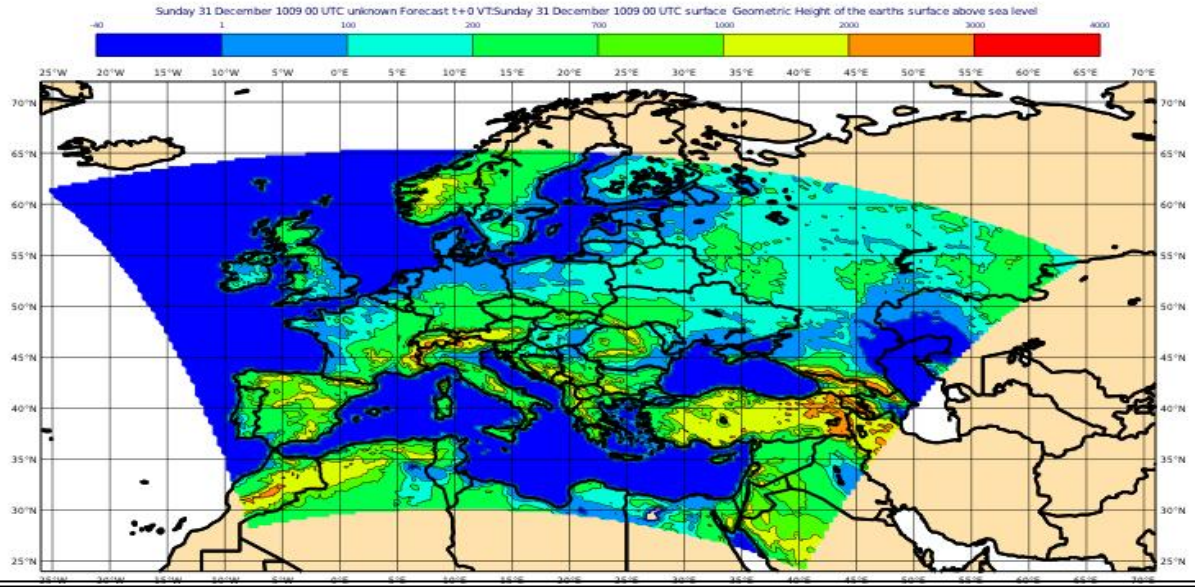
NWP Test suite: Present Status

GOAL

- Build up a software environment to perform carefully-controlled and rigorous testing: Calculation of verification statistics for any COSMO model test – version
- Offer necessary information on the model forecasting performance
- Provide the COSMO community with standards against which the impacts of new developments in the model should be evaluated
- Benchmark to monitor the progress of mesoscale forecast improvement (periodic testing as COSMO evolves)

ECMWF resources – special project SPITRASP 2013 - 2015
(submitted by A. Raspanti)

Computer resources	2013		2014		2015	
	Allocated	Used	Allocated	Used	Allocated	Used
HPC Facility (units)	400 000	11.91	1 000 000	356 420.40	1 000 000	6354.24
Data storage capacity (GB)	80	1	180	20	180	0



Performed NWP meteorological Tests

➔**COSMO-4.26** & **COSMO-5.0** (7km) used as prototypes (Spring 2014)

➔ **COSMO-5.0** & **COSMO-5.1** (7km) Nov.2014

➔**COSMO-5.1** & **COSMO-5.3** (7km) To be performed after GM2015

TESTS for versions 5.1

- 72 hours run
- one daily cycle based on 00UTC initializing data
- ECMWF inital and LBC (11.6Gb)
- Runs for January 2013 and July 2013

COSTS:

- Interpolation for **COSMO-5.1**: **~ 81.5 BU** per run (takes ~ 8 min)
- **COSMO-5.1**: **~ 2284 BU** per run (takes ~ 28 min)
- total_tasks = 64 and node = 1 for **int2lm**
- total_tasks = 512 and node = 8 for **COSMO**

