

# Foraminiferal tracers of Indian-Atlantic interocean exchange during the last 600 kyr

José N. Pérez-Asensio<sup>1</sup>, Kazuyo Tachikawa<sup>1</sup>, Thibault de Garidel-Thoron<sup>1</sup>, Laurence Vidal<sup>1</sup>, Corinne Sonzogni<sup>1</sup>, Abel Guihou<sup>1</sup>, and Min-Te Chen<sup>2</sup>



<sup>1</sup>CEREGE UM34, Aix Marseille Univ, CNRS, IRD, INRAE, Coll France, 13545 Aix-en-Provence, France (perez@cerege.fr)



<sup>2</sup>Institute of Earth Sciences, National Taiwan Ocean University, Keelung 202, Taiwan



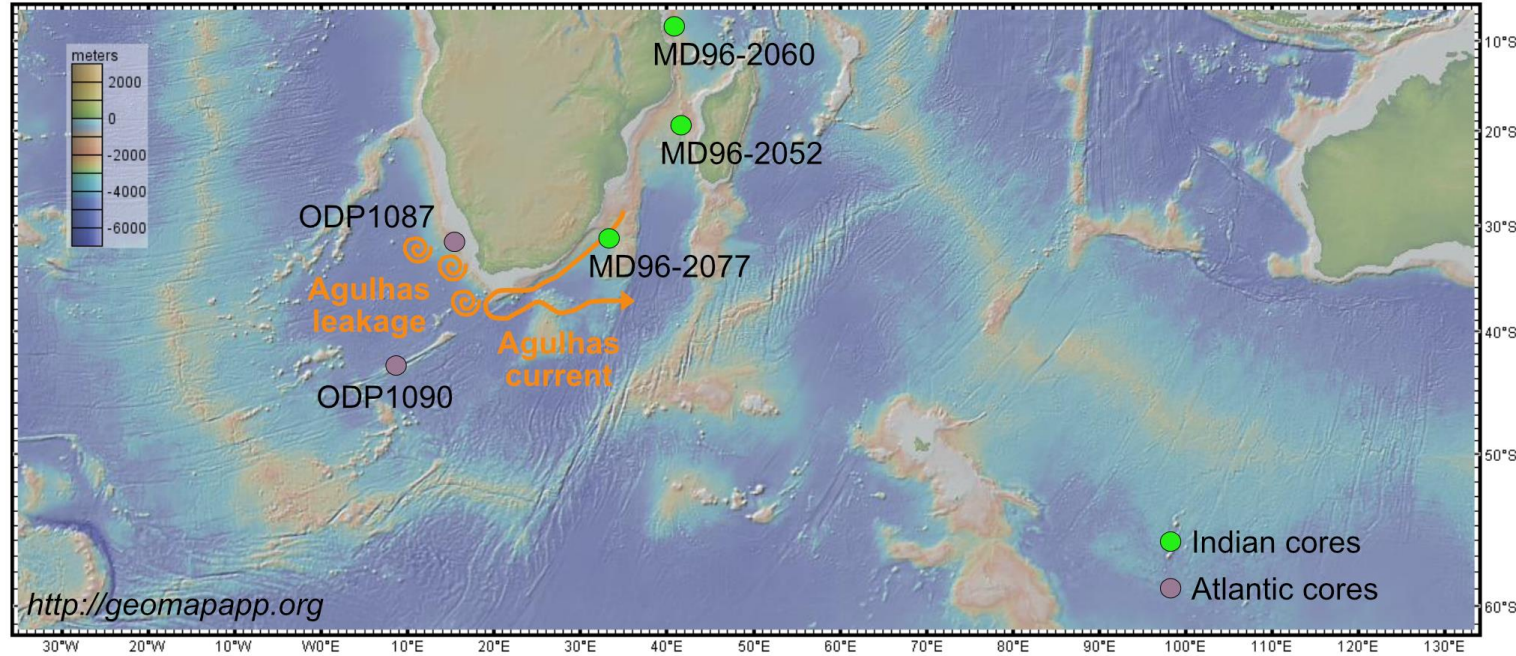
**MARIE SKŁODOWSKA-CURIE ACTION**

INDEXCLIMA: n°840675



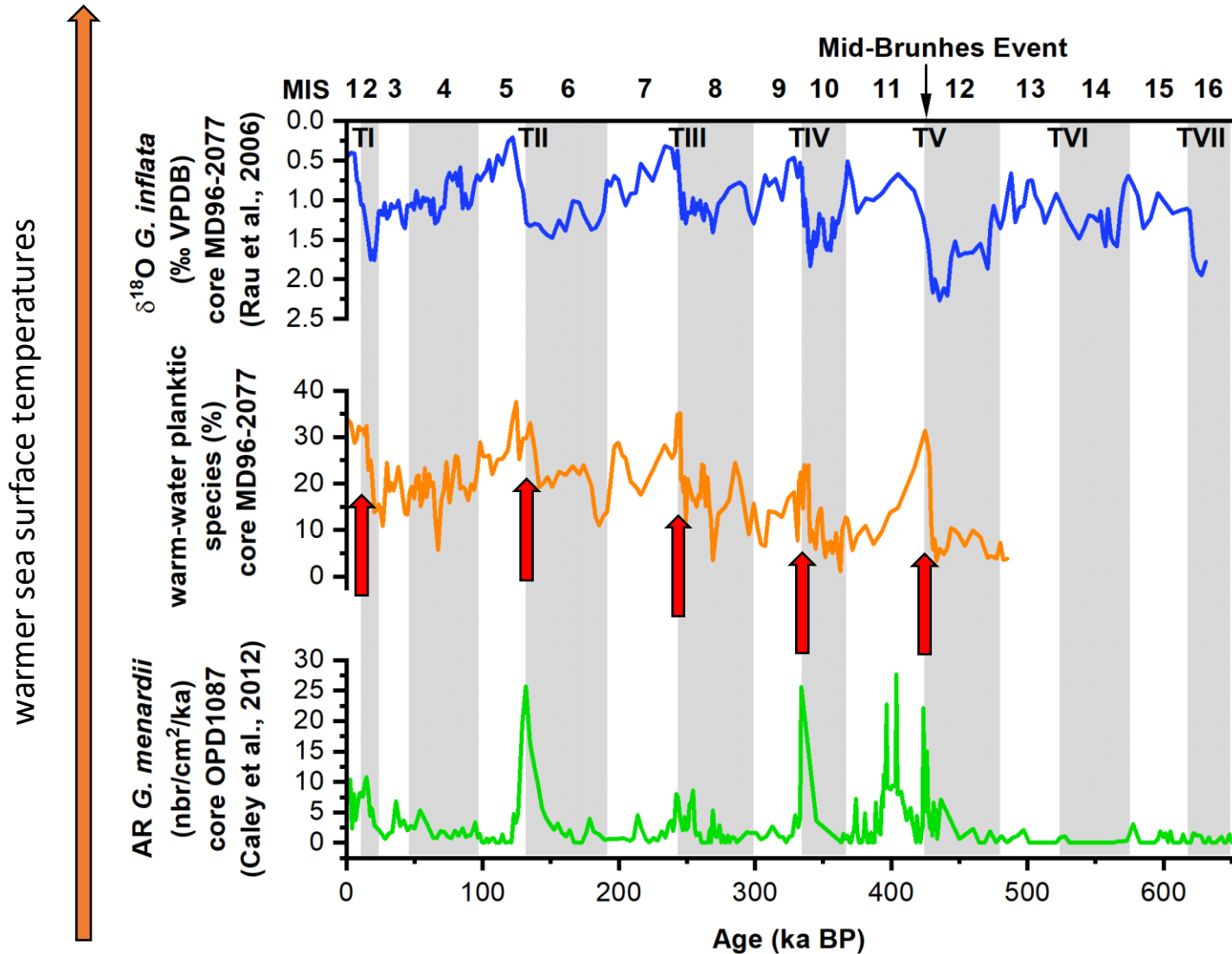
This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement N° 840675.

