Czech Hydrometeorological Institute

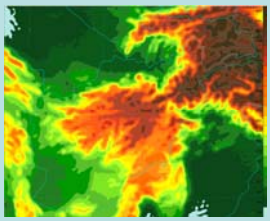
ALADIN@CHMI

Model set-up

- LACE domain (309x277 grid points, linear truncation E159x143, Δx=9km)
- 43 vertical levels, mean orography
- time step 360 s
- OI surface analysis based on SYNOP
- digital filter spectral blending of the upper air fields, long cut-off cycle (6h cycle, filtering at truncation E61x55, no DFI in the next +6h guess integration)
- digital filter blending + incremental DFI initialization of short cut-off production analysis of the upper air fields
- 3h coupling interval
- ALADIN cycle 32t1_alr02.01 (ALARO-0 with 3MT)
- OpenMP parallel execution
- 00, 06, 12 and 18 UTC forecast to +54h
- hourly off-line fullpos
- post-processing using obs-operators of OI

- hourly DIAGPACK analysis (SYNOPs)
- verifpack on CY32T1
- monitoring of SYNOP and TEMP observation based on OI quality control

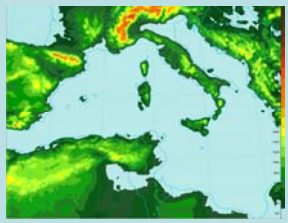
ALADIN/Afghanistan



- domain (162x135 grid points, linear truncation E80x67, Δx=10km)
- 43 vertical levels
- time step 360 s
- digital filter spectral blending of the upper air fields + incremental DFI initialization, (6h assimilation cycle, filtering at truncation E18x15)
- 3h coupling interval, ARPEGE driven
- ALADIN cycle 32t1_alr02.01 (ALARO-0 with 3MT)
- OpenMP parallel execution
- 00 and 12 UTC forecast up to +48h
- used mainly for weather service at Kabul airport

Mediterranean Forecasting System Toward Environmental Predictions

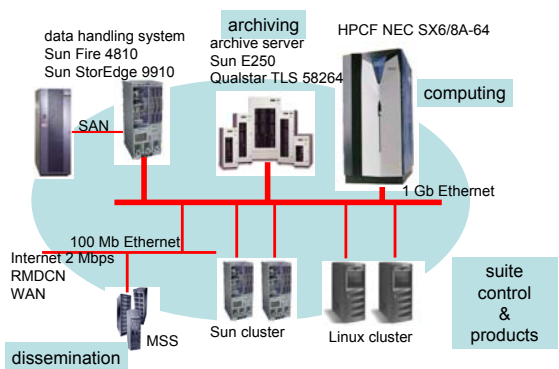
European Commission research grant



- domain (256x200 grid points, linear truncation E127x99, Δx=9.5km)
- 37 vertical levels
- time step 400 s
- digital filter spectral blending of the upper air fields + incremental DFI initialization, (6h assimilation cycle, filtering at truncation E28x22)
- 3h coupling interval
- ALADIN cycle 29t2mxl (preALARO-0)
- OpenMP parallel execution
- 00 forecast up to +120h once a week
- hourly GRIB latlon products used by MFSTEP community

Operations

HW system:
• NEC SX-6/8A 64GB
• Linux cluster (suite control & products)
Operational team:
• 4 NWPers (on-call support)
• computer operators
The suite operated under SMS 4
Download of LBC via RMDCN



Major operational changes (October 2007 – September 2008)

26 November 2007 new tuning of turbulence to improve winter bias of T2m

29 February 2008 prolongation of the forecast at 06 an 18 UTC up to +54H

4 June 2008 switch from ALARO-0-minus-3MT to a complete ALARO-0 package

ALARO-0–3MT package

- pseudo-prognostic TKE scheme (TKE fully prognostic but use of turbulent exchange coefficients computed diagnostically)
- cloud optics takes into account the effect of spectral saturation, globally across the atmosphere
- prognostic microphysical scheme of resolved clouds and precipitation
  - prognostic cloud water, cloud ice, rain and snow
  - parameterization of autoconversion, WBF process, evaporation, collection, sublimation and melting/freezing
  - statistical sedimentation scheme
  - diagnostic graupel effect
  - vertical geometry of clouds and precipitation areas
- modified calculation of vertical diffusion coefficients in stable conditions
- radiation
  - a simplified version of the Voigt-line-broadening effect
  - revised statistical model for secondary thermal radiation coefficients

3MT package

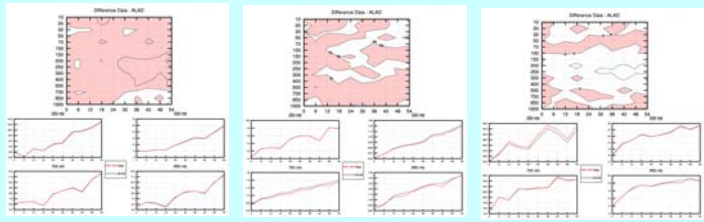
Modular Multi-scale Microphysics and Transport

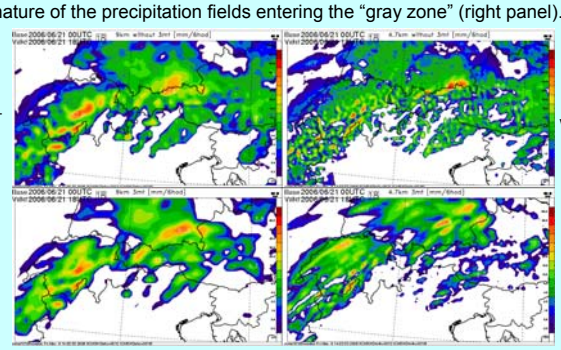
- Microphysics and Transport
  - computational separation between 'microphysics' and 'transport' for the deep-convective effects
  - no need any more to parameterize mean detrainment at resolved scale
  - quality of the scheme moved to that of its microphysics
  - relax cloud stationnarity assumption
- Multi-scale
  - additional prognostic variables
    - prognostic microphysics
    - prognostic area fraction (updraft, down draft)
    - prognostic vertical velocity of updraft and down draft
  - microphysical cascade inside time step
  - takes care for multi-scale performance of 3MT
  - prevents problem of double counting
- Modular
  - modular code

Validation of 3MT

RMSE against TEMP observation

Pink areas denote better performance of 3MT with respect to diagnostic scheme. Evaluation period from April 2nd till June 3rd 2008, geopotential (left panel), temperature (middle panel) and relative humidity (right panel).



Case study

Comparison of the diagnostic convection scheme (top panels) with the prognostic 3MT (bottom panels) on 9km (left panels) mesh shows significant removal of spurious noise in the precipitation fields. The first experiment with 3MT on 4.7km (bottom-right panel) mesh demonstrates multi-scale character of the scheme which maintains physical nature of the precipitation fields entering the "gray zone" (right panel).