

Holocene variations in Chinese clay deposition in coastal deposits of the South Sea of Korea: Implications for Kuroshio variability

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We quantified the temporal variation in the contribution of Chinese riverine sediments to the South Sea of Korea over the last 6 kys using elemental composition and clay mineral proxy models. This revealed significant variations throughout the Holocene, with major changes around ~5.2, ~4.2–3, and ~1.5 ka, likely driven by changes in the Kuroshio Current dynamics in the northwestern Pacific marginal sea. Notably, Chinese clays from the Huanghe (Yellow) and Changjiang (Yangtze) Rivers contributed up to ~70% of the total sediment deposition throughout most of the Holocene period until ~1 ka, challenging the idea that Korean rivers alone would have regulated sediment deposition in the coastal region of the South Sea. Around ~7 ka, the abrupt increase in Chinese clay deposition in the Korean shelf and coastal regions, followed by its sudden decrease by ~1.5 ka, reflects the onset of the Kuroshio inflow (i.e., the Tsushima Warm Current) and the establishment of the modern circulation system in these marginal seas, respectively. Additionally, a notable shift from Changjiang to Huanghe clay dominance after ~5.2 ka suggests the strengthening of the Cheju Warm Current (a branch of the Kuroshio), which transported smectite-rich sediments from the southeastern Yellow Sea to the South Sea shelf. A temporary reduction in Chinese clay contributions between ~4.2 and 3 ka provides clear evidence of a suppressed Kuroshio inflow associated with global climate change (e.g., the late Holocene neoglacial event). Our study provides a comprehensive understanding of the sedimentary response of Chinese clays to Kuroshio variability in the northwestern Pacific marginal seas.