More Clear than Mud: Using Os to Unravel Sources of Fe to Seawater through the Cenozoic

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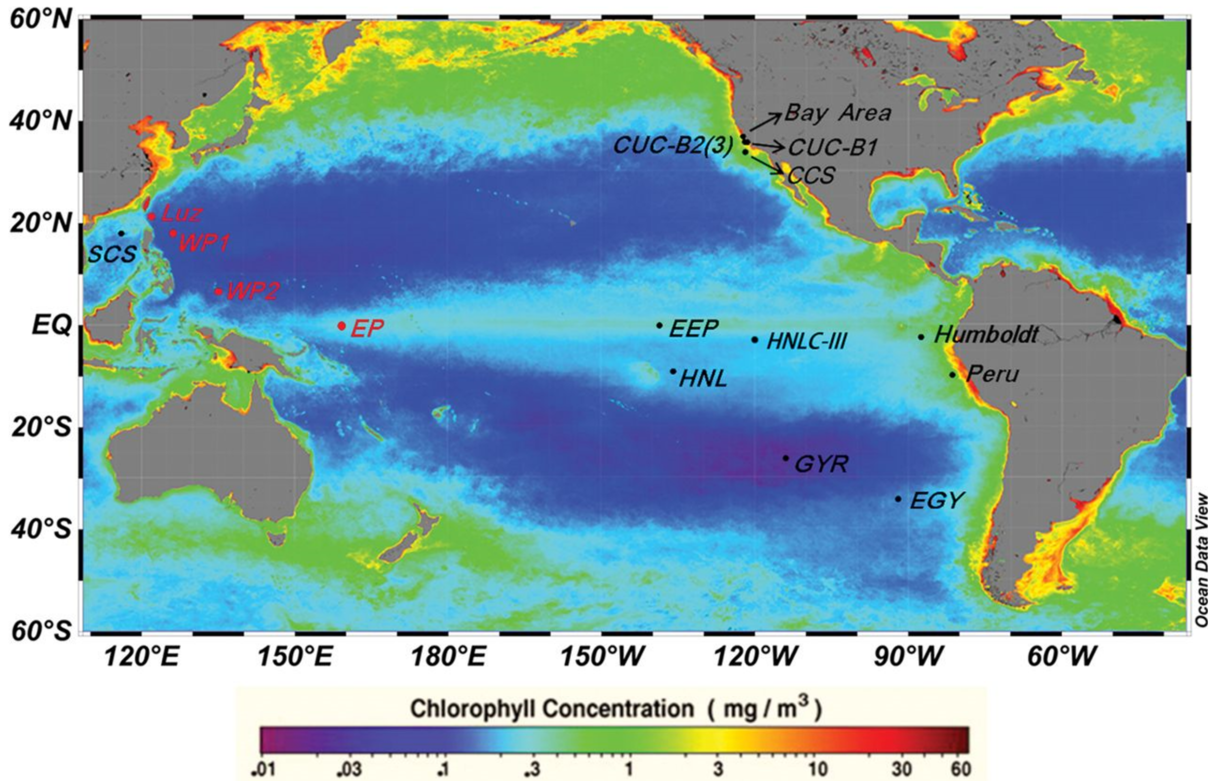
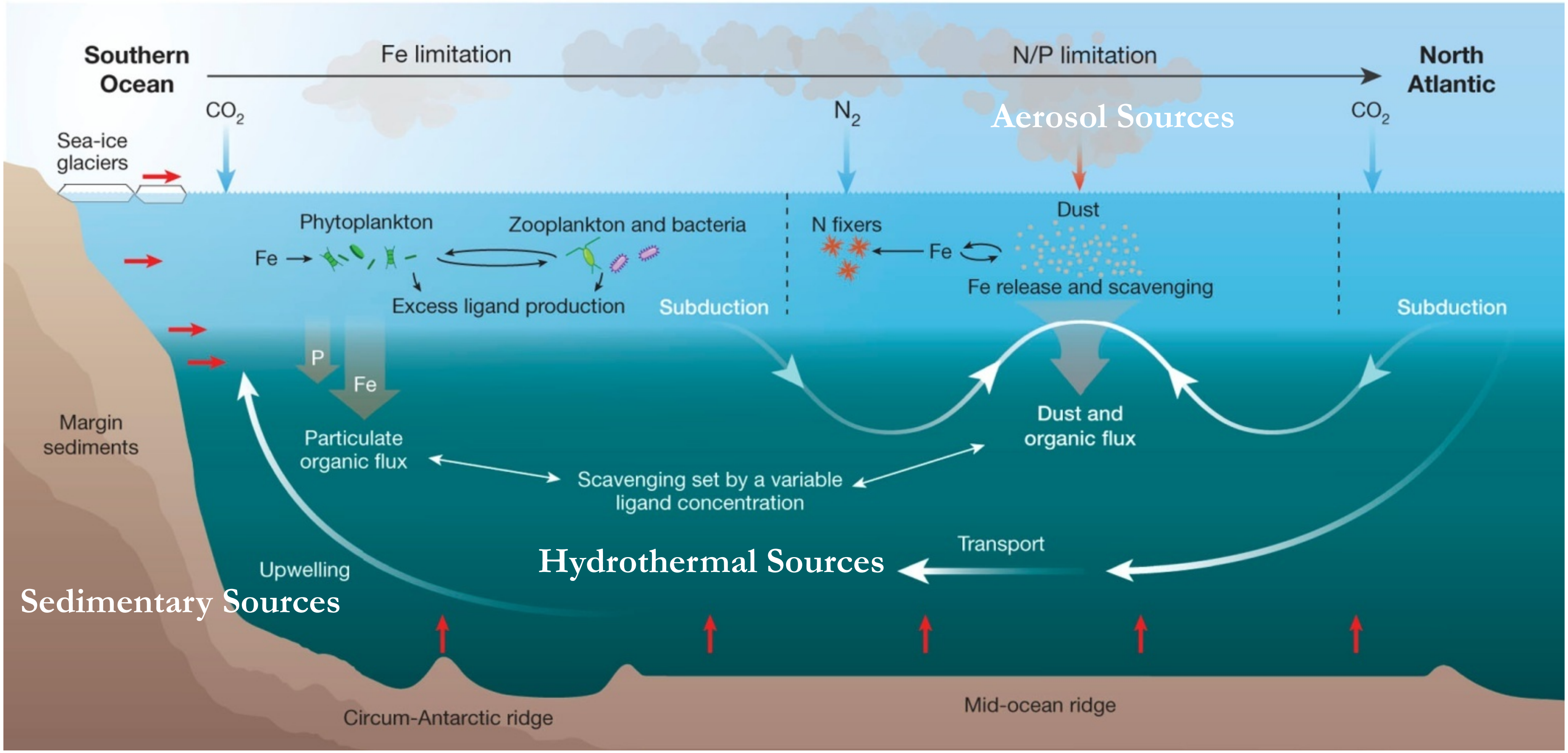
Primary Productivity and Fe Limitation



