

Supplementary figures

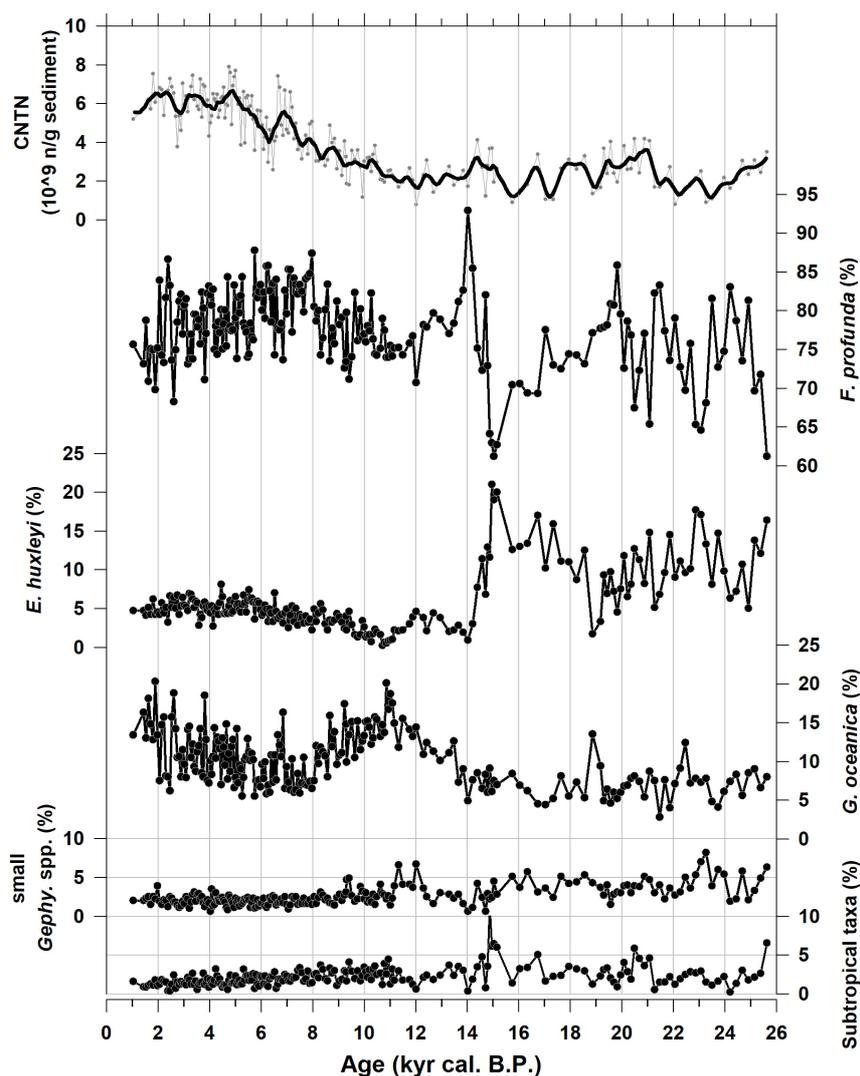


Fig. S1. The calcareous nannofossil total number (CNTN) and the relative abundances of main species of core MD77-176 over the last 26 kyr. The main coccolith species are *F. profunda*, *Emiliana huxleyi*, *Gephyrocapsa oceanica* and small *Gephyrocapsa* (*Gephyrocapsa* spp. <3 μ m). A few subtropical specimens can be observed and include *Oolithotus* spp., *Pontosphaera* spp., *Rhabdosphaera* spp., *Umbellosphaera* spp., *Calciosolenia* spp. and *Scyphosphaera* spp. Other species such as *Ceraolithus* spp. and *Calcidiscus* spp. are very rare (thus not shown here).

