Speaker: Prof. Fumiko Tajima
Affiliation: Lutwig-Maximillians-Universitaet Muenchen
Title: Topical Seismic Low velocity Anormalies Associated with Stagnant Slabs: Inference and Observational Uncertainties
Date & Time: 13:30-15:30, 11.09.2009
Place: Earth Science Bldg. 5F #503
Contact: Hidenori Terasaki

Report:
Prof. Tajima is now a professor of Lutwig-Maximillians-Universitaet (LMU) Muenchen in Germany. She first got a position in Frankfurt, Germany, then moved to several places in the US and to Japan. In the beginning of the seminar, she explained how she traveled around the world.

In the seminar, observed $V_p$ in the slab shows a discontinuity at a certain depth and the discontinuity depth differs (660 and 690 km) depending on the location. These observed seismic data can be successfully explained by a difference of phase transformation pressure associated with mineral assemblage in the slab and water content in the mineral. The results provide us a structural model of the slab. The seminar topics are based on seismology and also closely linked to mineral physics and volcanology. Many audiences, including staffs and students of Earth science and those of geophysics, were interested in the topics and enjoyed the seminar. The seminar abstract is shown below.

Abstract
Seismic tomography models published in the past two decades led to the findings of common long-wavelength features while there is still large variation of relatively short wavelength features among the models. Nonetheless, the tomography images have been interpreted rather equivocally in terms of thermal structure and water content (or fluid distribution) in the mantle. Thus, in an attempt to validate and supplement tomography models, we carried out waveform modeling in the mantle transition zone using reflectivity and finite difference synthetics with relatively short-wavelength body waves. Results show variation of seismic structure as well as topical low velocity anomalies (LVA’s) at the bottom of the MTZ where pronounced flattened high velocity anomalies (HVA’s), stagnant slabs, have been visualized by recent tomography studies. The effects of the LVA zones can be significant on P waveforms as SV converted or scattered waves in a relatively high frequency band while the image of local LVA’s embedded in HVA’s may not be necessarily captured in travel-time tomography studies alone. These LVA’s may indicate dehydration induced melts or fluids which were predicted from high pressure experiments for major subducted slab minerals, i.e., olivine under hydrous conditions. Given possible lateral temperature variation under slab geotherm, the LVA could be highly local. However, the waveform modeling along spotty single high frequency rays alone does not have resolving power of the lateral extent of structural variation or topical anomalies. Accordingly, we address sensitivity issues and apply a finite-frequency approach to remedy the lack of ability to constrain the lateral extent of structural variation or anomaly. Results should have clues to understanding the inhomogeneous distribution of fluids associated with deep dehydration under slab geotherm.

Tohoku University Global COE Program “Global Education and Research Center for Earth and Planetary Dynamics”
Prof. F. Tajima

Seminar scene