The Ocean Seismic Network Pilot Experiment

R A Stephen S T Bolmer J A Collins and K R Peal Woods Hole Oceanographic Institution
J A Hildebrand J A Orcutt F N Spiess and F L Vernon Scripps Institution of Oceanography

ODP contributes to our understanding of geologic hazards such as tsunamis and great earthquakes in subduction zones by enabling sea floor borehole seismic observatories that monitor earthquakes and other shocks An international consortium of seismic networks provides adequate earthquake monitoring capabilities for most continental regions but large areas of the ocean floor remain unmonitored The goal of the Ocean Seismic Network Pilot Experiment (OSNPE) was to demonstrate that high quality broadband seismic measurements could be made in the ocean basins For this experiment scientists installed a borehole seismometer into ODP Hole B near Oahu in the Pacific Ocean Between February and May the OSNPE continuously recorded broadband borehole seismic data for more than days During this time scientists observed more than fifty earthquake events from a magnitude event near Fiji to the magnitude Balleny Islands earthquake off the coast of Antarctica

Background seismic noise levels on the seafloor can be correlated with a variety of environmental parameters which allowed scientists to determine the quality of the data During the OSNPE seafloor current measurements near the site as well as sea state and wind data were obtained from near by U S National Oceanic and Atmospheric Association (NOAA) weather buoys Estimates of the tides at the site were obtained directly from the borehole sensor itself over very long periods Analyses have shown that seafloor stations can yield comparable data in terms of ambient noise levels and time series events to those recorded at continental stations

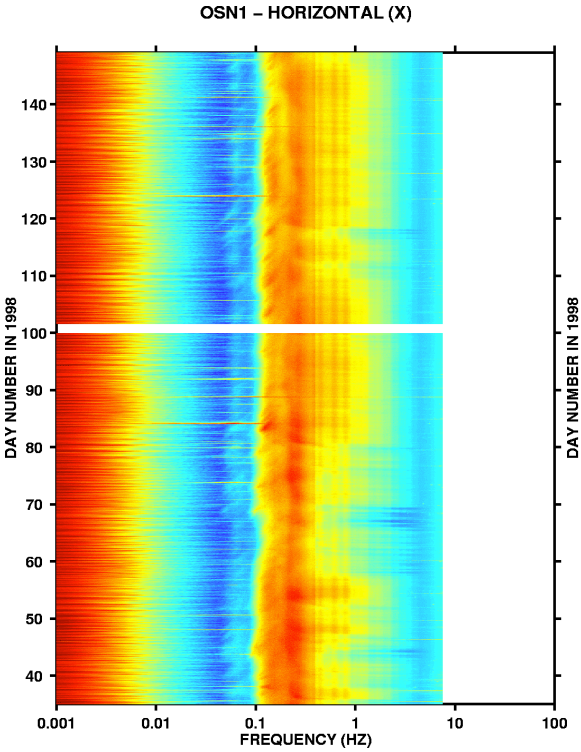

Figure 1: OSN Vertical Spectrogram

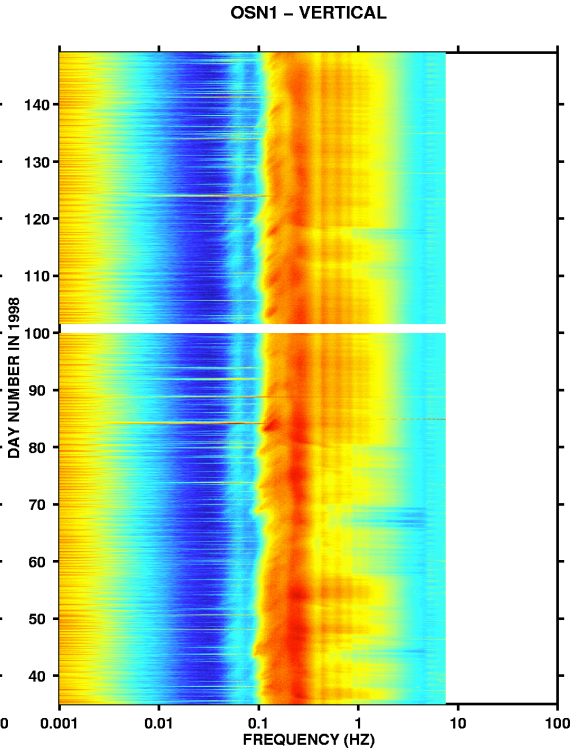

Figure 2: OSN Horizontal Spectrogram

Figures and show true amplitude spectrograms of the vertical and horizontal (X) components of ground acceleration respectively for the broadband borehole seismometer deployed at ODP Hole B Color red for high and blue for low indicates energy levels as functions of frequency (from mHz to Hz) and time during the deployment (from Julian Day to in) The diagonal events around mHz with lower frequencies arriving earlier correspond to dispersed surface gravity waves from distant storms The vertical lines between mHz and Hz correspond to resonances within the sediment column The thin horizontal lines (near days and for example) indicate earthquake arrivals