# NWP activities at Slovak Hydrometeorological Institute (2005)

**Mária Derková**

maria.derkova@shmu.sk

SHMÚ, Jeseniova 17, 833 15 Bratislava, SLOVAKIA

## 1 Introduction

This report gives a summary of NWP (Numerical Weather Prediction) activities at Slovak Hydrometeorological Institute (SHMI, SHMU) during the year 2005. The highlights are the introduction of 06 and 18UTC runs, prolongation of the model integration up to +54h, upgrade of the model cycle.

## 2 Operational setup

The NWP operational system at SHMI is based on ALADIN model with 9km resolution (domain covering whole RC LACE area), running on the IBM p690 server. The main characteristics of the supercomputer and the ALADIN/SHMU model features are summarized in tables below and the model domain is also shown.

Model is running four times per day up to 54h; in the dynamical adaptation mode with lateral boundary data provided by the global model ARPEGE. Data are downloaded via Internet, with RETIM2000 system as a backup. Hourly model outputs are available for further postprocessing and visualisation. ALADIN/SHMU model products are the main source of information for the forecasters (short-range forecast), and serve as the basic input for other numerous applications and products (automatic point forecasts, dispersion model, hydrological model etc.). The data for the PEPS project are also operationally provided.

The operational suite is based on the in-house developed system of perl scripts and programs, and enables on-line monitoring and documentation via the web interface. Given the importance of ALADIN/SHMU products, the non-stop human monitoring started on 01/01/2005.

The ALADIN/SHMU outputs are regularly verified: surface parameters at SHMU (recently upgraded to MySQL technology), available on intranet; data are also sent to be used in the common ALADIN verification project.

**COMPUTER CHARACTERISTICS and ARCHIVE DEVICE**

| | |
|---|---|
| IBM @server pSeries 690<br>Type 7040 Model 681<br>32 CPUs POWER 4+ 1.7 GHz<br>32 GB RAM Memory<br>IBM FAST T600 Storage Server, 1.5TB<br>AIX 5.2 | HW:<br>   IBM Total Storage 3584<br>   Tape Library (24TB)<br>SW:<br>   IBM Tivoli Storage Manager |

**MODEL CHARACTERISTICS**

| | |
|---|---|
| domain size | 2882 x 2594 km ; 320 x 288 points in quadratic grid |
| domain corners | [2.19 W ; 33.99 S] [39.06 E ; 55.63 N] |
| horizontal resolution | 9.0 km |
| vertical resolution | 37 layers |
| time step | 400s |
| length of the forecast | 54 hours; 1 hour output frequency |
| runs | four times per day (00, 06, 12 and 18UTC) |
| mode | dynamical adaptation |
| coupling model | ARPEGE global model |
| coupling frequency | 3 hours |
| code version | AL28T3_czphys |

# 3 Operational suite upgrades

- 01/01/2005: 24/7 human monitoring of the operational suite

- 12/01/2005: switch to +54h integration

- 31/03/2005: new model cycle AL28T3_czphys operational (modifications mainly in the cloudiness and the radiation schemes)

- 25/07/2005: 06UTC run introduced

- 21/09/2005: the dynamical adaptation of the wind field to high resolution orography (2.5km) introduced

- 29/09/2005: 18UTC run introduced

# 4   Research and development

Local research and development work was focused on

- the observational database software (ODB) was implemented and is currently being tested, with the aim of using it for veral, diagpack and later 3DVAR tools

- the high resolution numerical study of the 19/11/2004 severe windstorm in High Tatras

- the feasibility study of the MOS technique: the T2m error distribution for direct model output and the model output statistics based on ALADIN pseudoTEMPs;evaluated over 9 Slovak SYNOP stations

- the quantitative precipitation forecast (11 river basins, 77 subdomains) and its verification

