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Statistical Methods and Metrics in the Standardized Evaluation System for Decadal Climate Prediction in MiKlip

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Working in the field of climate science and its new area of research, the decadal climate prediction reminds of the origin of science and the variety of open questions to be answered. Despite that, the evaluation of decadal prediction systems is of course a scientific challenge; nowadays it is a technical challenge in the climate research as well. The major project MiKlip (www.fona-miklip.de) for medium-term climate prediction funded by the Federal Ministry of Education and Research in Germany (BMBF) has the aim to develop a model system that can provide reliable decadal forecasts on climate and weather. Therefore, a standardized evaluation system will be part of the MiKlip system to validate it, designed by the project 'Integrated data and evaluation system for decadal scale prediction' (INTEGRATION). Statistical methods are important instruments to provide such a system with reliability. The research field of metrics in the decadal climate prediction is not standardized like e.g. in the weather prediction and not even defined yet. Bringing different aspects of different research areas together and adapt them to one common system, as well as research on finding and combining new scores and skill scores is a major part of our research.

Uncertainties in the field of climate science and especially the decadal prediction are a prominent topic to be discussed right now. Due to the fact, that the decadal predictions are in between of initial and boundary conditions dependencies, uncertainties from both sides are enclosed in the system, plus the model uncertainties itself. The field of interest is the internal variability of natural processes like ENSO, AMOC, AMV, PDO, etc. To be able to detect the range of uncertainties, the ensemble approach is an effective method in climate science. Statistical methods like the CRPSS can help to understand the predictability and its reliability to observations and reanalyzes due to the ensemble spread. Key questions are: What affects such a decadal climate prediction system and how can a fundamental evaluation system indicate uncertainties in such a system in order to enhance it? First open questions will be answered.