Post-processing of ALADIN forecasts using neighborhood ensemble techniques

Endi Keresturi
endi.keresturi@cirus.dhz.hr

The traditional or point based verification of model forecasts is problematic because i) grid averaged values (model forecasts) cannot simply be compared to the point values (observations), as representativeness error can be as high as 50 % of the total error, especially given the fact that model effective resolution is 5–6 times higher than its grid spacing, ii) it has been shown in the past that point verification is unable to show benefit of increasing model resolution and iii) it is very sensitive to the double-penalty effect. This led to the development of so-called spatial verification techniques. The spatial evaluation accounts for structure errors, spatial displacements and field deformations. Through different approaches (i.e. scale separation, neighborhood, object or feature-based approach, etc.) spatial verification is reducing the double-penalty effect and is able to more correctly compare different resolution models.
In addition, lowering the grid spacing leads to faster error growth and saturation on the smallest resolved scales. For kilometric grid sizes, error saturation can occur after only a couple of hours of integration. This means that model forecasts on those scales become uncertain very quickly. That is why the ensemble and probabilistic forecasts are becoming more and more important.

In this work, we try to alleviate before-mentioned problems by generating a neighborhood ensemble from a deterministic ALADIN forecast. Selected neighborhood contains both spatial and temporal dimension and its size varies with the forecast range in order to account for increasing forecast uncertainty. By using neighborhoods, we can include probabilistic information to and reduce representativeness error of a deterministic forecast. We apply this technique to precipitation, temperature and wind variables. The results show increased forecast accuracy for all variables, especially for min/max temperatures and it gives us an elegant way to account for double-penalty effect for precipitation. In addition, various forecast products based on the neighborhood approach will be presented.

Key words: ALADIN, neighborhood, ensemble, post-processing