Climate for Culture

Final conference
07-11 July 2014
Max-Joseph-Saal
Residenz, Munich / Germany

DYNAMICAL DOWNSCALING OF ANTHROPOGENIC CLIMATE CHANGE SIMULATIONS FOR EUROPE: FROM GLOBAL CLIMATE MODEL RESULTS TO DATA SUITABLE AS INPUT FOR BUILDING SIMULATIONS

Lola Kotova[a], Daniela Jacob[a,b], and Uwe Mikolajewicz[c]

[a] *The Atmosphere in the Earth System, Max Planck Institute for Meteorology, Germany,* *lola.kotova@mpimet.mpg.de ;*
[b] *Climate Service Center, Germany, daniela.jacob@hzg.de ;*
[c] *The Ocean in the Earth System, Max Planck Institute for Meteorology, Germany , uwe.mikolajewicz@mpimet.mpg.de*

This work aims at creating and providing high resolution reliable climate evolution scenarios for damage assessment of movable and immovable cultural heritage objects in the near and far future.

Global climate model simulations, used e.g. in the IPCC to predict anthropogenic climate change, do have a typical spatial resolution of 100 km, for many purposes not sufficient for assessing potential damages. To provide better information on climate projections for the project target regions, model simulations with higher resolution (up to 10x10 km grid size) were carried out for Europe. For this purpose, the regional model REMO was adapted at the Max Planck Institute of Meteorology (MPI-MET). The model simulations were done for three time slices: the recent past (1960-1990), near (2020-2050) and far future (2070-2100). Two IPCC emission scenarios (A1B and RCP4.5) are taken into account.

In addition, the regional coupled model REMO/MPIOM with 25 km resolution in the atmosphere and 11 km in the ocean was used to estimate both changes in mean sea level as well as changes in positive sea level extremes.

The magnitude of climate change signal differs between regions and seasons. Thus the temperature increase projected by REMO for the A1B IPCC Scenario is about 2-4^{o}C in most part of Europe and is generally statistically significant. When comparing results for precipitation, it can be clearly recognized that the general tendency is a significant decrease in summer and a significant increase of winter precipitation. Regionally the changes in sea level rise show quite different values. In the North Sea the projected sea level rise is slightly higher than the global mean; in the Mediterranean the sea level rise is less than the global average due to enhanced net fresh water loss and resulting saltier water masses.

The results of the climate simulations are used as an input for other work packages.