

A 500-year seasonally resolved $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$, layer thickness and aspect record from a speleothem in the Han-sur-Lesse cave, Belgium

MAÏTÉ VAN RAMPELBERGH¹, SOPHIE VERHEYDEN^{1,2},
EDWARD KEPPENS¹ AND PHILIPPE CLAEYS¹

¹Earth System Sciences, VUB, Pleinlaan, B-1050, Brussels, Belgium

²R B I N S, Jennerstraat 13, B-1000, Brussels, Belgium

The top 56 cm of a fast growing (ca. 1 mm/y) seasonally laminated speleothem (Han-sur-Lesse, Belgium) are analysed for δO , δC , layer thickness and changes in calcite aspect. The record goes from 2001 to 1479 AD based on layer counting and 20 U/Th-ages. The proxies are seasonally biased and document drier and colder winters on multi-decadal scales. During such winters δC are higher, reflecting increased PCP, and layers are thinner and darker related to slower growth. Unusually dry and cold winters occur in 1565 to 1610, at 1730, 1770 to 1800, 1810 to 1860, and 1880 to 1895, which agrees with historical and instrumental records. More relative climate variations, with the 4 proxies varying independently and less intense, occur from 1479 to 1565, 1610 to 1730, and 1730 to 1770. The winters during the first and last period are wetter (and warmer), but drier (and cooler) from 1610 to 1730. These interpretations correspond with warmer vs. colder periods respectively in historical data and reconstructions. Our interpretation of the seasonal δO and δC variations differs from that on the higher scale. δO variations suggest a 2.5 °C seasonality in cave air temperature during the two relatively wetter (and warmer) winter periods, which corresponds to the seasonality observed today, while a 1.5 °C seasonality indicates colder summer temperatures during the drier and cooler interval from 1610 to 1730. Variations in seasonality of δC are driven by changes in PCP intensity.