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Evaluating parametrized processes using short range forecasts

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Numerical Weather Prediction provides an environment where an atmospheric model is continously confronted with data. Verification in the short range has the advantage that the forecast drift is still small (the model state is close to the synoptic state) and that subgrid processes can be isolated from the feedback on the large-scale flow.

Examples of the Integrated Forecasting System (IFS) short range forecast errors are presented that are related to the individual physical parameterizations, i.e surface parameterization (2m temperature), convection (tropical wind errors, diurnal cycle, "mass increments"), gravity wave drag (wind errors above orography), cloud and boundary-layer parameterizations (cloud amount and boundary-layer structure). It is illustrated that the short-range forecast errors also largely explain the typical model errors in long range, climate type integrations. Finally, examples are given how operational data (data assimilated in the analysis) and research data (either additional observations and types of observation, or data from cloud resolving models) can contribute to improved parameterizations.