- the 15th ALADIN workshop was organised, 6-10/6/2005 in Bratislava

In frame of the ALADIN international project following R&D issues were tackled

- optimisation of the content of the coupling files

- new parameterization of cloud optical properties proposed for model ALARO-0

- non-isothermal reference temperature profile in NH dynamics of ALADIN

- radar reflectivity assimilation - assigning of dynamic quality flag

- technical work on phasing and optimisation of the model source code

# 5   Future plans

- prolongation of the forecast range up to 72h

- test and implement pseudoasimilation cycle using DFI blending technique

- systematic improvement of the operational model quality via ALADIN-2 project: concentration on ALARO-0 prototype

- continue to work on AROME project (NH-dynamics, radar data assimilation)
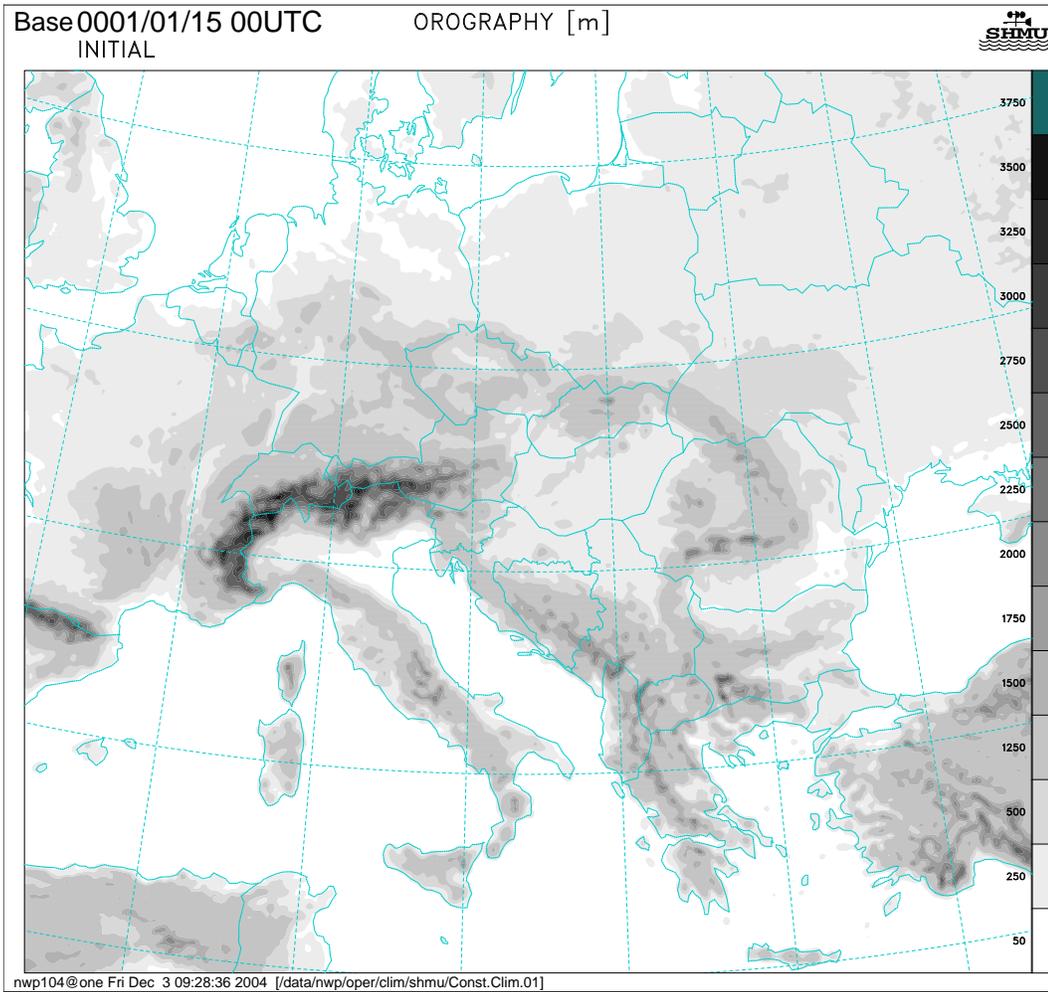
- cooperation with other RC LACE partners on LAM EPS

Figure 1: Domain of ALADIN/SHMU