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Future Climate Change in the Baltic Sea Area

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Regional climate models have been used extensively since the first assessment of climate change in the Baltic Sea region published in 2008, not the least for studies of Europe (and including the Baltic Sea catchment area). Therefore, conclusions regarding climate model results have a better foundation than was the case for the first BACC report of 2008.

This presentation will report model results regarding future climate. What is the state of understanding about future human-driven climate change? We will cover regional models, statistical downscaling, hydrological modelling, ocean modelling and sea-level change as it is projected for the Baltic Sea region.

Collections of regional model simulations from the ENSEMBLES project for example, financed through the European 5th Framework Programme and the World Climate Research Programme Coordinated Regional Climate Downscaling Experiment, have made it possible to obtain an increasingly robust estimation of model uncertainty. While the first Baltic Sea assessment mainly used four simulations from the European 5th Framework Programme PRUDENCE project, an ensemble of 13 transient regional simulations with twice the horizontal resolution reaching the end of the 21st century has been available from the ENSEMBLES project; therefore it has been possible to obtain more quantitative assessments of model uncertainty. The literature about future climate change in the Baltic Sea region is largely built upon the ENSEMBLES project.

Also within statistical downscaling, a considerable number of papers have been published, encompassing now the application of non-linear statistical models, projected changes in extremes and correction of climate model biases.

The uncertainty of hydrological change has received increasing attention since the previous Baltic Sea assessment. Several studies on the propagation of uncertainties originating in GCMs, RCMs, and emission scenarios are presented. The number of studies on uncertainties related to downscaling and impact models is relatively small, but more are emerging.

A large number of coupled climate-environmental scenario simulations for the Baltic Sea have been performed within the BONUS+ projects (ECOSUPPORT, INFLOW, AMBER and Baltic-C (2009-2011)), using various combinations of output from GCMs, RCMs, hydrological models and scenarios for load and emission of nutrients as forcing for Baltic Sea models. Such a large ensemble of scenario simulations for the Baltic Sea has never before been produced and enables for the first time an estimation of uncertainties.