ALADIN

A year of preparation

EWGLAM/SRNWP, Exeter, 4/10/10

ALADIN 2009=>2010 (1/3)

- Soon (15/12/10) a new Memorandum of Understanding (Claude Fischer chaired the redaction committee):
  - keeping roughly the same structure and content as MoU3 while improving wording and consistency ("**no revolution**");
  - eliminating what never concretely materialised and adding the consequences of GA decisions that proved stable and constructive across the past five years ("**best practice**");
  - trying and re-equilibrating the management entities, especially LTMs and CSSI, while starting some harmonisation with HIRLAM ("**more efficiency in the future**");
  - the latter can be seen in the MoU4 as a series of bottom-up small steps, including the joint possibility to temporarily activate transversal "task-forces" ("**more reactivity**").

ALADIN 2009=>2010 (2/3)

- Soon (15/12/10) at the same General Assembly (in Prague) that will sign MoU4:
  - A new Programme Manager, ***Piet Termonia***;
  - Changes in PAC and CSSI leadership and membership;
  - Some ‘nostalgia’, with ***20 years*** passed since the sending of the first letter proposing the creation of a Consortium.
- Preparation for a rehearsal of the ‘Strategy document’:
  - HARMONIE Brainstorming Workshop in May 2009;
  - Mid-term risk-assessment of the 4-year plan.

ALADIN 2009=>2010 (3/3)

- Brac-HR meeting, 17-20/5/10, Brač in Croatia:
  - 24 representants of HARMONIE, plus participation of ECMWF, COSMO, Met-Office;
  - Preparatory contributions, key-note lectures, 6 WG sessions, plenary and conclusion gatherings.
- As outcome:
  - A lot of ***independent topical suggestions***
  - Consensual identification of ***where we should put more efforts*** (scalability issues, phys-dyn interaction, diagnostic/validation/verification)
  - A lot of ***disagreement*** on how to proceed on these issues!
- **ALADIN PAC was not amused by this outcome!!**

About science now …

- Since we are in a period of ‘internal frictions’ I’ll talk about a result obtained in Toulouse, **BUT** out of the Arpege, Aladin, Arome, Alaro business …
- It might nevertheless be quite important in the future.

The problem of the 'ideal' moist potential temperature (1/5)

- Transport terms are of two kinds:
  - **Advective** ('conservation' = the Lagrangian derivative is zero);
  - **Diffusive** ('conservation' = the 'intensity' of the average is equal to the average of the 'intensities').
- In the definition of so-called 'potential temperatures', this creates a problem. Generally speaking when one of the properties is verified, the other one is not!
- This starts already with 'dry' θ expressions like:

$$\theta_a = T.(\frac{p_0}{p})^{[R(q_d,q_v)/(C_p(q_d,q_v,q_l,q_i)]} \quad vs. \quad \theta_d = T.(\frac{p_0}{p})^{[R_d/C_{p_d}]}$$

- θ_a is a 'Lagrangian' quantity (R/C_p remaining constant in displacements) but not an 'intensive' quantity (one cannot average the exponents between differing air parcels).
- The situation is obviously the reverse for θ_d!
- Things get of course far worse with moisture included.

