

Revealing past environmental changes on the Antarctic Peninsula by analyzing high resolution sedimentary records from Lake Esmeralda, Vega Island

Anna Pířková (1), Daniel Nývlt (2), Matěj Roman (3), Juan Manuel Lirio (4), and Kateřina Kopalová (1)

(1) Department of Ecology, Faculty of Science, Charles University, Prague, Czech Republic (anna@piska.net), (2) Department of Geography, Faculty of Science, Masaryk University, Brno, Czech Republic, (3) Department of Physical Geography, Faculty of Science, Charles University, Prague, Czech Republic, (4) Instituto Antártico Argentino, Buenos Aires, Argentina

Topographically and climatically, the environment of the Antarctic Peninsula (AP) differs significantly from Continental Antarctica. The AP forms an unbroken chain of rugged, alpine topography, which forms a climatic barrier separating the warmer Bellingshausen Sea on the western coast from the colder Weddell Sea on the east. The AP has experienced one of the highest temperature increases on Earth in the second half of the 20th century as a response to the ongoing global warming (Turner et al., 2005). However, the last decade was colder and a significant decrease in air temperature was detected especially in the north-eastern part of the AP (Turner et al., 2016; Oliva et al., 2017). The extreme sensitivity of the area to climate change represents exceptional potential for AP palaeoclimatic records either from marine, lacustrine, or ice cores.

We have analysed several sedimentary cores from yet unstudied Lake Esmeralda, which was formed as a result of the last deglaciation during the Pleistocene/Holocene transition. We here focus on the longest (177 cm) core that could record environmental changes of the past millennia. In order to describe both inorganic and organic components of the sediment we used a combination of the following methods: XRF, XRD, magnetic susceptibility measurement, chemical analysis for determination of cation exchange capacity, grain size analysis, geochemical analysis (TIC, TOC, TS), high pressure liquid chromatography (HPLC) and diatom community analysis. This combination of methods gave us an insight in the past environmental changes in the lake catchment as well as in the lake body. More specifically it enabled us to define periods of enhanced weathering and to distinguish colder and warmer phases. The preliminary results will be completed with age-depth model resulting in a high resolution multi-proxy record that will contribute to a better, more detailed picture of the past climatic and environmental changes in the north-eastern AP region.

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