



## Neodymium and uranium isotopes and rare earth element cycling in the Amazonian mangroves (wet season campaign)

Mangroves are important tropical ecosystems that sequester carbon and regulate the exchange of trace elements between land and ocean. The Amazonian mangrove belt south of the Amazon estuary ( $\approx 542$  km) is one of the world's longest continuous mangrove systems, yet its role in seasonal trace element and isotope cycling remains poorly constrained. Previous work (Xu et al., 2025) indicates that porewater discharge and the dissolution of iron–manganese oxyhydroxides may release rare earth elements (REEs) and control the isotopic signatures of coastal seawaters. However, these conclusions are based mainly on one season observations. Isotope data from mangrove river water and tidal seawater during the rainy season are still lacking, limiting our understanding of seasonal variability and net export fluxes. This project will investigate neodymium (Nd) isotopes, uranium (U) isotopes, and REEs in river water, tidal seawater, porewater, and sediments collected from the Amazon mangroves. The goal is to compare wet- and dry-season datasets and quantify the seasonal controls on trace element cycling and coastal export. **The student will participate in a joint field campaign in Brazil from 11–24 May 2026, including sample collection within mangrove creeks and tidal channels south of the Amazon estuary.** The project combines tropical fieldwork with laboratory-based isotope and trace element analysis.

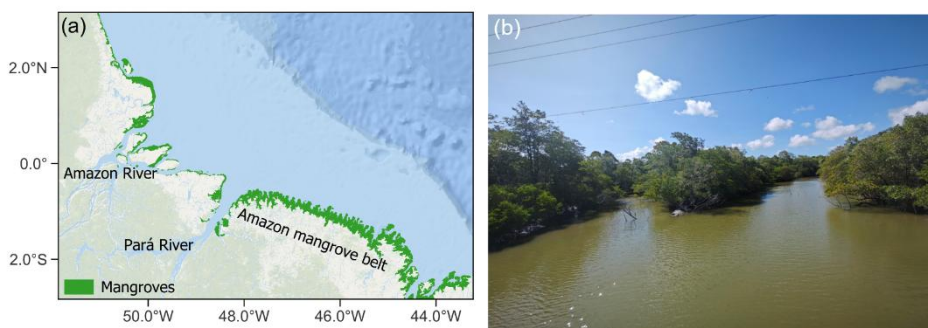


Fig. 1 (a) Map of extensive mangrove forests (green area) south of the Amazon estuary and (b) photo of creek waters within the mangroves.

**Requirements:** Interest in environmental physics and marine geochemistry, basic knowledge of chemistry, and enthusiasm for both field and laboratory work. Portuguese language skills would be a strong advantage for fieldwork in Brazil.

**Contacts:** Interested candidates are invited to contact Dr. Antao Xu ([axu@iup.uni-heidelberg.de](mailto:axu@iup.uni-heidelberg.de)).

Reference: Xu, A., Hathorne, E., Seidel, M. et al. The Amazonian mangrove systems accumulate and release dissolved neodymium and hafnium to the oceans. *Commun Earth Environ* 6, 13 (2025). <https://doi.org/10.1038/s43247-024-01989-1>