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Verification of forecast ensembles in complex terrain including observation uncertainty

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Traditionally, verification means to verify a forecast (ensemble) with the truth represented by observations. The observation errors are quite often neglected arguing that they are small when compared to the forecast error.

In this study as part of the MesoVICT (Mesoscale Verification Inter-comparison over Complex Terrain) project it will be shown, that observation errors have to be taken into account for verification purposes. The observation uncertainty is estimated from the VERA (Vienna Enhanced Resolution Analysis) and represented via two analysis ensembles which are compared to the forecast ensemble. For the whole study results from COSMO-LEPS provided by Arpae-SIMC Emilia-Romagna are used as forecast ensemble. The time period covers the MesoVICT core case from 20-22 June 2007.

In a first step, all ensembles are investigated concerning their distribution. Several tests have been executed (Kolmogorov-Smirnov-Test, Finkelstein-Schafer Test, Chi-Square Test etc.) showing no exact mathematical distribution. So the main focus is on non-parametric statistics (e.g. Kernel density estimation, Boxplots etc.) and also the deviation between “forced” normal distributed data and the kernel density estimations.

In a next step the observational deviations due to the analysis ensembles are analysed. In a first approach scores are multiple times calculated with every single ensemble member from the analysis ensemble regarded as “true” observation. The results are presented as boxplots for the different scores and parameters. Additionally, the bootstrapping method is also applied to the ensembles. These possible approaches to incorporating observational uncertainty into the computation of statistics will be discussed in the talk.