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How well suited are maar lakes of Madagascar for palaeoenvironmental multi-proxy reconstructions? – First results from shallow seismic, sedimentological and hydrological investigations in Central and Northwest Madagascar.

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Madagascar is well known for its unique flora and fauna which are frequently in the focus of scientific investigations. However, studies on environmental changes in Madagascar linked to Quaternary climatic and/or anthropogenic impact are scarce. The aim of this initial study is to evaluate the potential of maar lakes, situated in different climatic zones of Madagascar, for paleoenvironmental studies and to identify promising coring sites with continuous sediment sequences reaching far back in time. Therefore, in November 2016, a shallow seismic profiling campaign, combined with surface sediment, short gravity core (max. 1.8 m), water and plankton sampling was performed on three target sites. These were two deep maar lakes, i.e. Andraikiba (Central Madagascar, 50m waterdepth) as well as Amparahibe (46,5m waterdepth) and Andampy Ambatoloaka, a shallow (5m waterdepth during low tide) former maar lake now connected to the Ocean (both NW-Madagascar.
Vertical water parameter measurements in Lake Amparahibe confirm anoxic bottom conditions, while dissolved oxygen values at the water surface are about 7.9 mg/L (103%). Temperature decreases with depth from 29.3 °C to 27.2 °C, and the lake is slightly alkaline with an electrical conductivity of around 245 μS/cm. Since Andampy Ambatoloaka is connected to the ocean, it shows slightly alkaline conditions as well, electrical conductivity is high (∼57.8 mS/cm) and dissolved oxygen and temperature values are relatively stable at about 8.2 mg/L (104%) and 28.1 °C, respectively.
The shallow seismic survey shows an infill with layered sediments of >50 m thickness in Lake Andraikiba. In Lake Amparahibe natural gas in the sediment prevented deeper penetration, however the record shows 10 m of undisturbed, layered sediments in the uppermost part. Sediment cores obtained from both lakes consist of dark brownish to blackish, clayey to silty and partly laminated sediments. High values of magnetic susceptibilities (>1800*10-6 SI) and high contents in organic matter, indicate a mixed signal of terrestrial input and intra-lake productivity, with sedimentation most probably under anoxic conditions. The marine site, in contrast, is influenced by tides, and characterized by coral debris in the shallow parts of the maar and grey silty sediments in the central part with a water depth of 5 m during low tide.
However, initial results indicate that a combination of these maar lakes along climatic gradients hold a high potential for paleoenvironmental reconstructions even on long timescales.