# Numerical Weather Prediction activities at IMGW

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## LOCAL AREA MODEL

### THE COMPUTER SYSTEM

HP Bl460c - 32 blades in 2 racks c7000 - LINUX CLUSTER controlled by 2 managing servers.
Every blade contains 2 4-core 16 GB processors Intel Xeon X5570.
Blades interconnected with InfiniBand 4xQDR.
Computing power above 2,5T FLOPS.
Cluster with 2TB storing volume connected with NetApp disks via the Fibre Channel protocol.

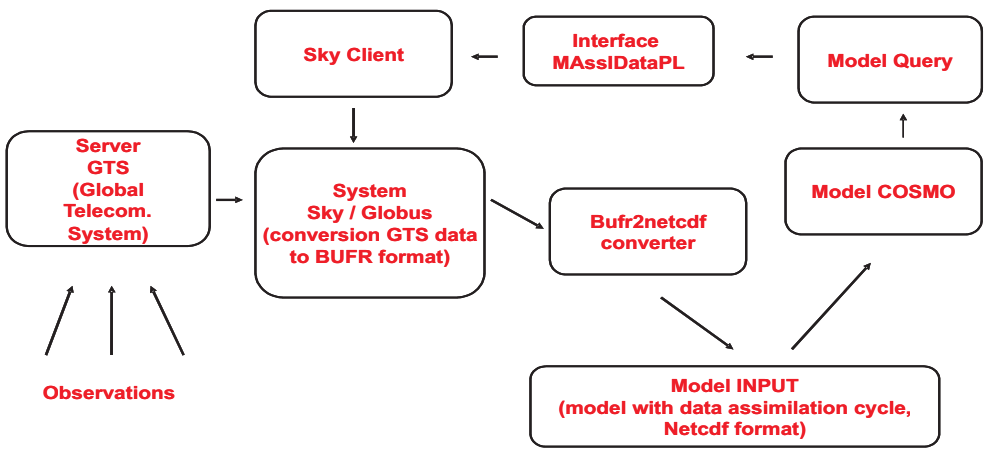
### THE MODEL CONFIGURATIONS

| | | |
|---|---|---|
| Horizontal Grid Spacing [km] | 14 | 7 |
| Domain Size [grid points] | 193 x 161 | 385 x 321 |
| Time Step [sec] | 80 | 40 |
| Forecast Range [h] | 78 | |
| Initial Time of Model Runs [UTC] | 00, 12 | |
| Model Version Run | 4.0 | |
| Lateral Boundary Conditions | Interpolated from GME at 3h intervals | |
| Initial State | Interpolated from GME | |

## ASSIMILATION CYCLE

### IMPLEMENTATION

Operational implementation of assimilation cycle at IMGW for the COSMO 7 km resolution model involved the subsequent stages:
1. Preparation of the operational suit for observational data input from a GTS (Global Telecommunication System) server, in the required format (NetCDF),
2. Development of a script system, responsible for execution of the assimilation cycles fed by Sky/Globus observational data input, for two model runs at 00 and 12 UTC ,
3. Development of the database interface MAssIDataPL (Model Assimilation Interface Data for Poland) responsible for querying the Sky/Globus system for the assimilation data input, and appropriate for observation types and their spatial range defined by the assimilation system operator,
4. Final tests of the whole operational suit fed with the real data supplied in different time and spatial configurations.




**Future perspectives:**
- incorporation of the Integrated Water Vapour data from the GNSS (Global Navigation Satellite System) to the assimilation cycle of the COSMO 7 km resolution model
- implementation of the radar derived Latent Heating fields to the assimilation cycle of the COSMO 2.8 km resolution model.

