



## **Diagnosis of analysis and forecast ensembles by using normal modes**

N. Zagar

Faculty of Mathematics and Physics, University of Ljubljana, Ljubljana, Slovenia (nedjeljka.zagar@fmf.uni-lj.si)

The three-dimensional structure of state-of-the-art analysis and short-range forecast ensembles is presented in terms of normal modes. A fully orthogonal set of normal modes is applied with the goal to represent most of the input dynamical information in the wind and geopotential fields at model levels. This allows us to quantify circulation in terms of balanced and unbalanced, eastward- and westward-propagating inertio-gravity (IG), motions of different vertical and horizontal scales. Derived energy distributions provide information about the flow-dependency of the short-range forecast errors as well as the analysis uncertainty in terms of balanced and IG motions.

Of special interest are the tropics, where the flow-dependency of the background-error covariances is considered more important for data assimilation than in the mid-latitudes where the linear balance relationship applies well to the large-scale errors in the mass and wind field.