

Northern Sourced Water dominated the Atlantic Ocean during the Last Glacial Maximum*

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- Low glacial $p\text{CO}_2$ commonly assumed to be related to **reorganizations of deep water masses**
- **Water mass structure** accommodating such increased carbon storage continues to be **debated**
- We present new **Nd isotope** data (ϵNd) of the **Southwest Atlantic**, that allow fingerprinting of water masses and calculation of past water mass mixing

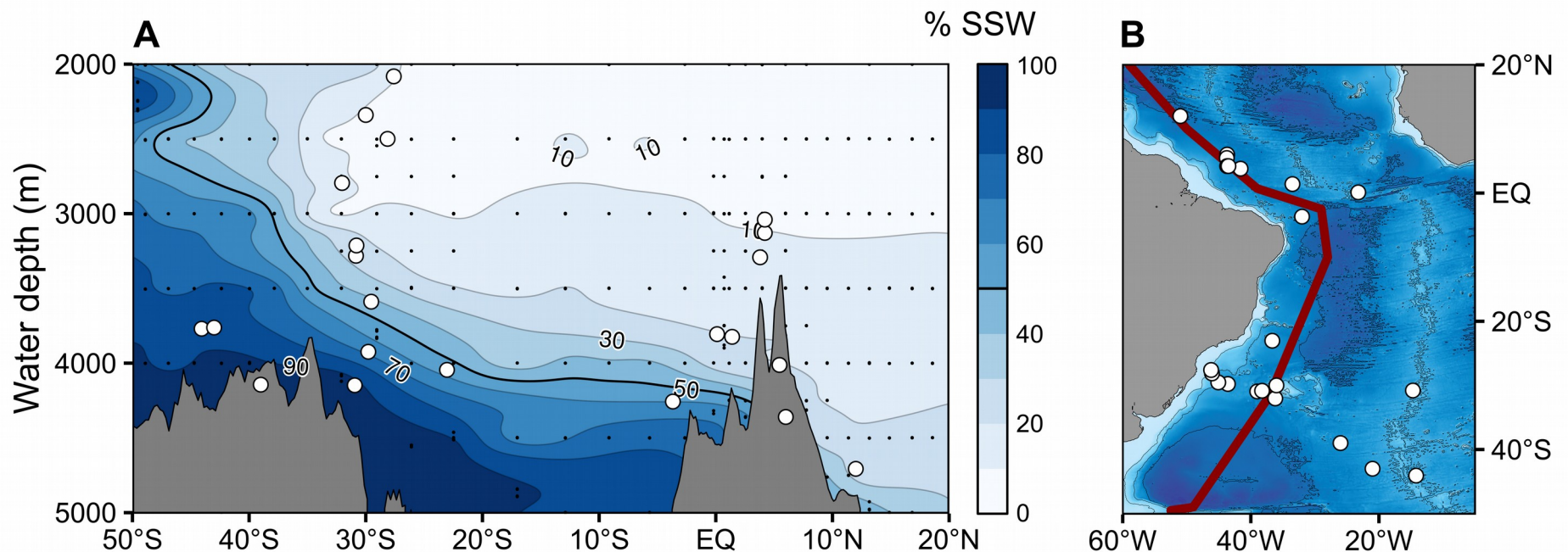
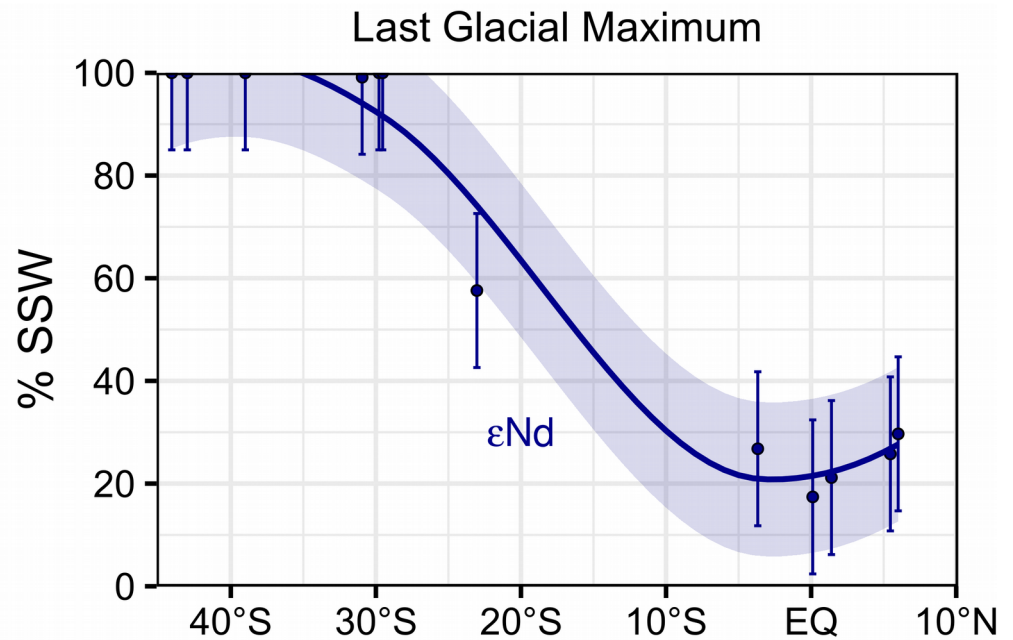
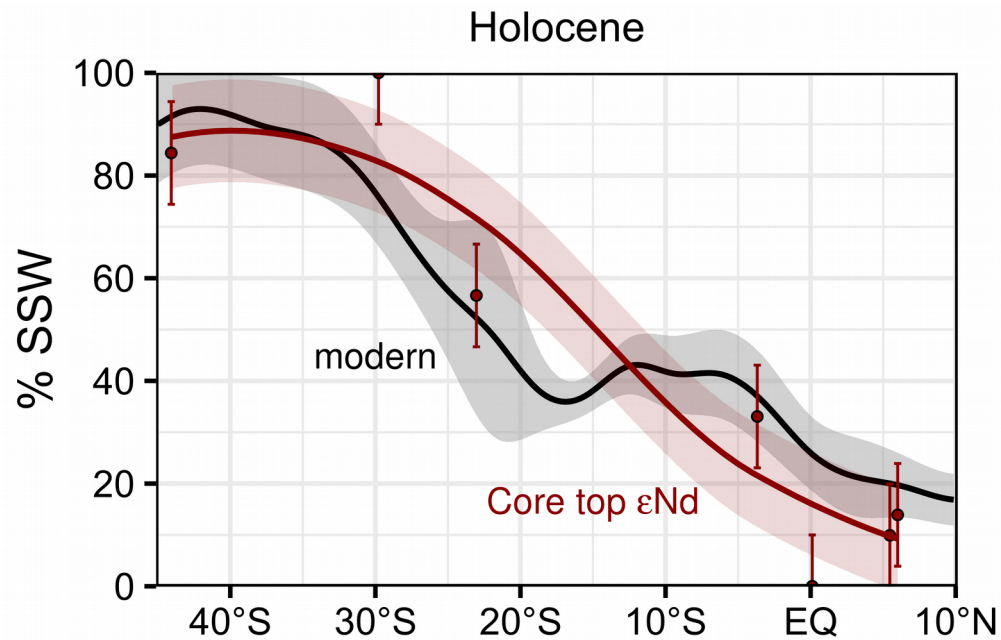


