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Late Holocene High Resolution Multi-Proxy Climate and Environmental Records From Lake Van, Eastern Turkey

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Lake Van is the world's largest soda Lake with a surface area of 3522 km2, a water volume of 576 km3 and a maximum water depth of 451m. It is situated in the East Anatolian Highlands of Turkey at (43°E and 38.5°N) at an altitude of 1650m. The lake is characterized by a high pH ($\sim$9.8) and annually varved sediments.
Four interface cores with lengths of up to 1.4 m and undisturbed top were collected from Lake Van. All cores were analyzed for physical properties using Geotek Multi Sensor Core Logger (MSCL), inorganic elemental analysis using an Itrax XRF core scanner, and total organic carbon (TOC) and inorganic carbon (TIC) analysis using TOC analyzer. Radionuclide (210Pb and 137Cs) analysis and varv-counting were used to establish the chronology, with the two methods providing very conformable results. The varves were counted using 60 μm resolution digital X-ray radiograpic images. An increase in the activity of 137Cs radioisotope in comparison with 210Pb age data gives support for the presence of the record of 1986 Chernobyl nuclear accident. The sedimentation rate varies from 0.4 to 0.7 mm/year at different core sites.
Our sedimentary records extend back to about 3600 a BP and are correlatable between the different core sites. Elemental (Ti, Fe, K) and magnetic susceptibility profiles suggest relatively large detrital input occurred over the last 750 a BP, during 1700-1150 a BP, 2150-1700 a BP, 2150-1800 a BP, 2450-2350 a BP, and 3150-2600 a BP, which are interpereted to correspond to wet periods. The intervening periods during 1150-750 a BP, 1800-1700 a BP, and 2350-2150 a BP, 2600-2450 a BP are characterized by low detrital input and high carbonate contents, correponding to relatively dry periods. There also short dry periods at 150 a, BP, 1450-1400 a BP and 2950 a BP within the long wet periods listed above. High organic productivity correponding to >5% TOC in the sediments occurs during 110 a BP, 210 a BP, 460 a BP, 530 a BP, 790 a BP, 1460 a BP, and 1940 a BP. In general, there is negative correlation between the TOC and TIC contents.