Status of GPS/Acoustic Measurements of Seafloor Strain Accumulation Across the Cascadia Subduction Zone

G H Purcell, Jr, 1, E Young (Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109; tel. 818-354-3395); F N Spiess, D E Boegeman, R M Jawhead (Scripps Institution of Oceanography, UC San Diego, La Jolla, CA 92039; tel. 619-534-1621); H Dragert, M Schmi dt, G Jewsbury (Pacific Geoscience Centre, Geological Survey of Canada, 9860 West Saanich Road, Sidney, British Columbia, V8L 4B2, Canada; tel. 604-363-6447); M Lisowski (U.S. Geological Survey, MS/9-92, 345 Middlefield Road, Menlo Park, CA 94025; tel. 415-329-4855); D C DeMet (Department of Geology and Geophysics, University of Wisconsin, Madison, WI 53706; tel. 608-262-8598)

This paper presents the status of a long-term experiment using a hybrid GPS/acoustic system to determine strain rates across the Cascadia subduction zone.

In May-June of 1991, long-lived acoustic transponders were installed on the seafloor on both sides of the Cascadia subduction zone. Measurements from a surface buoy, equipped with three GPS antennas and a precise acoustic transducer, located seafloor reference points in the coordinate frame of land-based GPS receivers. These measurements were repeated in September, 1993, and two additional transponders were set in place. Periodic measurements over five to ten years are expected to yield sufficient estimates of fault locking depth and net convergence velocity. Current 1 y, determinations of these parameters rely on onshore geodetic measurements and plate motion models. This experiment also serves as an engineering test of the new GPS/acoustic system, and is expected to lead to substantial improvements in experiment design and analysis techniques.

Current evaluations of system accuracy, based on data from the first and second epoch measurements, and on comparisons with acoustic surveys, are discussed.