Tracking human and regional climate changes in lake sediment records from Flores Island, the Azores

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The ecological landscape of the Azores, in particular Flores Island, was signifcantly altered by human settlement in the first half of the last millennium, in addition to changes driven by variations in North Atlantic climate and regional volcanic activity. We assessed the environmental impacts of regional climate and human-driven changes in the Azores over the past ~1000 years in a lake sediment record from Lagoa Funda. We tested for changes in the terrestrial landscape and the precipitation regime using compound-specific stable isotopic and chain-length distributions of terrestrial leaf waxes. In addition, we analyzed branched and isoprenoidal glycerol dialkyl glycerol teraethers (brGDGTs and isoGDGTs) to track trophic state changes (in particular eutrophication) after human settlement. The shift in lake sediments from massive to laminated mud in the last 500 to 600 years BP coincides with a significant increase in GDGT-0/crenarchaeol, indicative of increased methanogenic archaeal activity in the water column and the formation of bottom water anoxia. The detection of human activity using fecal sterols allows us to further hypothesize the timing of initial human settlement and the associated environmental impact. This research is funded by the research projects RapidNAO (CGL2013-40608-R), and PaleoModes (CGL2016-75281).