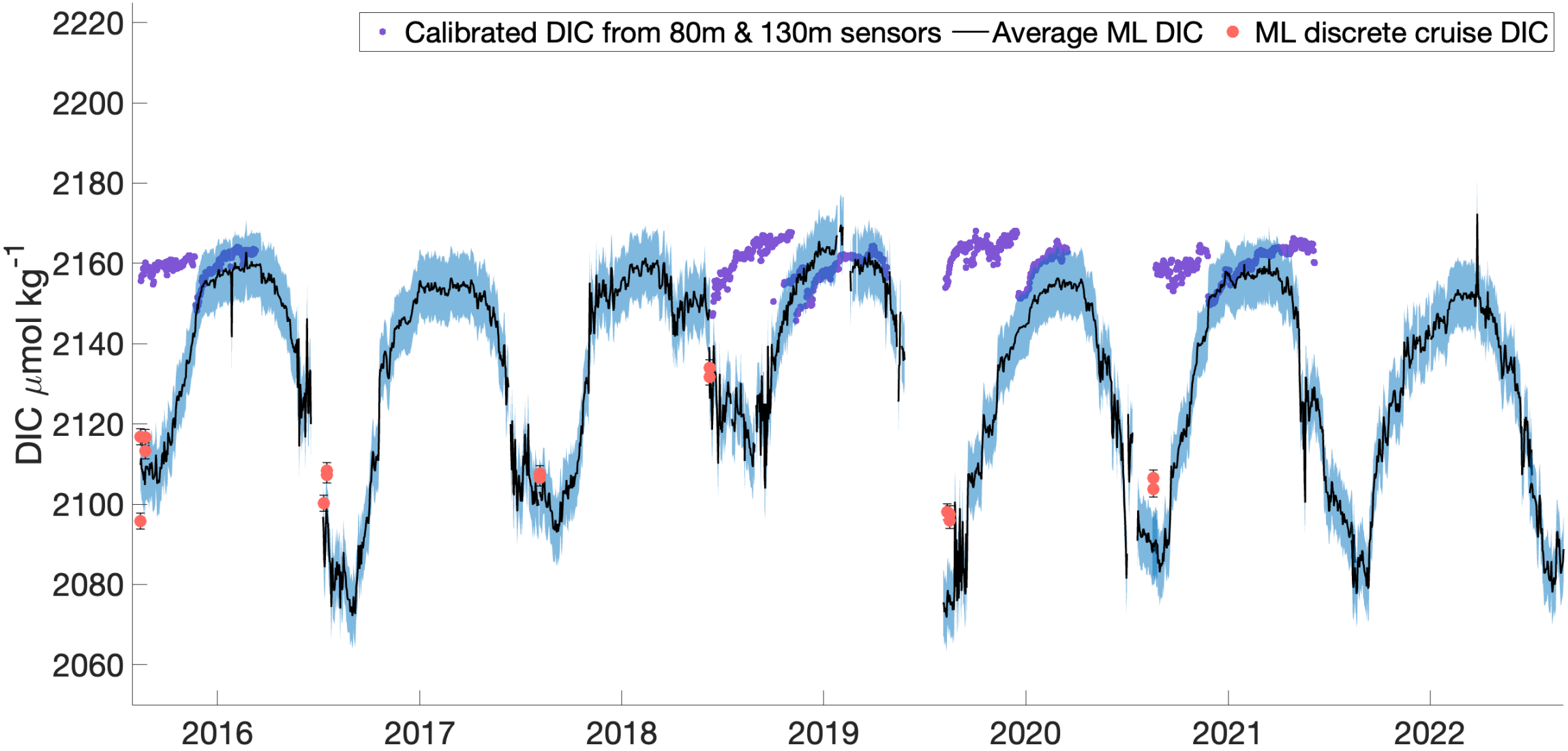
Calibrate *and* Validate



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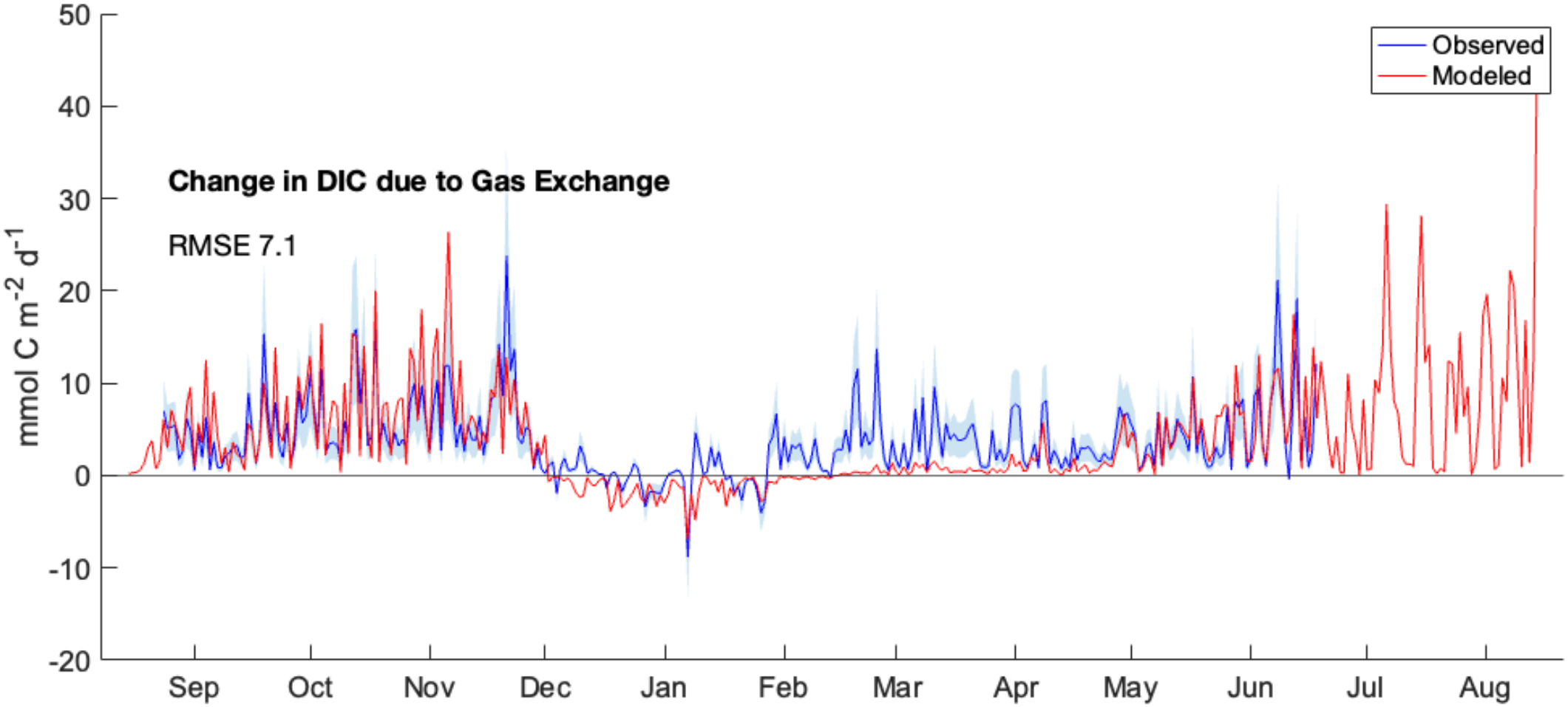
Takeaways

- With careful calibration and validation, we can answer interesting questions about carbon cycling using OOI data
- Leveraging multiple data sources can aid in the calibration and validation process
- Don’t be (too) intimidated by the data at first glance!