# 1. SCIENTIFIC OBJECTIVE, SEDIMENT CORES AND METHODS



- **Scientific objective:** the principal aim of this study is to reconstruct the Indian-Atlantic interocean exchange by tracing both surface and deep circulation state during the last 600 kyr.
- **Sediment cores:** data from the studied Indian core MD96-2077 (3781 m water depth) were compared with published data from the Atlantic cores ODP1087 (1371 m water depth) and ODP1090 (3702 m water depth). Additionally, future analyses will be performed in the Indian cores MD96-2052 (2627 m water depth) and MD96-2060 (2026 m water depth).
- **Methods:** surface-water circulation was traced using planktic foraminiferal species indicative of warm sea surface temperatures. Deep-water circulation was studied using benthic O and C stable isotopes, and it will be further constrained using Nd isotopes.

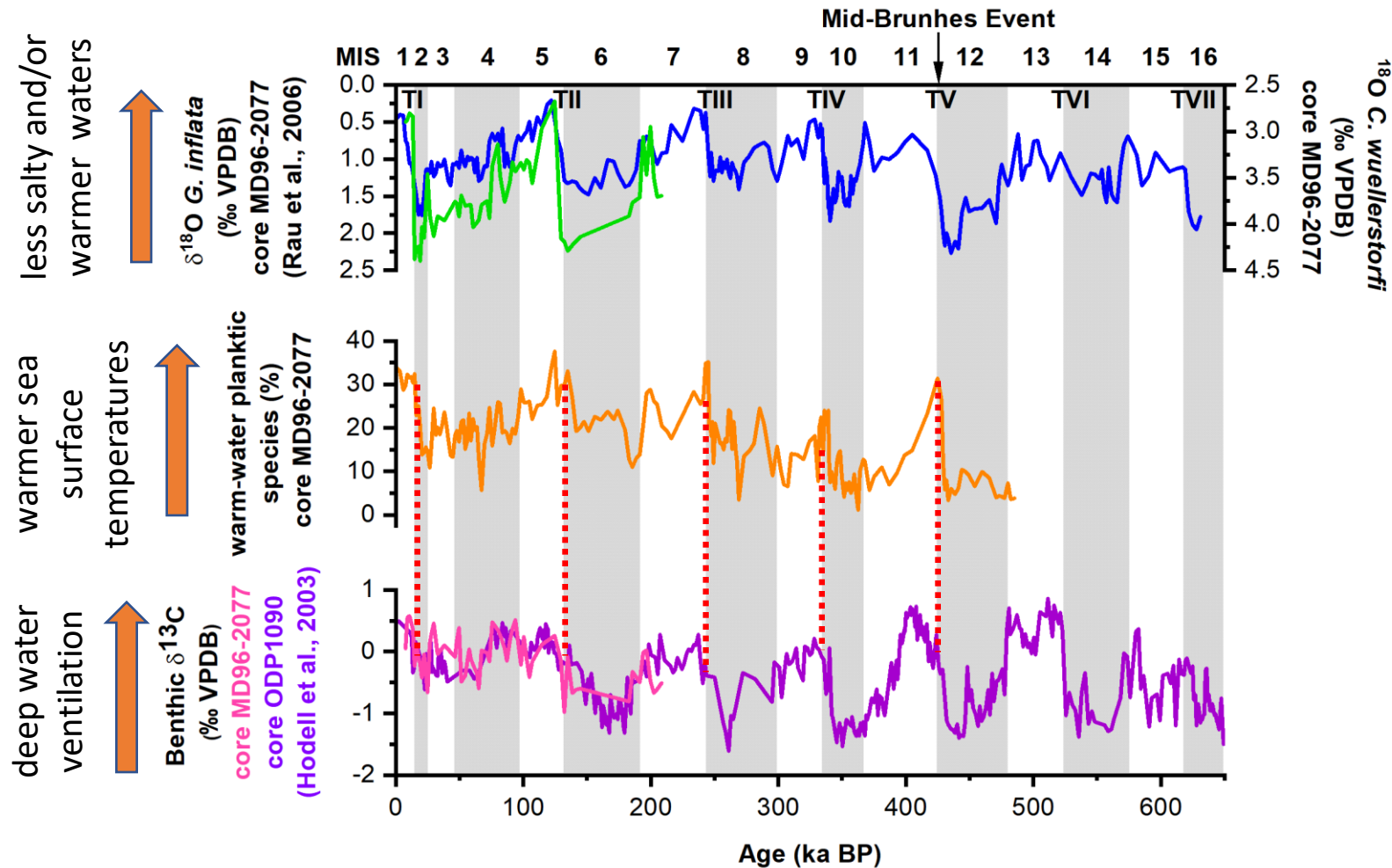