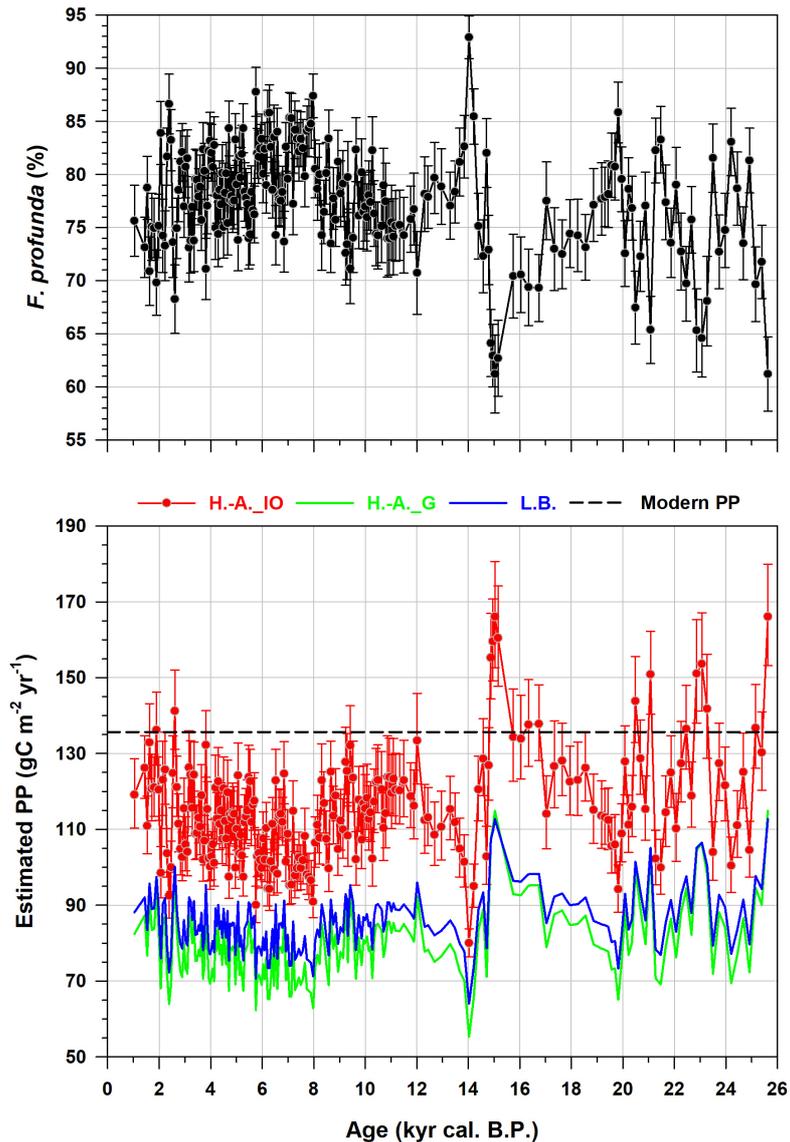


Fig. S2. (a) Relative abundance of *F. profunda* at site MD77-176; (b) Calculated primary productivity based on the Indian Ocean equation (PP-IO_HA) (red line) and the global equation (PP-G_HA) (blue line) of [Hernández-Almeida et al., \(2019\)](#); and based on the Arabian Sea equation (PP-AS_LB) (green line) of [Beaufort et al., \(1997\)](#). The black dash line marks the modern value of averaged PP in the region surrounding core MD77-176 (see [Fig. 1](#)).

