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"Enhancing PANGA (Pacific Northwest Geodetic Array) for Urban Seismic Risk Assessment:

Collaborative Research with Central Washington University, Oregon State University, and

University of Washington" Proposal dated Spring, 2000.

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Abstract

In the Pacific Northwest, efforts to quantify the hazards associated with the Cascadia subduction zone and crustal faults have been hampered by the difficulty of geologic field work and the lack of plate boundary seismicity. Global Positioning System (GPS) measurements now offer a new methodology applicable to just this type of difficult tectonic problem. GPS measurement of crustal motion have rapidly taken the lead in the study of plate boundary interactions at subduction and transform boundaries worldwide. We address large scale plate margin-scale deformation as well as local seismic risk by continued monitoring of widely spaced PANGA sites and developing a much denser network of high-quality observations by integrating campaign and continuous measurements into a regional velocity field.

PANGA is a consortium of US and Canadian institutions engaged in GPS geodetic investigation of the Cascadia plate boundary system. Currently, 50 permanent GPS sites have been installed and are now collecting continuous data in the Pacific Northwest. These sites are funded by NSF, US Geological Survey, and the Geologic Survey of Canada and are supplemented by non-geodetic quality sites operated by the NGS. The primary focus of PANGA is to establish a velocity field for the Cascadia region that can be used directly to assess seismic hazards from the Cascadia plate interface, and also to understand the complex kinematics of the Pacific Northwest as a whole.

Along strike variability in plate locking, the position of the coupled interface relative to population centers, the importance of the second tectonic signal propagating northward from the distributed Pacific-North America plate boundary system, and the as yet unknown signature of active crustal faults are crucial to an assessment of earthquake hazards in Cascadia. This project has two principal objectives designed to address these issues: 1) Generation of an integrated velocity field that combines regionally available campaign observations with continuous data from PANGA and adjacent networks and sets them in an internally consistent and robust reference frame will provide constraints to the National Seismic Hazards Mapping Project and improve our understanding of the budget of megathrust coupling vs. crustal deformation. This aspect of the project has direct impact

on estimated budgets of seismic strain. The velocity field will be continually updated as new data, improved methods, and new constraints from other disciplines become available. 2) The PANGA Investigators Community Meeting. The continuous data have added important new constraints to characterizing crustal deformation in the Pacific Northwest and vastly strengthen the context of campaign results, allowing us to rigorously address reference frame issues and characterize error spectra.