

ABRUPT CHANGES IN THE SOUTH CHINA SEA MIXED LAYER DEPTH DURING THE LAST 25 Ka



Amanda Gerotto*¹; Maikon Di Domenico¹; Iván Hernandez-Almeida²; Rubens C. L. Figueira³; Renata Hanae Nagai¹

¹Center for Marine Studies, UFPR; ²MARUM, Uni-Bremen; ³Oceanographic Institute, USP

*Corresponding author: gerottoamanda@gmail.com



Introduction

Asian Monsoon System paleorecords have shown abrupt climatic centennial-scale oscillations similar to the North Hemisphere high latitudes^{1,2}. Here we investigate these climate-oscillations in the South China Sea (SCS) by reconstructing mixed layer depth (MLD) since the Last Glacial Maximum (LGM). The MLD was chosen as it responds to the atmospheric patterns driven by the East Asian Monsoon (EAM)³.

Data and Chronology

We compiled a dataset composed of 11 PF published census records (>150 μm) from cores retrieved from the SCS (Figure 1). The ages were obtained from the published records based on $\delta^{18}\text{O}$ stratigraphy or ^{14}C dating (which were calibrated to calendar years with Calib 7.1).

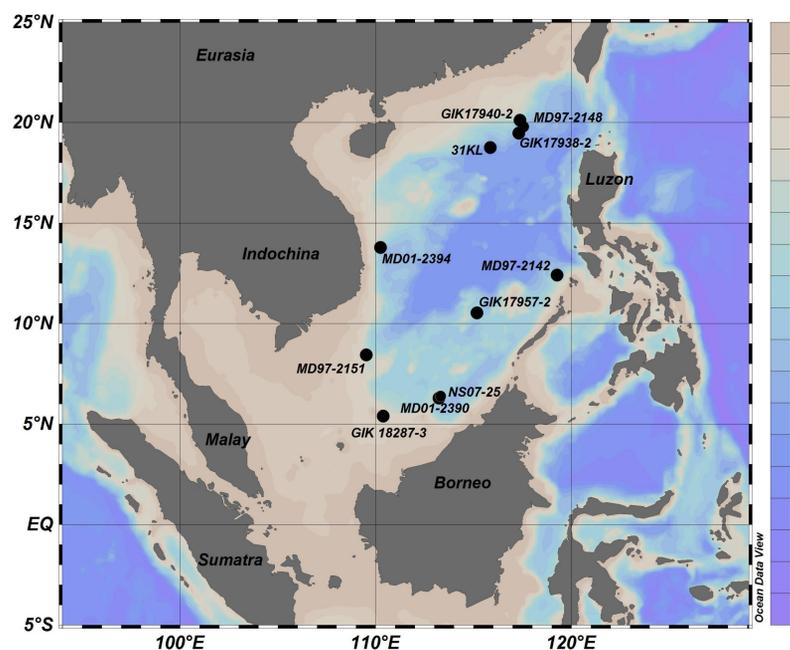


Figure 1. South China Sea and locations of cores used to compose the dataset.

During cold events the EAWM strengthening is influenced by the intensification of the Siberian high-pressure system in response to cooling NH, resulting in cold and dryer northeasterly winds in the SCS^{2,4}.

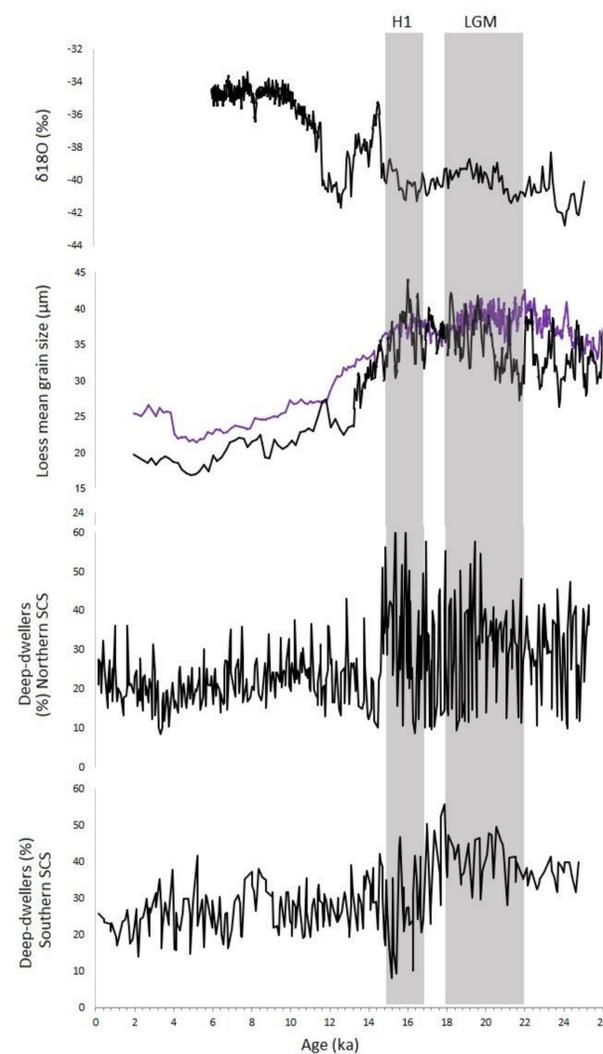


Figure 2. Ice core $\delta^{18}\text{O}$ reconstruction compared to SCS and continental proxies of EAM. Greenland $\delta^{18}\text{O}$ record⁵; Loess mean grain size of Gulang and Jingyuan (Chinese Loess Plateau)². Deep-dwellers (%) variability of northern SCS (this study); Deep-dwellers (%) variability of southern SCS (this study).

Conclusion

The abrupt climatic changes recorded in the SCS marine proxy was associated to the coupled ocean-atmosphere responses under the influence of the south shifted Siberian high-pressure system during LGM and H1 events.

Acknowledgments

Thanks to CAPES for the MSc scholarship; and to Dr. Min-Te Chen and Dr. Pai-Sen Yu to provide the MD9721-48 and MD01-2394 datasets.

References

- Guo et al., *Climate of the Past Discussions*, 4, 1061 (2008).
- Sun et al., *Nature Geoscience*, 5, 46 (2011).
- Duan et al., *Acta Oceanologica Sinica*, 31, 19 (2012)
- Wang et al., *Climate of the Past*, 10, 2007 (2014).
- Groots and Stuiver, *Journal of Geophysical Research*, 102, 26455 (1997).

Deep-dwelling PF as a MLD Index

The percentage of deep-dwelling PF species (i.e., *Globorotalia* spp., *Neogloboquadrina* spp.) was applied to reconstruct MLD changes in the SCS over the last 25 ka. To obtain the MLD stack curves we divided the records into two groups and combined records to generate continuous (from 0 to 25 ka) records representing the North (records retrieved above 13°N) and South (records retrieved below 13°N) SCS.

Results and Discussion

In the northern sector records, both the LGM and the H1 are marked by relatively higher abundance of deep-dwelling PF species (Figure 2). Meanwhile, in the southern SCS we observed high abundances during the LGM followed by a stable shoaling of the MLD (Figure 2).