Geophysical Research Abstracts
Vol. 17, EGU2015-10581-1, 2015
EGU General Assembly 2015

Exploring the potential of UV-spectral luminescence on different types of stalagmites

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The application of UV- spectral luminescence scanning (UV-SLS) has become an established method to reconstruct river discharge and associated precipitation form coral records. The studies on coral cores have shown that relative variations of the green and blue intensities emitted after exposure by UV light are related with relative concentrations humic acids. We explore the potential of UV-SLS on 7 stalagmite samples originating from three caves with very different settings. Three of the selected stalagmites originate from the Cloşani Cave (Romania), two stalagmites from the Zoolithencave (Germany) and two stalagmites from the B7-Cave (Germany). All stalagmites were polished before scanning with the Avaatech core scanner at the NIOZ (Netherlands) using both UV and visual light. This scanner is equipped with a UV-LED light source and can continuously record the emitted UV-SLS with a CCD line-scan camera ($\sim$70m/pixel).
Under visual light the stalagmites from Zoolithencave show fine laminations of lighter and darker brownish layers. Both samples from B7-Cave show several brownish detritus layers as well as milky parts, but also some dark/clear parts with a visible lamination. Finally, the stalagmites from Cloşani Cave are very different with one stalagmite showing alternating white and dark/clear lamination, while a second one is more or less completely clear and a third one showing brownish detritus layers as well as dark/clear and milky parts.
Preliminary UV-SLS results reveal that the very clear stalagmite C09-2 from Cloşani Cave does not show any luminescence. Similarly, all brownish detritus layers in the different speleothems turn opaque, which proofs to be useful to detect hiatuses in speleothems. Furthermore, the whiter parts in the stalagmites B7-1, B7-7 (B7-Cave) and C09-1 (Cloşani Cave) show stronger luminescence than the darker/clearer parts. The stalagmite Stam-4 (Cloşani Cave) shows a clear lamination of alternating white and dark/clear layers, which also appears in the luminescence scans with more luminescence in the white than in the dark layers. The brownish layers in the speleothems from Zoolithncave show higher luminescence than the clear layers, which could be interpret as more humic acids contained in the brownish layers.
These preliminary results show the potential of UV-luminescence scanning for analysing speleothems and also indicate which stalagmites may be appropriate for this type of analysis. More detailed comparison with elemental chemistry and stable isotopes is planned to further explore the potential of UV-SLS analysis of speleothems.