VERSUS software installed at ECMWF

➔ **virtual machine** based on the ECGATE linux system

➔ main software, accompanying software (R language, grib_api, SWING, BufrDC) installed and appropriately configured

Final product -> remote access of each user to the virtual machine and execution of the verification suite through the **web graphic interface**

- **restricted rights to some directories and configuration files where certain components of VERSUS are installed**
- **setup of the virtual machine on ECGATE (actually 8Gb and 2 CPU's)**
- **remote web access issues and problems with connection to the virtual machine**

TROUBLESHOOTING:

- With regards to the running and maintaining of the test suite, we experienced, especially at the end of 2014 some problems with the network and remote connection to the VERSUS virtual machine using NoMachine.

- Problems were also encountered during the installation of a newer version of the VERSUS software on the ecgate virtual machine, with the web server.

First approach grid-to-point comparisons:

Gridded surface and upper-air model data to **point observations**

Setup of station stratification

area covering -25/24/65/65 (W/S/E/N) selected from the world-wide WMO flatfile

~3600 stations

Suspect observations values

Parameter	|Fcst-Obs| < Value
FF_10m	50 m/s
MSLP	2500 Pa
PS	2500 Pa
TD_2m	30 deg. C
T_2m	30 deg. C

Verifications:

- **COSMO 5.1 & COSMO 5.0, CROSS Model – Surface:**
  - **➔2mTD, MSLP, 2mT, WS**
  - **➔TCC**
  - **➔6h/12h/24h precipitation**
- **COSMO 5.1 & COSMO 5.0, CROSS Model – Upper air:**
  - **➔T, WS, RH**

Completed meteorological test -> report prepared & submitted to STC

- main comparisons (**graphs**) of the **two model versions** (5.0 & 5.1)
- summary of **main verification results** & **suggestions** regarding advantages/disadvantages associated with the latest model version
- section for **discussion** & **evaluation** of the statistical analysis and main findings - **neutral/positive/negative benefit** to the performance of the model resulted from the new implementation

Annual Report submitted to ECMWF

includes a description of the use of ECMWF resources for 2014-2015 and some verification results

REQUEST FOR A SPECIAL PROJECT 2016–2018 (SPITRASP)

MEMBER STATE: Germany, Greece, Italy

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In the framework of the new ECMWF Special Project the existing NWP platform will be used to test new versions of the model and will also be updated in order to perform tests and evaluate higher resolution (convection permitting) COSMO model (2.8 horizontal resolution).

Computer resources required for 2016-2018: The maximum project duration is 3 years, therefore a continuation project cannot request resources for 2018		**2016**	**2017**	
High Performance Computing Facility	units	5.000.000	5.000.000	
Data storage capacity (total archive volume)	gigabytes	1000	1000	

Future Activities (NMA proposition)

1. Maintenance and running of the Test Suite - A. Montani (for the next 2 years)

Number of FTEs should be doubled to cover 2 runs of COSMO 7km and 2 runs of COSMO 2.8km
0.2 FTE instead of 0.1 FTE

2. Verification – M. Bogdan

Number of FTEs should be doubled to cover 2 runs of COSMO 7km and 2 runs of COSMO 2.8km
0.3 FTE instead of 0.15 FTE

3. Documentation – Report for each meteorological test (version comparison) – R.Dumitrache

Number of FTEs should be doubled to cover 2 runs of COSMO 7km and 2 runs of COSMO 2.8km
0.1 FTE instead of 0.05 FTE
Annual ECMWF report – A. Iriza

RECOMMENDATION

The NWP test suite should be considered as a permanent PT under the coordination of the WG5 leader because the most part of the project (execution and documentation) is done inside the WG5 where it was initially developed.

Propositions from SPM for the report content

- Add more numerical form in the representation of scores in addition to the graphical ones
- Statistical significance of the comparison results (as differences are marginal)
- Possibility to add a unified score (combining the performance of various parameters
- Group upper air verification on one graph

Develop the tool for convective-scale applications