School of Earth and Atmospheric Sciences
Georgia Institute of Technology

"Regional Climate Models Add Value to Global Model Data – A Review and Selected Examples"

presented by

Hans von Storch
Institute for Coastal Research
Geesthacht, Germany

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Abstract: An important challenge in current climate modeling is to realistically describe small-scale weather statistics such as topographic precipitation, coastal wind patterns or regional phenomena like polar lows. Global climate models simulate atmospheric processes with increasingly higher resolutions, but still regional climate models have a lot of advantages. They consume less computation time due to their limited simulation area and thereby allow for higher resolution both in time and space as well as for longer integration times. Using regional climate models for dynamical downscaling purposes, their output data can be processed to produce higher resolved atmospheric fields, allowing the representation of small-scale impacts (such as storm surges along coasts).

But does the higher resolution lead to an added value when compared to global model results? Most studies implicitly assume that dynamical downscaling leads to output fields superior to the driving global data, but few work has been done to substantiate these expectations. Here, we review the benefit of dynamical downscaling by explicitly comparing results of global and regional climate model data to observations. Regional climate model generally performs better for the medium spatial scales, but not always for the larger spatial scales – specifically when a large-scale constraint such as spectral nudging, is invoked.

We conclude that regional models may indeed provide added value, but only for certain variables, scales and locations; in particular when influenced by regional specifics such as coasts, or when meso-scale dynamics like Polar Lows is involved. Therefore the utility of a regional climate model depends crucially on the scientific question.