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汤加—斐济地区300 km间断面的SdP转换波证据

谢彩霞[1,2,3], 周元泽[2,3], 王卓君[2,3], 欧东新[1]*

1. 桂林理工大学地球科学学院, 桂林 541004;
2. 中国科学院研究生院地球科学学院, 北京 100049;
3. 中国科学院计算地球动力学重点实验室, 北京 100049

Evidence of SdP conversion phases for the 300 km discontinuity beneath Tonga-Fiji region

XIE Cai-Xia[1,2,3], ZHOU Yuan-Ze[2,3], WANG Zhuo-Jun[2,3], OU Dong-Xin[1]*

1. College of Earth Sciences, Guilin University of Technology, Guilin 541004, China;
2. College of Earth Science, Graduate University of Chinese Academy of Sciences, Beijing 100049, China;
3. Laboratory of Computational Geodynamics, Chinese Academy of Sciences, Beijing 100049, China

摘要 上地幔速度间断面的存在形态及其性质的研究对于理解地球构造运动以及地球内部物质运移过程具有重要意义.针对上地幔中可能存在的300 km速度间断面, 本文收集日本Hi-net地震台网所记录的2004年以来、震源深度在145~219 km之间、且震级为m_b5.0~6.0之间的6个汤加—斐济地区地震的波形资料. 利用4次根倾斜叠加方法对收集到的波形资料进行叠加处理,获得了相应的叠加灰度图, 从中提取的离源下行的SdP次生转换震相, 进而据此确认了汤加—斐济地区下方的300 km深度附近的速度界面.因该界面起伏较小, 更倾向于该界面为辉石的斜方到高压单斜相变面; 同时基于转换震相的强度差异,我们发现该界面速度跃变量要大于410 km间断面, 因而俯冲带的化学分异和脱水过程产生的较轻物质可能在该界面处形成一定的聚集,使得汤加—斐济地区的该界面更容易被观测到.

关键词 汤加—, 斐济地区, 300 km间断面, *N*次根倾斜叠加

Abstract: The upper-mantle discontinuities are important for understanding the tectonics and the material transportation in the Earth's interior. In order to retrieve the SdP conversion phases from the possible 300 km discontinuity, the waveform data of six earthquakes with focal depths between 145 and 219 km and m_b5.0~6.0 since 2004 are collected from Hi-net of Japan. The data are processed by 4-th root slant stack method to get the vespegrams which are used to pick the SdP phases based on the theoretical differential times and slownesses. The conversion points related to the SdP phases show that there is a clear and flat velocity interface around 300 km which means the interface is preferred as the orthorhombic to high-pressure monoclinic phase transition of (Mg,Fe)SiO_3 pyroxene. What's more, the velocity contrast of the interface is larger than the 410 km discontinuity, which means that the light chemical differentiation or slab dehydration from the subduction zone accumulated at the interface and makes the interface beneath the Tonga-Fiji more detectable.

Keywords Tonga-Fiji region, 300 km discontinuity, *N*-th root slant stack

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Corresponding Authors: 周元泽,男,1972年生,固体地球物理学博士,主要从事地球内部结构与地震波传播以及地震信号分析等方面的教学科研工作.E-mail:yzzhou@gucas.ac.cn Email: yzzhou@gucas.ac.cn

About author: 谢彩霞,桂林理工大学硕士研究生,主要从事地震信号分析和地球内部结构研究.E-mail:xcx4233@126.com

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