

PAST AND FUTURE CHANGES OF SEA LEVEL ALONG THE EAST COAST OF THE UNITED STATES OF AMERICA

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Our goal is to quantify future changes of sea level along the Eastern coast of North America with particular emphasis on heavily populated areas which may be susceptible to such changes. There are several processes that will contribute to the sea level signal and each needs to be considered in order to produce accurate projections¹. The primary component signals are: changes in sea surface height due to ocean steric changes and the associated dynamic signal, changes in relative sea level due to melting of land ice (ice caps, glaciers and ice sheets), changes in relative sea level due to glacial isostatic adjustment (GIA) associated, mainly, with the melting of the now absent Laurentide ice sheet. This presentation focuses on the contribution of the latter to estimates of future sea level change.

To constrain GIA model parameters, we utilize paleo sea level data from the study of Engelhart and Horton², in which approximately 500 index points distributed between Maine and Southern Carolina were presented and assessed. The paleo sea-level data are compared to model output from over 360 spherically symmetric Earth models each driven by a number of different glaciation histories from the analysis of Tarasov et al³. Early results indicate changes of the order of $14\pm 2\text{cm}$, $8\pm 2\text{cm}$ and $-2\pm 1\text{cm}$ over the 2000-2100 period to $27\pm 5\text{cm}$, $15\pm 4\text{cm}$ and $-4\pm 2\text{cm}$ for the 2100-2300 period for the cities New York, Boston, and Portland, respectively. The GIA contribution to sea level change shows some spatial variation along the coastline with the region of greatest subsidence centered about Delaware and the region of greatest rebound, as expected, near the margin of the former Laurentide ice sheet. Preliminary results from analysis of climate model output to determine the thermosteric and ocean dynamic contribution and fingerprinting experiments for determining the contribution from glaciers, ice caps and ice sheets indicate that GIA will be a non-negligible contributor to future sea-level change in this region.

References

1. Slangen et. al, *Climate Dynamics*, **38**, 1191-1209 (2012)
2. Engelhart, S.E., Horton, B.P., *Quaternary Science Reviews*, **54**, 12-25 (2011)
3. Tarasov et. al., *Earth and Planetary Science Letters*, **315-316**, 30-40 (2012)