- Phytoplankton draws down a considerable amount of atmospheric CO_2 and plays a role in modulating climate
- However, primary productivity is limited by Fe bioavailability in high-nutrient low-chlorophyll (HPLC) regions

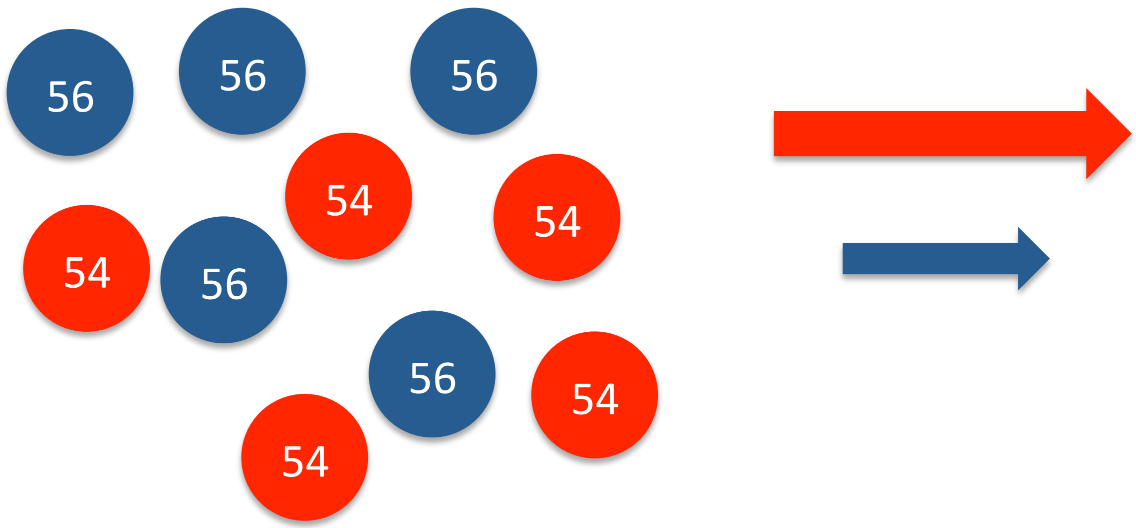
(Li et al. 2015; *J. Plankton Research)*

