

Coastal land change due to tectonic processes and implications for relative sea-level rise in the Samoan Islands

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Of the major coastal land change mechanisms responsible for relative sea-level change, tectonic subsidence is generally quoted as ranging from $< \text{mm/yr}$ to 1 cm/yr . However, we documented coseismic and ongoing post-earthquake surface displacements from continuous GPS and tide gauge/altimetry data that indicated rapid subsidence on two of the major Samoan Islands of 12 - 20 cm during and following the 8.1 2009 Tonga-Samoa earthquake. Earlier results and our modeling of GRACE-derived gravimetric data provided a preliminary forecast of future relative sea-level rise through rapid land subsidence [Han et al., 2019]. Of course these numerical forecasts of time-dependent deformation are only as good as our input observations and our assumed rheological models. As part of our current NASA Earth Surface and Interior study, we are obtaining a wider range of data to constrain and test alternate models of ongoing postseismic deformation across American Samoa and Upolu, Samoa: (1) times series of altimetry plus tide gauge data processed to complement the cGPS data available to provide high-temporal resolution, point measurements of uplift/subsidence, (2) InSAR derived observations of surface deformation across the highly vegetated Samoan Islands, (3) evaluating and using NASA satellite lidar data (ICESat-I & ICESat-II, GEDI) for fusion with multi-source topographic data sets and for estimating topographic change on the decadal time scale. We are evaluating and using these new observations to better understand and separate out local, island-wide, and multi-island subsidence patterns and to evaluate the high impact of rising sea-level in a tectonically active region.