

# Crustal Deformation and the Seismic Cycle across the Kodiak Islands, Alaska

**Jeanne Sauber** » NASA Goddard Space Flight Center  
**Gary Carver** » Humboldt University  
**Steven Cohen** » NASA Goddard Space Flight Center  
**Robert King** » Massachusetts Institute of Technology

2008-2012 UNAVCO PROPOSAL: GEODESY ADVANCING EARTH SCIENCE RESEARCH

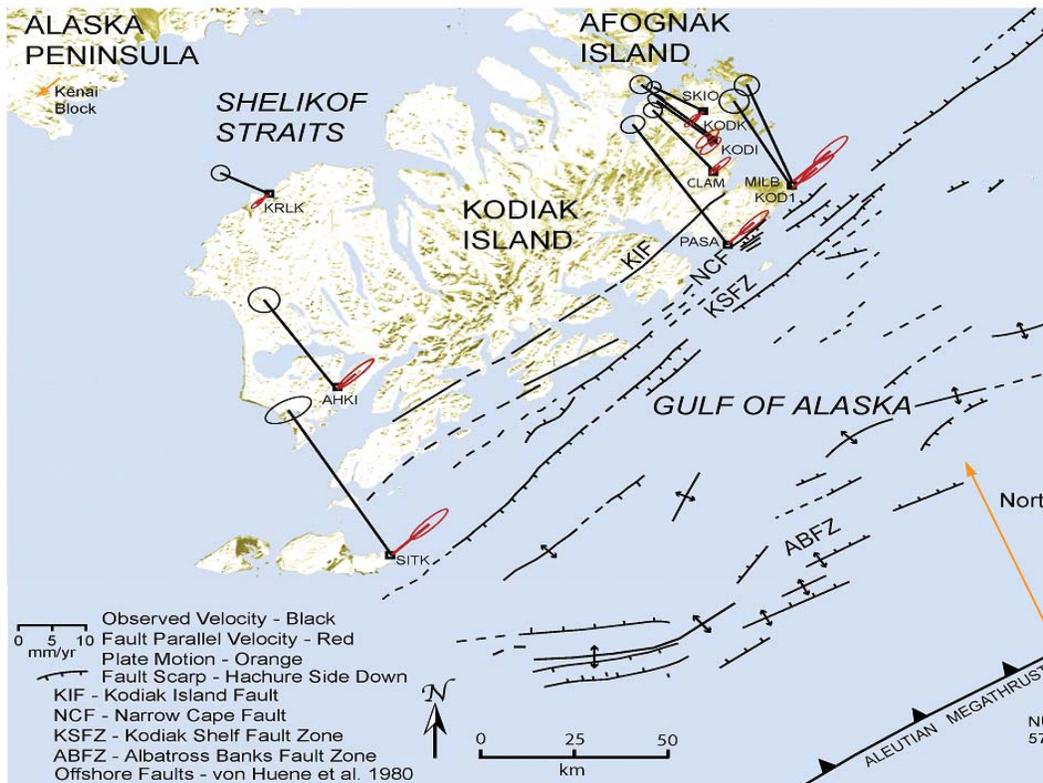
The Kodiak Islands are located approximately 120 to 250 km from the Alaska-Aleutian Trench. At this location, the Pacific plate is underthrusting the North American plate at a rate of about 57 mm/yr. The southern extent of the 1964 Prince William Sound (Mw = 9.2) earthquake rupture occurred offshore and beneath the eastern portion of the Kodiak Islands. In this study we report global positioning system (GPS) results for 1993 to 2001 from Kodiak Island. The results span the transition between the 1964 uplift region along the eastern coast and the region of coseismic subsidence farther inland. We used these geodetic results to look at the amount of slip near Kodiak during the great 1964 earthquake, and we examined the relation of the coseismic slip to crustal deformation measured in the 30 years following the great earthquake. In addition to strain accumulating that will be released in the next large

subduction earthquake, we suggest that 4-8 mm/yr of slip is accumulating that will be released as left-lateral strike-slip motion across the inland faults of Kodiak Island. Based on the pre-1964 and post-1964 earthquake history, as well as the pattern of interseismic earthquakes across the plate boundary zone, we hypothesize that in southern Kodiak some strain is released in moderate to large earthquakes between the occurrences of great earthquakes like the 1964 event. In northern Kodiak, however, the main thrust zone is locked and will eventually be relieved in another large subduction zone earthquake in the future.

References

Sauber, J., Carver, G., Cohen, S., and King, R. Crustal deformation and the seismic cycle across the Kodiak Islands, Alaska, *J. Geophys. Res.*, 111, B02403, doi:10.1029/2005JB003626.

This research was supported by NASA's Solid and Natural Hazards Program, SRTM investigation (921-622-74-10-04).



**Figure 1.** Map showing representative GPS station velocities from the northeastern Kodiak and the USGS Katmai network in southwestern Kodiak processed by R. King using GAMIT/GLOBK [Sauber et al., 2006; Carver et al., Alaska Seismic Hazard Chapman conference, May, 2006]. UNAVCO instruments were used for campaign observations between 1993 and 2001 and at the permanent IGS station KODK.