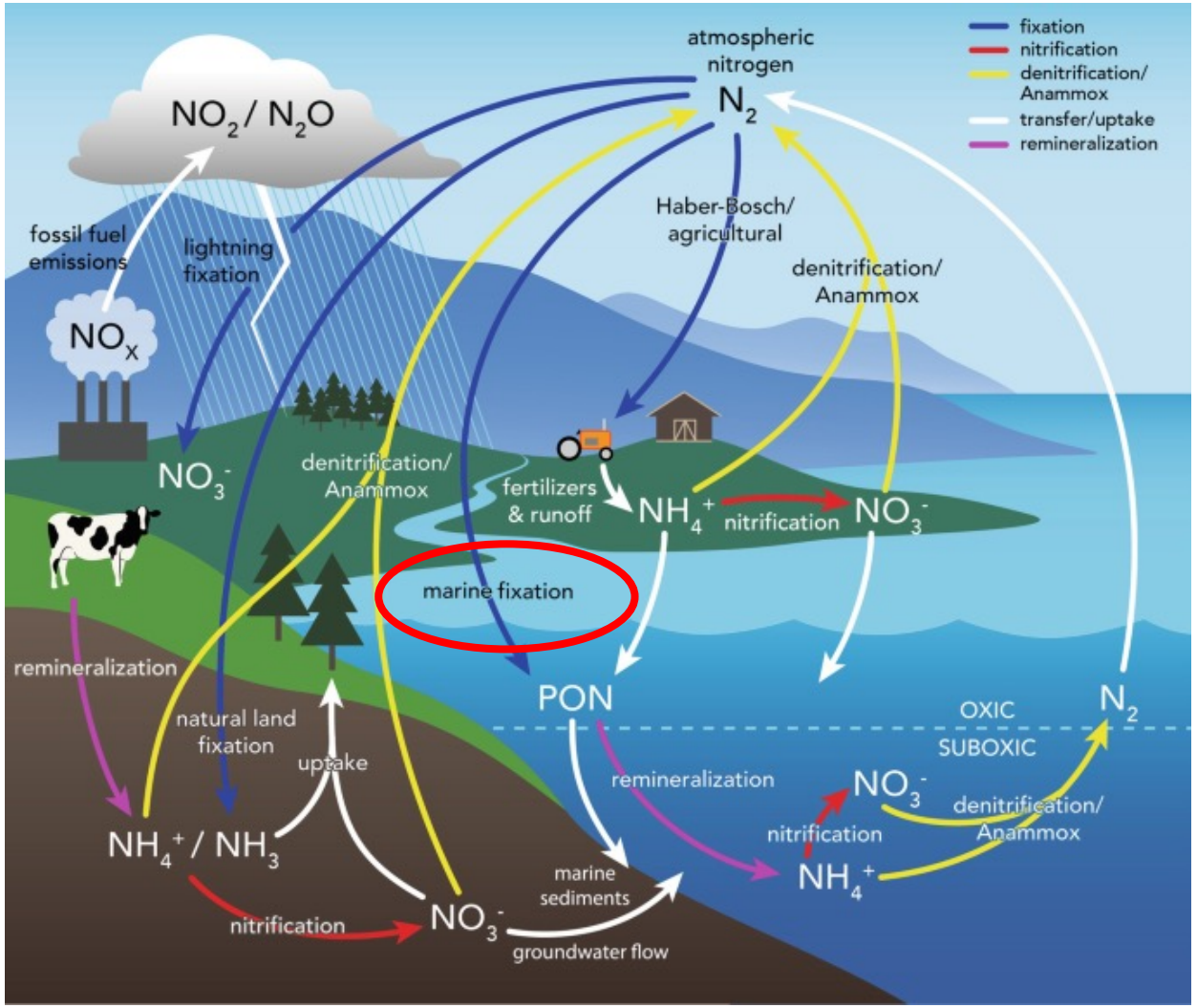
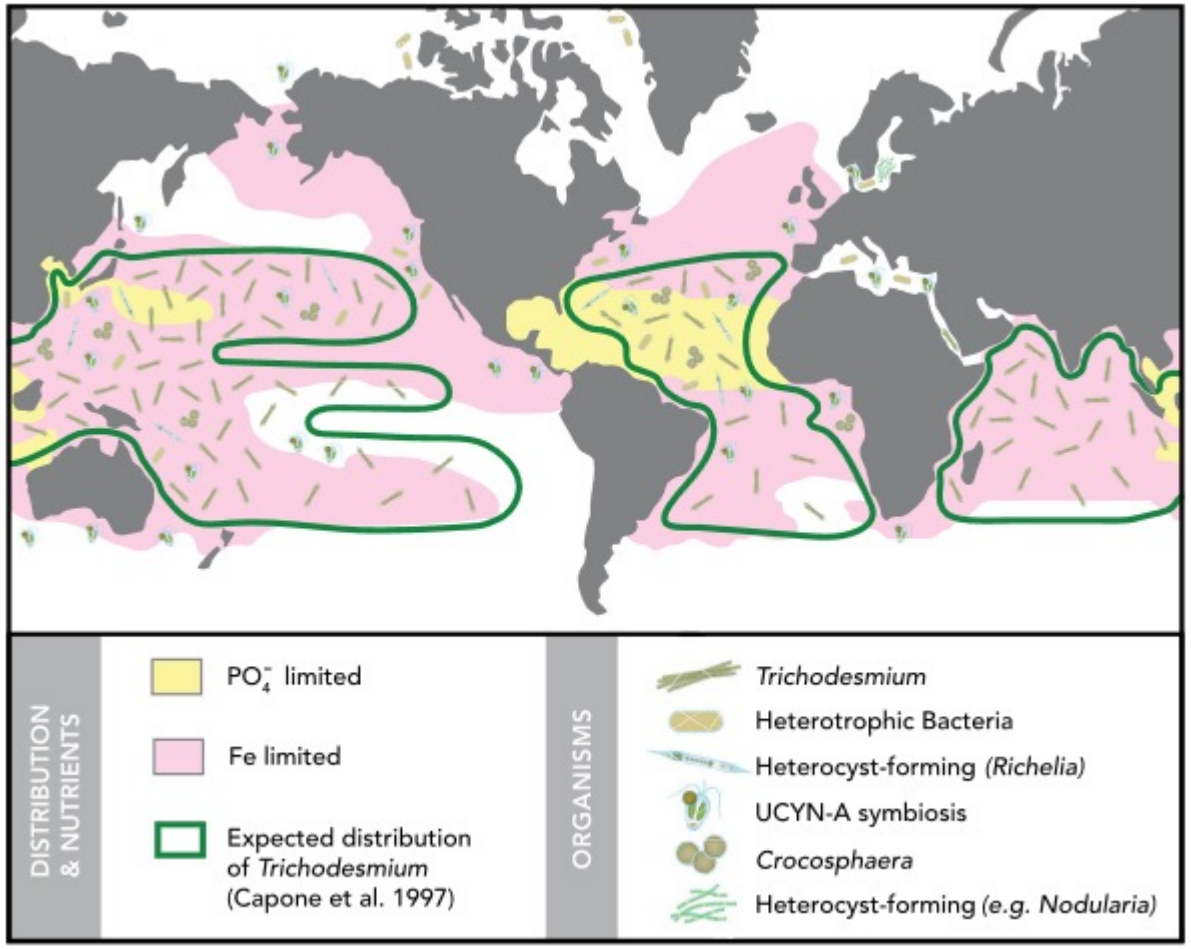
# Diel Cycling in Biological Nitrogen Fixation Time Series

