Geophysical Research Abstracts
Vol. 15, EGU2013-9252, 2013
EGU General Assembly 2013

The coastal effect in sea-level change

Volker Klemann (1,2), Mark E. Tamisiea (1), and Zdenek Martinec (3)

(1) National Oceanography Centre, Liverool, United Kingdom (volkerk@gfz-potsdam.de), (2) now at GFZ Helmholtz Centre Potsdam, Potsdam, Germany, (3) Dublin Institute for Advanced Studies, Dublin, Ireland

The amount of water that was stored in the ice sheets during the last glacial cycle is reflected as a global sea level drop of more than 120 m around 20,000 yr before present. This drop is evident in geological samples, the sea-level indicators (SLIs), which are analysed in regions far away from the glaciation regions. The analysis of this type of geological data allows the reconstruction of sea level variations during the glacial cycle and, so, to assess the mass transport between ice-sheets and ocean. Nevertheless, these farfield SLIs show a significant deviation of up to 20 m with respect to the eustatic sea level, which represents the global average of relative sea level.

The largest variations appear for coastal sites, where the ocean floor is unloaded due to the reduced water column whereas the proximate land area is not affected. This mechanism, discussed as hydro-isostatic contribution in literature, results in a flexure of the lithosphere along all coastlines and, so, depends on the shape of the coastline but also on the rheological structure of the respective area. We assess this variabiltity of sea level change at typical SLI locations for different earth models and glaciation histories and show a large sensitivity of the predicted deviations from eustatic sea level to the considered earth model, whereas the influence of the considered glaciation history is rather small. This confirms a general strategy to model the hydro-isostatic contribution adopting a spherical model which is parameterized by the regional tectonic setting.