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Title: Tracing Waters from the West Philippine Sea to the Sulu Sea by way of the South China Sea

Abstract: Like most other deep basins in southeast Asia, the deep Sulu Basin is isolated from the neighboring seas by surrounding topography. While the near-surface circulation is mainly governed by the seasonally reversing monsoon winds, the deep circulation is forced by an inflow of intermediate water from the SCS through the Mindoro Strait (sill depth 420 m), which supplies the intermediate and bottom waters of the Sulu Sea. Below 1000 m T, S, AOU, PO4, SiO2, pH, total alkalinity, total CO2 and fCO2 in the Sulu Sea are remarkably homogeneous. Below the warm and fresh surface layer, the core of the Subtropical Lower Water from the West Philippine Sea can be seen around 200 m depth as a very distinct salinity maximum. It lies well above the sill depth in the Mindoro Strait and its spreading is thus not hampered by topography. The North Pacific Intermediate Water (NPIW) is the primary source for the intermediate and deep waters of the Sulu Sea. A low-salinity core originating from this low salinity NPIW can be traced across the Sulu Sea in the 600-to-1400 m depth layer. The higher temperature and oxygen but lower salinity and nutrients of the deep waters compared to the South China Sea (SCS) are indicative of an intrusion of NPIW. Deep plume convection down the continental slope is the likely generation mechanism. The maximum depth of the renewal depends strongly on the density of the water inflowing through the Mindoro Strait. The shallower the thermocline in the SCS results in the denser the incoming water and the deeper the convection in the Sulu Sea. A possible mechanism for thermocline uplifting is the passage of tropical cyclones which may be responsible for the intrusion of the intermediate depth SCS water. The biological productivity is probably the major factor leading to the low surface water fCO2 value of around 250 ☐atm in summer. The excess, anthropogenic CO2 penetrates to about 1000 m.

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