

2008 Fall Meeting
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Cite abstracts as **Author(s) (2008), Title, *Eos Trans. AGU*, 89(53), Fall Meet. Suppl., Abstract xxxxx-xx**

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HR: 0800h

AN: **DI21A-1723**

TI: [Surface Wave Tomography for the Hawaiian PLUME Project and the Seismic Structure of the Hawaiian Swell](#)

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AB: During the two-stage seismic component of the Hawaiian PLUME (Plume-Lithosphere Undersea Melt Experiment) project from January 2005 through June 2007, we collected continuous seismic data at ten land stations and nearly 70 ocean bottom sites which were occupied with broad-band seismometers. This provides an ideal basis to analyze surface waves across a broad frequency band to image the crust and mantle of the Hawaiian swell. In the first OBS deployment phase from January 2005 through January 2006, 35 sites were occupied in an elongated array centered on the island of Hawaii, with a station spacing of roughly 75~km and an aperture of 500~km. In the second phase from May 2006 through June 2007, 37 sites were occupied in a larger array with a station spacing of roughly 200~km. Our current

analysis concentrates on long-period teleseismic Rayleigh waves. During the first phase we collected records from upward of 95 suitable large, shallow earthquakes with scalar seismic moment $M_0 \geq 0.015 \times 10^{20}$ Nm ($M_S \geq 5.6$) or larger and source depths of 200~km or less. We also identified 70 smaller events with signal levels suitable for analysis. For the second phase, our initial analysis includes 163 larger earthquakes. We currently have over 5000 unique single-station phase measurements for the first deployment stage and 2500 for the second. We use this primary phase database to obtain two-station path-averaged phase velocity curves. These path-averaged dispersion curves are each well constrained by many earthquakes and are internally consistent between 15 and 50~s, allowing us to image the lithosphere and upper asthenosphere. Some larger events provide constraints beyond 100~s, thereby illuminating the lower asthenosphere. Using these dispersion curves we determine path-averaged depth profiles for nearly 300 two-station legs for the first deployment. The analysis of the second stage has provided over 100 legs and is still ongoing. We combine these profiles in an inversion for 3-D structure. We have also begun to determine group velocities, which provide additional constraints and improve depth resolution of the crust and mantle. Our analysis reveals a roughly 30~km thick low-velocity anomaly in the lower lithosphere beneath the islands of Hawaii and Maui that indicates that the lithosphere has undergone some degree of rejuvenation. Deeper imaged features include anomalously low velocities in the asthenosphere to the west of Hawaii. These results are consistent with those from the 1997/98 SWELL pilot experiment that covered an area in the southwestern corner of the PLUME array.

UR: <http://igppweb.ucsd.edu/~gabi/plume.html>

DE: 3037 Oceanic hotspots and intraplate volcanism

DE: 7255 Surface waves and free oscillations

DE: 7270 Tomography (6982, 8180)

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SC: Study of the Earth's Deep Interior [DI]

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