



Seismic Pre-Site Survey for a potential new ICDP site – PaleoVan - at Lake Van, Turkey

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Lake Van (eastern Anatolia in Turkey) is the fourth largest of all terminal lakes in the world (volume of 576 km³, max. diameter 130 km WSW-ENE and max. depth of 451 m). The lake is located in a tectonically very active region and is surrounded by volcanoes. A lava dam blocking the outflow of the lake results from an eruption of Nemrut Volcano (to the west of the lake) approximately 100,000 to 200,000 years ago. Previous scientific investigations have shown that the sediments are annually laminated. Therefore the sediments of Lake Van can act as high-resolution archive for reconstructing changes of the geo-biosphere and the climate system in the Near East region during the Quaternary.

During the meeting of the European Lake Drilling Program in 2001 it was suggested to start with a proposal development for large lake drilling with the ICDP equipment pool GLAD800. In this context we carried out a seismic pre-site survey at Lake Van from June 1st to June 15th 2004. In total we collected 50 profiles with a length of ~850 km by means of a high-resolution multichannel seismic system and a GeoChirp system. Based on first results of the new seismic data, up to 10m-long cores were taken in Lake Van using a specially developed deep-water piston corer. The new seismic and core data will be the basis for the development of an ICDP-proposal for Lake Van.

The deepest part of the lake is the Tatvan Basin with an average water depth of about 450 m. Sediment thickness in the basin is larger than 550ms two-way-traveltime

(>400m). The basin is bounded by faults which suggest ongoing subsidence of the basin. Tatvan Basin shows an alternating succession of well-stratified and chaotically reflecting layers. The chaotic sediments indicate slump and slide deposits, which are probably the result of quick lake level fluctuations but earthquakes can act as trigger of the slumps and slides as well. The well-stratified sediments of the main basin are occasionally intercalated by lahar deposits and turbidites. In contrast, a small elongated secondary basin shows undisturbed sediments, which suggests a promising location for an ICDP-site. Two dated ash-layers, which can act as marker-horizons in the entire survey area, give a sedimentation rate of about 75cm/1000a for the secondary basin during the Holocene. A small sedimentary ridge divides the large Tatvan Basin from the smaller secondary basin. Sedimentation rates on the sedimentary ridge are reduced by approximately 30% but a first analysis of a newly collected core on the ridge indicates the absence of any lahar or turbidite deposits.

The most prominent features of the lacustrine slope and shelf are prograding deltaic sequences, a karst-like topography, as well as a large number of erosional and depositional unconformities, reflecting the variable history of Lake Van. Numerous buried prograding deltaic sequences and erosional unconformities in the eastern part of the lake indicate that the lake level dropped in several periods for at least 300 m. The karst-like topography in shallow areas of the lake shows U- and/or V-shaped depressions, which could have been eroded by sediment-laden currents; but an origin as a result of the upward migration of gas and water and the formation of pockmarks is possible as well.