## POSTER presentation 75: Wednesday

# Detection of speleothem growth bands with an open source geophysical software

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Speleothem growth bands are commonly referred as one of the parameters that are used for paleoclimate reconstructions. Accordingly, this work presents a new tool for detecting these bands based on the gray-scale image of the speleothem using the Mirone open source geophysical software. This program has initially been developed for working on georeferenciated images for geophysical studies, as for instance for recognizing paleomagnetic inversions from deep-sea sediments. This recognition based on gridded images is very similar to what is needed for the recognition and detection of speleothem growth bands. The detection is made by localizing the minimum gray values on the color profile extracted automatically from the speleothem photography just by tracing a line on the image. As the minimum values are pointed on the profile, the corresponding locations appear with a dot symbol on the speleothem gray-scale photography. This process can be repeated as often as wanted and bands can then be individualized and their width measured. The overall process can be defined as friendly mostly if the image is already georeferenciated and in gray-scale. Nevertheless, Mirone software also allows preparing the image into geotiff format, which can then be directly used for digitally assisted detection of the speleothem growth bands.

# *Climate Change – The Karst Record (KR6) University of Birmingham 26-29th June 2011 with pre- and post-conference field trips*

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# Detection of speleothem growth bands with an open source geophysical software

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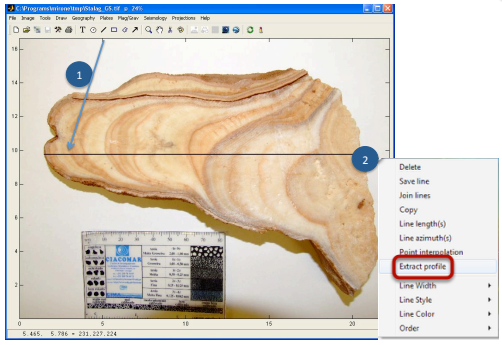
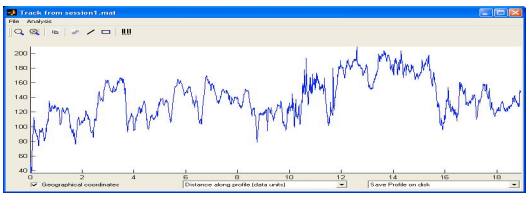
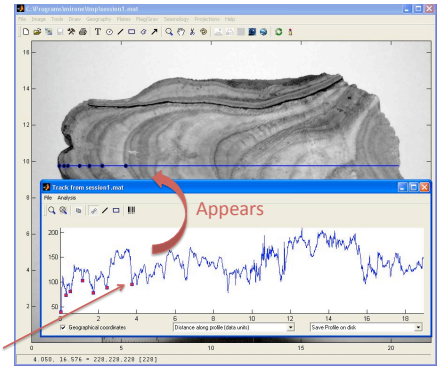
**1 - Mirone[1] software:** Mirone is a MATLAB-based framework tool that allows the display and manipulation of a large number of grid/images formats through its interface with the GDAL[2] library. Its main purpose is to provide users with an easy-to-use graphical interface to manipulate GMT[3] grids. In addition it offers a wide range of tools dedicated to topics in the earth sciences, including now semi-automatic recognition of speleothem growth bands.



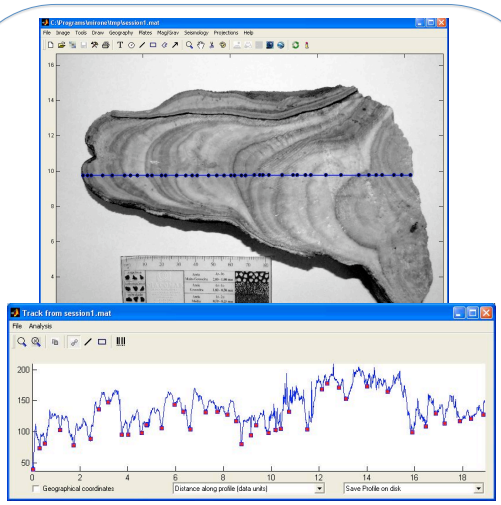

**2 - Gridded images:** Gridded images are equivalent to georeferenciated images. They can be registered from a camera photography, a scan or even an X-Ray image as long as there is a scale. Working image must be in one band color (grayscale).



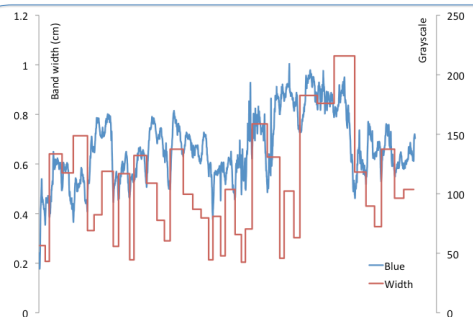
**3 – Grayscale profile:** First step to extract the profile is to select the location of that profile by drawing a line (n°1 in figure 2). Then, extract the grayscale gridded profile (n°2 in figure 2) and it appears in a new window from which it can be saved.




**4 – Band limits detection:** The grayscale profile allows to select a value of interest, for instance minimum values, and the corresponding point is automatically placed on the image.



**5 – Speleothem growth bands:** Because the red dots represent the growth band limits, their location on the grayscale profile (.dat) and the image can be saved (.tiff) .




**6 – Processed growth band data:** Growth band width data can be processed in any software and coupled with other information.

**References:**
(1) J. F. Luis. Mirone: A multi-purpose tool for exploring grid data. Computers & Geosciences, 33, 31-41, 2007, http//w3.ualg.pt/~jluis/MIRONE.
(2) GDAL - Geospatial Data Abstraction Library, http://www.gdal.org/.
(3) GMT – Generic Mapping Tools, http://gmt.soest.hawaii.edu/.

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