Distribution of mercury concentrations in the atmosphere over the western part of the Pacific Ocean

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Concentrations of atmospheric mercury were measured over the western part of the Pacific Ocean on board r/v 'Academic A. Nesmejanov' (voyage N-17) from October 19 1989 to February 15 1990 along a route Vladivostock–Singapore–New Zealand–Vila (New Hebrides)–Vladivostock. The measurements were made using a MERCURY-3 atomic fluorescent photometer with an absolute limit of detection close to 50pg (50×10^{-12}g). Because of the very low observed concentrations, the metallic gold accumulation of mercury method was used. Duration of accumulation depended on the Hg concentration with 2hrs near the Asian continent, Indonesia and The Philippine Islands, but in open ocean and near New Zealand it was 12hrs. The background of mercury was rather high (3.4 ng/m^3 = 3.4×10^{-9}g/m^3) near the Asian continent, Taiwan, Indonesia, The Philippine Islands and New Guinea. In this area several significant anomalies, possibly of anthropogene nature (near Taiwan and the Asian continental coast) were detected. Several big anomalies were detected near The Philippine Islands, and the largest anomaly (120 ng/m^3) was registered near New Guinea at the time of crossing the Equator. These latter anomalies are possibly of volcanic origin since volcanic activity was rather high at the time. The background was very low (close to 0.43 ng/m^3) in the open ocean and near New Zealand. Diurnal cycles of changing mercury concentrations in the atmosphere were established for some days, with the minimum occurring between 02.00 and 03.00 hrs, and the maximum/between 13.00 and 14.00 hrs. Annual mercury contribution to the atmosphere from anthropogene and natural sources was estimated. The author suggests that mercury from the former is about 10,900 tons/year and the latter, about 12,080 tons/year. A lifetime of 2.5–3 months is estimated for atmospheric mercury from natural sources.