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Magnetostratigraphy of the Chicxulub YAX-1 drill core - Secondary components and short polarity intervals?

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Paleomagnetic and magnetostratigraphic methods, coupled with detailed petrophysical data, provide a useful way to map impact structures and to date them (Elbra, et al. 2004). However, paleomagnetic data of drill cores must be interpreted with caution since they can be influenced by several processes. In the current work we are studying the Yaxcopoil-1 drill core samples from Chicxulub impact crater in order to obtain a more detailed (magneto-) stratigraphy of Yax-1 drill core and to identify various processes affecting paleomagnetic properties of the core.

Results of AF-demagnetization of the cores reveal that the impact layer has a primary R-polarity magnetization within the chron 29R as generally accepted. However, the data are more complex. For example, the 29 R-polarity samples carry also a superimposed normal polarity component. In addition, there are three or four short normal polarity events within the 29R-chron. The origin of these presumably secondary N-components and the presence of short N-polarity intervals within the 29R can be caused by: (i) handling of drill core samples in storages by a variety of people that may lead to artificial up or down orientations of some samples; (ii) although the impact layer is generally highly magnetic many of the samples are very weakly magnetized having intensities near to the noise level of the used SQUID-magnetometer, which may lead to erroneous polarity assessments, and (iii) hydrothermal processes as well as fluid activity, initiated by the impact, can remagnetize the samples partially or totally with a change in their original polarity. These processes can produce mixed polarities, where the identification of the primary polarity is hampered.

In the upper part of the target rocks, below the impact layer, the paleomagnetic data show also evidences of secondary overprints which may be related to post-impact

hydrothermal processes. However, the lower part of the target rocks as well as the very upper portion of the post-impact sediments should reveal more straightforward magnetostratigraphy.

References

Elbra, T., Pesonen, L.J., 2004. The Chicxulub Impact - Connection to K/T Boundary Event Based on Petrophysical and Paleomagnetic Investigations. EOS Trans. AGU. 85847, Fall Meeting Suppl., CD-ROM