Fe: A Complex System



(Tagliabue et al. 2017; *Nature)*

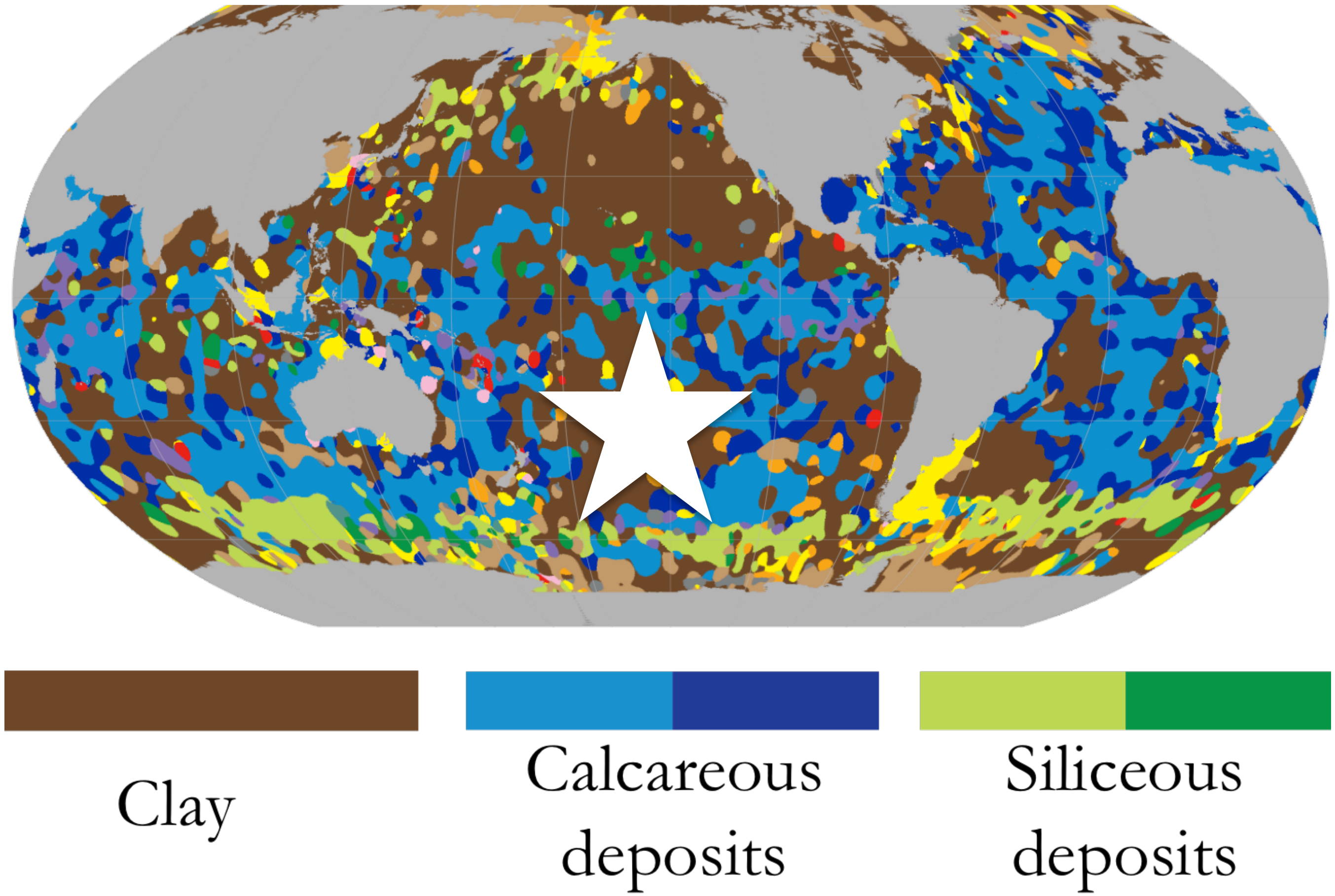
Isotopic Fingerprinting



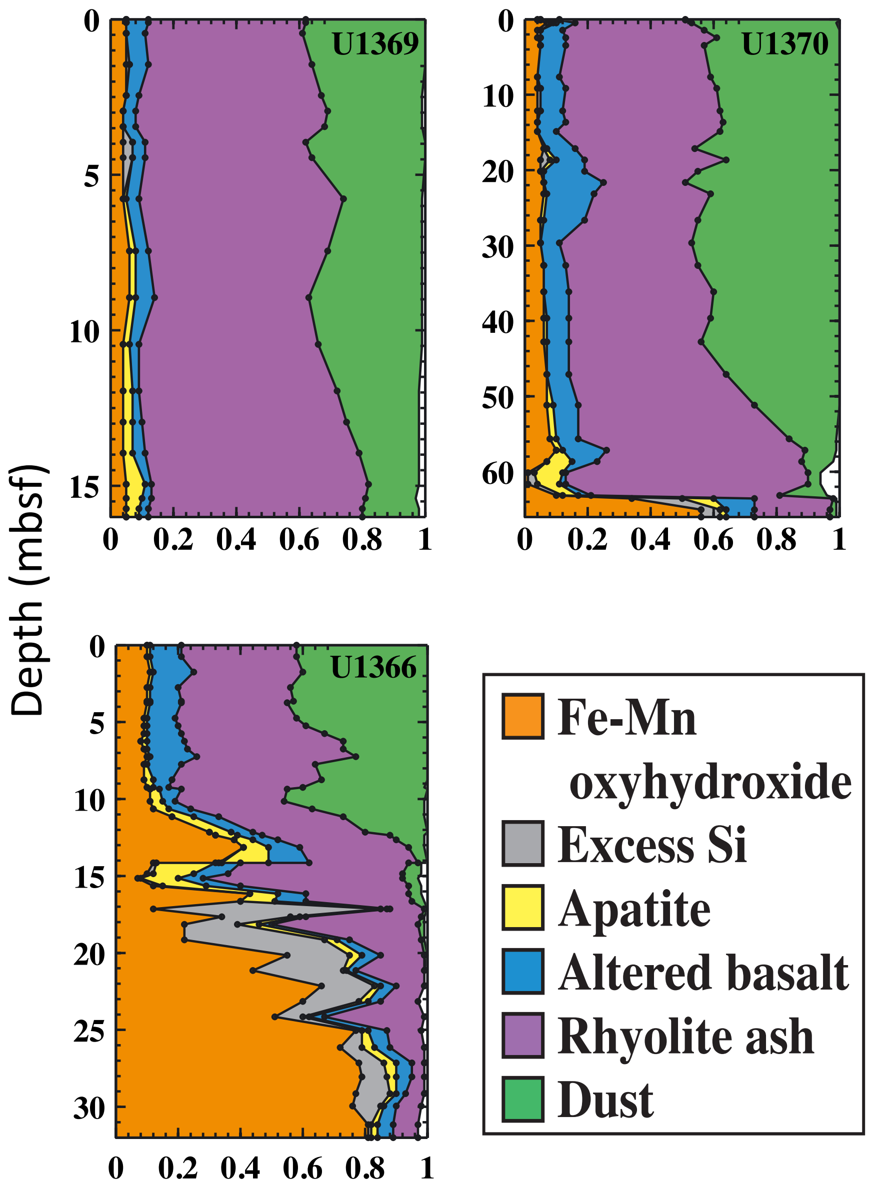
Enriched with ^{54}Fe

$$\delta^{56}Fe = \left[\frac{{}^{56}Fe \big/ {}^{54}Fe_{sample}}{{}^{56}Fe \big/ {}^{54}Fe_{IRMM-014}} - 1 \right] x\ 1000$$

Pelagic Clays as a Potential Archive



(Modified from Dutkiewicz et al. 2015; *Geology*)

