# The changes of the Kuroshio path in the Northwest Pacific since 35ka

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Kuroshio, a strong western boundary current in the subtropical North Pacific, has strong influences on the climate of Japan and East Asia. Global sea level rises and falls when ice sheets and glaciers melt and grow. The Last Glacial Maximum (LGM, 21ka) is the most recent interval in Earth history when global ice sheets reached their maximum integrated volume. The expansion of the ice sheets at the LGM resulted in a sea-level lowering of about 130 m and a cold phase compared to present. Under the circumstance of sea level, Kuroshio did not bifurcate into the Japan Sea and form the Tsushima Current. As the sea level rises, the Tsushima Current flowed into the Japan Sea at about 10ka (Gallagher et al., 2015), and the sea-level reached the present level at 7ka~6ka (Zheng et al., 1994). However, how the Kuroshio and Tsushima Current pathway evolved in the conditions of different sea level and climate remains unclear.

In Okinawa and southern Korea, some archaeologists have found evidences of people drifting on the Kuroshio from Taiwan to northern regions. According to studies by Japanese anthropologists, the first person that set foot on Okinawa probably sailed there on bamboo rafts from Taiwan more than 30,000 years ago. However, this hypothesis needs more evidences because sailing across the Kuroshio is a difficult thing if the Kuroshio 30,000 years ago had the same surface velocity as present. Therefore, clarifying the strength and path of Kuroshio is also helpful to the understanding on human migration.

In this study, we used the model of Japan Coastal Ocean Predictability Experiment (JCOPE) to simulate the changes of the Kuroshio path under the combined influences of sea level, the air-sea heat flux, and wind stresses in five historical regimes (35ka, 30ka, LGM, 6ka, and 0ka). The meteorological and oceanic data are provided by the climate model MIROC4m (Chan et al., 2011) which is a fully coupled atmosphere-ocean general circulation model (AOGCM).

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