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Paleogeophysical characterization of a climate archive based on downhole logging in the ICDP project PALEOVAN

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Lake Van (eastern Anatolia, Turkey) is the 4th largest terminal lake worldwide and is located at a key climatic position. Past climate changes have been recorded in the sensitive hydrological system of Lake Van, which is evident from terraces around the lake. The lake sediments archives approximately 500,000 years of climate history. The ICDP project PALEOVAN aims to enhance the understanding of the paleoclimatic and paleoenvironmental conditions of the Middle East.
Investigations (shallow coring, surface geophysics) have been started in 1970's and a deep drilling campaign has been executed in summer 2010. Two boreholes with total depth of 140 m (Northern Basin) and 220 m (Ahlat Ridge) were drilled; the core recovery was about 91 % (Ahlat Ridge) and 71 % (Northern Basin). The Ahlat Ridge site is located in a deep basin of Lake Van (water depth: 375 m). Results from a geophysical survey indicate, that an undisturbed sedimentary sequence is preserved. The lithology consists mainly of clayey silt and tephra deposits, which originates from several volcanoes in the surrounding of Lake Van.
A continuous dataset of downhole data (spectral gamma ray, magnetic susceptibility, dipmeter, and resistivity) as well as partly sonic data have been achieved at both sites.
Spectral gamma ray, resistivity, and susceptibility data have been interpreted by applying multivariate statistics (cluster analysis). The logs have been subdivided into cluster units based on similarities in their physical properties. The lithological information from the visual core description has been taken into account and associated lithological units have been derived.
The tephra deposits at the Ahlat Ride drillsite are characterized by strong differences in their physical properties. The tephra differ mainly in their natural radioactivity and susceptibility values. In cooperation with other PALEOVAN working groups, not only differentiation but also linking with different volcanic sources and eruption phases is possible.