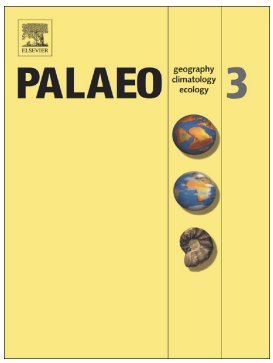

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Seasonal trends in calcite-raft precipitation from cenotes Rainbow, Feno and Monkey Dust, Quintana Roo, Mexico: implications for paleoenvironmental studies

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Abstract

Calcite-raft precipitation was monitored in three Yucatan cenotes (Rainbow, Feno and Monkey Dust) over a 2-year period. Site-specific variables including water temperature, relative humidity, water level and salinity were recorded as well as rainfall (Cozumel). Calcite-raft surface area was monitored through trail cameras that collected photographs every 60 minutes. Accumulation rates were recorded using sediment traps that were collected in May and December of each year. Calcite-raft surface area was calculated using an image segmentation procedure that identified the boundary of objects (edge detection) that share certain pixel characteristics, removed non-points of interest and measured the sum of the area covered by the raft material. Results show that large rainfall events have a regional effect on the meteoric water mass (i.e. salinity), as well as the precipitation of calcite rafts. The large rainfalls and increased inflows cause dilution of the $CaCO_3$ supersaturated condition of the meteoric water mass and cause increased flow hindering calcite-raft precipitation for days to weeks after the rainfall. Raft precipitation gradually returns with deceasing flow after the event, and stagnation allows the recurrence of $CaCO_3$ supersaturation and accumulation of nucleation particles. Small rainfalls