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Indian Ocean Monsoon Variability recorded in Holocene High-Resolution Speleothem Records From Soqotra Island (Yemen).

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Situated in the Indian Ocean between the Horn of Africa and the Arabian Peninsula, Soqotra island captures meteoric rainfall twice a year, due to the migrating inter-tropical convergence zone (ITCZ), offering continental proxies -in the form of speleothems- to register Indian Ocean Monsoon (IOM) variability. Due to the recent availability of meteorological data (rainfall and temperature) of 11 manual stations recorded over the last 5 years, we calculated that approximately 85% of the rainfall is related to the NE Monsoon period, while only 15% is related to the SW Monsoon period with an important irregular geographical distribution over the island. As seasonal fluctuations of rainwater oxygen isotopic composition are related to the amount of rainfall, differences in the oxygen isotopic compositions of meteoric waters versus groundwater are used to estimate amount and timing of karst aquifer recharge. At the NE limestone plateau karstic recharge only takes place during the NE Monsoon rainy period when a rainfall threshold of 80 to 90 mm is exceeded, explaining the more negative cave drip waters and groundwater in general. Two caves in this area were chosen as research location and the isotopic composition of nowadays forming speleothem calcite was monitored by sampling drip waters and collecting freshly deposited calcite on glass slabs. A sampled speleothem from Hoq Cave (SSTM1) and one from Casecas Cave (S-STM5) have formed over the past 6 ka BP and the past 1 ka BP (TIMS U/Th dating) respectively. Both speleothems display alternations of dark compact and white porous layers, which are interpreted as seasonal variations because they coincide with carbon and oxygen isotopic variations as observed by measurements at

a 50 μm resolution. At the two sampling locations, distant of 6 km, both speleothems present similar isotopic changes over the last 1 ka, controlled by the NE Monsoon rainfall variability. Correlations with other proxies in the same region will contribute to a better understanding of the IOM system.