Seafloor sediment supply of nutrient silicon on the Greenland margin

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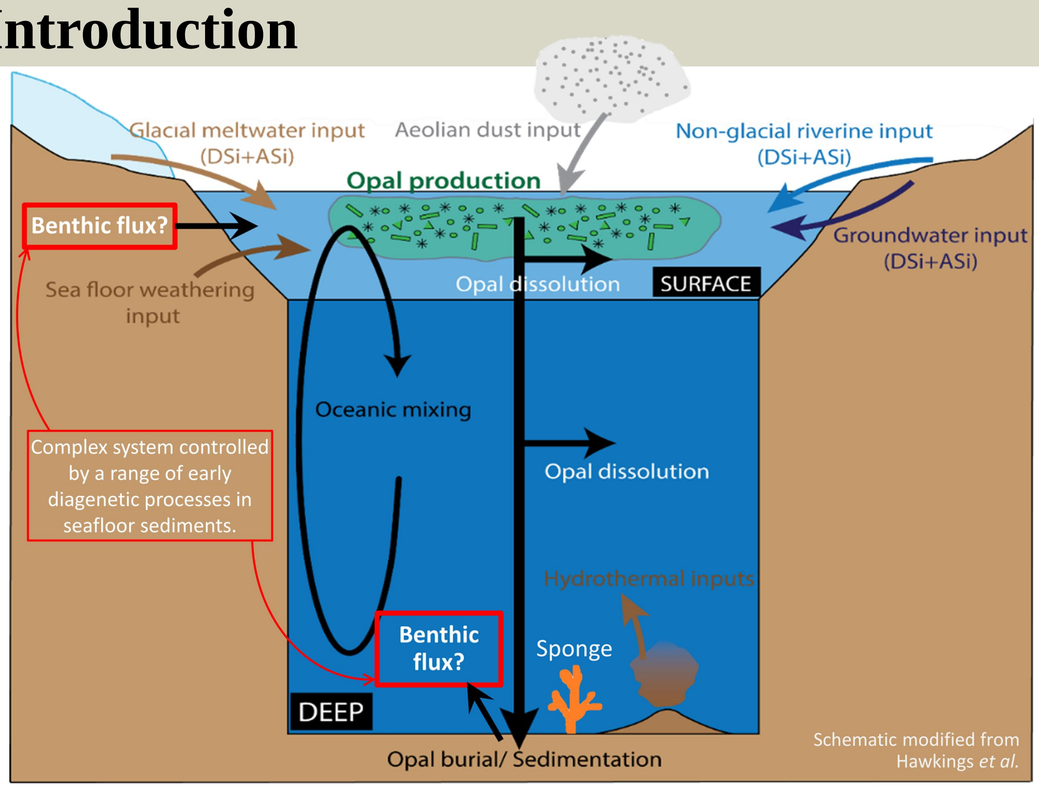
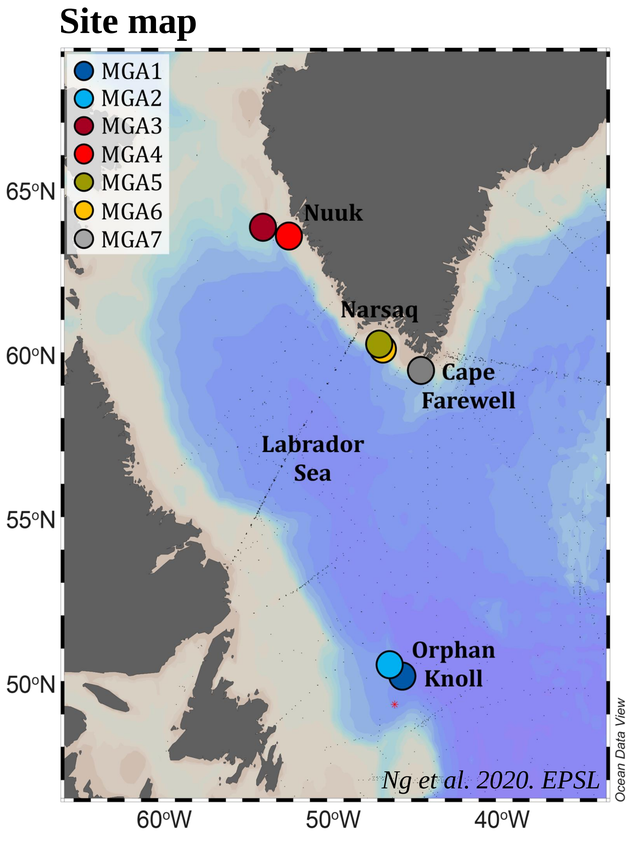
Introduction



