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Final Report

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Accomplishments

This project: 1. Continues GPS monitoring of surface change during and following the fortuitous occurrence of the Mw = 7.3 Landers earthquake in our network, in order to characterize earthquake dynamics and accelerated activity of related faults as far as 100's of kilometers along strike. 2. Integrates the geodetic constraints into consistent kinematic descriptions of the deformation field that can in turn be used to characterize the processes that drive geodynamics, including seismic cycle dynamics.

In 1991, we installed and occupied a high precision GPS geodetic network to measure transform-related deformation that is partitioned from the Pacific - North America plate boundary northeastward through the Mojave Desert, via the Eastern California shear zone to the Walker Lane. The onset of the Mw=7.3 June 28, 1992, Landers, California, earthquake sequence within this network poses unique opportunities for continued monitoring of regional surface deformation related to the culmination of a major seismic cycle, characterization of the dynamic behavior of continental lithosphere during the seismic sequence, and post-seismic transient deformation. During the last year, we have reprocessed all three previous epochs for which JPL fiducial free point positioning products available and are queued for the remaining needed products, completed two field campaigns monitoring ~20 sites (October 1995 and September 1996), begun modeling by development of a finite element mesh based on network station locations, and developed manuscripts dealing with both the Landers-related transient deformation at the latitude of Lone Pine and the velocity field of the whole experiment. We are currently deploying a 1997 observation campaign (June 1997).

We use GPS geodetic studies to characterize deformation in the Mojave Desert region and related structural domains to the north, and geophysical modeling of lithospheric behavior. The modeling is constrained by our existing and continued GPS measurements, which will provide much needed data on far-field strain accumulation across the region and on the deformational response of continental lithosphere during and following a large earthquake, forming the basis for kinematic and dynamic modeling of secular and seismic-cycle deformation. GPS geodesy affords both regional coverage and high precision that uniquely bear on these problems.

Recent, relevant publications of the Co-Investigators.

M. Meghan Miller, Frank H. Webb, David Townsend, Matthew P. Golombek, and Roy K. Dokka, 1993, Regional co-seismic deformation from the June 28, 1992 Landers, California, earthquake: Results from the Mojave GPS Network - Special Report: Geology, v. 21, p. 868-872.

M. Meghan Miller, Dan Johnson, Carrie S. Whitehill, Randy Palmer, 1996, Modern deformation in the Eastern California shear zone from GPS geodesy: Co-seismic, post-seismic and secular deformation, 1991 to 1994. Geological Society of America Abstracts with Programs, v. 28, p. 451.

Humphreys, E. D., and R. J. Weldon, Deformation across the western U. S.: A local estimate of Pacific-North America transform deformation, *Journal of Geophysical Research*, *99*, [B10], 19,975-20,010, 1994.

Palmer, R. L., and E. D. Humphreys, Finite element modeling of crustal deformation in southern California and northern Baja California, *Eos, Transactions of the AGU, v. 76, p. F580,* 1995.

Inventions

No inventions have resulted from the performance of this research.