Zinc complexing ligands along the Malacca Straits and from rivers in tropical South East Asia: Understanding the connection to regional and global distributions of ligands and bioavailable Zinc

GONZALO CARRASCO[1] AAZANI MUJAHID[2] MORITZ MULLER[3] JANI TANZIL[4] JENNIE LEE[5] FEDERICO LAURO[4] EDWARD BOYLE[6]

[1] Singapore-MIT Alliance for Research & Technology, Singapore
gonzalo.carrasco@smart.mit.edu
[2]Universiti Malaysia Sarawak, Malaysia
[3] Swinburne University, Malaysia
[4] Earth Observatory of Singapore, Singapore
[5] Universiti Malaysia Terengganu, Malaysia
[6] Massachusetts Institute of Technology, USA

Organic complexing ligands dominate the chemical speciation of Zn in seawater, affecting its bioavailability and regulating its micronutrient role. We have shown evidence of water masses in the West Pacific connecting point sources related to marginal seas, riverine matter, benthic fluxes, and continental shelves, with ligand concentrations and binding strengths evolving along water mass trajectories. We used ASV and modern comprehensive mathematical methods.

Here we present results from recent studies in tropical South East Asia that explore (1) in rivers from pristine peatland and with agricultural and industrial anthropogenic influence and (2) a transect along the Malacca Straits with the aim of elucidating fresh natural and anthropogenic material in the organic matter mix that the ligands are a part of. We will compare the results from these sources of organic matter with samples from a transect across the Malacca Straits that reflects what could be transported further out to the South China Sea or the Andaman Sea, with the ligands observed in continental shelves, where the organic matter has suffered biochemical processes, with previous analysis of ligands observed in the West Pacific, after decades of bacterial respiration while travelling along water masses. Preliminary data shows an intriguing disconnect of the strongest ligand between the riverine sources and the oceanic values that we expect to resolve with the Malacca Straits transect. We aim to compare these ligands in order to assess the relevance of these sources of complexing ligands to regulate regional and global distribution of Zn ligands and its bioavailable concentrations.