



FLEXFORDEC - A flexible forecast system for decadal climate predictions

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On timescales of several years to several decades, weather and climate patterns depend not only on the anthropogenic rise of greenhouse gas concentrations in the atmosphere, but also on natural climate variability. Natural climate variability is both, internal – ultimately induced by weather in both atmosphere and ocean – and forced – caused by solar variability and volcanic eruptions. Owing to the chaotic nature of the internal variability, its predictability horizon is limited. But the clear signal of decadal-timescale variability in almost all climate records suggests that, if we are able to observe the phase and amplitude of the current decadal variability “event”, we can exploit the memory of the climate system to predict the further evolution of this event. How to turn this potential for decadal climate prediction into realised predictive skill is the grand challenge of the BMBF-funded project MiKlip.

FLEXFORDEC establishes a central decadal climate prediction system. Based on the experience previously gained at MPI-M during CMIP5 and in cooperation with the other projects throughout MiKlip we successively form an ensemble prediction system (EPS) for global-scale decadal climate variability. This system considers a technically complex data assimilation architecture comparable to the one provided by NWP and by seasonal climate prediction. This system will also consider scientifically complex questions such as the inclusion of relevant climate system components (e.g., land surface and sea-ice), and the generation of a sufficiently large ensemble.

During the course of MiKlip a succession of central prediction systems will be developed (one in each of the development stages DS1 to DS3), employing successively more sophisticated process representation. For each system we will perform sets of hindcasts and forecasts, control runs and 20th-century experiments with the model of highest possible resolution (for example, T63L95/TP04 during DS1). Here we will show first results from DS1 and outline the strategies for DS2 and DS3.