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Deterministic and Probabilistic Metrics of Surface Air Temperature and Precipitation in the MiKlip Decadal Prediction System

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Decadal forecasting of climate variability is a growing need for different parts of society, industry and economy. The German initiative MiKlip (www.fona-miklip.de) focuses on the ongoing processes of medium-term climate prediction. The scientific major project funded by the Federal Ministry of Education and Research in Germany (BMBF) develops a forecast system, that aims for reliable predictions on decadal timescales. Using a single earth system model from the Max-Planck institute (MPI-ESM) and moving from the uninitialized runs on to the first initialized 'Coupled Model Intercomparison Project Phase 5' (CMIP5) hindcast experiments identified possibilities and open scientific tasks. The MiKlip decadal prediction system was improved on different aspects through new initialization techniques and datasets of the ocean and atmosphere. To accompany and emphasize such an improvement of a forecast system, a standardized evaluation system designed by the MiKlip sub-project 'Integrated data and evaluation system for decadal scale prediction' (INTEGRATION) analyzes every step of its evolution. This study aims at combining deterministic and probabilistic skill scores of this prediction system from its unitialized state to anomaly and then full-field oceanic initialization. The improved forecast skill in these different decadal hindcast experiments of surface air temperature and precipitation in the Pacific region and the complex area of the North Atlantic illustrate potential sources of skill. A standardized evaluation leads prediction systems depending on development to find its way to produce reliable forecasts. Different aspects of these research dependencies, e.g. ensemble size, resolution, initializations, etc. will be discussed.