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Towards a comparison of interglacial climate variability in the tropics during the last 300.000 years

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To better estimate effects of current climate change on the water cycle in the highly variable tropical region, past periods of similarly warm climate conditions can provide unique insights. The interglacial phases of the past 800,000 years are promising targets for this purpose, since these provide a natural variety of different climate configurations. While several reconstructions of past interglacial periods are available, the terrestrial, and in particular tropical regions are still under-represented in the record. Speleothems can be used to observe changes and effects on the eco- and climate system as well as their coupling on seasonal to millennial time scales, which usually cannot be resolved by climate model simulations.

This project aims to further close the research gap of these regions with investigations of stalagmites from Cueva Larga, Puerto Rico. Cueva Larga is a well-monitored location[1,2,], and speleothem records from this cave have demonstrated a high sensitivity to regional and global climatic variations, in particular changes in the position of the ITCZ, Atlantic sea surface temperatures and ocean circulation[3,4]. First precise ^{230}Th/U ages on previously collected stalagmites show the potential to reconstruct climatic variations during parts of the past interglacials of the past 300,000 years, i.e., MIS1, MIS, 5, MIS7, and MIS9. In the next step, time series from high-resolution trace element and stable isotope measurements ($\delta^{18}O$ and $\delta^{13}C$) from these interglacials will be conducted.

The multi-proxy speleothem time series will allow to improve the quantitative and qualitative understanding of precipitation intensity and variability during interglacials and also help to constrain both the sensitivity of the Earth system in the tropics to different climatic drivers and the extent of current climate change compared to natural variability.

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