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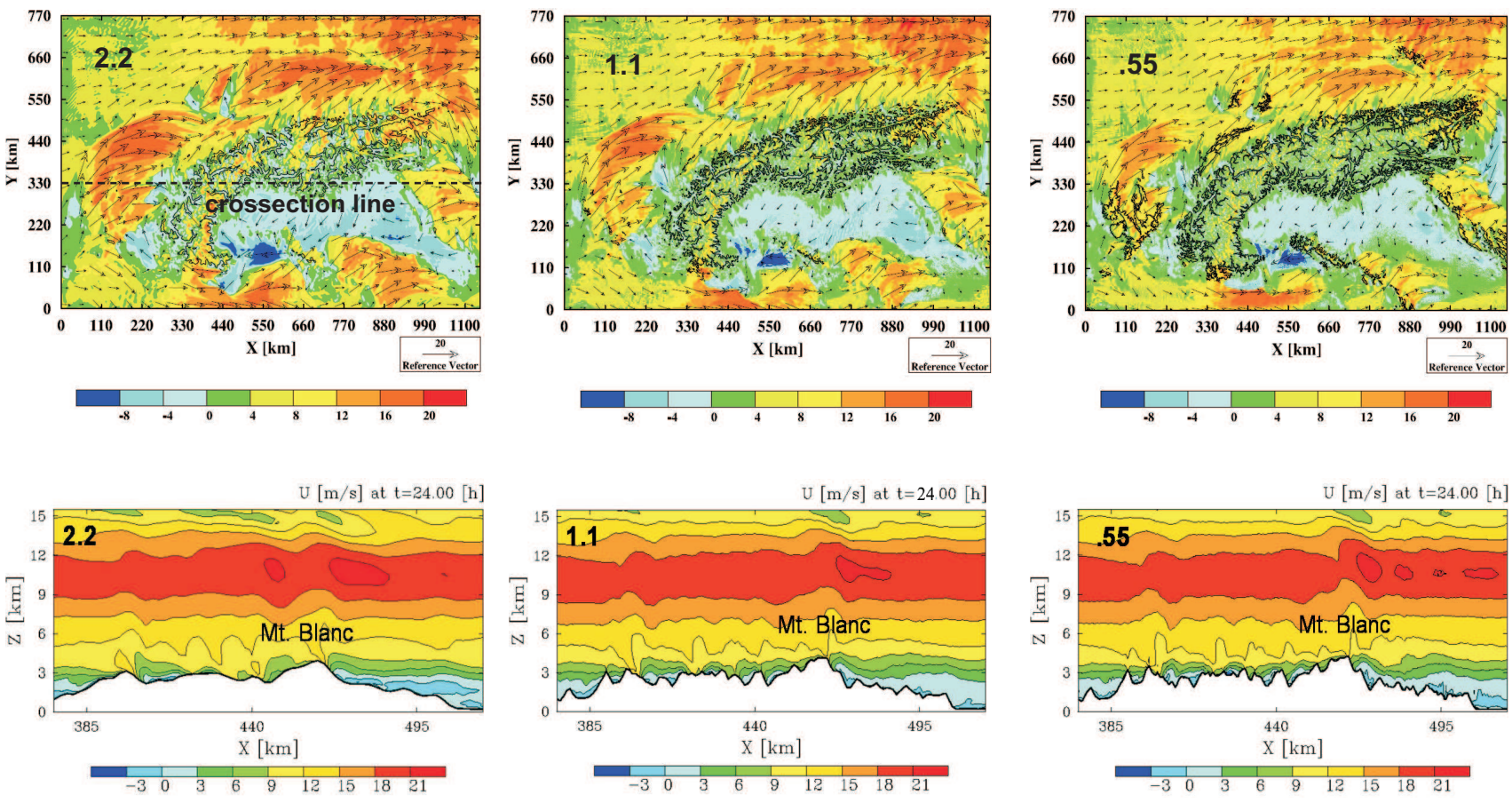
## RESEARCH

### CONSERVATIVE DYNAMICAL CORE - COSMO PRIORITY PROJECT

The focus of this project is on the development of a new generation dynamical core for operational, regional numerical weather prediction (NWP). It is required that the new core operates for horizontal grid sizes of O(1 km) and below, robustly handling steep orography and explicitly representing vigorous convection. The project results are of general significance, as they address the applicability of the sound-proof equations for regional NWP typically relying on fully compressible governing equations. Up to date, the IMGW team conducted an extensive testing of the EULAG dynamical core for idealized and semi-realistic flows. Semi-realistic tests addressed the Alpine flows with grid resolutions of 2.2, 1,1 and 0.55 km. These tests were accompanied by a study of the EULAG's surface boundary-layer and the moist model, to assess their suitability for applications with steep orography and stretched terrain-following coordinates.




**Quasi-stationary Alpine flows with very high resolutions.**

Setup of the experiment:
- 24 hour forecast
- initial conditions: horizontally averaged wind and temperature from MeteSwiss COSMO2 operational analysis from 12. 11. 2009, 00z,
- boundary conditions: constant in time and defined as above
- horizontal resolution: 2.2, 1.1, 0.55 km,
- for 2.2 km resolution: grid points, main model levels, horizontal domain as for COSMO2,
- for higher resolutions: grid points generated by halfing horizontal grid spacings, domain size as for 2.2 km experiment,
- orography: MeteoSwiss 2.2 km dataset or derived from 90m SRTM data for 1.1 and 0.55 km resolutions
- no parameterizations of subscale processes.