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Input and transport of organic matter in Yangtze River estuary and its adjacent shelf areas, biomarkers-based study

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Organic matter (OM) in the surface sediments from the lower Yangtze River (CR section), Estuary-inner shelf (ZJ section) and middle-outer shelf areas (PN section and YSZ area) is characterized by a variety of technology, including elements, isotope, bulk geochemistry, biomarkers analysis. Of major interest is: (1) molecular-level details of sedimentary OM compositions and sources; (2) The response of transport and distribution of OM to the mecoscale oceanographic events (i.e. water masses, fronts, currents). The results show: (1) Sudden changes of chromatogram proxies of n-alkanes in adjacent stations in Yangtze Estuary are linked to the input from the different water columns (the "estuary water" and the "plume water") and the estuary filtering effect; (2) Under the influence of sorting dynamics and selective transport, sedimentary OM in the CR and ZJ section characterized by relative lower degraded level, higher woody tissue and lignin concentration, maybe derives from advanced plant debris, whereas sedimentary OM from the YSZ zone and PN section is characterized by higher degraded level, lower woody tissue and lignin concentration, suggesting this material is likely to be soil OM eroded from the extensive Yangtze River drainage basin; (3) Terrestrial OM 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 (ALKlong = ąÆn-C27, 29, 31, 33), ALKmiddle = ąÆn-C21, 23, 25), and PAHs), and total

nitrogen are well correlated with TOC (n=6, R2=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 across the ZJ section suggest that the degradation level of land-derived n-alknanes is positively correlated with the distance from Yangtze Estuary. The opposite relationship as well as a significantly higher degradation level is observed in the PN section. Yangtze-discharged OM is transported southwards along the Zhe-Min coast (ZJ section) and enters into the Okinawa Trough (OT) via bottom currents. 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 terrestrial OM. 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.