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超高压变质岩物理性质的相关性对建立结晶岩区地球物理解释标尺的意义

[欧新功](#) [金振民](#) [夏斌](#) [徐海军](#) [金淑燕](#)

[1]中国科学院广州地球化学研究所,中国科学院边缘海地质重点实验室,广州510640 [2]中国地质大学地质过程与矿产资源国家重点实验室,武汉430074

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摘要:

大陆科学钻探为认识深部地壳的结构、组成、力学性质和物理状态提供了重要的基础数据,岩石物理性质的测量对于原位测井资料的校正和地表地球物理测量的解释具有重要意义,岩石物理性质和岩石学研究相结合,还能为岩石的变质作用以及变质过程中化学成分的迁移提供必要的约束.本文主要对CCSD100~3100m的综合岩石物理资料进行了相关性调查和聚类分析,并得出如下结论:(1)岩石物理性质中的地震波速度、密度、热导率之间具有强相关性,他们都受岩石中主要矿物的组成和含量所控制;(2)岩石的电阻率和磁化率受金属氧化物含量的控制,与岩性有相关性;孔隙度、渗透率与岩性没有相关性;(3)利用岩石的物理性质可以反演不同的岩性,其中地震波速度、密度和热导率对榴辉岩和片麻岩大类具有很好的分类效果,而结合磁化率和电阻率则能更好的区分出超基性岩、正片麻岩和副片麻岩,上述结论对综合地球物理解释中物理参数的选取和结晶岩区地球物理解释标尺的建立具有重要的意义.

英文摘要:

Scientific Drilling has become a critical tool to provide data essential to understand the structure, composition, mechanical behavior and physical state of the deeper crust. Petrophysical studies are necessary for the calibration of borehole logging results and for the interpretation of surface geophysical investigations. Such studies, in combination with petrological investigations, are also required for the understanding of chemical alteration and metamorphism. Correlation investigation and cluster analysis are performed on petrophysical properties of ultra-high pressure rocks from 1000 - 3100m of CCSD main hole, and the conclusions are given as following: (1) the strong correlations among seismic wave, density and thermal conductivity are controlled by the mineral assemblage and proportion in the rocks; (2) electrical resistivity and susceptibility are controlled by the metal oxide in the rocks and associated with the lithology of the rocks, but the porosity and permeability have no correlation with lithology; (3) the lithology of the rocks can be classified according to their petrophysical properties. Eclogite and gneiss can be distinguished according to the seismic velocity, density and thermal conductivity, but the ultra-mafic rocks, prargneiss and orthogneiss can be well recognized if the susceptibility and resistivity are added to the analysis parameters. These conclusions are of great important to the parameter selection in geophysical interpretation and also have the great significance on establishing the geophysical interpretation standards for crystalline rocks.

关键词: [超高压岩石](#) [岩石物理性质](#) [聚类分析](#) [中国大陆科学钻探](#)

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主办单位: 中国矿物岩石地球化学学会

单位地址: 北京9825信箱/北京朝阳区北土城西路19号

本系统由北京勤云科技发展有限公司设计

[linezing@163.com](#)