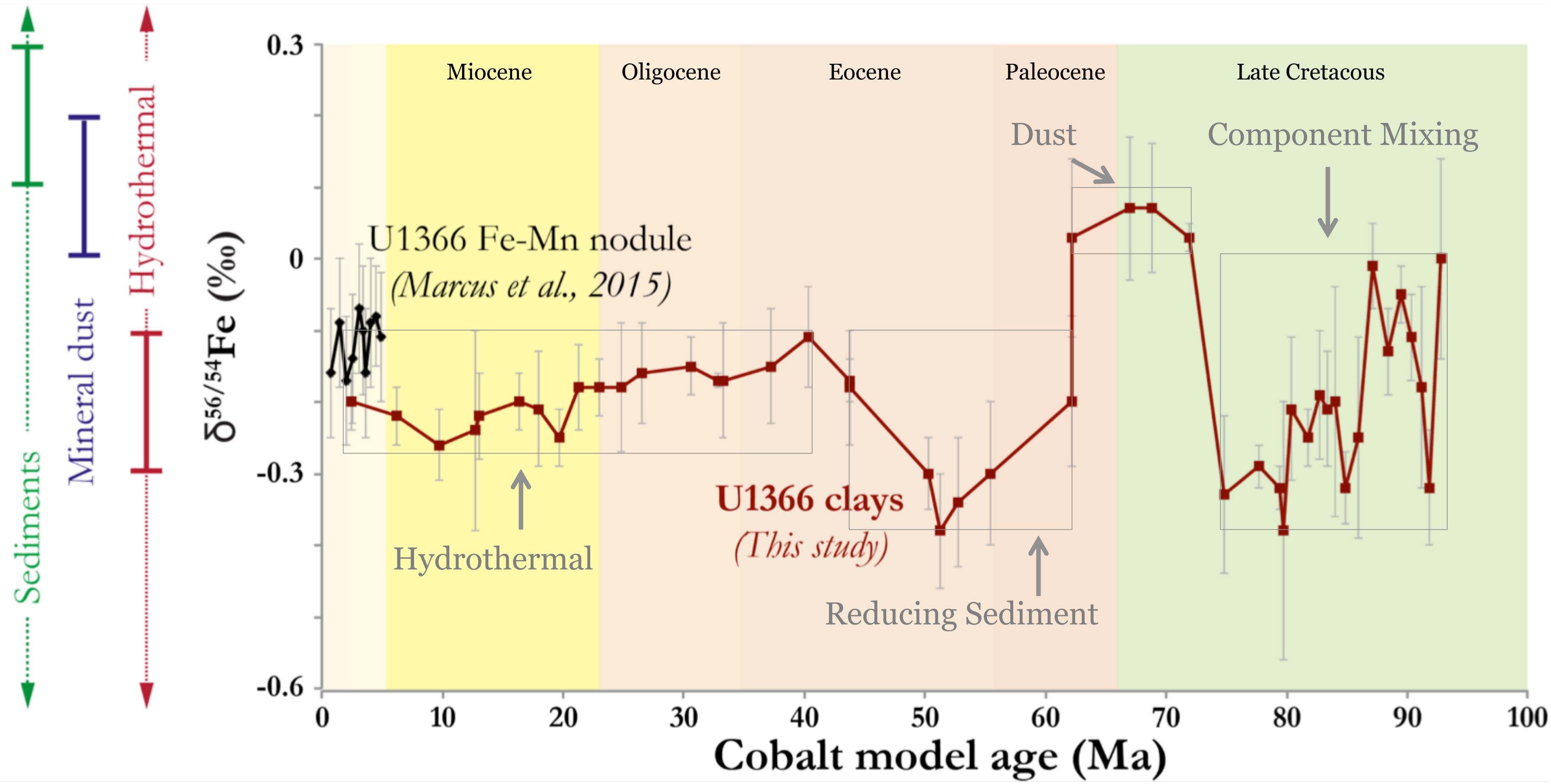


Pelagic Clays as a Potential Archive

- Pelagic clays cover ~50% of the seafloor
- Some clays are heavily enriched with Fe (up to 80 wt.%)
- Pelagic clays are made up of six components
- Here, we focus on Site U1366, with plans to expand the study to Sites U1369 and U1370

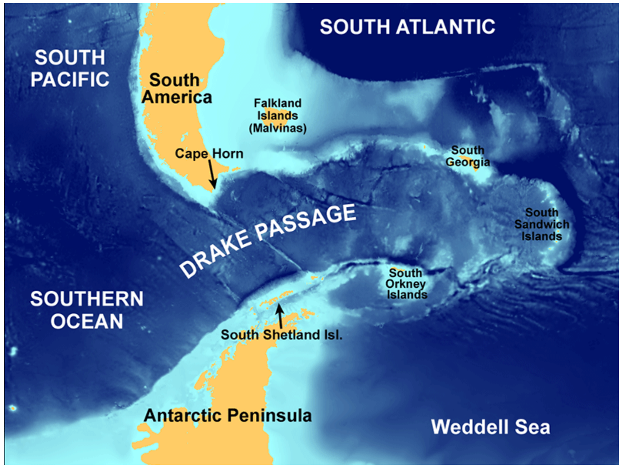
(Dunlea et al. 2015; *Paleoceanogr.*)

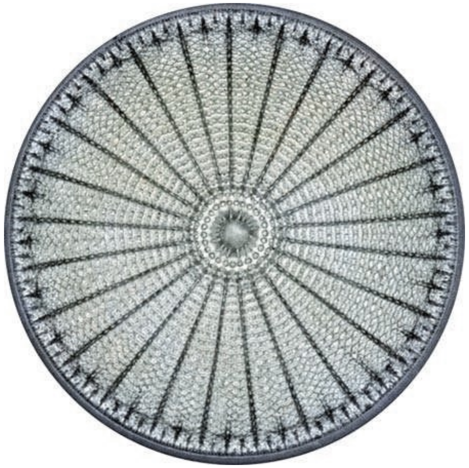
Fe Isotope Results



Conclusions and Outlook

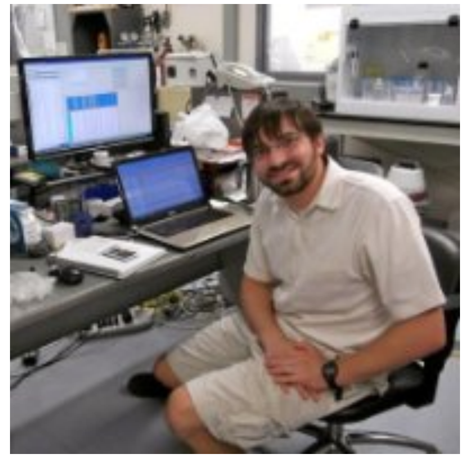
- Opening of the Drake Passage
  - The opening of the Drake passage (~41 Myr) may have changed ocean circulation and introduced more hydrothermal input
- Diatoms
  - Diatoms became abundant ~34 Myr ago—how did this affect Fe?
- Large Igneous Provinces (LIPS) and volcanic ash inputs
  - LIPS and/or volcanic ash may have increased dust input from 65-75 Myr





Acknowledgements

Ariel Anbar



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