

CONVECTION SCHEME IN ALARO 0
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Ivana Stiperski

1. AIM

Luc Gerard prognostic convection scheme has been adapted to satisfy the basic requirements of modularity of ALARO 0

2. NEW GENERAL DEVELOPMENTS

The whole scheme has been organized in such a way as to allow the maximum modularity. In that sense all the routines output only fluxes, which are being upgraded in APLPAR, so that all the upgrades and updates of thermodynamic variables are visible and dissociated with specific routine (thus enabling plug in of equivalent routines). Thus, updates of microphysical variables have been taken out of updarft (ACCUVD) and downdraft (ACMODO) routines.

Prognostic snow and rain have been introduced (also in GFL structure).

The equations for updarft/downdraft vertical velocity and mesh fraction have been modified so as to include the resolved vertical velocity advection coming from the dynamics in the correct way.

A change of prognostic updraft and downdraft vertical velocity and mesh fraction into historic and subsequently diagnostic ones has been made. These historic and diagnostic variables are left as an option under the switch LHIST.

Microphysics in Luc Gerard's scheme have been substituted by the ACPLUIE_prog developed by Bart Catry. This scheme has been modularized so that it now consists of one microphysical scheme APLMPHYS which is called by APLPAR and which in its turn calls three small routines for autoconversion ACACON, collection ACCOLL and evaporation/melting of precipitation ACEVMEL.

In line with other developments in Alaro 0, all references to NDPSFI (delta_m) option have been removed from all the routines

3. RESULTS AND CONCLUSIONS

The results of the tests done on prognostic/historic/diagnostic vertical velocity and mesh fraction can be seen by examining Figure 1. (prognostic reference), Figure 2. (historic vertical velocity and diagnostic mesh fraction) and Figure 3. (diagnostic vertical velocity and historic mesh fraction). Testing has shown that the mesh fraction should be at least historic (certainly not diagnostic) if we wish to preserve the good results obtained by the original prognostic scheme. On the other hand putting vertical velocity diagnostic does not degrade the results in such a degree, and due to computation saving might be preferred over historic (see Fig 2. and 3.)

Tests of the whole scheme have not been done yet therefore no results can be given on how these new developments impact the convective scheme