Geophysical Research Abstracts, Vol. 7, 05844, 2005
SRef-ID: 1607-7962/gra/EGU05-A-05844


# Glacial isostatic rebound models of rapid uplift in southeast Alaska

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Five years of GPS observations at 74 sites indicate uplift rates of 10 - 32 mm/yr over a large area of southeast Alaska. Studies of raised shorelines at 27 sites throughout the region show rapid sea level changes, up to 5.7 m RSL over the last 250 yrs. Both the raised shoreline data and the GPS data indicate greatest uplift surrounding areas of post-Little Ice Age (LIA) deglaciation. Using a combination of geomorphic indicators and historical observations of the ice extent in Glacier Bay, we have built a model of LIA glacial expansion and retreat of the Glacier Bay Icefield. Total ice volume lost in Glacier Bay since 1750 AD is on the order of 3000 cubic km, with ice thickness changes up to 1.5 km. Additionally, present day rates of glacier thinning across southeast Alaska have been measured with airborne laser altimetry. Using these observations of ongoing glacial load changes combined with the unloading specific to Glacier Bay, we have developed a series of viscoelastic rebound models constrained by our uplift observations. Rebound models that invoke an Earth structure of a 50 km thick elastic crust over a 100 km thick asthenospheric layer with viscosity of 0.5 - 1.0 x 10**19 Pa s can completely account for the rapid uplift of southern Alaska with a low degree of misfit to the uplift observation.