Geophysical Research Abstracts,
Vol. 11, EGU2009-2269, 2009
EGU General Assembly 2009

Magnetic study of the Chinese Continental Scientific Drilling (CCSD) Project

Q. S. Liu (1), Q. L. Zeng (1), T. Yang (2), J. P. Zheng (3), N. Qiu (1), H. P. Pan (1), Z. M. Zhang (4), H. J. Xu (3), Z. M. Jin (3), and Z. Q. Xu (4)

(1) Department of Geophysics, China University of Geosciences, Wuhan 430074, China (lqs321@cug.edu.cn / +86-27-67883251), (2) Institute of Geophysics, China Earthquake Administration, Beijing 100081, China, (3) Faculty of Earth Sciences, China University of Geosciences, Wuhan 430074, China, (4) Institute of Geology, Chinese Academy of Geological Sciences, Beijing 100037, China

The main hole (MH) of the Chinese Continental Scientific Drilling Project (CCSD) is located in the southern segment of the Sulu ultrahigh pressure (UHP) metamorphic belt, eastern China. The CCSD-MH was completed at its final depth of 5,158 m. It consists of orthogneiss, paragneiss, variable eclogites, ultramafic rock and minor schist. Major research themes for magnetic studying in interval of 100 $\sim$ 2050 m which including all rock types in whole hole and results were: (1) comparison of susceptibility measured on core samples $\kappa_{core}$with that derived from downhole magnetic survey data has shown their agreement, i.e. the CCSD investigations do not prove the supposedly considerable influence of pressure on rock susceptibility. Consequently, the in situ conditions do not affect susceptibility, therefore it is right to measure this quantity at atmospheric environment on cores taken from wells and use the values obtained as true one. (2) Because azimuths were not determined for the CCSD well cores, consequently, the behavior of the NRM vector could not be fully analyzed, only its absolute values NRM were studied. The maximum value of NRM equal to 115.62 $\times 10^{-3}$Am^2/kg was measured for fresh eclogite with lamellare textures from intensively exsolution structure. The highest of susceptibilities (χ) are from 200×10^{-7} m^{3}kg^{-1} to 500×10^{-7} m^{3}kg^{-1} those of serpentinized peridotites at interval of 600 $\sim$ 690 m. (3) Major magnetic rocks are serpenitized peridotites located in interval of 600 $\sim$ 690 meters (average χ=368.21×10^{-7} m^{3}kg^{-1}, NRM=10.64 $\times10^{-3}$Am^2/kg); orthogneisses (average χ=27.43×10^{-7} m^{3}kg^{-1}, NRM= $\times10^{-3}$Am^2/kg,); paragneisses (average χ=11.47×10^{-7} m^{3}kg^{-1}, NRM=0.68 $\times10^{-3}$Am^2/kg,); and all eclogites (average χ=8.65×10^{-7} m^{3}kg^{-1}, NRM=0.54 $\times10^{-3}$Am^2/kg,). Along the CCSD well section the Q varies from 0.06 to 1746, and 54.6% in all samples is higher than 5. (4) From raw eclogites to partially retrograded eclogites to completely retrograded eclogites (amphibolite-epidote facies), density systematically decreases and χ and NRM values of partially retrograded eclogites are higher than the end members (including both raw eclogites and completely retrogressed eclogites). The enhanced magnetic properties of the partially retrogressed eclogites are due to the formation of PSD magnetite within symplectite. With further increasing the degree of the retrograded metamorphism to completely retrogressed eclogite (amphibolite-epidote facies), the magnetite content decreases and the concentration of weakly magnetic minerals (e.g. hematite) increase. The significant volumes of the partially retrogressed eclogites have high NRM (average of 0.78 $\times$ 10^{-3} A m^{2}kg^{-1}) and Q (average of 15.13) values, which is one of the major magnetic rocks in Sulu UHP metamorphic belt, and thus may account for the magnetic anomalies flanking the northeastern part of the Sulu UHP metamorphic belt.