Geophysical Research Abstracts
Vol. 17, EGU2015-9146, 2015
EGU General Assembly 2015

Changes of mean relative sea level around Canada in the 20th and 21st centuries

Guoqi Han, Zhimin Ma, Nancy Chen, Rick Thomson, and Aimee Slangen
Fisheries and Oceans Canada, St. John's, Canada (guoqi.han@dfo-mpo.gc.ca)

Trends in regional mean sea levels can be substantially different from the global mean trend. Here, we first use tide-gauge data and satellite altimetry measurements to examine trends in the mean relative sea level (MRSL) for the coasts of Canada in the past century. We then combine model output and satellite observations to provide sea level projections in the 21st century. The MRSL trend based on historical tide-gauge data shows large regional variations, from 3 mm/yr (above the global mean MRSL rise rate 0f 1.7 mm/yr) along the southeast Atlantic coast, close to or below the global mean along the Pacific coast and Arctic, to –9 mm/yr in the northeast centred near Hudson Bay. This significant spatial contrast can largely be attributed to the vertical land motion. The combination of altimeter-measured sea level change with Global Positioning System (GPS) data can approximately account for tide-gauge measurements at most stations over 1993-2011. When the GPS data are used the projected MRSL change between 1980-1999 and 2090-2099 under a medium high climate change emission scenario (A2) ranges from -50 cm in the northeast to 75 cm in the southeast. Along the Beaufort Sea, the MRSL rise is up to 70 cm. The MRSL change in the Pacific coast varies from -15 to 50 cm. The ocean steric and dynamical effect contributes to the MRSL rise along the Canadian coasts, and is dominant in the southeast. The land-ice (glaciers and ice sheets) melt contributes 10-20 cm to the MRSL rise, except in the northeast. The effect of the vertical land uplift is large in the northeast centered near Hudson Bay, significantly reducing the MRSL rise. The land–ice melt also causes the MRSL to fall in the northeast. The projected MRSL change under a high emission scenario (RCP 8.5) has a spatial pattern similar overall to that under A2, with a slightly bigger rise of 7 cm on average and some notable differences at specific sites.