PALEOVAN

Lake Van Drilling Project
Turkey

Goal & Scientific Objective

The main objectives of the PALEOVAN project are the recovery and analysis of a long continental paleoclimate record in a sensitive, semiarid region. This includes exploration of the dynamics of lake-level fluctuations and hydrogeological development and analyzing organic matter content and composition (biomarkers). Further scientific goals are the temporal, spatial and compositional evolution of explosive volcanism as reflected in the succession of tephra deposits, as well as the reconstruction of earthquake activities. In addition the sediments may host key pathways for migration of continental and mantle-derived noble gases to be analyzed in pore waters.

Operational Achievements

Two sites were multiple-cored, Northern Basin (NB) with 4 and Ahlat Ridge (AR) with 7 holes.

The drilling took place in water depth of 245 m (NB) and 360 m (AR).

Cores were retrieved from sub-lake-floor depths of 140 m (NB) and 220 m (AR) depth.

The total length of recovered cores is over 800 m.

Downhole logging (by LIAG Leibniz Institute for Applied Geophysics), MSCL (Multi Sensor Core Logger), deep biosphere sampling and noble gas sampling was conducted at both sites. MSCL measured all recovered core sections and yielded wet bulk density, magnetic susceptibility, and p-wave velocity data.

Data & Sample Access

Downhole data and core description data are available on the ICDP website upon request.

Cores are stored at the MARUM – IODP Bremen Core Repository.

Web & Media Resources

http://van.icdp-online.org/

http://earth.esa.int/ers/ers_action/van.html

www.geo.uni-potsdam.de/ICDP_Homepage/highlights/

www.deuqua.org/2015/02/12/neuer-blog-artikel/ (in german)

www.youtube.com/watch?v=_Wpx93K7bGU (in german)

Timeline

2007 ICDP proposal submission

2010 (May-June) drilling operations

Principal Investigators

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Barge at drilling site

Scientific Findings

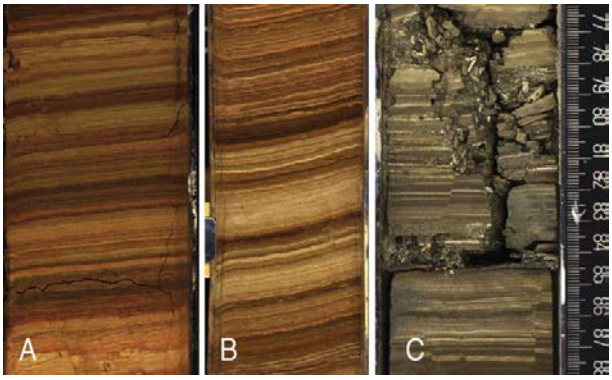
The Ahlat Ridge record encompasses more than 0.5 Ma of paleoclimate and volcanic/geodynamic history, providing the longest continental record in the entire Near East to date.

Lake Van evolved from a Ca-carbonate dominated freshwater body with a neutral pH to a high-pH Na-carbonate dominated saline water body.

The glacial/stadial vegetation in the Lake Van region during the last 0.6 Ma can be described as dwarf-shrub steppe and desert steppe with Ephedra, Artemisia, chenopods, grasses and forbs.

The Lake Van pollen record underlines the different environmental correspondence to global climate change in the continental interior of the Near East compared to the global ice volume and/or greenhouse gas.

Porewater salinity measurements enable reconstruction of past lake volumes. On long time-scales, the salinity of Lake Van is likely to be directly linked to large-scale climate forcing.



Finely laminated background deposits from Ahlat Ridge (Litt et al. 2012).

Key Publications

Huguet, C.; Fietz, S.; Stockhecke, M.; Sturm, M.; Anselmetti, F.S.; Rosell-Melé, A. (2011): Biomarker seasonality study in Lake Van, Turkey. Organic Geochemistry 42 1289-1298. doi:10.1016/j.orggeochem.2011.09.007

Litt, T.; Anselmetti, F.S.; Baumgarten, H.; Beer, J.; Cagatay, N.; Cukur, D.; Damci, E.; Glombitza, C.; Haug, G.; Heumann, G.; Kallmeyer, J.; Kipfer, R.; Krastel, S.; Kwiecien, O.; Meydan, A.F.; Orcen, S.; Pickarski, N.; Randlett, M.E.; Schmincke, H.U.; Schubert, C.J; Sturm, M.; Sumita, M.; Stockhecke, M.; Tomonaga, Y.; Vigliotti, L.; Wonik, T.; the PALEOVAN Scientific Team (2012): 500,000 Years of Environmental History in Eastern Anatolia: The PALEOVAN Drilling Project. Scientific Drilling 14 18-29. doi: 10.2204/ iodp.sd.14.02.2012

Litt, T. and Anselmetti, F.S. (eds.) (2014): Results from the PALEOVAN Drilling Project: a 600,000 year long continental archive in the Near East. Quaternary Science Reviews 104 1-126, Special Issue.

Tomonaga, Y; Brennwald, M. S.; Livingstone, D. M.; Kwiecien, O.; Randlett, M.-E.; Stockhecke, M.; Unwin, K.; Anselmetti, F., S.; Beer, J.; Haug, G. H.; Schubert, C. J.; Sturm, M.; Kipfer, R. (2017): Porewater salinity reveals past lake-level changes in Lake Van, the Earth's largest soda lake. Nature Scientific Reports 22;7(1):313. doi: 10.1038/s41598-017-00371-w