Decadal sea level change due to Greenland Ice Sheet melting

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In the recent past the melting of the Greenland Ice Sheet became a major contributor to global and regional sea level change. The water inflow causes eustatic and steric sea level to rise, which is simulated using the finite element sea-ice ocean model (FESOM). Four scenarios of ice mass loss of 100, 200, 500, and 1000 Gt/yr respectively are converted to a fresh water flux and added along the Greenland coast south of 75 degree north. In this study, time series of sea level rise at a number of towns around the North Atlantic is analyzed.

The global mean sea level change amounts to about 0.3 mm/yr if 100 Gt/yr of fresh water is flown into the ocean. However, regional deviations from the global average occur, caused by density variations. In the first years, steric sea level mainly changes near its source. After 48 years of model integration, regional sea level change is distributed over the North Atlantic and the Arctic Ocean.

Regional sea level also changes due to the reduced gravitational attraction of the remaining ice mass. This effect is computed using Green's functions and causes sea level to fall near the source of mass loss and to slightly rise farther away.