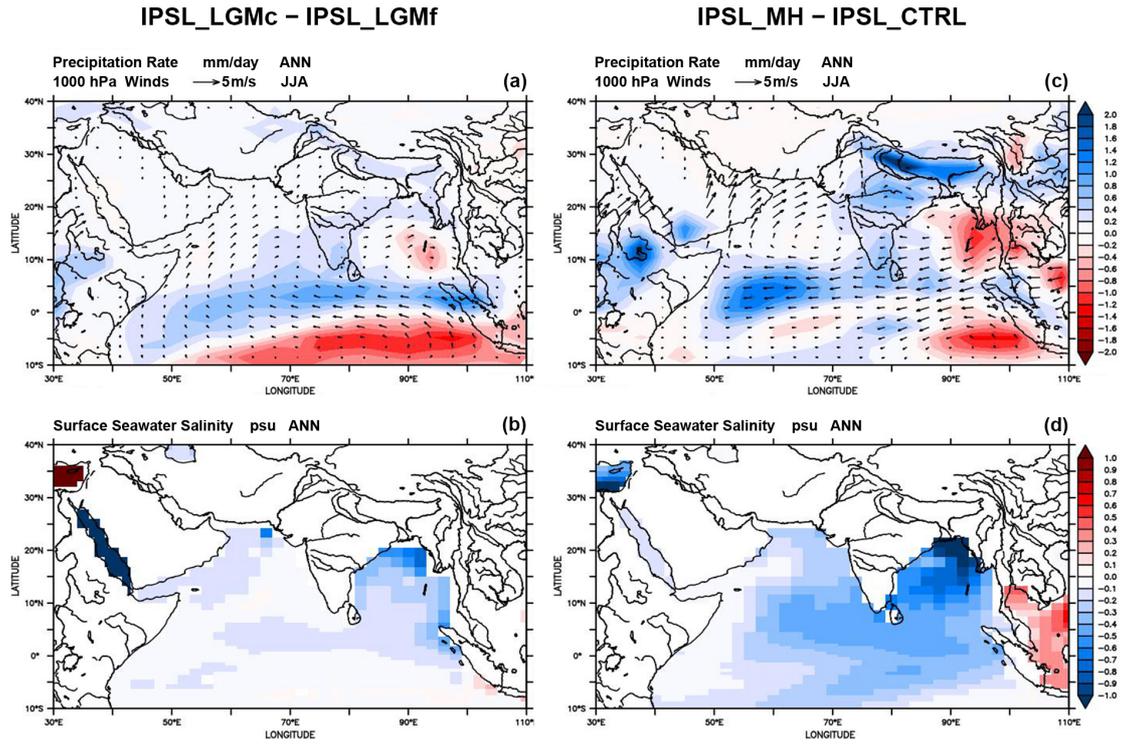


Fig. S3. Differences of climatic and oceanic parameters between the experiments LGMc and LGMf, and between the experiments MH and CTRL run with IPSL-CM5A-LR. ANN=annual mean, JJA= mean of summer months (from July to August).

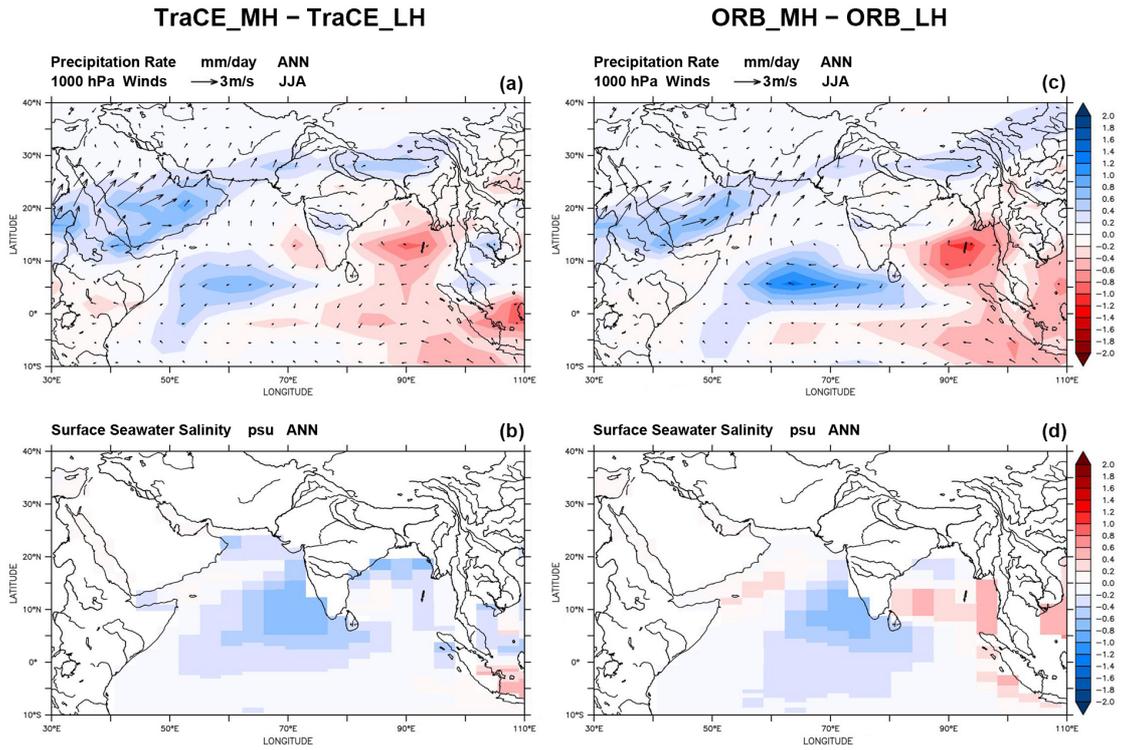


Fig. S4. Differences of climatic and oceanic parameters between the MH and LH in the TraCE, and between the MH and LH in the ORB.

