

Estimation of sources and contribution of Pb pollution in South China Sea through Pb isotopes records in coral during last century

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Long-term temporal change of Pb isotopes in coral from the South China Sea was investigated during the period 1910-2006 for the first time. In addition to the Pb concentration, the Pb geochemical behavior in coral and coral-recorded Pb pollution history are analysed. Coral $^{206}\text{Pb}/^{207}\text{Pb}$ and $^{208}\text{Pb}/^{206}\text{Pb}$ ratios changed from 1.1523 to 1.1554, and 2.1196 to 2.1240. During the two periods with high Pb concentration, ~1920-1940 (before 1960s) and ~1970-2006 (after 1960s), it was found that Pb isotopes ratios changed significantly in coral samples after the introduction of leaded gasoline. The values of $^{206}\text{Pb}/^{207}\text{Pb}$ and $^{208}\text{Pb}/^{206}\text{Pb}$ in coral sample fall into the range of a mixture of vehicle exhaust, coal and fly ash, which dominant Pb pollution source of aerosols. It is indicated that coral Pb was transported by aerosol from human activities on the Chinese mainland.

According to estimation and calculation of Pb emission from coastal regions around the South China Sea (including Fujian, Guangdong, Guangxi, Hainan, HongKong and Taiwan) in 1978-2006, the coal combustion and vehicle gasoline are the main sources of Pb in aerosol. Total Pb emission estimation in 1978-2006 confirmed that Pb in Sanya coral mainly came from vehicle exhaust after 1960s. However about 75% of aerosol Pb was from vehicle gasoline consumption contributed over 80% of coral Pb. But in Hong Kong and Taiwan, coal combustion made a more significant contribution to Pb concentration in corals. Results of Pb emission estimation and Pb isotopes in coral implied that Pb pollution sources of South China Sea change from coal combustion to leaded gasoline consumption in 1960s.