

Interactive comment on “Recalculation of error growth models’ parameters for the ECMWF forecast system” by Hynek Bednář et al.

Anonymous Referee #1

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The reviewed manuscript aims to estimate the Lyapunov exponent, asymptotic error and model error for the ECMWF forecasts. The authors are comparing different parametric models to do such estimates. The topic is interesting but as a reader I have problems to follow some of the steps and assumptions in the manuscript, especially the correction step that is introduced. The manuscript also has a number of statements that need to be better clarified. I therefore recommend a major revision before it can be accepted for publication.

Major comments 1. I do not understand why the geometric vs arithmetic mean is discussed in the manuscript, especially as it cannot be fully applied to the ECMWF scores that are externally calculated. The part needs to be better motivated or removed.

2. In the L05 a model error is introduced, but it needs to be better explained how this

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error would work and how it relates to real model errors.

3. The correction scheme for which the results are presented on line 210-233 is not properly introduced and motivated. For example, it is not easy to see how a correction based on L05 can be applied to ECMWF data. A proper description is needed.

Minor comments: Line 18-19: Initial errors grow due to the chaotic nature of the system. Line 19-20: The growth can be considered exponential for short lead times before non-linear effects (saturation) starts to play a role. Note that for very short lead times the error growth could be faster either due to small-scale processes as discussed in Zhang et al., or due to decorrelation between analysis error and forecast errors. Line 22: “with increasing” -> “as function of” Line 27: L is often referred to as practical predictability Line 30: Historically U is referred to as the perfect model assumption Line 38: Based on time-derivatives of the error Line 44 and other places: Do not use ‘ (e.g don’t) Line 48: The need for a multi-scale growth model can be elaborated a bit more on. Line 99: Is “real” referring to the forecast as opposed to observations? Line 116: “Ago” and “ahead” is confusing Line 177: ERA-Interim does also include errors, which might be correlated with the forecast initial conditions Line 175: Do you tune the L05 differently for different years of ECMWF data, to account for lower initial and lower model errors? Line 191: “RMS” - Root mean square? Line 199: How would the result look if you force beta to be zero? Line 210-233: This paragraph is very difficult to follow. Line 244: Odd statement. Line 288: p should be given by the system and be independent of the model error Line 270-273: I do not understand the statement “used in ECMWF forecasting system”. Please give a reference.

Interactive comment on Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2020-250, 2020.

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