# The Nitrogen Cycle




Zehr & Capone, 2021

# Global Nitrogen Fixation

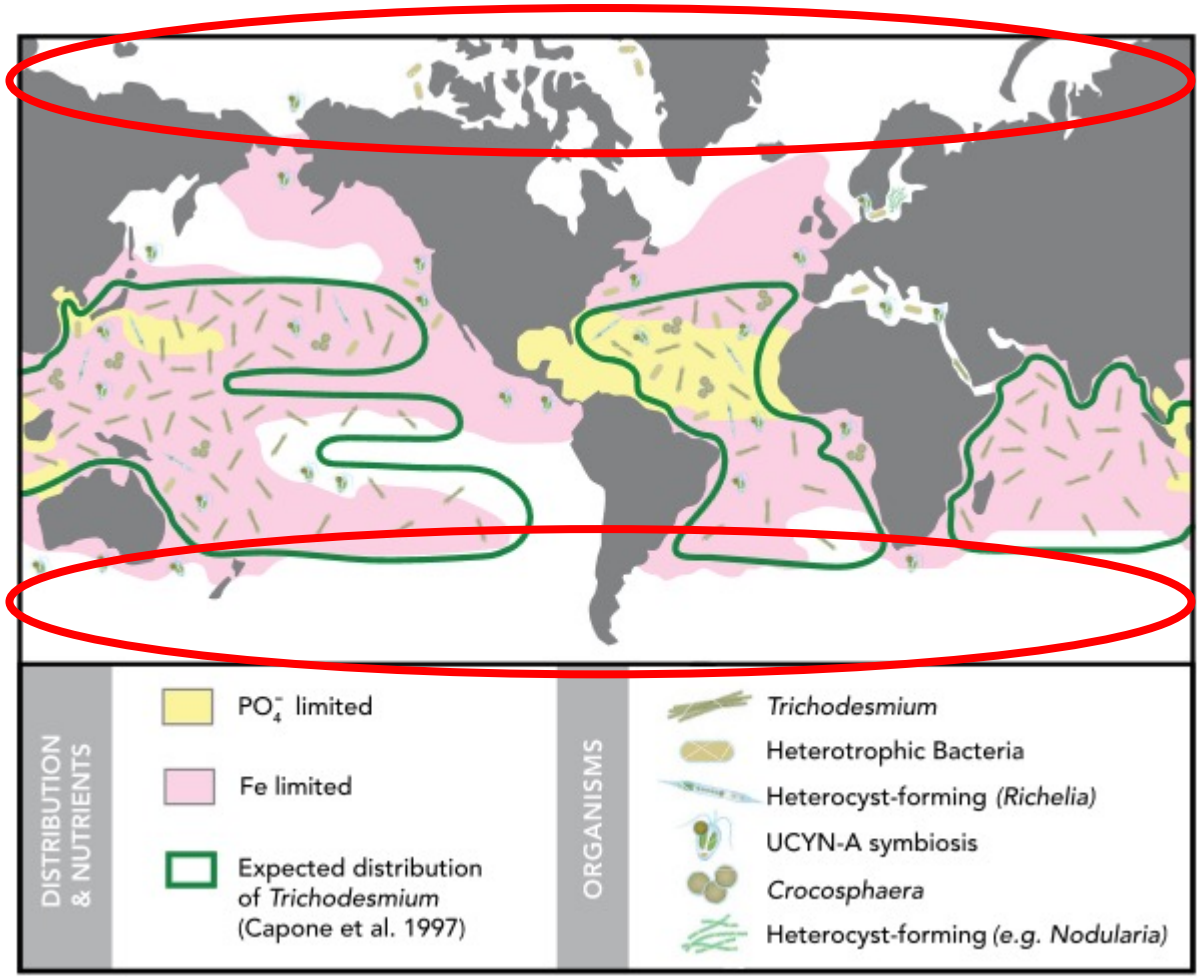



Zehr & Capone, 2020

Historic Hotspots

- Oligotrophic areas
- Tropical regions

# Global Nitrogen Fixation

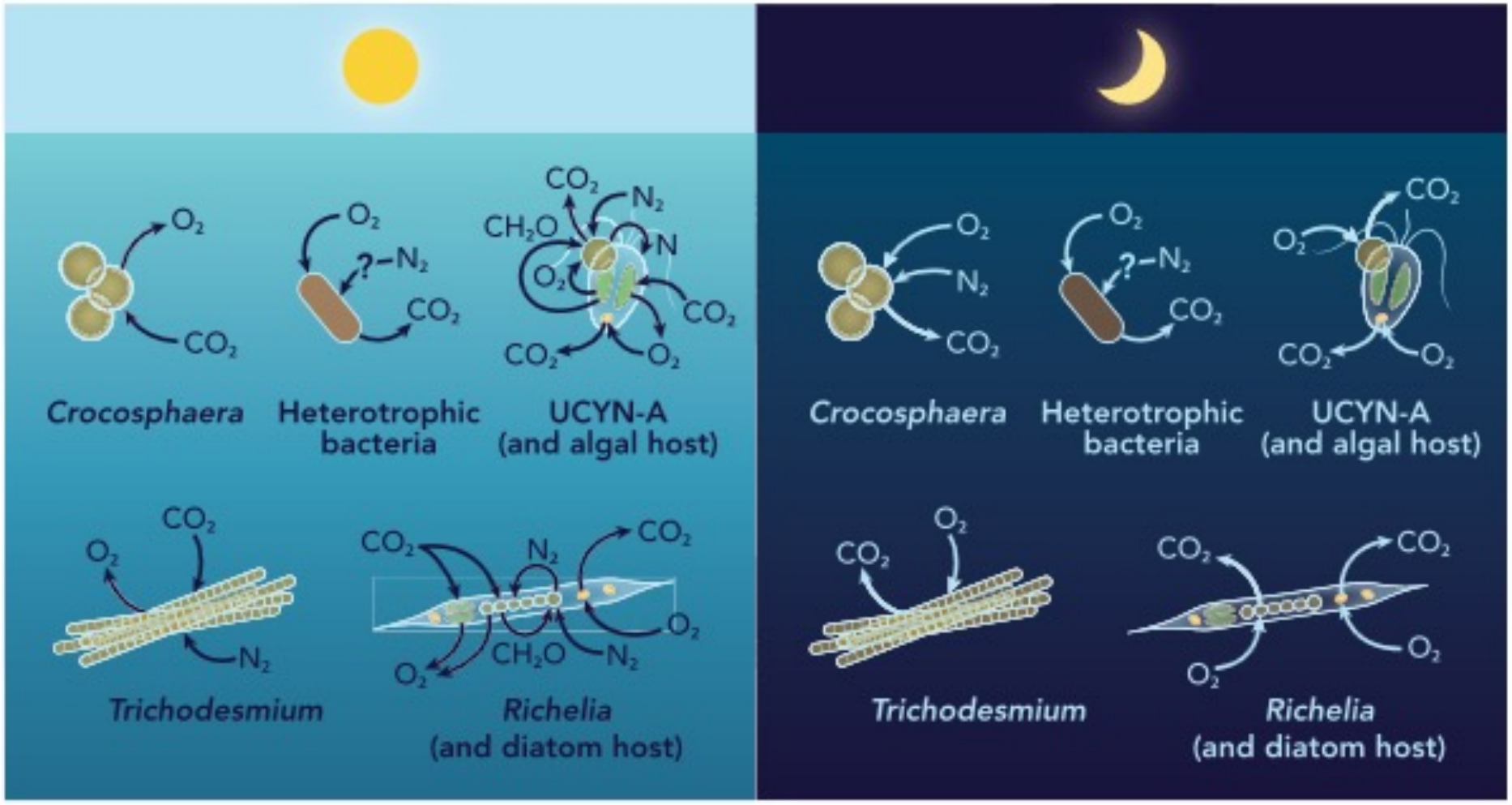



Zehr & Capone, 2020

Historic Hotspots
- Oligotrophic areas
- Tropical regions

Understudied and undersampled regions
- **Coastal areas**
  - *Tang et al 2019, Mulholland et al 2012, Grosse et al 2010*
- **Polar areas**
  - Arctic
    - *Shiozaki et al 2018, Shiozaki et al 2012, Sipler et al 2017,*
  - Antarctic
    - *Shiozaki et al 2020, Shiozaki et al 2022, Raes et al 2020*

