Geophysical Research Abstracts
Vol. 19, EGU2017-3383-1, 2017
EGU General Assembly 2017

Thinning and superobbing of radar data in precipitation simulations

Yuliia Palamarchuk, Serguei Ivanov, and Igor Ruban
Odessa State Environmental University, Ukraine (j_pal@ukr.net)

In order to simplify calculations and reduce computational resources in data assimilation system, high dense observations, such as radar and satellite, require preprocessing. This step may include various procedures depending on data types and modelling systems. Screening of abundant data, however, leads to a potential problem with the compatibility of scales described by different resolutions networks.

Tests with the Generalized Cross-Validation (GCV) method using a simulated high resolution data set at a full resolution led to a poorer analysis than a lower resolution data set that preceded it. These results can be addressed to the increased effect of inconsistency between the resolutions used in the model and observation spaces.

The problem is partially overcome by screening high resolution observations toward the resolution used in the model. Two widely used approaches on this way are the thinning and superobbing. Thinning of radar observations throws a significant part of data out from the process, but also affects a spectral distribution for sub-scales finer than a thinning parameter. Superobbing assumes averaging of observations within a given box to create new one located at an averaged position. Both approaches reduce the number and resolution of the radar data input in a data assimilation system.

Numerical experiments with the Harmonie model using radar data from the BaltEx experiment have been carried out to investigate the impact of the above approaches on the assimilation process. Implementation of both methods showed a computationally inexpensive way. A major drawback of those, however, is that in some cases they lead to the loss of real precipitation features. Full resolution radar data showed complex precipitation patterns on mesoscales from several kilometers to hundreds meters, while averaging of observations toward the model grid size with the resolution of 2.5 km transforms them. Changes occur in a different manner depending on the matching of a precipitation pattern with the model mesh. The altering appears stronger in cases where an averaged box size considerably deviates from scales of dominating precipitation patterns mainly responsible for mass and latent heat energy fluxes.

The contribution of such representativeness error is in the focus of further researches.