

Chinese Continental Scientific Drilling Project (CCSD) and Multiple Observation at deep borehole

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The Chinese Continent Scientific Drilling (CCSD) project at Donghai, Jangsu province starting from June 2001 is one of the International Continent Drilling Project (ICDP). The depth of the CCSD main hole reached 5000 m in January 2005. The site of CCSD is located east of the Tan-Lu fault, in the convergence boundary between the North China block and the Yangtze block where is the ultrahigh-pressure metamorphosed (UHPM) terrace based on the tectonic view. The Yangtze block moved northward and encountered the North China block about 220 Ma ago. The Dabie-Sulu ultrahigh-pressure metamorphosed terrace with about 2000 km long occurred gradually after the Yangtze block subducted beneath the North China block. The quiet seismic activity in and around the site of CCSD lasted about 3000 years after the 1668 large M8.5 earthquake in Tancheng-Lvxian, China along the Tan-Lu fault, north of the site of CCSD. The famous 1975 Haicheng M7.5 earthquake occurred in the northern end of the Tan-Lu fault. The structure of the crust and upper mantle, the mechanisms for the ultrahigh-pressure metamorphosed terrace, and dynamics of the continental block convergence boundary are widely investigated in the CCSD project. The realization of this project will bring an impetus to study on global geodynamics and geosciences, but also to the estimation of the resources, mitigation of disasters and environment protection in China.

Many scientists for geology, geophysics, geochemistry and microbiology from American, Germany, Canada and Japan have participated the CCSD project besides the scientists from the universities and institutes of China. Many sub-projects in different fields have being performed by the eight research groups, e.g., analyses of physical and chemical characteristics of the 5000 m deep rock cores, analyses of tectonics and mines based on the loggings and deformations of cores, fluid chemic components and the DNA of biology in deep rock etc. Many section diagrams for rock properties of 4000 m cores, chemic components, physical loggings, VSP and deformations are performed until the end of 2004. The live microorganisms were fund in the deep rock of 3910- 4000 m where the temperature is high to 90 degree C based on the DNA analyses. Many papers and reports on seismic velocity structure and tectonics in and around the site of CCSD have been published. About 30 scientific achievements were lectured or/and posted in a special section of 2004 AGU fall meeting. It is very interesting that an anomaly of He element in the fluid underground at the CCSD hole was observed in the 2004 Sumatra, Indonesia M9 earthquake. Many new scientific results are expectable with progress of the study activities of CCSD project.

A multi-component geophysical observation project has been started in China. A multi component geophysical and geochemic observatory, the most deep observatory in the borehole, including three component seismograms, strainmeters, thermomaters magnetometers, geochemic aanlyses is constructing in the deep boreholes in and around the main hole of CCSD. The multi-observations will continuously carried out for 15 years at least. The great scientific achievements for the structure in the crust and mantle, the causative mechanisms of the Dabie-Sulu UHPM belt, the tectonics in the Tanlu fault, even in East Asia can be expected based on the noiseless data from the multi- component observation in the deep borehole.