

## "Convergence" days (24-25 Sept 2008, Toulouse): summary of the working groups on 3MT and shallow convection

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**Objectives.** CNRM will endeavour in 2009 to put the 3MT scheme in operations in ARPEGE/ALADIN. Partners will follow on developing 3MT, which is already their operational scheme. The objectives are clearly common ones.

**Cloud condensates and cloudiness.** While combining the 3MT scheme with existing other parameterizations, several steps need to be done. One of them is to associate 3MT with the Smith-type cloud fraction (or pdf function from the Bougeault-type approach, based on the TKE variances) and condensation process, and test the alternative Xu-Randall approach as used in 3MT-LACE.

- To do this CNRM will write a documentation of the algorithmic of adjustment (cloud condensates, cloudiness) in 3MT (some rather complete documentation exists about 3MT aspects and will be re-assembled by Partners immediately) and in the Toulouse present parallel suite. / Action: EB and JMP, with the help of RB. October 2008.
- CNRM will check how this algorithmic works, in a single-column model framework. Partners are however not sure whether these simplified tests may be sufficient to see all important aspects of the feedbacks involved. / Action: EB.
- CNRM and Partners will write an analysis document: "How could Smith-type computations or other adjustment computations (Bougeault-type ones) be interfaced with 3MT". / Action: JMP, EB, RB. Say December 2008.
- Scientific interactions between CNRM and Partners about problems raised and solutions that can be proposed, while running 3MT in the global model ARPEGE. / Action: RB, JMP, EB, Luc Gerard, Doina, Banciu, Jean-François Geleyn, etc. 2009.
- Depending on the conclusions of the above mentioned document "How could Smith-type...", a march towards a common code, associating 3MT with Smith-type or Bougeault-type approaches, could start. Given their past experience Partners believe that the volume of specific coding shall be rather small and propose to code the required additional piece, which at first stage would be integrated on each side (ARPEGE, ALARO) to enable tests. Attention shall be paid to ensure coherent cloudiness and cloud water contents input to radiation schemes respectively used.

**Prognostic entrainment.** Partners will develop the prognostic entrainment in 2009. CNRM is interested in such developments, but with lower priority than the other 3MT actions. / Action: Several MM (Doina Banciu, mainly).

**APLMPHYS vs ACPLUIZ tests.** This item was addressed in the microphysics working group, however one recalls this point here, as important for an operational use of 3MT at CNRM. 3MT could be used with either APLMPHYS (developed by Partners) or ACPLUIZ (developed by CNRM). CNRM is interested in testing APLMPHYS in a simplified mode, where the cloud fraction only is activated, and precipitating fraction is not activated, to check if scientific results become closer between the 2 codes, and thus estimate, at different resolutions, the scientific impact of this option. CNRM and Partners agree that the Partners would add in APLMPHYS the code to simulate this simplified mode. Action: Partners for APLMPHYS, Yves Bouteloup for the test of APLMPHYS vs ACPLUIZ.

**More sophisticated adjustment.** Partners are interested in improving their present 3MT adjustment. Jean-Philippe Lafore (CNRM) informs the Partners that a PhD is starting at CNRM on this topic. CNRM and Partners may keep in touch on this long term action.

**3MT and shallow convection.** The present status of 3MT is to deal with sub-grid precipitating convection (SPC). Therefore, there is a need to associate 3MT with a sub-grid non-precipitating convection scheme (SNPC).

- CNRM will first associate 3MT with the KFB scheme to do this, as KFB is the SNPC scheme used in the present ARPEGE parallel suite. / Action: JMP, EB.
- CNRM has also plans to test the EDKF SNPC scheme in ARPEGE. If EDKF can be used in ARPEGE associated with the current Bougeault deep convection scheme, it will be tested also with 3MT. This should be done in a transparent way with respect to the work done concerning the cloud condensates and cloudiness as reported above. Action: EB, JMP.
- CNRM intends to develop a shallow convection scheme in 3MT. This scheme will take advantage of existing experience about shallow convection schemes at CNRM (climate or mesoscale), the objective is to go beyond separate deep- and shallow-convection schemes to build a scientific frame that would allow a continuous transition from dry to shallow non-precipitating convection, to deep precipitating convection. The Partners propose to modularise the updraft and downdraft computations of 3MT, in order to anticipate such new non-precipitating developments. / Action: Jean-François Guérémy (10% of his time, say 1MM in 2009), Jean-Marcel Piriou (0.5MM in 2009, more involved in 2010), and Partners for the modularisation (2 to 3 MM).
- CNRM will write a short document to explain to what extent the 3MT structure would be able to offer a frame for non-precipitating convective schemes, parametrizing entrainment and detrainment by any "external" method. / Action: JMP, still in 2008.

**Man-months (MM):**

- CNRM: 8MM (JMP), 3MM (EB), including the above actions and efforts for putting 3MT operational in ARPEGE (in 2009).
- Partners: 1MM for the cloudiness and condensate issues (likely still in 2008), another 1MM (at least) for interactions due to putting 3MT operational in ARPEGE (in 2009),

3MM for modularisation (2009), 3MM in total for prognostic entrainment (2008 and 2009).