

# AOB&COE Seminar

## Dr. Laura Wallace

(Institute of Geological and Nuclear Sciences (GNS))

**Title: Balancing the plate motion budget in the South Island, New Zealand and the Tohoku region, Japan, using the elastic block method**

2007年3月29日 (木) 14:00-15:30

地震・噴火予知研究観測センター(別館)第一会議室

Research Center for Prediction of Earthquakes and Volcanic Eruptions

March 29, 2007 (Thu) 14:00-15:30

Meeting Room #1, AOB Annex

- Abstract -

The South Island, New Zealand contains one of the world's classic collisional plate boundaries. I will discuss how we integrate GPS, geological and seismological data to describe the active deformation in the South Island by using an elastic, rotating block approach to interpret these data. This approach also allows us to "balance" the plate motion budget in the South Island, and estimate the degree of interseismic coupling on the active faults in the region, which has implications for future seismic hazard estimates. The data are fit to within uncertainty when inverted simultaneously for angular velocities of rotating tectonic blocks and the degree of interseismic coupling on faults bounding the blocks. Consistent with previous geological studies, we find that most (70-82 %) of the relative plate motion budget in the central South Island is accommodated on the Alpine Fault (27-31 mm/yr strike slip, ~5 mm/yr reverse slip). The GPS velocities also suggest that up to 5 mm/yr of active dextral deformation on faults distributed within the Southern Alps <100 km to the east of the Alpine Fault is possible. The degree of interseismic coupling on the Alpine fault changes markedly along-strike, with shallower maximum coupling depths on the central portion of the Alpine Fault relative to northern and southern portions of the fault. This is consistent with previous suggestions based on thermal observations in the region of the central Alpine Fault, as well as seismological interpretations of high fluid pressures at depth. Vertical axis rotation rates of tectonic blocks in the central South Island are similar to that of the Pacific Plate, suggesting that edge forces dominate the tectonic block kinematics in the central South Island.

We have also interpreted GPS and seismological data from the northern Honshu region using the elastic block method. I will show the interseismic coupling distribution we obtain using this method, as well as discussing implications for rates of deformation in the Japan Sea, and possible rates of deformation in the Backbone Range of northern Honshu.

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