3rd International Conference on Earth System Modelling
Vol. , 3ICESM-206-1, 2012
3rd International Conference on Earth System Modelling
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Evaluation of decadal hindcasts: climate indices and clouds

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The research programme MiKlip, funded by the Federal Ministry of Education and Research in Germany (BMBF), aims at the development of a system for decadal climate prediction. The MiKlip baseline system includes 10-year hindcast and prediction ensembles according to the Coupled Model Intercomparison Project Phase 5 (CMIP5) protocol. The VeCAP project contributes to the development of a framework for the validation of the MiKlip system focusing on the probabilistic evaluation of the decadal hindcasts and forecasts. A basic suite of statistical methods is established during an early phase of the project. The suite enables the probabilistic evaluation of the MiKlip system by means of scores and skill scores against observational data sets such as reanalysis and satellite data products.

Here we will present results of a process oriented evaluation based on a set of predefined indices representing climate modes such as the North Atlantic Oscillation and the Southern Oscillation enabling a general characterisation of the decadal hindcasts. This analysis is complemented by a data based evaluation of clouds focusing on cloud cover and cloud optical thickness. Selected components of the CFMIP observational simulator package (COSP), which are already available as integral part of the atmosphere general circulation model, are used to derive related cloud products as seen by the satellite-borne instruments (radiances) from climate model simulations. The hindcasts are evaluated for cloud properties as derived by the International Satellite Cloud Climatology Project (ISCCP) and radiances as seen by CloudSat. While ISCCP covers the period from 1983 to present, CloudSat is available since 2006. Additionally to the analysis employing satellite simulator techniques an evaluation of clouds using direct model output is performed. Here, cloud properties derived from multi-spectral radiometer measurements (Advanced Very High Resolution Radiometer, AVHRR) are used, which are provided by the Satellite Application Facility on Climate Monitoring (CM SAF, http://www.cmsaf.eu/) as part of the CM SAF AVHRR GAC data set covering the period 1982-2009.