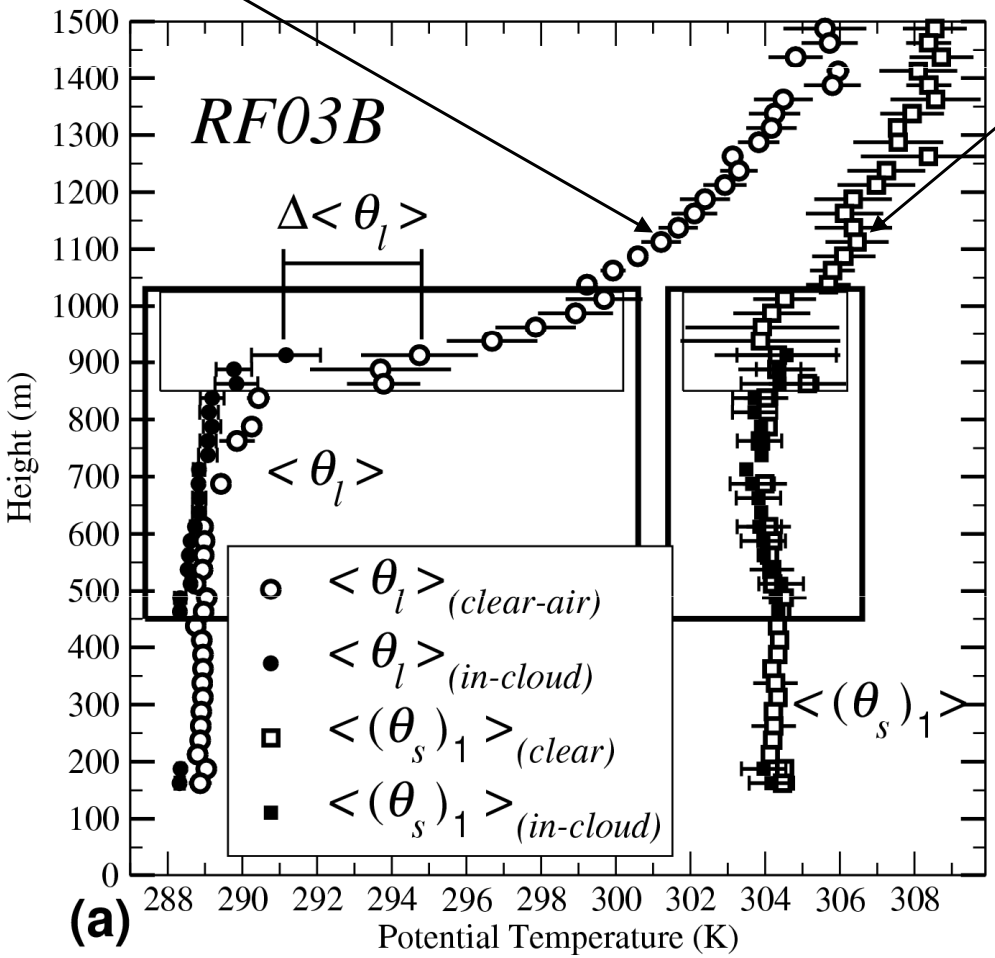
The problem of the 'ideal' moist potential temperature (2/5)

- Phase changes make it far more difficult to define 'moist potential temperatures' both with good 'Lagrangian' and with good 'intensive' conservation properties. The literature is nevertheless full of proposals!
- Recent proposal of P. Marquet (submitted to QJRMS):
  - Go to the most general moist entropy formulation to implicitely define a θ_s
  - Make a few approximations to get a relatively simple equivalent named $(\theta_s)_1$
  - Find out that the new quantity is a kind of linear combination of the two famous 'moist conserved quantities' θ_l and q_t .
  - And it works !!!

The problem of the 'ideal' moist potential temperature (3/5)

Bett's 'moist conservative' θ_l

New proposal $(\theta_s)_1$



More homogeneity between cloudy and clear air parts in the new case

Cloud layer

The 'top of PBL discontinuity' practically disappears when using the new quantity

The problem of the 'ideal' moist potential temperature (4/5)

- We shall now have a moist potential temperature truly conservative for reversible and adiabatic processes, including all those linked to phase changes.
- This may have far-reaching implications for the treatment of 'moist turbulent motions' (possibility to replace θ by $(\theta_s)_1$ in turbulence direct-type computations, perhaps even for Third Order Moment terms, less need to intertwin the cloudiness and turbulence parameterisations, …)
- Central issue: since $(\theta_s)_1$ is 'homogeneous', may we write ?

$$\overline{w'.(\theta_s)_1'} \Leftrightarrow \overline{w'.\rho'}$$

- Preliminary results indicate that it may well be the case (the 'neutral case' is a ***very stable target*** for a shallow convection scheme written dirtectly in R_i from $(\theta_s)_1$)!

The problem of the 'ideal' moist potential temperature (5/5)

- We shall now have a moist potential temperature truly conservative for reversible and adiabatic processes, including all those linked to phase changes.
- If the applicability to other type of clouds is confirmed (and there is no reason why it should not be) this has far-reaching implications for the treatment of 'moist turbulent motions'.
- In fact, what is here at stake is not the fact that the new temperature may be as homogeneous in all types of clouds as in Sc (those are really the ideal case for entropy conservation). What counts is that the equilibrium position towards which 'moist turbulence' will tend is the one corresponding to this 'well mixed $(\theta_s)_1$ case'.
- We shall try and verify it. If yes, well, one can dream ……