

Sources and Deposition History of Mercury in Marginal Seas off Eastern China using Mercury Isotopic Compositions

RUNSHENG YIN^{1,2^}, ZHIGANG GUO^{3^}, LIMIN HU⁴, WENCHUAN LIU³, JAMES P. HURLEY^{2,5}, DAVID P. KRABBENHOFT⁶, RYAN F. LEPAK², TIAN LIN⁷, XINBIN FENG⁷, XIANGDONG LI^{8*}

¹State Key Laboratory of Ore Deposit Geochemistry, Institute of Geochemistry, Chinese Academy of Sciences, Guiyang 550002, China

²Environmental Chemistry and Technology Program, University of Wisconsin-Madison, Madison, WI, 53706, USA

³Shanghai Key Laboratory of Atmospheric Particle Pollution Prevention, Department of Environmental Science and Engineering, Fudan University, Shanghai 200433, China

⁴Key Laboratory of Marine Sedimentology and Environmental Geology, First Institute of Oceanography, State Oceanic Administration, Qingdao 266061, China

⁵Department of Civil and Environmental Engineering, University of Wisconsin-Madison, Madison, WI, 53706, USA

⁶U.S. Geological Survey, 8505 Research Way, Middleton, WI, 53562, USA

⁷State Key Laboratory of Environmental Geochemistry, Institute of Geochemistry, Chinese Academy of Sciences, Guiyang 550002, China

⁸Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong

The concentrations of mercury (Hg) and Hg isotopic compositions were measured in three ²¹⁰Pb-dated sediment cores in the Chinese marginal seas. The concentrations and influxes of Hg showed increased Hg deposition since the 1950s and accelerated since the 1970s, due to the rapid economic development of China. Coastal regions have higher Hg influxes than the offshore sites. Large variations of both mass dependent fractionation (MDF; $\delta^{202}\text{Hg}$: -1.94 to -0.69‰) and mass independent fractionation (MIF; $\Delta^{199}\text{Hg}$: -0.16 to -0.31‰) signatures of Hg were observed in the sediments. There was a clear trend of increased $\delta^{202}\text{Hg}$ from the deep sediments to surface layers with much pronounced MIF signals in deep layers. From the combined MDF and MIF signatures, three major inputs of Hg may be identified, including the watershed runoff, land-based industrial emissions, and atmospheric deposition. Increased Hg from industrial inputs was clearly observed since the 1970s.