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Volcanic, tectonic and climate forcing of the system Nemrut-Süphan-Lake Van: dating Late Glacial lake level changes of Lake Van more precisely, tectonic uplift of lake sediments and paleoclimate proxies derived from land deposits

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Alkaline Lake Van and adjacent active Nemrut and Süphan stratovolcanoes represent a coupled system that evolved in time and space by a combination of volcanic, geodynamic and climate forcing. Nemrut volcano has supplied >90 % of the ca. 25 vol. % of volcanic fraction in the sediments drilled in 2010 in the ICDP Paleovan Project.
Preliminary 40Ar/39Ar ages suggest inception of the lake close to 600 ka, possibly coincident in time with building-up of Nemrut in the hinge area between Muş and Van basins. Tephra layers on land and in the cores occur in clusters suggesting distinct periods of eruptive swarms lasting hundreds to thousands of years. This episodic explosive volcanic behavior may be basically controlled by magma ascent rates modulated and triggered by e.g. regionally controlled (North Anatolian fault system) tectonic and seismic activity. Seismites appear to precede a major swarm of Lateglacial Süphan tephras in the upper part of the core.
Uplift of dominantly volcanic and nonvolcanic deposits of Halepkalesi peninsula by several 100 m (?) are interpreted as due to intralake intrusions suggesting that such intrusions are common features of the subaqueous morphology. A tephra layer alternating with carbonte sediments was dated as ca. 200 ka indicating that lake alkalinity developed prior to ca. 200 000 years.
The fall-rise-fall of lake level prior to, and following, emplacement of the youngest thick fallout pumice deposit UP (Upper Pumice) was dated precisely at ca. 30 ka at 3 different localities. Lake level was significantly lower than at present by several tens of m since UP and preceding fallout sheets were deposited on dry land. Shortly after eruption of UP, lake level rose quickly inundating, eroding and reworking most of UP – being > 10 m thick in nearby quarries at higher elevation. The remnant of UP and some 8 m of overlying shallow water-reworked volcaniclastic sediments fell dry again which we speculate occurred at ca 20 ka. We tentatively correlate the rapid rise in lake level as due to strong precipitation in the eastern Mediterranean at this time and similarly dry conditions at about 20 ka.
Dominant paleowind directions based on the axes of partial isopach maps of 15 major fallout deposits on land reflect prevailing SW-NE paleowind directions over the past >400 000 years. Evidence for a period of pronounced wet and warm conditions is reflected in a fossil swamp deposit interlayered with diatomites and tephra layers characterized by a rare phenocryst mineralogy (aenigmatite) in an intramontane basin ca 25 km southeast of Nemrut Volcano. These deposits are stratigraphically overlain by fallout deposits of the ca. 90 ka old huge Incekaya eruption that contain evidence of abundant vegetation (roots, tree molds etc).