Fig. 1: (A) Water mass distribution of the Southwest Atlantic based on conservative water mass properties. Thick black line depicts the water mass boundary between northern and southern sourced water (50%). (B) Map depicting the transect of panel A as red line. Circles mark locations of sediment cores used in this study.



Meridional water mass structure

- Test of Nd isotopes as **past water mass tracer** by comparison of late Holocene data to hydrographic data of Fig. 1 at 4000 m water depth (left)
- Same approach for Last Glacial Maximum, but with **adjusted end member** signatures (Huang et al., 2020; Zhao et al., 2019) (right)
- Only **small differences** in meridional water mass structure between Holocene and LGM



Water depth: 4000 ± 500 m



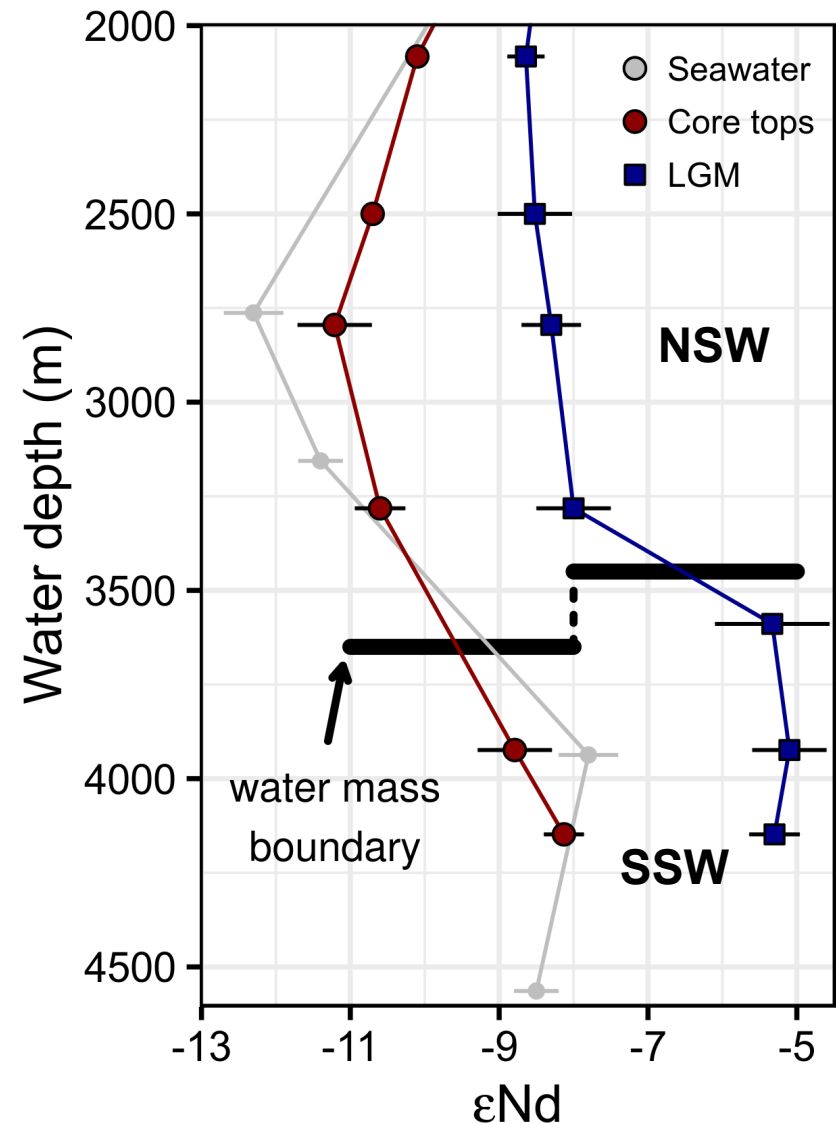
Vertical water mass structure

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- Vertical deep water mass structure is examined at **$\sim 30^\circ\text{S}$**
- Again, **good agreement** between Holocene and seawater data
- LGM reconstructions are generally more radiogenic (higher) due to **shifted end member signatures**
- **Glacial** water mass boundary clearly visible at **~ 3500 m** water depth
- Water mass boundary nearly **invariant** between Holocene and LGM





