Improving mangrove proxies for far-field sea-level reconstructions

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Sea-level reconstructions from low latitude locations over the past few thousand years tell us about global ice melt before the anthropogenic era. Mangroves dominate coastal environments in the low latitudes, and generally accumulate sedimentary deposits in the upper half of the tidal range. Despite being an important far-field archive of sea-level change, mangrove sediments currently make poor sea-level proxies. Problems with microfossil preservation and a limited understanding of the sedimentation processes within mangrove environments makes interpreting these deposits challenging. Our research aims to address some of these issues through a multi-proxy study of modern mangrove environments from the Seychelles archipelago in the Indian Ocean.

We seek to better understand modern mangrove sedimentation processes. A primary objective is to further investigate mangrove sedimentological sea-level proxies, using spatially and vertically-resolved particle size analysis and by monitoring sediment accumulation rates through a mangrove forest. Here we present a dataset of surface sediment grainsize distributions and total organic carbon compositions at two mangrove locations on the island of Mahé, in the Seychelles archipelago.

A second objective is to investigate new organic geochemistry sea-level proxies from mangrove sediments. We hypothesize that sea-level changes via their influence on salinity influence the environmental water composition of a mangrove environment over time, and therefore dominate the isotopic signature of plant lipid biomarkers. We present here preliminary results showing the distribution of lipid stable isotopes from mangrove surface sediments across a salinity gradient, which may be used to reconstruct past salinity and sea-level variations.