# Diazotroph fixation diel cycling




Zehr and Capone, 2020

# Comparing Four Datasets

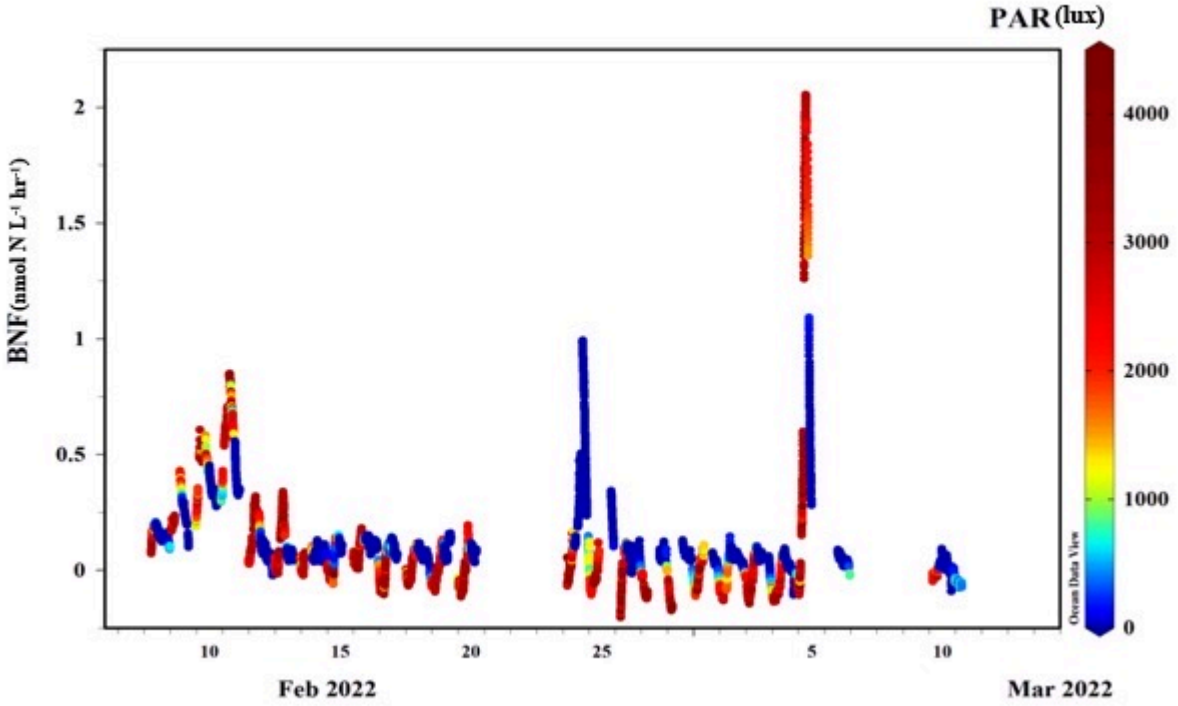
North Atlantic, 2019

Indian Ocean, 2022

Northwest Passage, 2022

Barents Sea, 2023

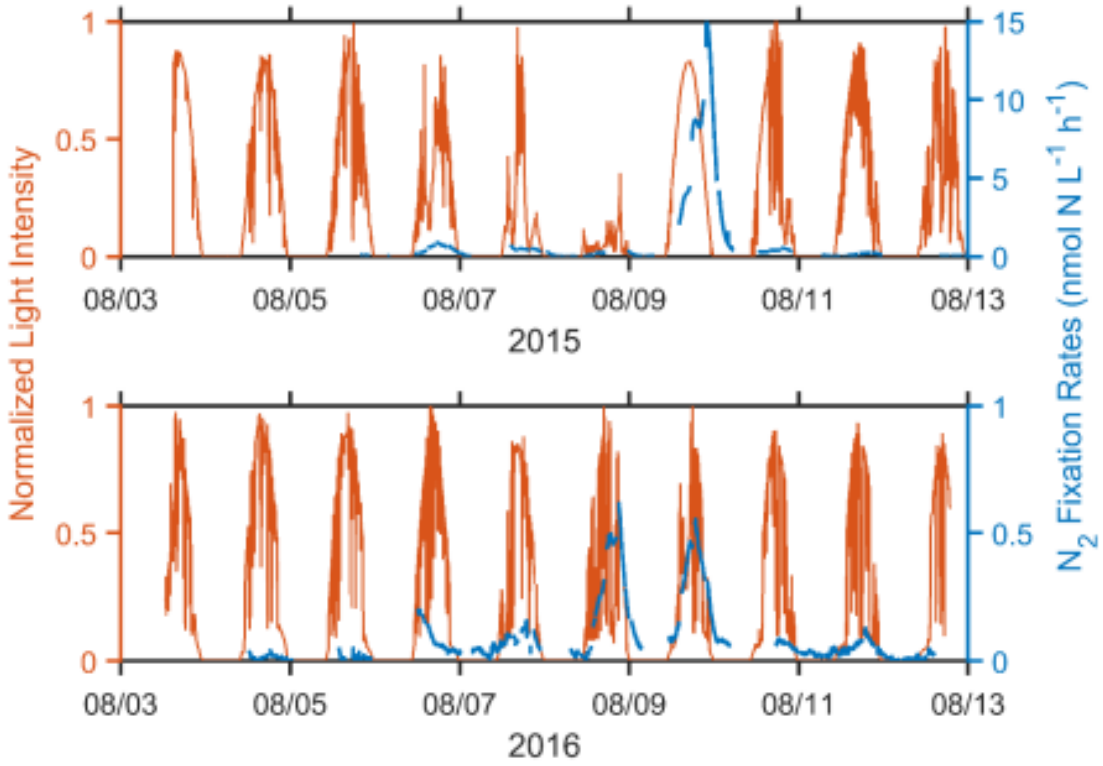
# Indian Ocean




BNF in umol N/L*hour. Color bar demonstrates Photosynthetically Active Radiation (PAR)

