



4D variational data assimilation for locally nested models

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This talk is focused on the problem of 4D-variational data assimilation for locally nested models, i.e. multiresolution modelling systems. Such systems allow a local increase of the mesh resolution in areas where it seems to be necessary, by running the same model on a hierarchy of grids. In the case of "one-way" interaction, coarse grid solutions provide (by interpolation) boundary conditions for the high resolution grids. In the case of "two-way" interaction, a feedback from the fine grids to the coarse grids is added.

For the generic case of a local high resolution grid embedded within a coarser resolution one, we derive the adjoint system in the two cases of "one-way" and "two-way" interactions. It is shown that the adjoint formulation adds new interactions between the grids, in the opposite sense of the interactions existing in the direct formulation. In particular, in the "one way" case, the adjoint formulation creates a retroaction term from the fine grid onto the coarse grid. These formulations will be illustrated and discussed in the test case experiment of a 2D shallow water model.