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On the Thermosteric "Sea Level Sensitivity" of Climate Models: Does it Match the Observations?

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In a recent paper, Rahmstorf (2007) used a semi-empirical approach to estimate future sea level rise, based on the assumption that the rate of sea level rise is proportional to the atmospheric temperature increase over its pre-industrial value. Using the proportionality constant determined from twentieth century observations, future sea level rise can be estimated based on projections for the atmospheric temperature rise. The resulting estimate (50 to 140 cm global mean sea level rise in 2100) is much higher than the projections recently presented by the IPCC in the Fourth Assessment Report (2007).

This raises the question whether the current generation of climate models is capable of correctly reproducing the (thermosteric component of) sea level rise in response to atmospheric temperature changes, so that we can have confidence in the projections.

Here, the thermosteric "sea level sensitivity" (defined as the rate of global mean thermosteric sea level rise given a certain temperature rise) is analyzed from a suite of climate model simulations performed in preparation of the IPCC Fourth Assessment Report. In particular, the strong model dependency of the "sea level sensitivity" will be discussed. The results are compared to estimates of the rate of thermosteric sea level rise derived from hydrographic data over the twentieth century.