

RC LACE Research stay report

Topic: ALARO-1 related issues

Neva Pristov, RC LACE area leader for physics

CHMI, Prague 6-11 December 2015

The purpose of this one week stay was to collect information on recent ALARO-1 developments and discuss about short and long term plans. Luc Gerard was also there on ALADIN flat-rate stay, so we had some common discussions.

Radmila Brožkova presented her work on the new shallow convection parameterization and diagnostic of shallow convection cloudiness inside TOUCANS. Its influence on mixing and cloudiness was checked. Shallow convection cloud cover is quite realistic, but during summer is too large, consequence is a significant delay of onset of summer convection. Scientific validation of this scheme is continuing.

Jan Mašek reported about the 8th HIRLAM radiation working week (Tallin, November 2015) where he gave a brief overview of ACRANEB2 related activities with some verification results (https://hirlam.org/trac/attachment/wiki/HarmonieWorkingWeek/Radiation201511/presentation_masek.pdf) and had valuable discussions with Robin Hogan (ECMWF). He implemented few new features into the research version of ACRANEB2: computation of true direct solar flux (for verification against ground measurements), computation of sunshine duration based on true direct normal irradiance and generalized cloud overlap (exponential-random, for the time being with constant decorrelation depth). Verification over 9 month period (Feb–Oct 2015) confirmed persisting problem with too strong surface insolation in autumn/winter, which is related to underestimated low stratus clouds in the cold season. He presented his study of the impact of cloud overlap methods (maximum-random, exponential-random, nearly maximum-random).

Luc Gerard presented his recent work on the complementary subgrid draught (CSD) parameterization (Gerard 2015). A perturbation approach of the bulk mass flux is used for representation of deep convective updrafts and downdrafts, still closed in the same model

column and accounting for the convective mesh fraction. Prognostic variables allow a gradual evolution in time of the subgrid ensemble. Attention is paid to the ordering and interactions of the moist parameterizations. The formulation of the closure and of the triggering with a specific triggering criterion were found to be an important issues.

The progress of the ALARO-1 schemes is considerable, so we agreed that would be useful to organize ALARO-1 working days in 2016. We were discussing also about potential LACE research stays at CHMI in 2016. It was pointed out that the method for interpolation from model levels to screen level (2m temperature and rel. humidity) should be revised and a candidate is needed.

I have received valuable comments about the draft version of ALARO description for LACE BAMS paper.

A summer case on 17.7.2015 when ALADIN/CZ (ALARO-1vA, lbc from ARPEGE) missed the convection over Czech Republic was checked. This convection was also not predicted in other LACE applications (www.rlace.eu). There were only minor difference in precipitation amounts when comparing simulations in the Slovenian set-up with ALARO-0 and ALARO-1vA physics package and ECMWF/IFS as boundary conditions.

Luc Gerard, 2015: Bulk Mass-Flux Perturbation Formulation for a Unified Approach of Deep Convection at High Resolution. *Mon. Wea. Rev.*, 143, 4038–4063.
doi: <http://dx.doi.org/10.1175/MWR-D-15-0030.1>