# Mercury isotopic ratios of soil and sediment samples collected from contamiated areas in China

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Mercury isotopic ratios of soil samples collected from mercury mining area, artisanal zinc smelting area, gold mining area, and of sediment samples from two reservoirs which were contaminated with mercury from different anthropogenic sources were analyzed using MC-ICP-MS (Neptune) technique developed in Trent University [1]. In comparison, mercury isopotic ratios of soil samples collected from a pristine area were also analyzed. Distinctive mercury isotopic ratios were observed for soil and sediments from different areas. Soil samples collected from gold mining and mercury mining areas had mercury isotopic retaios of δHg 198 and δHg 199 close to those of zinc and mercury ores, of which the δHg 198 and Hg 199 values close to 0. Soil samples from the prinstine area had the lowest values of δHg 198 and δHg 199, which varied from -1.5 to -2.7‰. Soil samples collected from zinc smelting area showed the values of δHg 198 and δHg 199 in between the values of soil collected from the pristine area and those of soil collected from mercury and gold mining areas. Sediment samples collected from Baihua reservoir, which was seriously contaminated with mercury by a chemical plant that used mercruy as a catalyst to produce acetic acid, had completely different mercury istopic ratios with the sediment samples collected from Hongfeng reservoir, of which the mercury contamination source is from a coal fired power plant. The δHg 198 of sediment samples of Baihua reservoir varied from -0.5 to -1.0‰, while the δHg 198 of sediment samples of Hongfeng reservoir varied from -1.7 to -2.0‰. The preliminary results revealed that mercury isopotic ratios could be a useful tool to attribute the sources of mercury contamination in the environment.

[1] Hintelmann & Lu (2003) *Analyst* **128,** 635–639.

# A record of seasonality in the Western Mediterranean from the LGM to recent using stable isotopes and trace elements in limpet shells

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Seasonal resolution climate records from mid and high latitudes would allow investigation of the role of seasonality in controlling mean climate on diverse timescales, and of the evolution of climate systems such as the North Atlantic Oscillation. Marine mollusc shells provide a possible archive. Finding and dating sequences of marine mollusc shells spanning long periods of time is difficult, however, due to sea-level change and the destructional nature of most coastal environments.

This study uses molluscs collected for food by Neanderthals and early humans on Gibraltar over at least the last 50,000 years. Gibraltar is close to the boundary of modern day climate belts making this an interesting location for paleoclimate reconstruction. Archaeological excavations of Gorham's Cave on Gibraltar have revealed a sequence of mollusc shells. These are sometimes found in habitation levels and otherwise in layers of sediment blown into the cave, which is today at sea-level. $^{14}C$ ages were obtained for a suite of samples spanning an age range from the last glacial to recent. The species found are predominantly *Patella sp.* (limpets).

We have carried out stable isotope and trace element analysis of modern and fossil *Patella* shells by micromilling. Modern shells show that their oxygen isotope composition accurately captures the full seasonal range in sea-surface temperature.

Analysis of *Patella* shells from the last glacial show a much greater cooling of winter sea surface temperatures (SST) than of summer SST. Further analyses of Patella shells spanning the 19-10 kyr bp interval and from the mid-Holocene enable an assessment of the evolution of seasonality in the Western Mediterranean since the last glacial.