A 2000-year record of mercury and lead level and Asia-Pacific civilization in red-footed booby droppings of South China Sea

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Aims- To reconstruct a record of Hg and Pb level in red-footed booby droppings, and to assess human impacts on ancient environment.

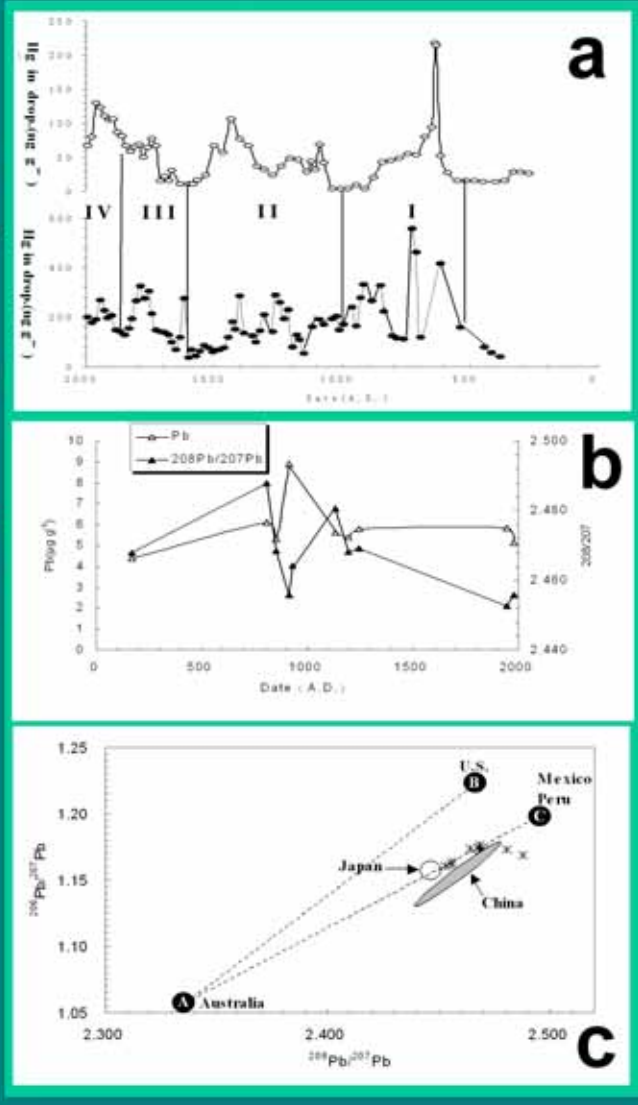
Materials and Analysis- Two cores (DY2,DY4) of lake sediments affected by red-footed booby droppings were collected from East Island (16º39'N-16º41'N, 112º43'E-112º45'E) in West Sand Islands of South China Sea. Mercury and lead concentration and isotopic compositions of lead in sediments were analyzed, and the age of layers were determined using AMS^{14}C techniques.

Results and Conclusions

Fig a -The dramatic variations of mercury and lead concentration likely associated with the Asia-Pacific civilizations, especially with those related metallurgical activities. Briefly, Hg levels are relative high during four episodes of extensive gold and silver mining activities by amalgamation: Tang Dynasty (600-900 A.D., I), South-Song and Ming Dynasty (1150- 1500 A.D., II), New World (1600-1800 A.D., III) and Industrial Revolution (from 1840 A.D. to present, IV), while the mercury concentrations decrease significantly during wartime in China around 1000 A.D. and the Independence War of South America (~1800-1830 A.D.) for depressing productivities of gold and silver.

Fig b -For lead contamination, the increments of lead concentration coincide with historical booming periods of lead melting, and its peaks correspond to these of Hg increment.

Fig b,c- According to the isotopic compositions of lead, before about 1800 A.D., the China mainland appears to be the dominant source of lead contaminant with higher $^{208}Pb/^{207}Pb$ ratios of 2.46-2.49. However, from 1840 A.D. the industrial and gasoline lead from Japan and America seems to play a more important role for decreasing $^{208}Pb/^{207}Pb$ to 2.44-2.46, and $^{206}Pb/^{207}Pb$ from 1.171 to 1.161-1.162.



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