Climate for Culture “Atmosphere”

Climate for Culture: Damage risk assessment, macroeconomic impact and mitigation strategies for sustainable preservation of cultural heritage in the times of climate change

Project summary:

Climate Change is one of the most critical global challenges of our time. This factor, coupled with the increasing demand our society makes on energy and resources, has forced sustainable development to the top of the European political agenda. Scientific research shows that the preservation of the cultural heritage of Europe is particularly vulnerable to all three of these factors. As a non-renewable resource of intrinsic importance to the European identity, we need to develop more effective and efficient sustainable adaptation and mitigation strategies in order to preserve these invaluable cultural assets for the long-term future. More reliable assessments will lead to better prediction models, which in turn will enable preventive measures to be taken, thus reducing energy and the use of resources.
For this purpose and for the first time ever, the CLIMATE FOR CULTURE project will connect completely new high resolution Climate Change evolution scenarios with whole building simulation models to identify the most urgent risks for specific regions. The innovation lies in the elaboration of a more systematically and reliable damage/risk assessment which will be deduced by correlating the projected future climate data (with the spatial resolution of up to 10x10 km grid size) with whole building simulation models and new damage assessment functions. In situ measurements and investigations at cultural heritage sites throughout Europe will allow a much more precise and integrated assessment of the real damage impact of climate change on cultural heritage at regional scale. Sustainable (energy and resource efficient) and appropriate mitigation/adaptation strategies, also from previous EU projects, are further developed and applied on the basis of these findings simultaneously. All these results will be incorporated into the assessment of the economic costs and impacts. Precious collections in historic buildings from various European regions

Project objectives:

The CLIMATE FOR CULTURE project builds on the three most urgent questions for cultural heritage in the times of climate change:
1. What will be the effects of climate change on cultural heritage in Europe?
2. What mitigation strategies are necessary to prevent damage to movable and immovable cultural heritage?
3. What will it cost us, if we do not react in time?

MPI-M Contribution to the project

Two groups are involved into the Project:

- regional climate modelling, Dr.Daniela Jacob, Department “The Atmosphere in the Earth System”
- research Group Ocean Physics, Dr..Uwe Mikolajewicz, Department “The ocean in the Earth System”

MPI-M leads the Work package 1 of the project. The main objective of this WP is:

To create and to provide high resolution reliable climate evolution scenarios (excluding extreme events) for damage assessment of movable and immovable cultural heritage objects in the near and far future.

To provide better information on climate projections for the project target regions, high-resolution model simulations (up to 10x10 km grid size) will be carried out for the whole of Europe. For this purpose, the regional model REMO will be adapted. The high-resolution model simulations will be done for the past (1960-1990), near (2020-2050) and far future (2070-2100). Two IPCC emissions scenarios (A1B and B1) will be taken into account. The global fields from the coupled general circulation model ECHAM5-MPIOM will be used as driving forces.

In addition, the coupled atmosphere-ocean model REMO-MPIOM will be used to provide sea-level variations under the different climate conditions.

Main deliverables of this task are high resolution climate datasets for the whole Europe for the two climate change scenarios as input for building simulation and damage assessment.