The Impact of Biological and Physical Process Timing on the Subpolar North Atlantic Carbon Sink

Friday, 3:25-3:35 in Convention Center room 156
OS53D - Advancing Our Understanding of Ocean Carbon and the Air-Sea Carbon Flux III Oral



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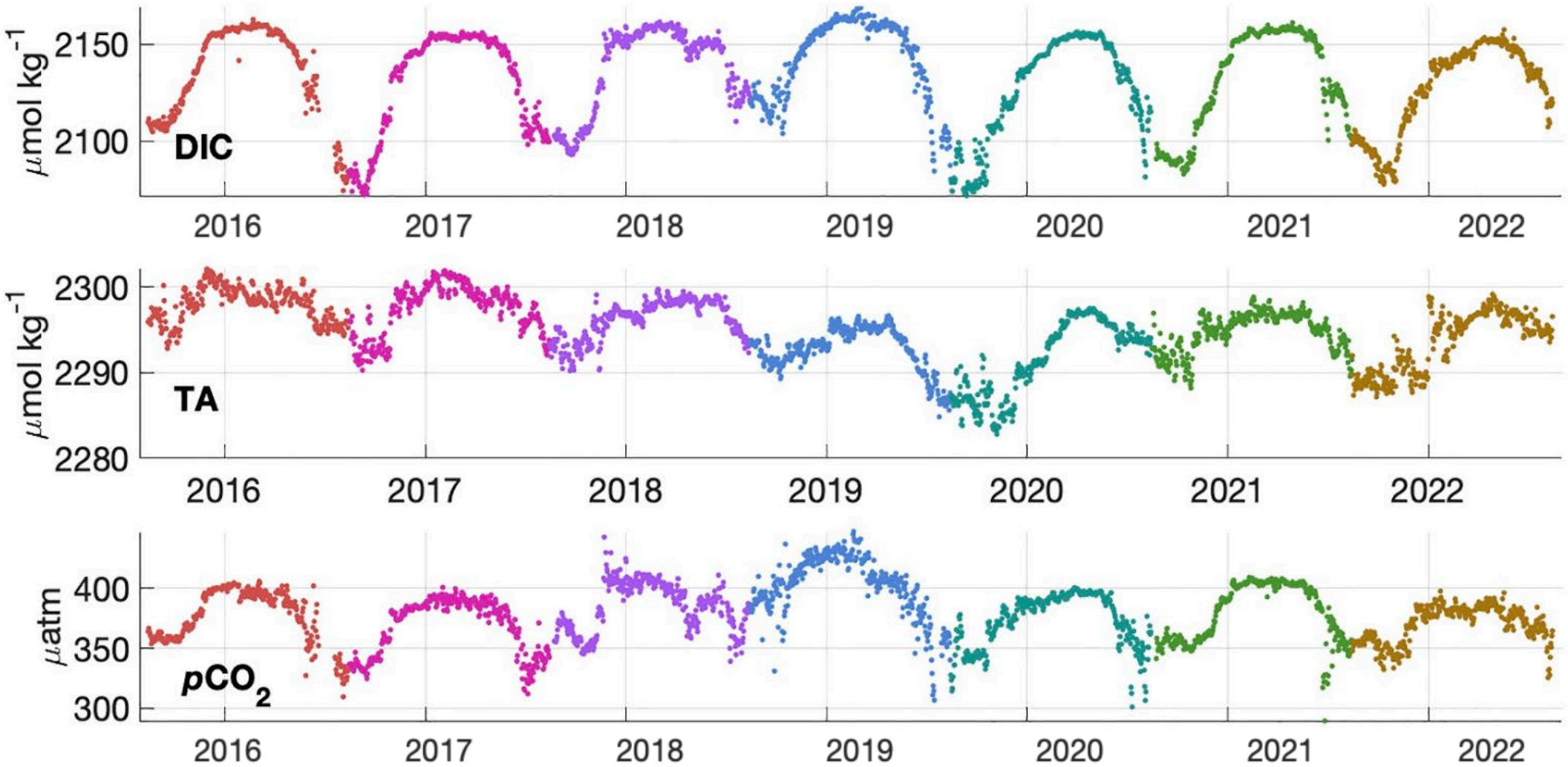
Thank you! Questions?



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