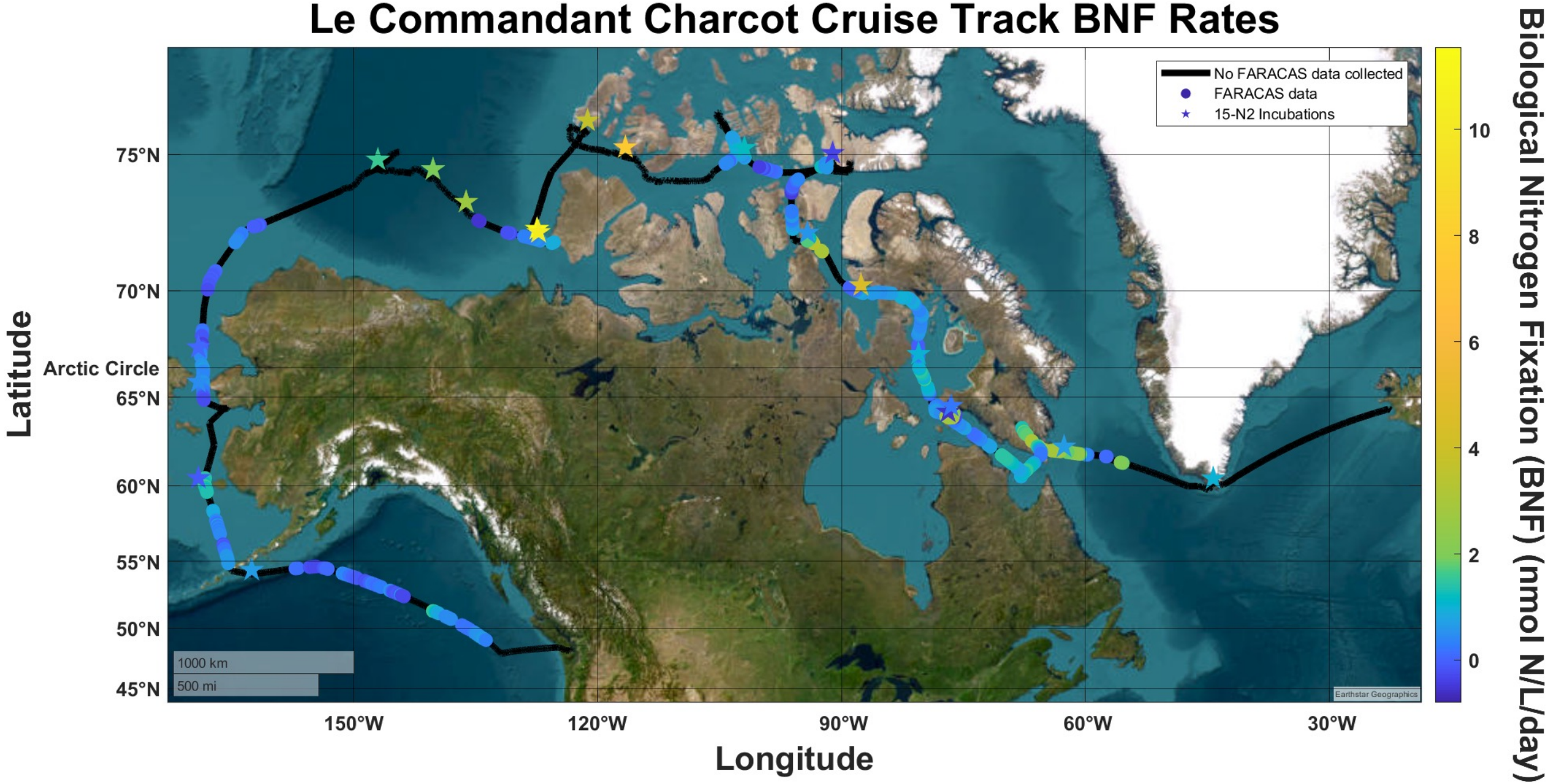
de Souza et al., in prep

# North Atlantic Ocean

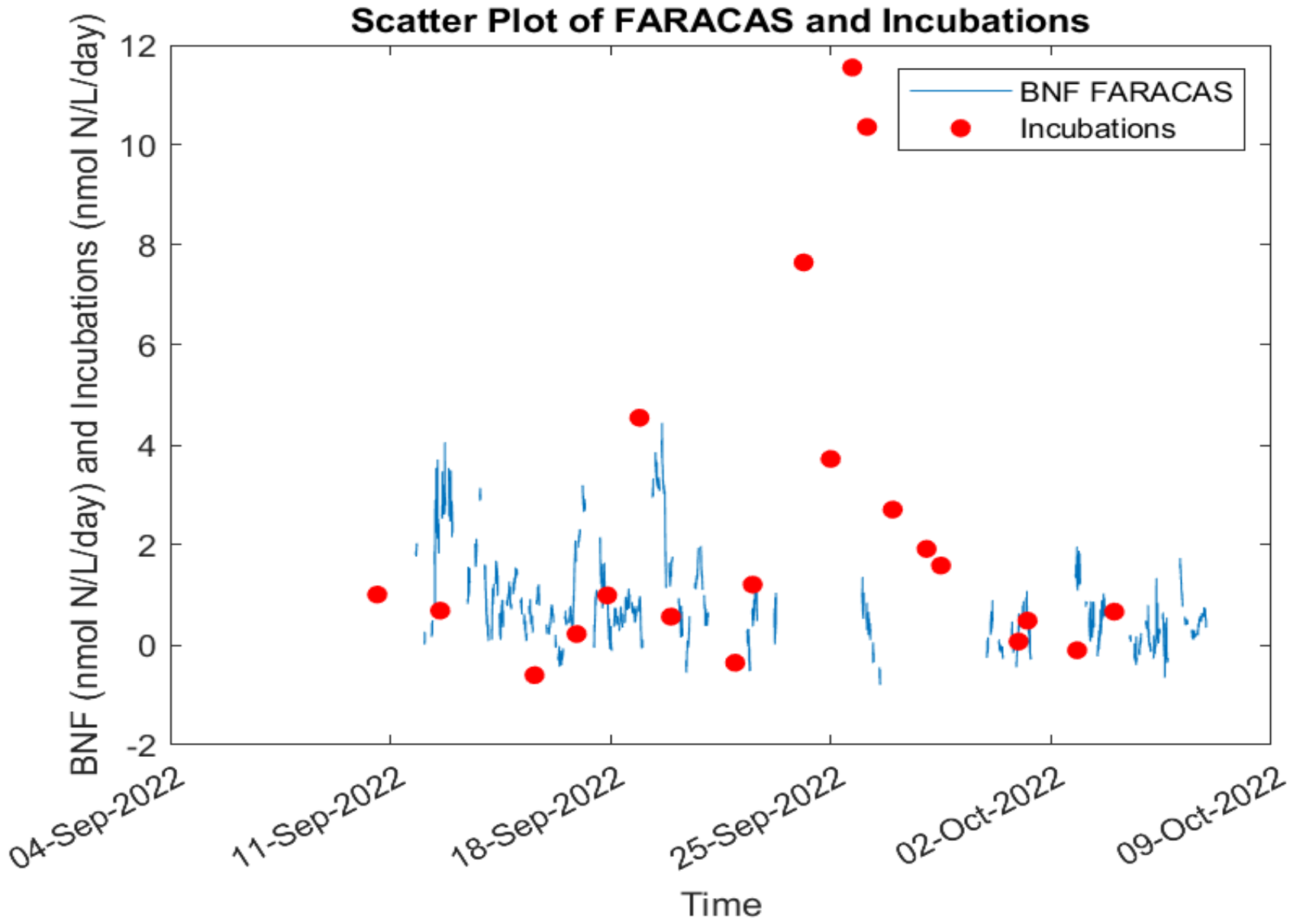



BNF over two North Atlantic cruises

Tang et al, 2019




de Souza et al, in prep




96514x2 double

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| 11 | 7.3877e+05 | NaN |
| 12 | 7.3877e+05 | NaN |
| 13 | 7.3877e+05 | NaN |
| 14 | 7.3877e+05 | NaN |
| 15 | 7.3877e+05 | NaN |
| 16 | 7.3877e+05 | NaN |

# How can I measure if there is periodicity present?

I have been looking at…

- Periodogram analysis
- Autocorrelation
- Lomb-Scargle Periodogram
- Discrete Wavelet Analysis