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Hydrology and Earth System Sciences Discussions

Interactive comment on "Dynamically vs. empirically downscaled medium-range precipitation forecasts" *by* G. Bürger

Anonymous Referee #3

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An important aspect of the medium-range prediction systems, their ability to adequately forecast intensive precipitation, is discussed in this study. The article presents results of evaluation of two downscaling systems of global circulation model outputs. The regional model LM provides dynamical downscaling procedure for precipitation from German weather service model data on the one hand, and elaborated statistical model subsequently downscales the precipitation from predictor fields of IFS spectral model on the other hand. Statistical parameters like Gilbert skill score, contingency table, and cost-lost value are used for quantitative assessments of the downscaling systems.

In general, I think that the article is publishable after relatively minor revision. Next follow some critical comments that should be addressed.

1. I share the opinion of the other reviewers that the comparison of the two forecasting systems using different GCMs may not be fully objective. To support his comparison procedure, I would recommend to the author to show and discuss the skill scores of the both GCMs over the area of central Europe in the rectangle area between (4W, 46 N) and (18W, 56N), which is chosen as synoptic domain for EDS model, for the period 2002 through 2005. The parameters for the valuation could be the same as the predictors in EDS model – namely, H50, T850, vorticity (850), specific humidity (850), and precipitation.

2. The author mentions that he is not "aware of any systematic comparison between dynamical and empirical methods of NWP downscaling" (p. 3519, line 23). In this respect, I would like to say that, in fact, there is a number of publications dedicated to inter-comparison and evaluation of statistical and dynamical downscaling methods. In particular, I would recommend to read and cite some of the following sources:

- Murphy James, An Evaluation of Statistical and Dynamical Techniques for Downscaling Local Climate, Journal of Climate , 1999, vol. 12 (1), no8, pp. 2256-2284

- Spak, S., T. Holloway, B. Lynn, and R. Goldberg (2007), A comparison of statistical and dynamical downscaling for surface temperature in North America, J. Geophys. Res., 112, D08101, doi:10.1029/2005JD006712.

-Haylock, M.R., Cawley, G.C., Harpham, C., Wilby, R.L. and Goodess, C.M. 2006 Downscaling heavy precipitation over the UK: a comparison of dynamical and statistical methods and their future scenarios International Journal of Climatology, 26, 1397-1415

- Schmidli, J., C. M. Goodess, C. Frei, M. R. Haylock, Y. Hundecha, J. Ribalaygua, and T. Schmith (2007), Statistical and dynamical downscaling of precipitation: An evaluation and comparison of scenarios for the European Alps, J. Geophys. Res., 112, D04105, doi:10.1029/2005JD007026.

3. I can not understand why all the predictor fields were interpolated on a 1x1 grid

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(p. 3522, line 1). The empirical orthogonal function (EOF) analysis could be applied directly to the predictor fields before interpolation procedure.

4. Does it really make sense to concatenate of all the predictor fields in a single array? (p. 3522, line 3). 81 EOFs were retained, but the author did not show the percentage of the total variance explained by these EOFs. In my opinion, the EOF analysis could be applied separately for each predictor field. In this case, the convergence of the EOFs, especially those for the geopotencial height, and the air temperature fields would be faster, and a smaller number of EOFs would be required. I believe that the concatenation of the few first significant EOFs of each predictor field would produce a more compact array.

5. Page 3522, line 18: “Suppose the series of daily atmospheric predictors is given as x(t)=(x1(t), . . . , xn(t)), with n=85 “ A misprint? Is it not right that n=81?

6. It would be good to apply a statistical significance test when comparing the performance of forecasting systems with respect to intensive precipitation that rarely occurs in the data sample.

7. I would recommend calculating the expected daily expenses amount as a function of the C/L ratios varying in an appropriate range, rather than restricting the discussion to a single value of this ratio.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 3517, 2009.