Knowledge of benthic flux is essential to evaluate the rapidly evolving nutrient Si cycle in the polar ocean. Here, we have carried out a benthic Si flux study at Greenland margin and the Labrador Sea (Ng et al. 2020).

Materials and methods

Site map



Pore water sampling

Core incubation experiments

Si isotope analysis

We employed Si isotopes to examine benthic Si flux, given the shift in Si isotope composition associated with early diagenetic processes e.g. dissolution of biogenic (B)Si, glacially-derived amorphous (A)Si, and reverse weathering (Ehlert et al. 2016, Geilert et al. 2020).

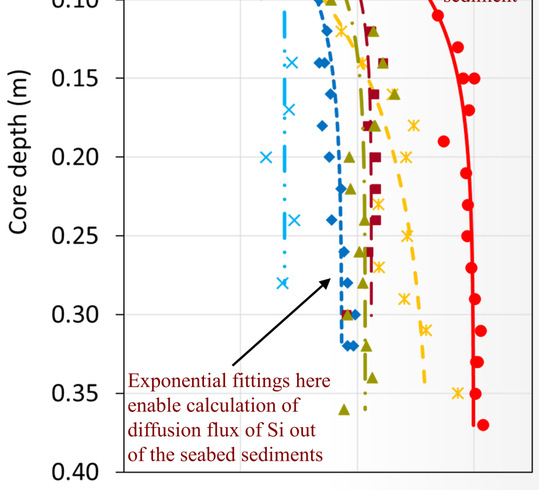
Results

MGA1 MGA2 MGA3 MGA4 MGA5 MGA6 MGA7

