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ICON-EPS: The operational global ensemble forecasting system of DWD

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The global forecast model ICON (ICOsahedral Nonhydrostatic model) is operational since January 20, 2015, at the German Meteorological Service (DWD).
Starting January 2018, and besides the High-Resolution deterministic ICON forecasts (at a nominal resolution of 13 km), DWD will start to produce and disseminate ensemble forecasts at a nominal global resolution of 40 km and 20 km over the European subdomain.

The ensemble forecasts are initialized by an Ensemble Data Assimilation system (EDA), in the specific implementation of a Localized Ensemble Transform Kalman Filter (LETKF). In the operational setup, model uncertainty is preliminary obtained only by a set of physics parameter perturbations that are fixed over the forecast lead time.

Predicting forecast uncertainty requires an ensemble with reliable spread-skill relations, which are directly depended on the choice of how perturbations are generated. DWD aims to obtain ensemble perturbations based on singular vectors. Here we use a matrix-free Krylov-subspace method in order to approximate the singular vectors efficiently, without the need of linear and adjoint models.