



## **High resolution geochemical proxy record of the last 600yr in a speleothem from the northwest Iberian Peninsula**

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In meteorology and climatology, the instrumental period is the period where we have measured directly by instrumentation, different meteorological data along the surface which allow us to determinate the evolution of the climate during the last 150 years over the world. At the beginning, the density of this data were very low, so we have to wait until the last 75-100 years to have a good network in most of the parts of the surface. This time period is very small if we want to analyze the relationship between geochemical and instrumental variability in any speleothem. So a very high resolution data is needed to determinate the connection between both of them in the instrumental period, to try to determinate de evolution of climate in the last 600 years. Here we present a high resolution speleothem record from a cave located in the middle of the Cantabrian Mountains without any anthropologic influence and with no CO<sub>2</sub> seasonal variability. This 600yr stalagmite, dated with U/Th method with a growth rate from 100 to 200 micrometers/yr calculated with Bchron model, provide us accurate information of the climate conditions near the cave. Trace elements are analyzed at 8 micrometers intervals by Laser Ablation ICP-MS which resolves even monthly resolution during the last 600 years with special attention with Sr, Mg, Al and Si. This data, without seasonal variability and with the presence of a river inside the cave, give us very valuable information about the extreme flood events inside the cave during the whole period, which is related with the precipitations and the snow fusion events outside the cave. We identify more extremely flood events during the Little Ice Age than in the last 100yr. As well, we have trace elements data with spatial resolution of 0.2mm analyzed with ICP-AES which allow us to compare the geochemical variability with both technics. We also analyze stable isotope d13C and d18O with a spatial resolution of 0.2mm, so we are able to identify variations and all possible correlations between them, trace elements and instrumental records from the different weather stations located near the cave. We use instrumental data, and the statistical correlation between our proxy and them, to calibrate and analyze the variability along the 600yr which provide us a lot of information about the climate variability. In spite of the significant global warming during the last 25 years, we have less variability during this period than along the transition between the Medieval Warm Period and the Little Ice Age. We also analyze this variability along the 600 years with wavelet analysis, with special attention in the instrumental period. With this mathematical method, we can identify several cycles both in trace elements and stable isotopes at special scales compatible with the decadal and multidecadal variability with a value similar to very important climate index like AMO.