2007 Fall Meeting
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Cite abstracts as **Author(s) (2007), Title, *Eos Trans. AGU*, *88*(52), Fall Meet. Suppl., Abstract xxxxx-xx**

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HR: 1340h
AN: **S23A-1107**
TI: Broadband Ocean Bottom Instruments Record Earth's Free Oscillations during the Hawaiian PLUME Experiment
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AB: Ocean islands are usually thought of as being noisy sites for the global seismic network (GSN). For example, in the microseism band between 15 and 5~s, noise levels can easily be 10-20~dB higher than at stations in the interiors of continents. On the other hand, and somewhat curiously, several Pacific island sites are some of the quietest to record vertical ground movement in the free oscillation band beyond 200~s. This includes station KIP (Kipapa, on Oahu/Hawaii) that is operated jointly by the USGS and the French GEOSCOPE

group. During the Hawaiian PLUME (Plume-Lithosphere Undersea Melt Experiment) deployment, we collected continuous seismic data from January 2005 through June 2007, using a variety of seismic sensors deployed on land and on the ocean floor. Ten broadband land stations were equipped with Wielandt--Streckeisen STS--2 seismometers, and about 70 ocean bottom sites were occupied with Güralp CMG-3T, Nanometrics Trillium 40 or Trillium 240 seismometers, and a Cox--Webb differential pressure gauge (DPG). This experiment gives us the unique opportunity to assess the quality and variability of ultra--long period seismic signals, for specific sensors, and evaluate the benefit and limits of deploying broad--band sensors on the ocean floor. In 2005, we recorded five very large earthquakes with scalar seismic moments of M_0=2x10^{20}~Nm or larger. One of these was the M_S=8.2 28 March aftershock of the great 26 December 2004 Sumatra--Andaman earthquake. At station KIP, which is equipped with a very broad--band STS--1, the free oscillation spectrum is of extremely high quality. We can identify mode $_0S_2$ (~0.31~mHz) that is observed only for the largest earthquakes, and only at the quietest GSN stations. Even on the STS--2 record, mode $_0S_3$ (~0.47~mHz) is clearly discernible. The quality of spectra recorded on the OBSs varies greatly, but at some sites we observe mode $_0S_6$ (~1.04~mHz). These records are greatly superior to those at GSN stations POHA (island of Hawaii), whose record has no seismic signal, and MIDW (Midway Island), whose record is noisy for this event. With M_0=111x10^{20}~Nm, events such as the 28 March aftershock occur only once every few decades and high-quality spectra should be expected. On the other hand, we can observe modes on OBS records also for the other four 2005 events, down to $_0S_{13}$ (~2.11~mHz) and at a noise level that is not met by many land stations in broadband seismic monitoring arrays. PLUME may well be the first OBS experiment recording free oscillation spectra since the OSN1 pilot experiment recorded the great 25 March 1998 Balleny Island earthquake. Higher ambient noise levels in the pressure signal as well as the lower sensor sensitivity at ultra--long periods hamper the observation of free oscillations on the DPG. For the 25 March event, we can observe modes down to $_0S_{20}$ (~2.88~mHz) but not much beyond that.

UR: **http://mahi.ucsd.edu/Gabi/plume.html**
DE: 3050 Ocean observatories and experiments
DE: 3094 Instruments and techniques
DE: 7255 Surface waves and free oscillations
DE: 7294 Seismic instruments and networks (0935, 3025)
SC: Seismology [S]
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