AvH6-63, 2010
6th Alexander von Humboldt International Conference

Late Pleistocene-Holocene sediment study from Zirahuen lake, Mexico, using rock magnetism

G. Vazquez (1) and B. Ortega (2)

(1) Posgrado en Ciencias de la Tierra (gvazquez@geofisica.unam.mx), (2) Instituto de Geofísica; Both at Universidad Nacional Autónoma de México, Ciudad Universitaria, Coyoacan, 04510, Mexico DF

Rock magnetic analysis in sediments from Zirahuen lake (central Mexico) provide the basis for an interpretation of past environmental conditions for the Holocene and late Pleistocene. Zirahuen lake is located at the center of the Trans Mexican Volcanic Belt (19° 26´ N, 101° 45´ W, 2,075 m asl). The area has a warm (16 °C), sub-humid climate with a rainy season from June to October (mean of 891 mm/year). Zirahuen is a tropical oligo-mesotrophic and monomictic lake, with a December-January mixing regime and a maximum depth of ca. 40 m. Four cores of 0.38 to 6.61 m long were collected, three in the center and one in the north ramp zone.

Sediments are characterized by alternated laminations and little strata (few millimeters to 7 cm). There have been identified four principal magnetic units (MU). The youngest, MU 1 is composed by dark brown clay; MU 2 is composed by brown silt, with white diatom oozes; MU 3 by brown fine-grained sandy silt; and MU 4 is composed mainly of massive diatom-rich silt. Time scale was established by twenty 14-C dates and the age of bottom sediments yielded an age of ca. 17,000 yrs BP (15,000 BC).

Magnetic susceptibility (MS) has been a good tool for core correlations between the central and littoral cores. MS shows two principal zones. The upper one that corresponds to the MU 1 with high and variable concentration of magnetic minerals, and the rest of the sequence (MU 2, 3 and 4) with a very low magnetic concentration. All rock magnetic parameters measured in the sequence show differences in all MU. Measurements of susceptibility vs. high temperature show that magnetite and Ti-magnetite are the main magnetic phase identified in most of the analyzed layers. The S300 ratio shows the presence of hard magnetic minerals at the base of both sequences. Hysteresis parameters indicate the presence of multidomain and superparamagnetic granis.

It has been possible to identify some periods of wet and dry conditions for every defined MU in the sequence. Results show that the main differences among each unit are in variations of the concentration of magnetic and superparamagnetic minerals, and in the particle-size distribution. These reflect differences in environmental conditions along the time.