

# Convergence on MICROPHYSICS



## AROME/Meso-NH microphysics **ICE3** – Main differences with ALARO microphysics **APLMPHYS**

**GENERALITIES on ICE3:** A classical bulk mixed microphysical scheme developed in Meso-NH with 3 ice categories by J.-P.Pinty (LA). Analogous schemes are in MM5, WRF (based on Lin et al.,1983), RAMS (Walko et al.,1995) with 5 species ...

Developped mainly upon tropical squall lines (Caniaux et al.), largely validated on Cevenol flood events (Ducrocq et al.), MAP orographic precipitation (Asencio et al., Richard et al.)  
: **A long time validation.**

### **MAIN DIFFERENCIES WITH APLMPHYS :**

- Mainly adapted to  **$\beta$ -mesoscales (<5km)** : **Resolved** variables : grid-mean values (no account for subgrid-scale variability except for the autoconversion) and small  $\Delta t$  (up to 60s) due to local calculations  $\neq$  Subgrid approach in 3MT, adapted to long  $\Delta t$  (400s in ALARO)
- Includes pronostic graupel hydrometeor with a large number of processes (30) (without the possibility to switch off the graupel)  $\neq$  Diagnostic graupel and 8 processes (up to 11 if graupel becomes pronostic)
- Sequential treatment of the processes in a bulk mode over all levels with an indirect dependence to the order  $\neq$  Specific treatment of the processes (according to the subgrid zone) level by level

# ALARO Proposal

**Objective for AROME microphysics** : Give to AROME microphysics the possibility to integrate an interoperable system including 3MT

**Main implications for AROME microphysics:**

- Splitting of the bulk routine into individual microphysical routines
- Pushing reshaping functions upward, leading to single level subroutines
- Introduction of converters : tendencies to fluxes, reverse order of vertical levels indexing, mixing ratio to specific humidity ...

**Workforce:** **At least** 3 persons x month, not including the validation

- Huge difficulty to compare consistently the 2 schemes



# Our Position

- **Actual tendency in the international microphysics community** : Towards a more sophisticated microphysics : Especially the 2-moment mixed microphysical schemes (ex: WRF, LM with ...).

**Plan for Meso-NH**: To implement and validate the Grabowski and Morrison (2008) 2-moment mixed scheme (currently tested in WRF) :

→ **The ALARO proposal is not a priority of development for Meso-NH**

2. The proposal, if **developed by ALARO with the help of Meso-NH/AROME**, will be evaluated in Meso-NH/AROME if :

- The compatibility with the Meso-NH environment is preserved
- Results are reproducible
- The computational efficiency is not reduced

3. Shall we have **to recode a future microphysical scheme in AROME** to keep interoperability ? e.g. a 2-moment scheme, with new difficulties

