## Mechanisms of inter- to multidecadal variability and their implications for climate predictions (MultiCliP)

The BMBF program "Mittelfristige Klimaprognosen" (MiKlip) will develop a system for climate predictions for up to a decade ahead. Decadal predictions are based on the long-term memory of the ocean and other climate sub-components and the associated variability on the decadal to centennial time-scale. The project proposed here, **MultiCliP, is funded by BMBF** and will use the comprehensive Earth System Model (ESM) developed at MPI-M in a hierarchy of model set-ups to identify mechanisms and feedbacks determining decadal to multi-decadal-scale variability, to assess their dependence on model resolution and complexity, to assess the role of external forcing (e.g., solar, volcanic), and to derive implications and recommendations for decadal forecasts. MultiCliP will analyse existing long-term climate simulations covering the last millennium and unforced control simulations as well as the upcoming IPCC AR5 20<sup>th</sup> century simulations and respective control experiments. In addition, a number of sensitivity experiments will be carried out to isolate the effect of resolution in the respective model component and to analyse specific mechanisms. The model set-ups also differ in their complexity, e. g, the explicit resolution of the stratosphere. Specific contributions are:

1) To identify coupled feedbacks in simulations covering the last millennium and in 20<sup>th</sup> century integrations, and to assess the role of low, mid, and high latitude processes and of external forcing.

2) to assess the role of model resolution in long-term integrations and to investigate the role of a dynamically-resolved stratosphere for the teleconnection pathways between the low, mid and high latitudes on decadal to multidecadal time-scales,

3) to dissect coupled feedbacks and teleconnection pathways using idealized atmosphere-ocean forcing and partially coupled experiments, and

4) to conduct idealized prediction experiments to determine the implications of the findings for decadal predictions and as tests for the proposed prediction system (DS3).

MultiCliP will provide valuable information and recommendations for the configuration of the prototypical MiKlip prediction system