

# Working Group on Physics

## SHORT TERM PLAN

### Common issues

#### **Convergence of the 1D models:**

1D ARPEGE/ALADIN/AROME  $\Leftrightarrow$  1D HIRLAM

#### **Validation**

- Use of simplified frames:

1 D model, ALPIA for physics-dynamic interactions

- Specific case studies in the complex environment

Set-up of a validation team

## **SHORT TERM PLAN**

### **HIRLAM**

- **Implementation of (minimum) HIRLAM physics in the ARPEGE/ALADIN frame**
  - Technical issues solved; implementation on Linux PC achieved
  - Convergence with Physics-Dynamics interface constraints
- **1D HIRLAM**
  - at this stage separate approach: without reducing functionalities

### **AROME**

- 1D ARPEGE/ALADIN/AROME as an option within the 3D model
- Technical issues
- Extended validation for meso  $\beta$  scales
- Tuning of the model to satellite approach
- Shallow convection: trial of Soares approach

### **ALARO** physics closed to the present solution

- Improvement of the radiation scheme
- Convection: based on Jean-Marcel Piriou and Luc Gerard ideas.
- Turbulence: “reversed” TKE
- Statistical sedimentation in ACPLUIE
- Cloudiness: recent work of Radmila Brozkova
  - linked with the prognostic variables for water species
- Improvement of the air – sea interaction formalism (MFSTEP findings)

## **MEDIUM TERM PLAN**

**The ALADIN developments should follow the ALARO “spirit”**

### Frame for experimentation

- Critical points could be confirmed/identified
- High priority will be given to:
  - stability problems for longer time steps
  - quality increase

### Harmonization frame for the existing parameterizations

numerical aspects and physical compatibility

rather than re-inventing new schemes

⇒ More transversal and validation work within teams  
(AROME, HIRLAM, ALARO and their combinations)

## **MEDIUM TERM PLAN**

### **AROME::**

- Optimisation of physical parameterization
- Data assimilation for cloud and precipitation
  - Validation

### **Special emphasis:** 3D turbulence, requiring brain storming

- Meso-NH development to be thought for SL formalism
- Link with SL Horizontal Diffusion

### **TL/AD physics for high resolution**

- Physics complexity ?
  - - Recent WMO Symposium on data assimilation in meteorology and oceanography (Prague, April 2005): with shorter time windows, 4D-Var at the kilometric scale could use more complex TL/AD physics than at larger scales.
  - - it is to be confirmed  $\Rightarrow$  opinion of data assimilation group
  - HIRLAM is ready to allocate manpower if this will be consider feasible
- ∇• Necessity to anyhow develop a special physics for perturbation

## LONG TERM ISSUES

### A) general direction of physical parameterization development

- - ⇒ a **unified convection-turbulence scheme** (see TARTU workshop)
    - accounting for the non local features of the convective mixing
    - treating all subgrid mixing processes in a unified frame work
      - convection partially delegated to turbulence scheme.
- **development of a turbulence scheme** (within or not the above idea?)
  - extended formulation of the third order moments
  - how to introduce microphysics in this scheme ?
- Meso-NH: 2 explored possibilities for the treatment of non local edies:
  - 3 order moments fitted on reference LES
  - parameterization of 3 order moments by a mass flux approaches

Action: Jean Francois to prepare a paper to clarify ideas

## LONG TERM ISSUES

### B) Maintenace

- **General idea**

to build physics in a framework based

- on basic equations
- compliant with basic numerical analysis

⇒ new code arhitecture

offering at the same time flexibility of choices and an easier maintenance

- **Two approches:**

- discipline imposed by the equations and discretization constraints

NOT STEP AFTER STEP BUT ANTICIPATION

- pedagogical approach

STRICT BUT NOT SO STRICT

education of the scientist in respect with out the proper numerics is