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SEDIMENTARY TERRESTRIAL ORGANIC MATTERS DISPERSAL IN THE ECS, AS REVEALED BY BIOMARKERS AND HYDRO-CHEMICAL CHARACTERISTICS

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Approximately 10% of the world's riverine sediment discharge is delivered into the East China Sea (ECS), mainly via the Yangtze River; consequently, it has attracted much interest as a site for the study of terrestrial organic matter (TOM) dispersal and fate. Research indicates that most of the TOM is transported and trapped in the inner shelf; however, some may be delivered further eastward and buried in the middle shelf or exported into the open ocean. In this study, biomarkers, $\delta^{13}C_{TOC}$ values and C/N ratios have been used to characterise OM in surface sediments in the ECS (ZJ and PN sections) and low Yangtze River (RC section). These are compared to hydro-chemical parameters (salinity, temperature, turbidity) and nutrient concentrations in the overlying water column, allowing the TOM source and dispersal mechanisms to be evaluated (Fig. 1).

TOM source-related indices are poorly correlated with each other in the RC and ZJ sections, suggesting that organic matter is heterogeneous and derives from various sources. In the PN section, however, the concentrations of 4 independent terrestrial biomarkers (abundances of lignin, high-molecular-weight *n*-alkanes ($ALK_{long} = \sum n\text{-}C_{27, 29, 31, 33}$), $ALK_{middle} = \sum n\text{-}C_{21, 23, 25}$), and PAHs), and total nitrogen are well correlated with TOC (n=6, R^2=0.99, 0.99, 0.86, 0.73, 0.95 respectively), suggesting that OM in those sediments is homogeneous and derives from a common source. Additionally, these 4 biomarker parameters show significant positive/negative correlations with water depth/offshore distance along the PN section. In contrast, marine biomarkers do not show a consistent variation with TOC contents or depth. *n*-Alkane CPI values suggest that the degradation level of land-derived *n*-alknanes is positively correlated with the distance from Yangtze Estuary in the ZJ section, but the opposite relationship is observed in the PN section. In addition, the overall degradation level in the PN section is significantly higher than that in

the ZJ section.

These unusual and apparently contradictory trends likely reflect the multiple controls on OM transport in the ECS. High resolution hydro-chemical parameters show a strong plume of water originating from the continental shelf slope and flowing westwards toward the Yangtze Estuary (Atsuhiko Isob 2006). Yangtze-discharged OM is transported southwards along the Zhe-Min coast (ZJ section) and enters into the Okinawa Trough (OT) via bottom currents (Liu, 2003). During this long-term process, diverse sources of refractory TOM are homogenised by extensive sediment-resuspension and associated mixing. Some of those uniform sediments are brought to the middle shelf by the Kuroshio Invading Water (KIW), but the Taiwan Warm Current and KIW prevents a similar delivery of the heterogeneous inner shelf TOM. Since the sediment in the PN section derives from the OT, the OM is expected to be both more degraded and, counter-intuitively, exhibit increasing degradation with increasing proximity to the Estuary. This reveals that the delivery of OM to marine sediments can be complex, and the primary focus of ongoing and further study of OM transport in continental margins will be to provide a better context for the use of terrestrial biomarkers as a proxy record for past climate.

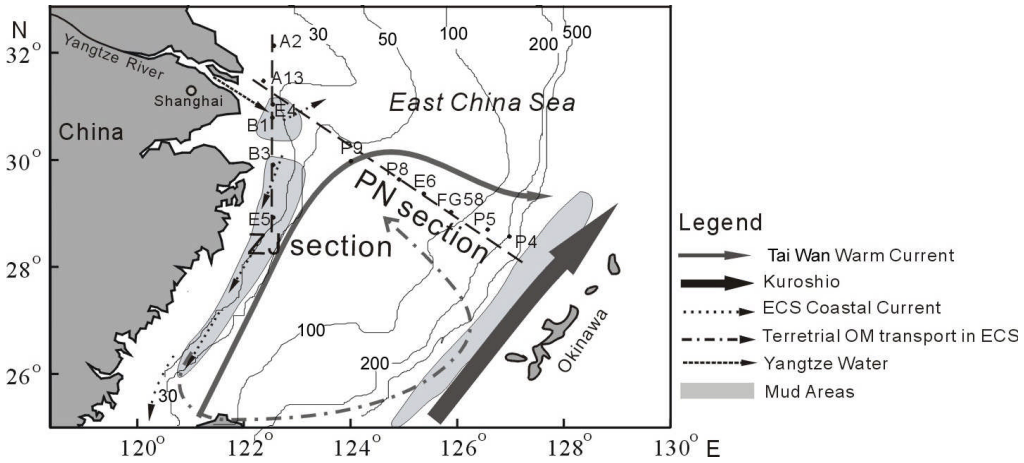

Figure 1. Stations of survey, current patterns and TOM transport in the ECS

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