Nonlinear Processes
in Geophysics
Discussions

# Interactive comment on "Multiple scale error growth in a convection-resolving model" *by* F. Uboldi and A. Trevisan

**Anonymous Referee #1**

General Comments

In this paper, the properties of the multiple-scale instabilities in a non-hydrostatic forecast model are investigated by performing parallel and twin experiments, and multiple-scale forecast error growths are examined in the low-dimensional subspace spanned by bred vectors. The discussions of the numerical results are interesting but rather speculative (with respect to the true error growths, as explained below in the specific comments 1 and 2). The paper needs to be revised before it can be accepted. My specific comments are listed below.

Specific Comments

1. The true error growths in a convection-resolving model may also depend significantly

on the model errors that are largely unknown and neglected in this study. Neglecting the model errors appears to be a major limitation for this study. This limitation should be addressed.

2. The error in the first control trajectory 18H is evaluated with respect the simulated "true" trajectory. Although the error of this control trajectory at 00:00UTC is considered to be compatible with the "present-day analysis error" in terms of amplitude [measured by (RMS) TUV norm] but it may not be compatible with the "present-day analysis error" in terms of spatial structure and related spectral structure. The "present-day analysis error" is not known for an individual realization (event) but its statistical moments may be estimated for the concerned type of weather events predicted by the non-hydrostatic forecast model (including its data assimilation system) used in this paper. Since these statistical moments are not yet fully estimated, it is not clear to what extent the error of the control trajectory 18H can represent the true error. This concern should be addressed. 3. The paper appears to be written for readers who are already familiar with the general concept of breeding technique. For other readers, a brief introduction of the breeding technique used in this paper may be helpful, and the related terms, such as, "rescaling amplitude (RMS TUV norm)" and "bred vector (BV)", may need to be explained and/or defined precisely (with mathematical formulations).

Please also note the supplement to this comment:
http://www.nonlin-processes-geophys-discuss.net/1/C116/2014/npgd-1-C116-2014-supplement.pdf