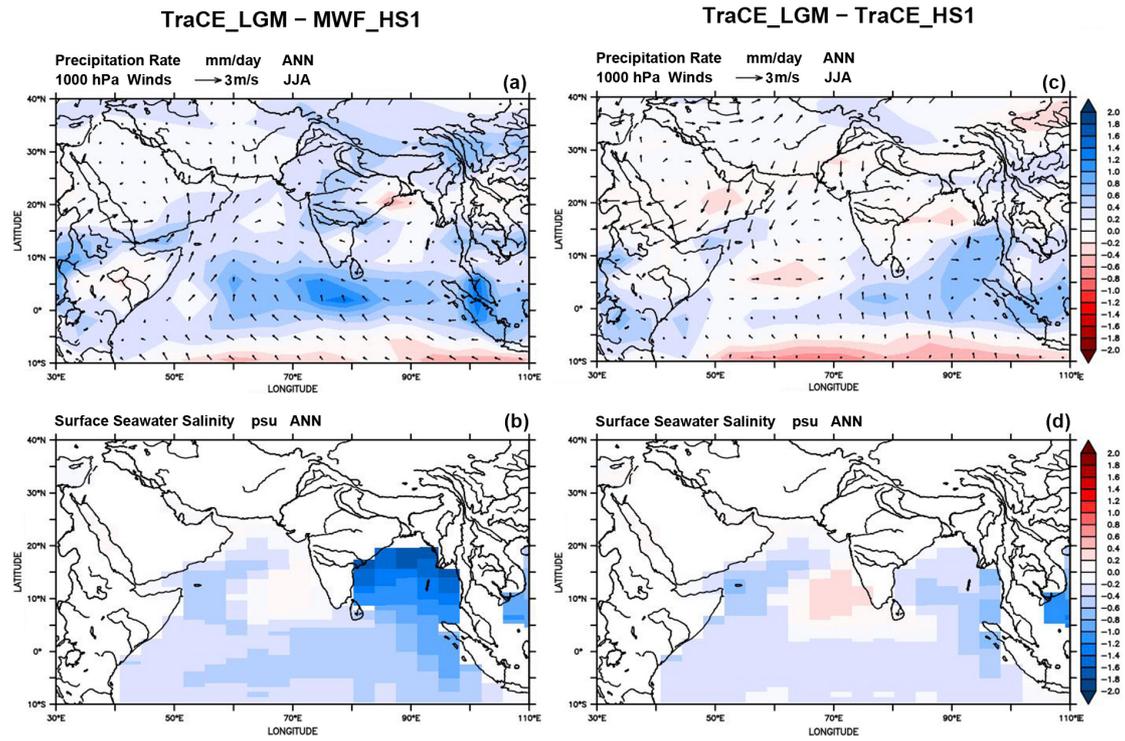


Fig. S5. Differences of climatic and oceanic parameters between the LGM in the TraCE simulation and the HS1 in the MWF, and between the LGM and HS1 in the TraCE.

