

# A Large Scale Host Model Constraint in a Limited Area 4D-Var

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A regional NWP model require a host model that provide lateral boundaries. We would like to present a method to include the large scales from the host model in the data assimilation process. One reason for doing this is to have the large scales in the regional model consistent with the host model already at the analysis time.

We add an extra term,  $J_k$ , to the cost function that measure the distance to the large scale vorticity field of the host model that provides lateral boundaries. The error characteristics of the  $J_k$  term are described by the horizontal spectral densities, the vertical eigenvectors and eigenvalues of the host model described in the regional model geometry. This constraint has been tested and evaluated with the HIRLAM model 4D-Var analysis on large domain covering the north Atlantic and Europe. Evaluations show clear forecast improvements up to +48h.

## References

[1] Dahlgren P. and Gustafsson N. “Assimilating host model information into a limited area model”, *Tellus A* 2012, vol. 64, 15836, DOI: 10.3402/tellusa.v64i0.15836  
<http://www.tellusa.net/index.php/tellusa/article/view/15836>