

Coral reveals changes of Kuroshio current into South China Sea via Luzon Strait

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The Kuroshio Current enters the South China Sea via the Luzon Strait

and exerts significant effects on circulation and water mass properties of this marine basin. However, limited by the few on-site observations, multi-decadal variations in Luzon Strait Transport remain uncertain.

Recently, a research team led by Prof. Hu Dunxin and Prof. Sun Weidong from the Institute of Oceanology of the Chinese Academy of Sciences (IOCAS) and their collaborators used coral isotopic proxy from Xiaoliuqiu Island along the Kuroshio intrusion route to reconstruct Luzon Strait Transport and investigated its interannual and decadal variability.

The study was published in *Palaeogeography, Palaeoclimatology, Palaeoecology* on Feb. 18.

Stable $\delta^{13}\text{C}$ values of coral can record the $\delta^{13}\text{C}$ variations of dissolved inorganic carbon in [seawater](#). Coral $\delta^{18}\text{O}$ values are controlled by both [sea surface temperature](#) and local seawater $\delta^{18}\text{O}$ values, the latter of which is related to the hydrological balance (i.e., precipitation minus evaporation and ocean advection) and sea surface salinity.

The $\delta^{13}\text{C}$ values of dissolved inorganic carbon and temperature of the South China Sea subsurface seawater are much lower than those of surface seawater, whereas the salinity is higher than that of the surface seawater.

The researchers found that increased (reduced) Luzon Strait Transport was expected to generate strong (weak) upwelling, resulting in low (high) $\delta^{13}\text{C}$ values of dissolved [inorganic carbon](#) and sea surface temperature, and high (low) [sea surface salinity](#), as recorded in the coral.

They reconstructed the interannual variability in the upper and surface layers of Luzon Strait Transport during 1977–2003 using the coral $\delta^{18}\text{O}$ record. Coral $\delta^{18}\text{O}$ data indicated that Luzon Strait Transport has

weakened since the 1970s.

The change of Luzon Strait Transport was associated with the northward (southward) migration of the North Equatorial Current bifurcation latitude: a northward (southward) shift of the North Equatorial Current bifurcation latitude weakened (strengthened) upstream Kuroshio transport, favoring an increase (decrease) in the Kuroshio intrusion.

"The information recorded by coral provides an opportunity to study ocean current in the case that [historical records](#) are lacking," said Li Xiaohua, first author of the study.

More information: Xiaohua Li et al, A monthly resolved coral $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ record of changes in the Kuroshio Current into the South China Sea via the Luzon Strait, *Palaeogeography, Palaeoclimatology, Palaeoecology* (2023). [DOI: 10.1016/j.palaeo.2023.111468](https://doi.org/10.1016/j.palaeo.2023.111468)

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