All result figures modified from Ng et al. 2020. EPSL

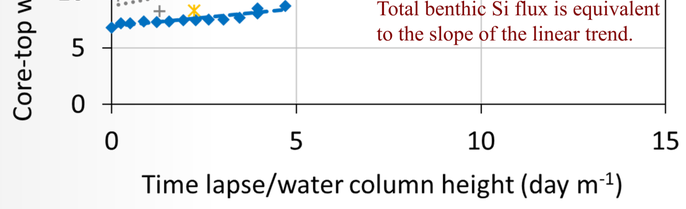
Pore water

DSi concentration

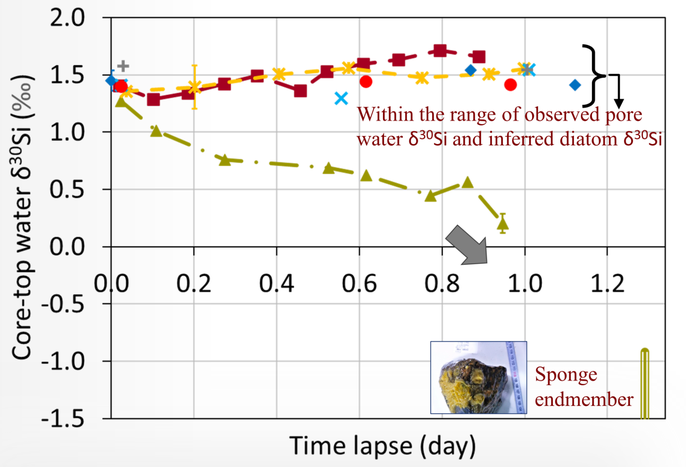


Core incubation

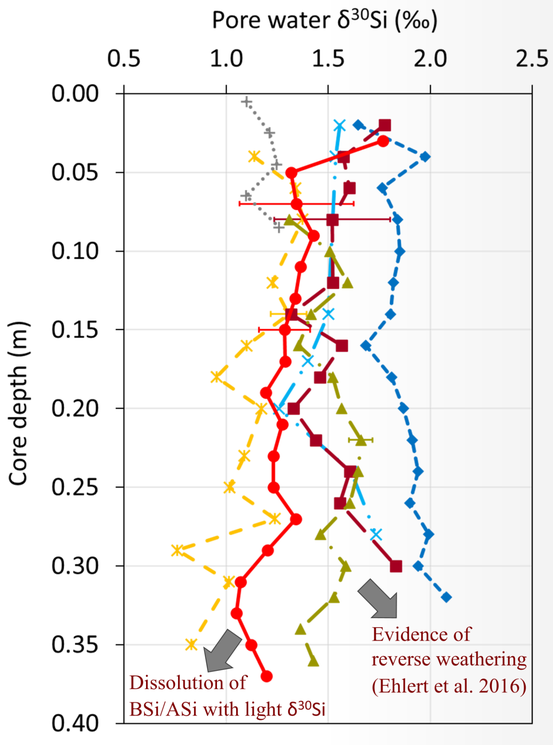
DSi concentration



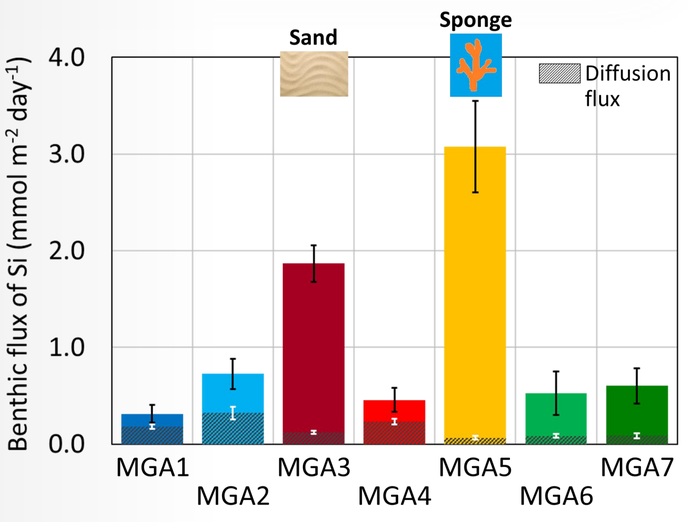
Si isotope



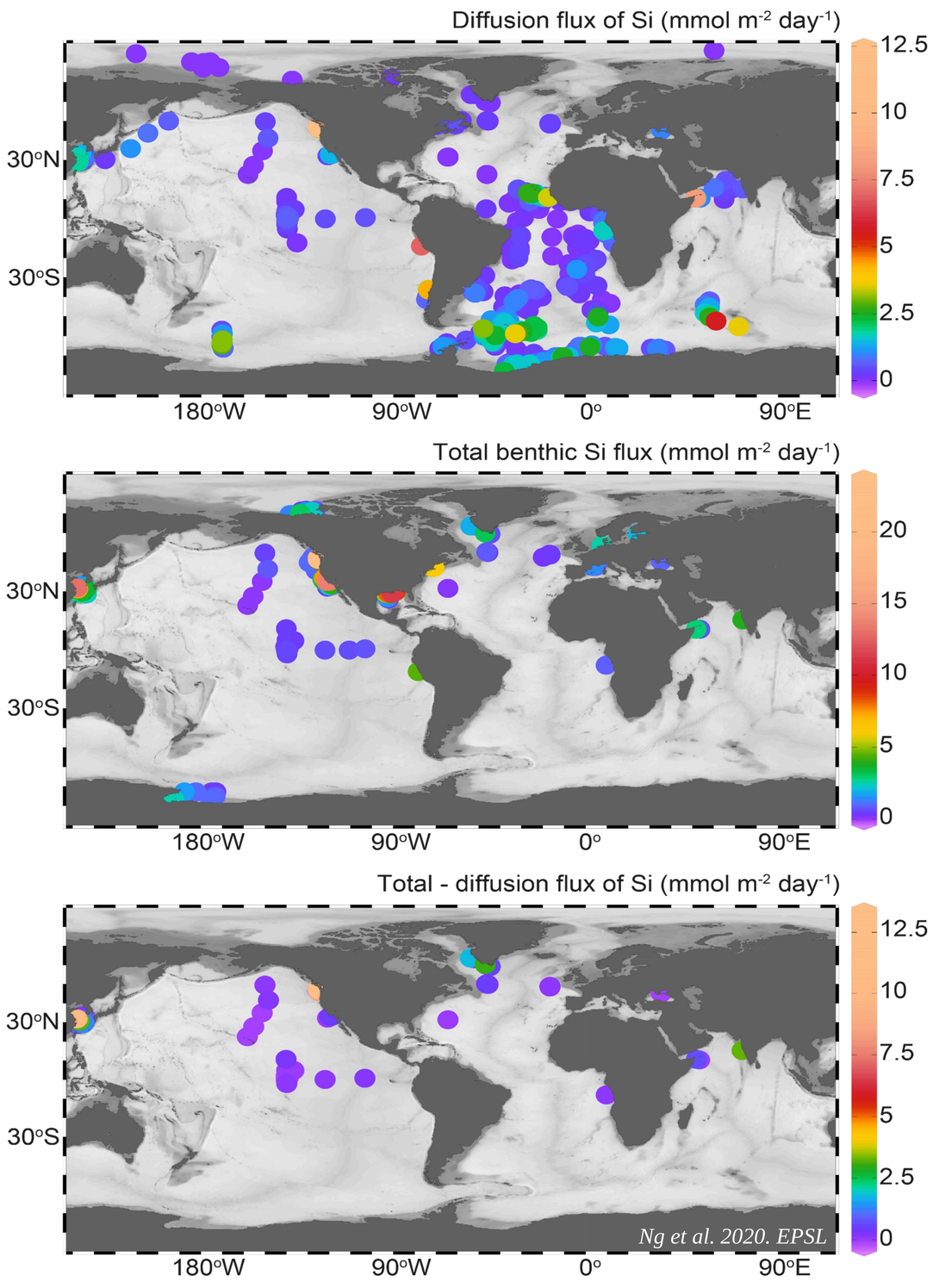
Si isotope



Benthic Si flux



Global compilation of benthic Si flux



Key findings

- **Benthic Si flux at Greenland margin is substantially higher than the open ocean.**
- **The intensified benthic flux is maintained by molecular diffusion, pore water advection and rapid dissolution of reactive silica phases.**
- **Strong benthic flux at Greenland, combined with wind-driven coastal upwelling, could provide significant supply of Si to coastal ecosystem.**
- **First estimation of total benthic Si flux from the western Greenland shelf (0.04–0.27 Tmol yr^{-1}) rivals the total Si export from Greenland Ice Sheet (0.2 Tmol yr^{-1}) and the pan-Arctic rivers (0.35 Tmol yr^{-1}).**

References

1) Ng, H. C. *et al. Earth Planet. Sci. Lett.* **529**, 115877 (2020).
2) Ehlert, C. *et al. Geochim. Cosmochim. Acta* **191**, 102–117 (2016).
3) Geilert, S. *et al. Biogeosciences* **17**, 1745–1763 (2020).

Acknowledgement

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