## 2. FORAMINIFERAL TRACERS OF SURFACE WATER CIRCULATION



- In the study site (MD96-2077, 3781 m water depth), stronger Agulhas current at glacial terminations is indicated by an increase of warm-water planktic foraminiferal species.
- Stronger Agulhas leakage during glacial terminations is also supported by the warm-water planktic *G. menardii* and *G. tumida* species record from the Atlantic core ODP1087 (1371 m water depth).

Rau et al., 2006 *Quaternary International*  
Caley et al., 2012 *PNAS*

### 3. GEOCHEMICAL TRACERS OF DEEP WATER CIRCULATION: PRELIMINARY RESULTS



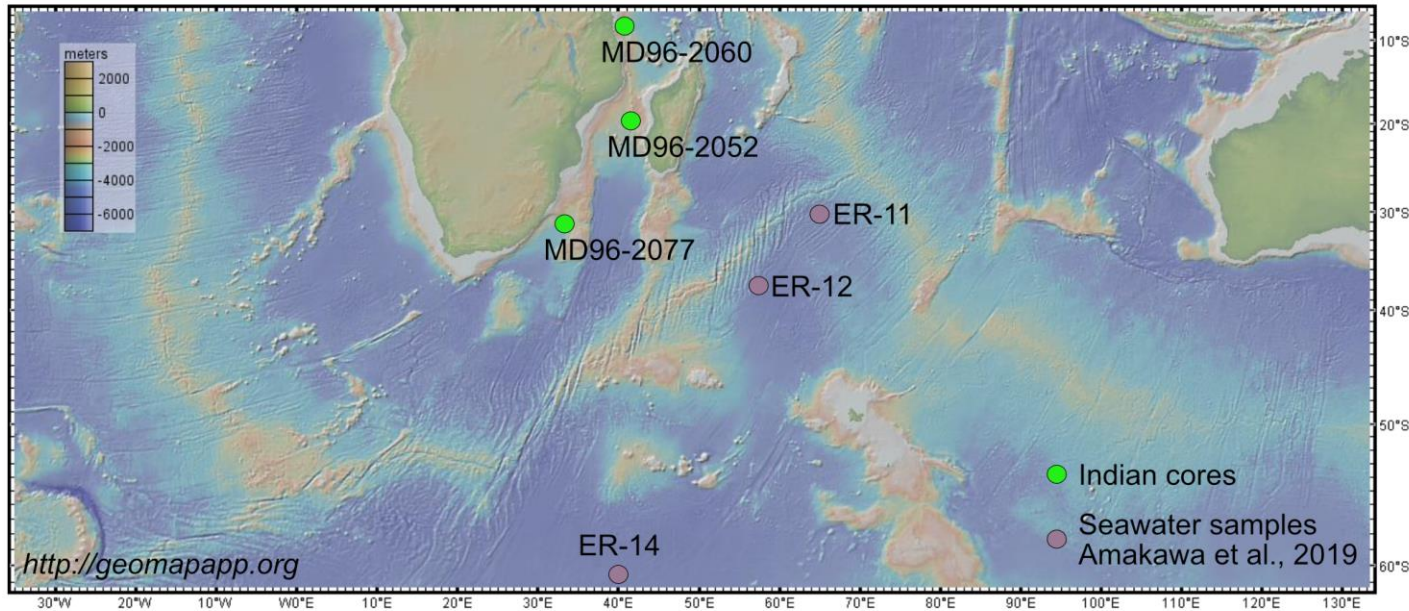
- The Indian (MD96-2077, 3781 m water depth) and Atlantic (ODP1090, 3702 m water depth) benthic  $\delta^{13}\text{C}$  records show similar low values during the last 200 kyr. This suggests that poorly ventilated deep water masses bathed both the Atlantic and Indian sites.
- Maxima of warm-water species at glacial terminations coincides with rising benthic  $\delta^{13}\text{C}$  values at both the Atlantic and Indian sites.

