SF	Mantle Dynamics of the Izu-Bonin Subduction System	
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Data collection: We are currently collecting new seismic data to evaluate shear wave splitting and seismic anisotropy to image flow in the Izu-Bonin subduction system. In particular, we are utilizing splitting measurements from local shear waves recorded at broadband seismic station OGS. In addition, we are employing a unique analysis method of *sS-S* splitting residuals, which is necessary as this region does not contain many nearby seismic stations. Preliminary results indicate that most fast polarization directions show a rotation from ~convergence-parallel in northern Izu-Bonin to ~trench-parallel in southern Izu-Bonin (see Fig.), implying either a complex flow pattern in the region, or a change in hydration within the mantle wedge. We are currently investigating plausible scenarios for these results (see next bullet).

Numerical modeling: To complement our data collection efforts, we are developing new models of mantle flow in subduction systems, with a focus on mantle wedge flow and predicted shear wave splitting observations that arise from this flow. Of particular note since the proposal was funded is the availability of a new set of numerical modeling codes that provides a more appropriate estimation of lattice-preferred orientation (LPO) of olivine aggregates in complex systems. We are utilizing this code to provide quantitative estimates of shear wave splitting resulting from various flow scenarios, including models in which hydrated olivine changes slip systems and may therefore significantly alter shear wave splitting measurements [*Jung and Karato*, 2001].

Broader Impacts: This funding supports the graduate educations of two ASU graduate students, Karen Anglin and Teresa Lassak. Both plan to defend their M.S. theses in mid-2004.

Figures and Captions

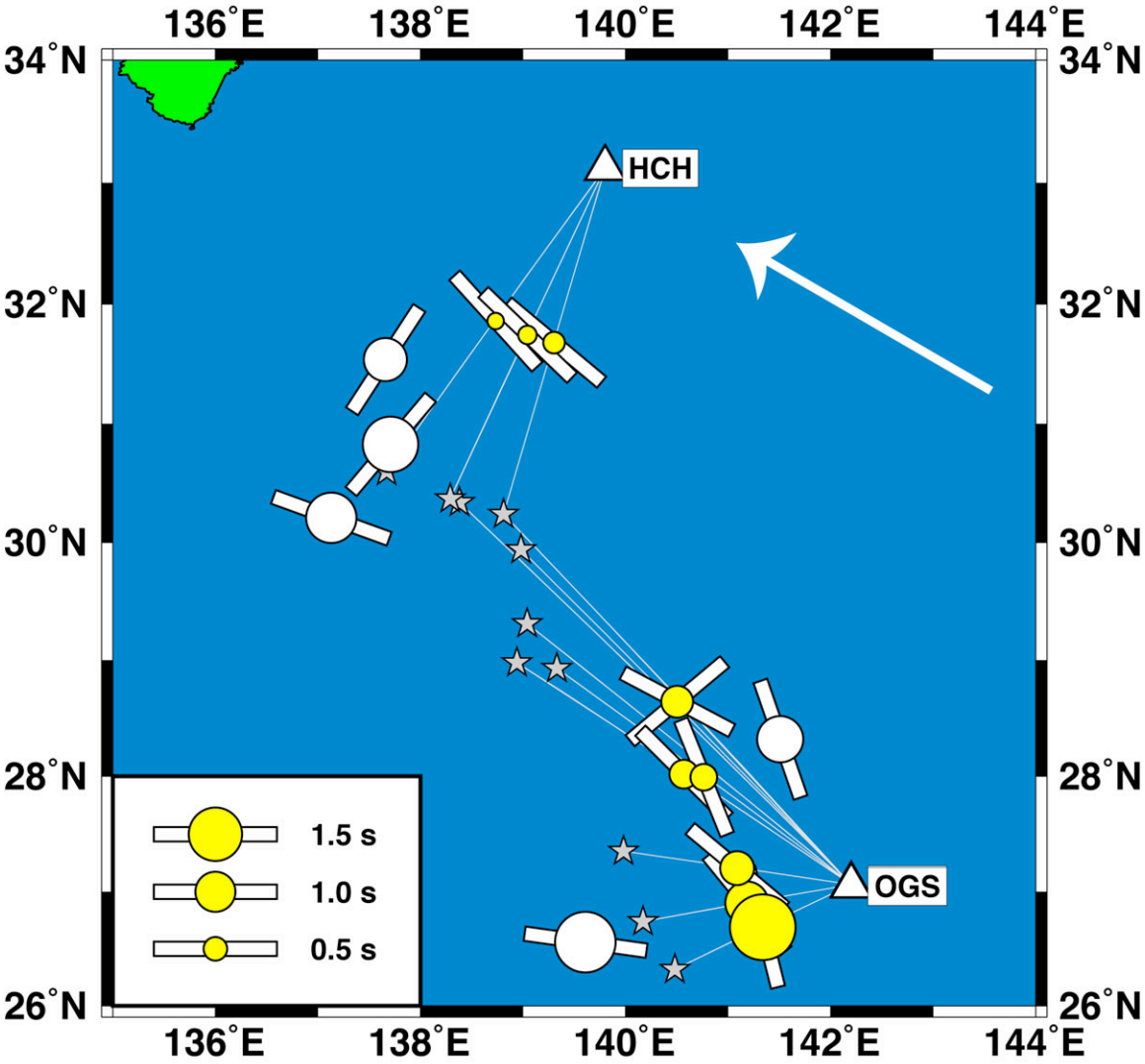

Figure 1: Preliminary shear wave splitting observations beneath the Izu-Bonin subduction system from *Fouch and Fischer* [1996] and *Anglin and Fouch* [2003]. White arrow denotes absolute plate motion direction of subducting Pacific plate. Local earthquake sources are marked by open stars; local seismic stations are marked by open triangles. The azimuth of the black bar denotes fast shear wave polarization directions; the magnitudes of the circles denote splitting time magnitude. Yellow circles denote local *S* measurements and are plotted at the midpoint between source and receiver; open circles denote teleseismic *sS* splitting measurements and are plotted at the surface bounce point for each raypath.

References

Anglin, K., and M. J. Fouch, Mantle seismic anisotropy in the Izu-Bonin subduction system, *Eos Trans. AGU, 84*(46), Fall Meet. Suppl., Abstract T31A-07, 2003.

Fouch, M.J., and K.M. Fischer, Mantle anisotropy beneath northwest Pacific

subduction zones, *J. Geophys. Res., 101*, 15,987-16,002, 1996.

Jung, H., and S. Karato, Water-induced fabric transitions in olivine, *Science, 293*, 1460-1463, 2001.

Publications and Presentations

We presented two student papers at the Fall 2003 AGU meeting in San Francisco, CA.

Anglin, K., and M.J. Fouch, Mantle seismic anisotropy in the Izu-Bonin subduction system, *Eos Trans. AGU, 84*(46), Fall Meet. Suppl., Abstract T31A-07, 2003.

Lassak, T.M., M.J. Fouch, and C.E. Hall, Geodynamic and seismic characterization of mantle flow in the Izu-Bonin subduction system, *Eos Trans. AGU, 84*(46), Fall Meet. Suppl., Abstract T31A-06, 2003.