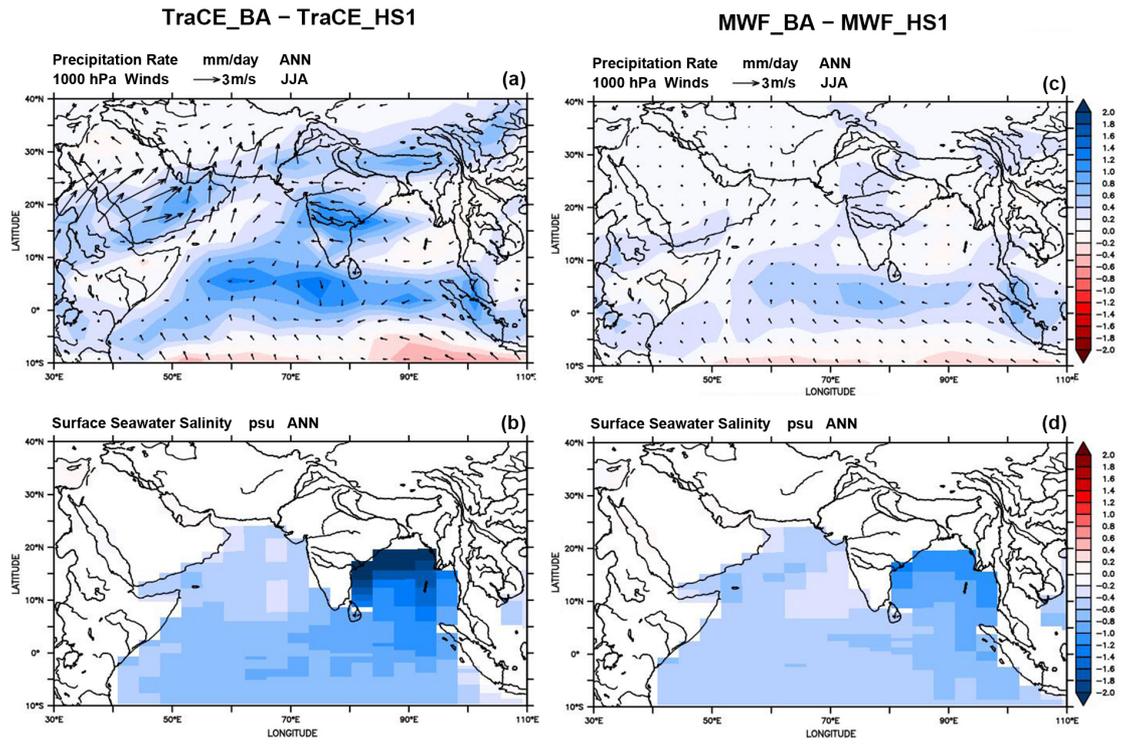


Fig. S6. Differences of climatic and oceanic parameters between the B-A and HS1 in the TraCE, and between the B-A and HS1 in the MWF.

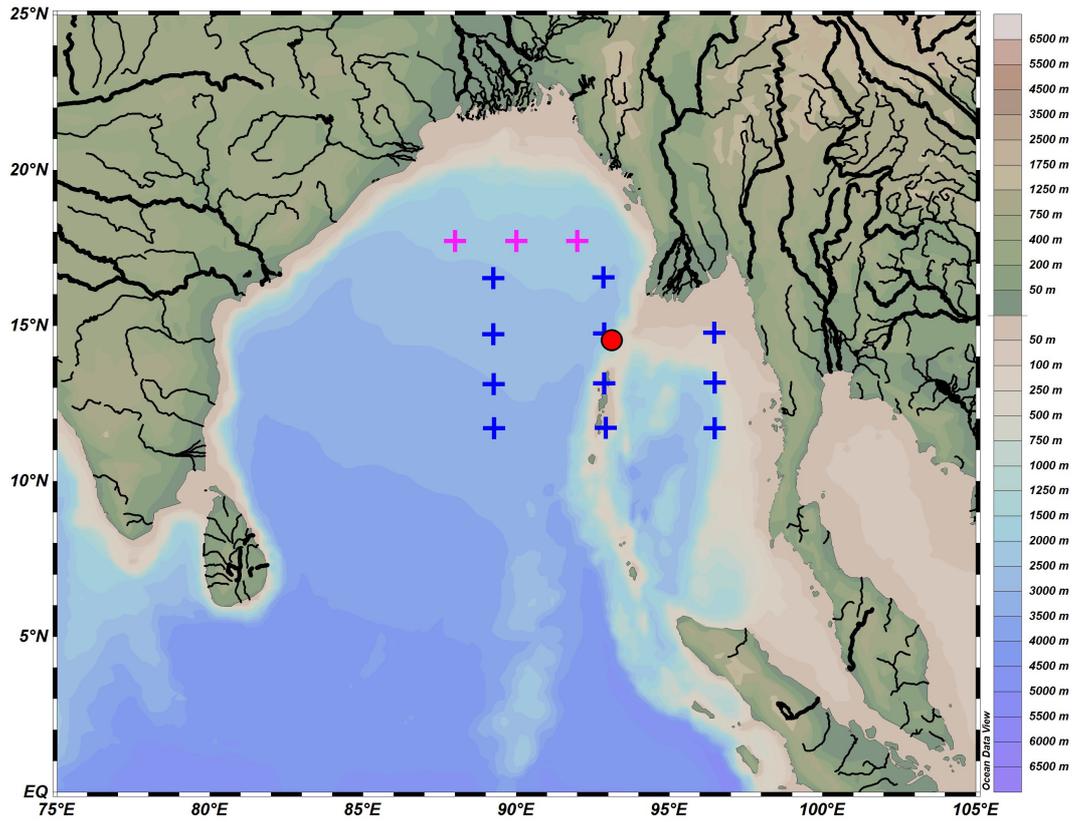


Fig. S7. Analyzed area for modeling. The bathymetric map was created by the Ocean Data View software (©Reiner Schlitzer, Alfred Wegener Institute) with its built-in global high resolution bathymetric data (GlobHR). Blue crosses mark the studied grids of oceanic outputs of TraCE-21 (Fig. 5, Fig. S8). Pink crosses mark the grids of the results shown by Fig. 7 and 8. The red dot marks the core MD77-176.

