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Seasonal changes in Holocene and Last Interglacial Asian Monsoon climate: evidence from Seychelles corals

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The major goal of the project was to provide the first seasonally resolved paleoclimatic data set from the western tropical Indian Ocean covering time slices during the Holocene and the Last Interglacial. We choose the Seychelles, because the climate is dominated by the seasonal reversal of the monsoon. We obtained high quality fossil coral material suitable for precise dating using the U/Th method. We checked the samples for diagenetic alteration using X-ray diffraction and petrographic thin sections. We analysed seven fossil corals (8-36 years) for oxygen and carbon isotopes and Sr/Ca plus Mg/Ca ratios. The time slices covered by our data set (2.1kyr, 3.8kyr, 4.15kyr, 5.2kyr, 6.2kyr, 136kyr, 275kyr) are very interesting because they group around major climatic events indicating stronger or weaker monsoon circulation. The coral data for the first time report on ocean seasonality during the highly instable phase in monsoon climate resulting in the changeover from a green to a dry Sahara at 6 kyr BP. We performed model runs (ECHAM5/MPI-OM1; ECBilt-CLIO-VECODE) to specifically investigate seasonality of sea-surface temperatures, precipitation and winds for the periods covered by our corals.

The corals indicate reduced seasonality in sea surface temperature at 2, 3.8 and 6 kyr BP, similar seasonality at 4.15, 136 and 275 kyr BP. The corals also indicate changes in seawater oxygen isotopic composition on interannual and decadal scales. Thus, we can provide new insights on tropical climate variability during periods of varying monsoon strength.