

Variability of upwelling in the northern South China Sea over the past century

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Coastal upwelling is typically related to the eastern boundary upwelling system (EBUS), whereas the powerful southwest Asian summer monsoon (ASM) can also generate significant cold, nutrient-rich deep water in western coastal zones. Here we present a sea surface temperature (SST) record (AD 1876-1996) derived from coral Sr/Ca for an upwelling zone in the northern South China Sea (NSCS). The upwelling-induced SST anomaly record reveals prominent multi-decadal variability driven by ASM dynamics with an abrupt transition from warmer to colder conditions in 1930, and a return to warmer conditions after 1960. Previous studies suggest the expected increase in atmospheric CO₂ for the coming decades may result in intensification in the EBUS, which could enhance upwelling of CO₂-rich deep water thus exacerbating the impact of acidification in these productive zones. In contrast, the weakening trend since 1961 in the upwelling time series from the NSCS suggests moderate regional ocean acidification from upwelling thus a stress relief for marine life in this region.

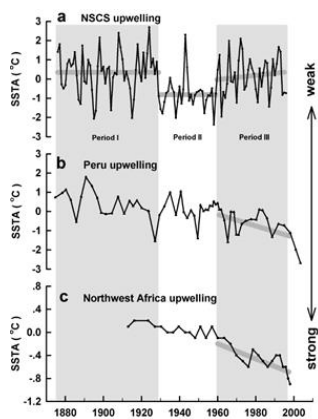


Fig.1 Time series of SSTA in the upwelling zones of (a) NSCS, (b) Peru [Gutiérrez *et al.*, GRL, 2011] and (c) Northwest Africa [McGregor *et al.*, Science, 2007].