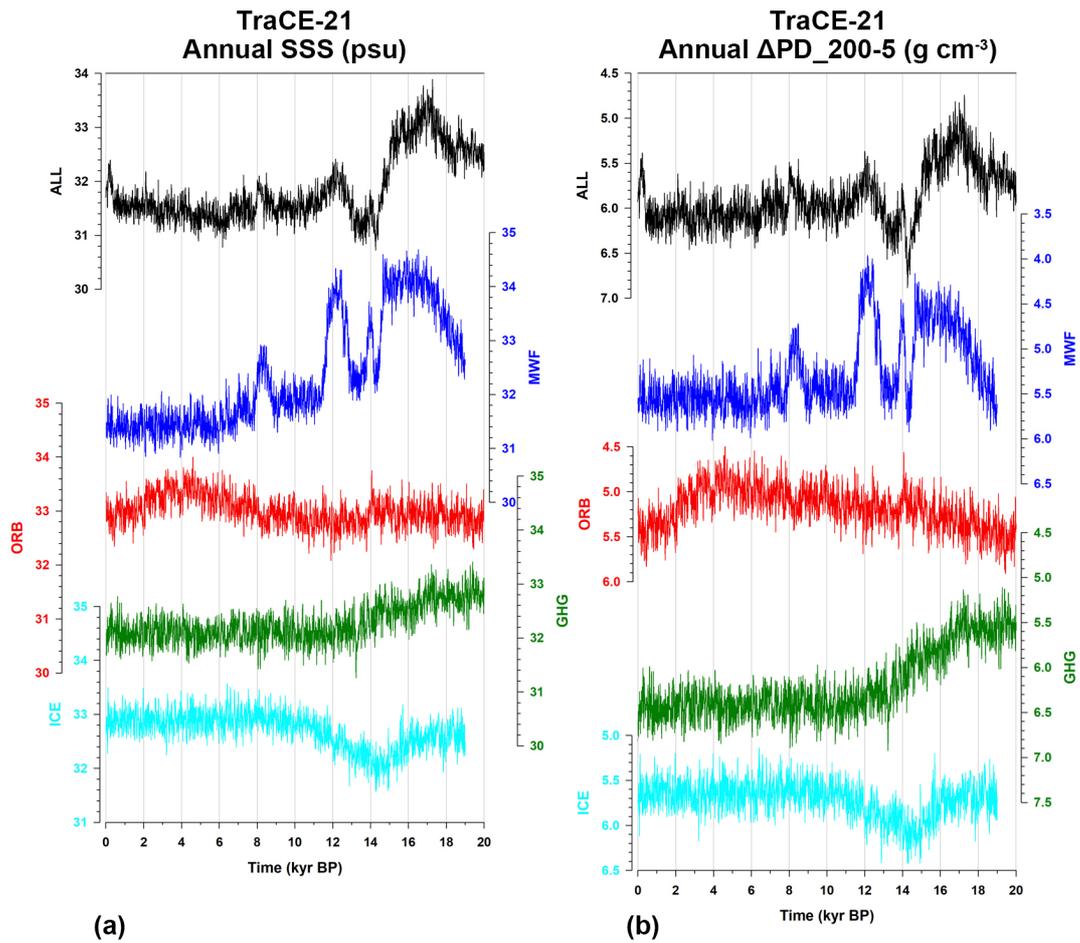


Fig. S8. Annual SSS (a) and annual potential density difference between 200 and 5 m (ΔPD) in TraCE-21 simulation (ALL) and single forcing experiments. The single forcing experiments are with other forcing fixed at their values at 19 kyr BP and forced by changing orbital insolation (ORB), green-house gas concentration (GHG), meltwater flux (MWF) and ice sheet (ICE).