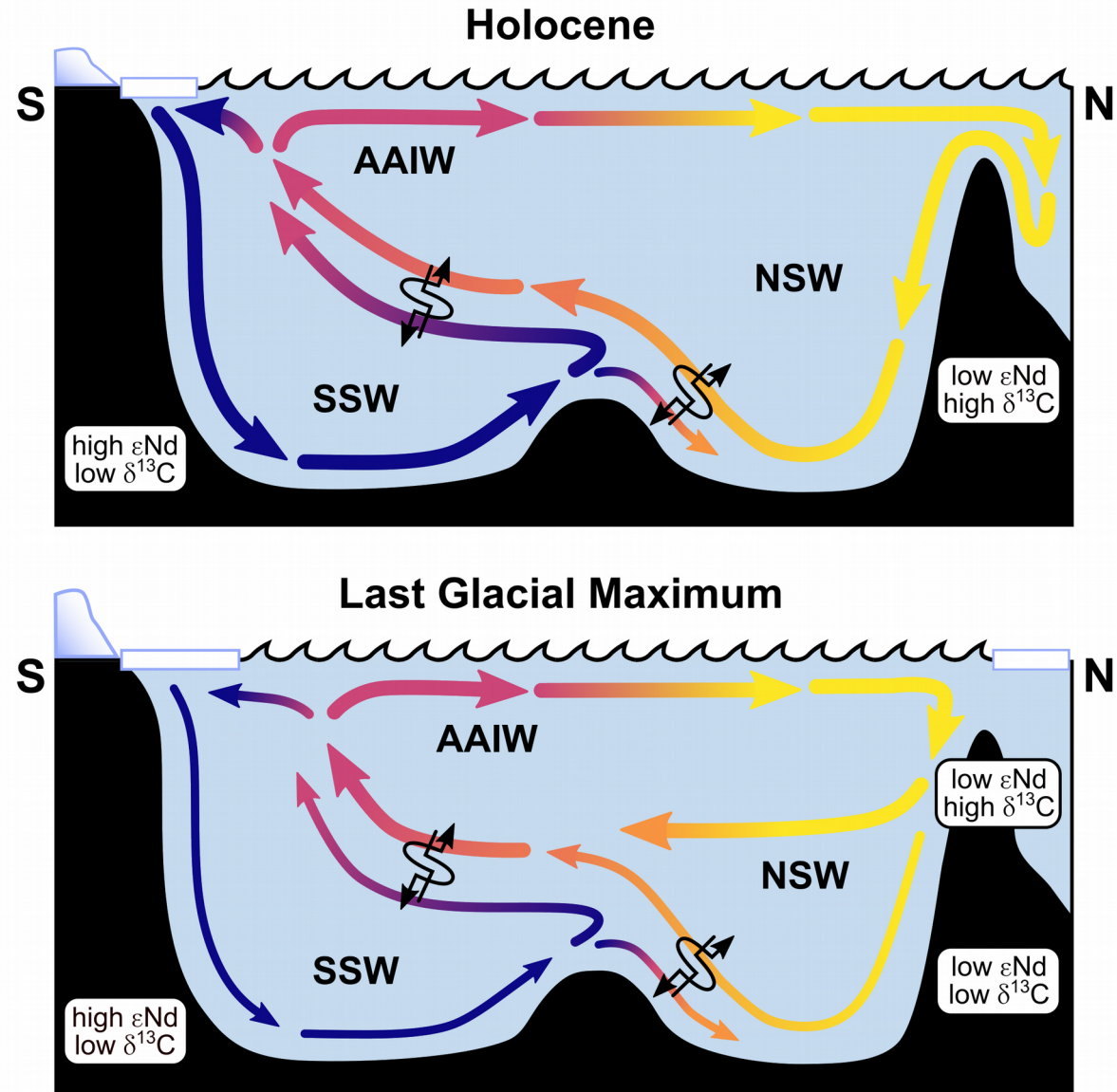
Conclusions

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- From our SW Atlantic reconstructions we can infer that **SSW did not dominate deep N Atlantic**
- Overall, glacial and Holocene water mass structures **surprisingly similar**
- Nd isotopes cannot provide information on the advection rate
- Combining ϵNd and $\delta^{13}\text{C}$ suggests **two distinct northern water masses**





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