

## Bacterial populations (first record) at two shallow submarine hydrothermal vents off west Mexico

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Thermophilic and metal oxidizing bacteria were identified in shallow hydrothermal vents on the western Mexican coast. The role of these bacteria in biomineralization processes observed in the vents is explained, and the effect of the vents on biodiversity of prokaryotes is discussed. Research was done at two shallow hydrothermal vent sites: Bahía Concepción in the Baja California Peninsula and Punta Mita, in the central Pacific coast. The study focuses on the biogeochemical processes related to the different species of bacteria present in the studied sites, which are involved in the anaerobic oxidation of methane (AOM), seawater sulfate reduction and metal oxidation. Vent water shows different composition in both sites; moreover, different pH and redox conditions control bacteria diversity. The composition of the discharged water ranged from nearly sea water to lower salinity fluids with a pH about 6, and the gas phase in the hydrothermal fluids was mainly CO<sub>2</sub> at the Baja California site, and N<sub>2</sub> and CH<sub>4</sub> at Punta Mita. The detected bacterial lineages represented typical deep vent species.

Physical and chemical characteristics of the geothermal manifestations play a major role in the biodiversity of bacteria in shallow hydrothermal vents. In the case of the submarine vents in Bahía Concepción and Punta de Mita, the redox conditions determine the presence/absence of distinct species of bacteria: gamma, delta and epsilon bacteria as well as bacterioidetes in the oxidizing conditions of Bahía Concepción; and thermotogae, aquificae and planctomycetes in Punta de Mita. On the other hand, there are some species that are ubiquitous in shallow vents, as the halophilic and chloroflexae bacteria.

## Tracing antropogenic Hg emissions in an urban area in Northeastern France

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Mercury (Hg) isotopes are giving new insights into the study of the Hg biogeochemical cycle through large mass dependent and mass independent fractionations (MDF and MIF). A few studies have evaluated the ability to trace atmospheric Hg using both direct atmospheric measurements [1] and indirect bio-accumulators such as lichens [2,3]. Species-specific isotopic compositions of atmospheric Hg display large ranges in both MDF and MIF, and their distinct signatures suggest the occurrence of isotopic fractionation during species conversion [4]. The isotopic compositions of atmospheric depositions potentially recorded in bio-accumulators can be altered through various fractionation processes [3], leading to ambiguous interpretation of Hg isotopic composition to track down atmospheric sources. As regards anthropogenic emissions, different species-specific compositions have been suggested [5] but direct field measurements have not yet been performed.

We report species-specific Hg isotope compositions inside and at the stack of a waste incinerator located in an urban area in northeastern France. Gaseous mercury concentrations and isotope compositions were measured simultaneously in the vicinity of the waste combustor. The main results from the exhaust indicate that oxidized Hg species are slightly enriched in heavier isotopes compared to Hg<sup>0</sup> species and initial Hg (waste). Diurnal variations recorded for Hg concentrations in the atmosphere are not compatible with the incinerator emissions. In contrast to incinerator emissions, isotopic compositions measured over several days of sampling display significant light isotope enrichment and indicate a little contribution of incinerator to surrounding atmosphere. Further interpretation and comparison with previously published urban topsoil and lichen compositions from the same urban area, provide us relevant informations to trace Hg anthropogenic emissions on such local scale.

[1] Sherman *et al.* (2010) *Env. Sc. Technol.*, **46**, 382-390; [2] Estrade *et al.* (2010) *Env. Sc. Technol.*, **44**, 6062-6067; [3] Blum *et al.* (2012) *Dev. Env. Sc.*, **11**, 373-390; [4] Rolison *et al.* (2013) *Chem. Geol.*, **336**, 37-49; [5] Sun *et al.* (2013) *Chem. Geol.*, **336**, 103-111