Geophysical Research Abstracts
Vol. 12, EGU2010-9174, 2010
EGU General Assembly 2010

Core scanning procedures and first characterisation of the 106 m long lacustrine sediment record of Laguna Potrok Aike, Argentina (ICDP-project PASADO)

Christian Ohlendorf (1), Dirk Enters (2), Catalina Gebhardt (3), Annette Hahn (1), Pierre Kliem (1), Bernd Zolitschka (1), and the PASADO Science Team (4)

(1) University of Bremen, GEOPOLAR, Institute of Geography, Bremen, Germany (ohlen@uni-bremen.de), (2) Lower Saxony Institute for Historical Coastal Research, Wilhelmshaven, Germany, (3) Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany, (4) PASADO science team as cited at: http://dc-app1-02.gfz-potsdam.de/site/contacts/contacts-search-all?select=3&term=pasado

Drilling operations for the southernmost ICDP project dedicated to terrestrial paleoclimatic reconstruction, the "Potrok Aike Maar Lake Sediment Archive Drilling Project" (PASADO), were completed in late November 2008. In the maar lake Laguna Potrok Aike (52°S, 70°W; 116 m asl.; diameter: 3.5 km, water depth: 100 m) in southern Patagonia, Argentina in total 510 m of lacustrine sediments have been recoverd using the GLAD800 platform equipped with a CS-1500 drill rig. Quadruplicate and triplicate cores down to a maximum depth of 101.5 m below lake floor have been taken using mainly the hydraulic piston coring tool. Total core recovery was 94,4 % from two drillsites located 700 m apart from each other in the central profundal plane of the lake. In 2009 all cores from Site 2 (southern basin plane) and most cores from Site 1 (central basin plane) were opened, described, documented by digital high resolution photography and scanned with different non-destructive techniques. A 106.08 m long composite profile was constructed for Site 2 based on visual core correlation and was then subsampled completely in consecutive 2 cm thick intervalls. Core scanning was performed in 5 mm steps for all parameters and involved the following techniques: 1) color scanning with a handheld X-rite spectrometer, 2) magnetic susceptibility scanning with a Bartington MS2F-sensor, 3) XRF scanning and X-radiography with an ITRAX core scanner (COX analytical systems) and 4) p-wave velocity/transmission seismograms and gamma ray absorption with a modified Geotek MSCL tool.

According to the preliminary age model, the sedimentary record from Laguna Potrok Aike reaches back to OIS 3 and exhibits contrasting lithologies downcore especially in the Pleistocene part of the record. Moreover, first estimates indicate that up to 50% of the record consist of redeposited sediments. To account for these pronounced downcore lithological changes it was necessary to adjust the XRF-scanning parameters (i.e. X-ray tube current) for each individual core section accordingly in order to obtain suitable XRF spectra. As a consequence, it is necessary to harmonise the acquired element profiles when constructing composite element stratigraphies in order to avoid distinct steps in the XRF-counts of consecutive sections measured with different instrument settings. In this contribution we describe the procedures that were used to harmonise the XRF-scanning data and present first results of the resulting element stratigraphies.

As a terminal lake, the sedimentary record of Laguna Potrok Aike is well suited to trace temporal changes in the hydrological cycle. Subaerial and subaquatic terraces evidence large lake level variations of +21 m to -35 m during Holocene and Late Glacial periods. Changes in lake level have been previously reconstructed by variations in the TIC percentages and the XRF Ca-counts in the sedimentary record. However, while the element profile of Ca is controlled by the proportion of authigenically precipitated calcite in the lake during Holocene and Late Glacial times this seems to be different during the earlier periods of the Pleistocene. Hence, XRF Ca-counts in this older intervall, which represents more than 80% of the sediment thickness recovered during the PASADO drilling campaign, seem to be controlled by different mechanisms.