Mercury accumulation in periphyton associated to macrophytes and its relationship with eutrophication in Cohana Bay

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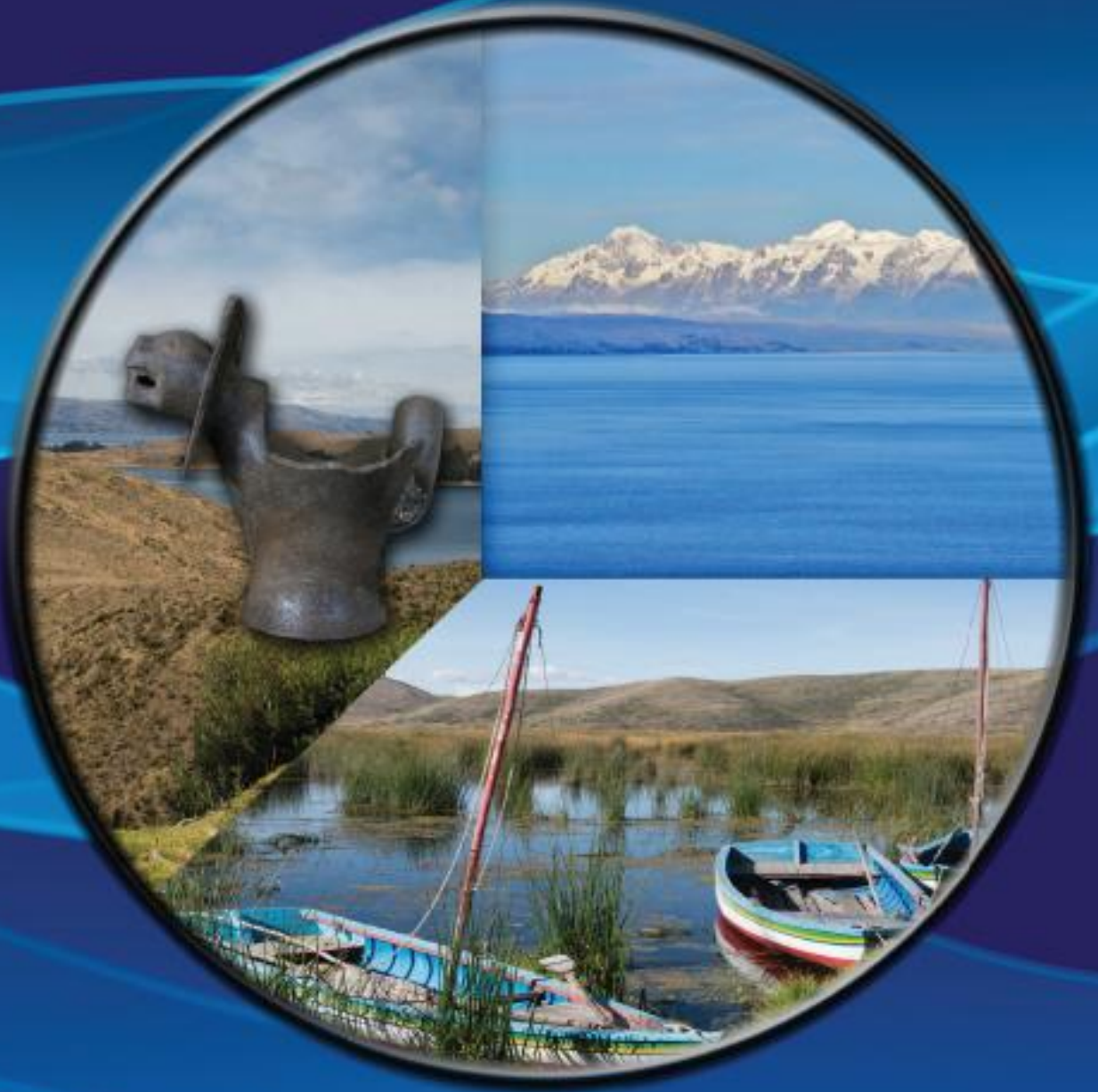
Abstract:

Methylmercury (MeHg) is one of the most toxic forms of mercury, due to its capacity to bioaccumulate and biomagnify within the trophic chain. Mercury methylation is mostly linked to bacterial activity and so far SRB (sulfate reducing bacteria) are considered the main methylators in anoxic sites. In aquatic environments, periphyton associated to macrophytes has proven to play an important role in both, production and accumulation of MeHg. Therefore, this research studied the relationship between eutrophication and MeHg found in periphyton associated to macrophytes in Cohana Bay. This particular area located in Titicaca Lake has an ongoing eutrophication process, due to wastewater discharge coming from Katari River. Because of this situation, Cohana Bay has an anoxic environment that allows the activity of bacteria, such as SRB. Thus, in order to established a relationship between SRB activity linked to eutrophication and MeHg accumulation found in periphyton associated to macrophytes, samples of periphyton were collected along an eutrophication gradient in two trips (april and september). The samples were divided so that they could be analyzed for MeHg, total mercury (HgT) and SRB activity. Given the high content of organic matter in periphyton, a Selective Extraction Method (SEM) that allows recovering most of MeHg within a sample for later analysis, was validated. Results showed that in spite of SRB activity being detected in periphyton associated to macrophytes, there is no relationship with MeHg accumulation. At the same time, other parameters such as: HgT and isotopic composition were considered in order to see a possible relationship with MeHg accumulation. Only the samples collected in april showed a significant relationship between MeHg with HgT and $\delta^{13}C$ (‰). The lack of a relationship between MeHg and eutrophication indicator isotopes of $\delta^{15}N$ (‰), confirmed that in Cohana Bay MeHg accumulation in periphyton associated to macrophytes is not related to eutrophication; rather other factors like periphyton composition could influence in this.

COLOQUIO INTERNACIONAL SOBRE LA CONTAMINACIÓN ACTUAL E HISTÓRICA EN LOS ECOSISTEMAS ACUÁTICOS ANDINOS



La Paz, 3 al 5 de mayo de 2016
Universidad Mayor de San Andrés, Cota Cota, La Paz

Proceedings

International colloquium on current and ancient contamination in Andes aquatic ecosystems

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General Planning

- **May 3rd 2016: Contamination and eutrophication of Lake Titicaca**

AM session: Mercury biogeochemistry and contamination of aquatic ecosystems of the Andes region
Keynote Lecture: Hg contamination in Latin America: the past is not what we think, nor the future (J.-R. Davee Guimarães).

PM session: Chemical contamination, eutrophication and monitoring of Lake Titicaca and its watershed
Keynote Lecture: Eutrophication of the Cohana Bay (D. Acha).

- **May 4th 2016: Arsenic issues in the Andes**

AM session: Arsenic biogeochemistry and contamination of aquatic ecosystems of the Andes region
Keynote Lecture: Arsenic contamination of groundwater (Chile) (G. Lobos).

PM session:
Workshop 1: Arsenic and mercury speciation.
Workshop 2: Paleoenvironmental studies in the Andean altiplano.

- **May 5th 2016: Historical reconstructions of the human-climate interactions in the altiplano: implication of archeological purposes**

AM session: Paleo-environmental reconstruction of Altiplano's archives
Keynote Lecture: Holocene Paleoclimatic and Paleoenvironmental History of the Lake Titicaca Basin (S. Fritz & P. Baker).

PM session: Archeology: historical human – environment interactions
Keynote Lecture: Recent contribution of terrestrial and subaquatic archeological investigation in Lake Titicaca (C. Delaere & M-A. Vella).