EGU22-10696
https://doi.org/10.5194/egusphere-egu22-10696
EGU General Assembly 2022

The Kuroshio Current at the Last Glacial Maximum and implications for coral palaeobiogeography

Noam Vogt-Vincent[1,2] and Satoshi Mitarai[2]
[1]Department of Earth Sciences, University of Oxford, United Kingdom
[2]Marine Biophysics Unit, Okinawa Institute of Science and Technology, Japan

The Kuroshio Current is the western boundary current of the North Pacific Subtropical Gyre and flows through the East China Sea, entering through a relatively narrow, 800m-deep sill (the Yonaguni Depression). The warm surface waters associated with the Kuroshio support habitable conditions in the East China Sea for some of the world's most northerly warm-water coral reefs. However, it has been suggested that sea-level fall at the LGM, with a possible further contribution from tectonics, obstructed the glacial Yonaguni Depression and diverted the Kuroshio to the east of the Ryukyu Arc.

Using a set of 2km-resolution dynamically downscaled ocean simulations with LGM boundary conditions from four PMIP3 contributions, we present regional state estimates for the glacial East China Sea which are both physically consistent, and compatible with sea-surface temperature proxy compilations. We find that, whilst the Kuroshio Current transport in the East China Sea is slightly reduced at the LGM, its path is relatively unchanged, with limited sensitivity to glacioeustatic sea-level change, glacial-interglacial changes in climate, and tectonic shoaling of the Yonaguni Depression. Simulations with the best model-proxy agreement predict only minor changes in the zone of habitability for warm-water coral reefs in the glacial East China Sea. Strong surface currents associated with the glacial Kuroshio may have maintained or even improved long-distance coral larval dispersal along the Ryukyu Arc, suggesting that conditions may have enabled coral reefs in this region to remain widespread throughout the last glacial. These findings are supported by seismic evidence for glacial coral reefs in the northern East China Sea. Further field studies are needed to investigate whether this is genuinely the case, and to provide additional constraints on how the coral reef front responds to long-term environmental change.