*Hodell et al., 2003 GGG*

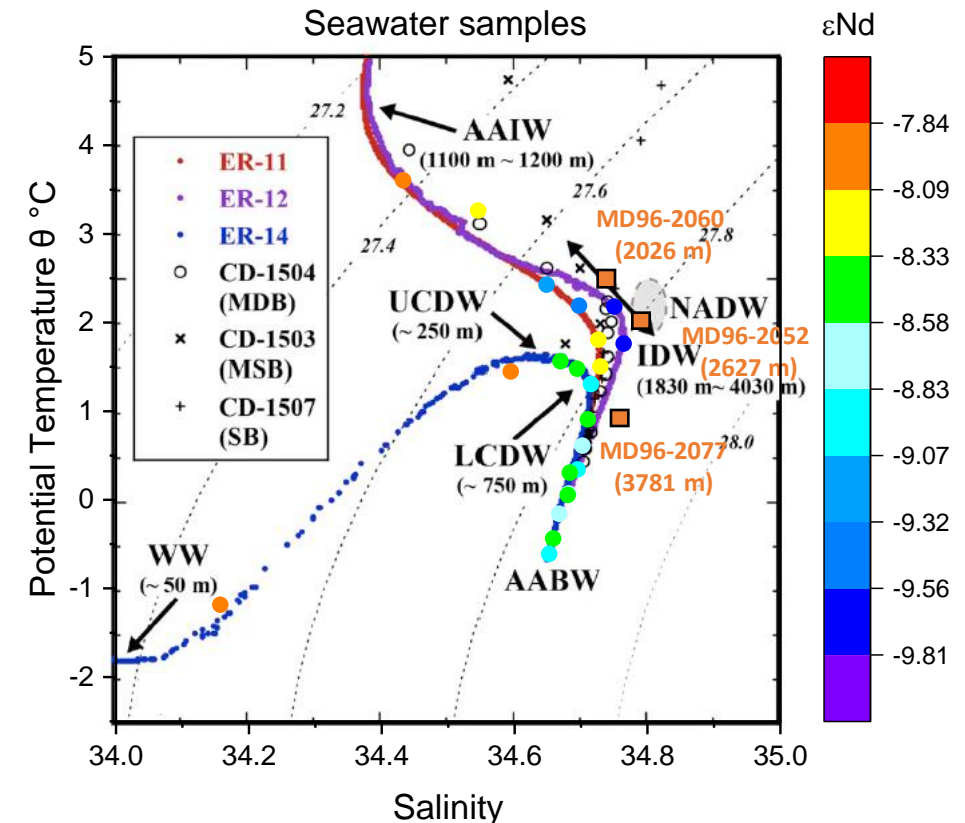
*Rau et al., 2006 Quaternary International*



## 4. FUTURE ANALYSES: ND ISOTOPIC COMPOSITION



Amakawa et al., 2019 Chemical Geology



- Foraminiferal Nd isotopic analyses will be performed as complement to the benthic  $\delta^{13}C$  data in order to identify the different water masses at the three Indian sites (MD96-2077, 3781 m water depth, MD96-2052, 2627 m water depth, MD96-2060, 2026 m water depth) in sediments covering the last 600 kyr.
- The present-day T and S data of bottom waters at core site MD96-2077 show the influence of southern source water (CDW). At core sites MD96-2052 and MD96-2060, T and S data indicate that these core sites are bathed by NADW. According to published seawater  $\epsilon_{Nd}$  values, expected  $\epsilon_{Nd}$  values for the core MD96-2077 will be around -8.5 to -8.8, and -9.8 for the cores MD96-2052 and MD96-2060.