

Marta JANISKOVA defended her thesis

Realization of a Simplified Physical Parametrization for Incremental Four-dimensional Data Assimilation

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A complete set of the simplified physical parametrizations has been developed for incremental 4D-Var assimilation system. It contains a simplified computation of radiative fluxes, vertical turbulent diffusion, orographic gravity waves, deep convection and stratiform precipitation fluxes. The validation of the whole direct simplified physical package has been done.

To include the described simplified physical parametrizations into assimilating model, their tangent linear and adjoint have been developed. The accuracy of the linearization of the simplified physical parametrizations has been investigated. The problem of additional regularization, i.e. smoothing modifications of some discontinuities in the parametrizations, arose during this validation and some smoothing modifications had to be developed.

To investigate the sensitivity of a 4D-Var assimilation system to physical processes, 4D-Var experiments using the adjoint model with simplified physical parametrizations have been performed. FASTEX (Fronts and Atlantic Storm Track Experiments) situations have been selected as test cases. The potential of including the physical processes in the assimilating model for the representation of the cyclogenesis has been demonstrated.