

4.63.P03

The climatic variability in the last 3000 years from the stalagmite records in the Guizhou Qixing Cave, China

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The TIMS-U series ages and the $\delta^{18}\text{O}$ values of the stalagmite from the Guizhou Qixing Cave (26°4'N, 107°16') have been determined using the MAT-262-RPQ and Delta-S mass spectrometers.

The stalagmite was developed in the period of 3145-200 a B.P and suffered in the four stages of the climatic-environmental variance.

The climatic characteristics in the first stage appeared in warmth and wetness with much rain, which corresponded to the late Holocene Megathermal Period (3145-2927 a.B.P.). However, Those in the fourth stage appeared in cold and dryness with less rain, which was relevant to the Little Ice Age 545-200 a.B.P.). The $\delta^{18}\text{O}$ values of the stalagmite are ranged from -5.98 to -3.51‰ with an average of -4.95‰, which revealed the Indian Oceanic and East-Asian summer monsoon gradually getting weaker in the Guizhou areas in the last 3000 years. That was consistent with the solar irradiation getting less in the North Hemisphere.

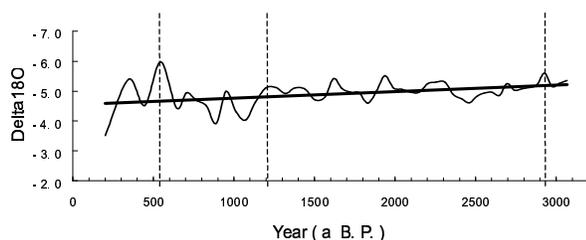


Fig.1. The $\delta^{18}\text{O}$ variant curve of the stalagmite (ZFQX2) from the Guizhou Qixing Cave

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4.63.P04

Sr/Ca ratios in Caribbean sclerosponges as temperature proxy

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Sclerosponges build massive calcareous skeletons in isotopic and chemical equilibrium with seawater. Their skeletons cover time intervals up to several centuries because of their slow growth rate between 0.1 to 0.4 mm/y. Therefore they are excellent archives for the reconstruction of past environmental conditions.

We investigated a specimen of sclerosponge *Ceratoporella nicholsoni* from 20 meters below sea level at Jamaica (Caribbean). Based on U-Th dating, this specimen covers a time interval of 600 years. Using a microdrill, a continuous profile along the growth axis of the sponge was sampled and analyzed with ICP-OES. Sr/Ca ratios were measured with a roughly monthly resolution in a time frame of 120 years, from the early 17th to the mid 18th century.

We find a seasonal signal in the Sr/Ca ratios. Growth rates determined by the annual Sr/Ca signal match the calculated growth rate based on U-Th dating.

Sr/Ca ratios in sclerosponges are an excellent temperature proxy with a temperature sensitivity of about -0.1 mmol/mol/K [1, 2]. We reconstruct the temperature history with a seasonal resolution for a certain interval of the Little Ice Age, including the Maunder Minimum. Annual temperature variations in this record have amplitudes of up to 1°C. This should be interpreted as a minimum signal, because the high resolution sampling technique does not prevent smoothing effects. Long term trends indicate a minimum temperature decrease of about 1°C from the early 17th century towards 1700 followed by an 1°C increase towards the mid 18th century.

These temperature variations during the Maunder Minimum are significantly larger in the Caribbean than the mean northern hemisphere variations [3].

References

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