Support Activities

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Outline:

- Motivation
- Main activities – PT “Support of COSMO licenses”
- Training support (at DWD + on-site training)
- Conclusions

Motivation:

• In **October 2013** (according to current plan) DWD will move to **GRIB2 for GME** data distribution.
• DWD will not invest in the adaptation of the HRM code to this standard
• Due to this fact, DWD ends the support for the HRM model and expects the migration of about 25 operational HRM users to the COSMO model
• The new non-hydrostatic global model **ICON** with local zooming option, grid spacing of 13 km (globally) and 6.5 km (nests), 90 layers up to 75 km and upgraded physics packages will replace GME by **Q2, 2014**.

Information to the HRM users!!

Takeuchi Sabrina Sabrina.Takeuchi@dwd.de to Majewski, anahit_h show details Aug 18 (6 days ago) Reply

Hello All

New updates are available:

hrm_2.9.tar.gz - The newest version of the hrm program.
gme2hrmV2_8.tar.gz - The newest version of the gme2hrm program.
hmx2hmyV2_7.tar.gz - The newest version of the hmx2hmy program.

These are the latest and the last updates for the HRM package.
The support for HRM will be discontinued at end of 2012.
At the end of 2013 there will be no more GME data available for running HRM in production mode.
Please migrate your HRM to COSMO as soon as possible.

Additionally following updates are available:
DWD-libgrib1_110128.tar.gz - This is the newest GRIB1 code available. It is the only grib1-package which can be used for both HRM and COSMO.
support.tar.gz - The newest support library. This library may be used for both HRM and COSMO.
supplement.tar.gz - The newest supplement routines. These routines may be used for both HRM and COSMO.
math_dwd_1.3.tar.gz - The newest math library. This library may be used for both HRM and COSMO.

schedulerV3_1.tar.gz - The newest scheduler version. Some batch systems and COSMO will be supported.

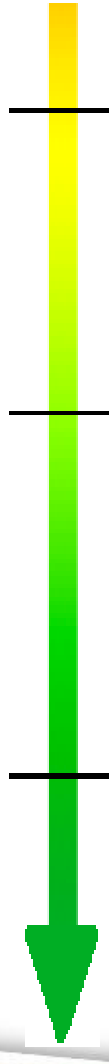
Outdated and never be supported:
grib1 - The very old grib1 package, for 32bit systems only
newgrib1 - The old grib1 package, but modifications have to be done for large domains

Caution:
The support for HRM will be discontinued end of 2012.
No more GME data will be available at the end of 2013.
Therefore migrate your HRM system as soon as possible!

COSMO is able to run with your GME data and the ICON data, which is available very soon.
For migrating to COSMO please contact Detlev Majewski (email:Detlev.Majewski@dwd.de)

Sincerely
Michael

Migration HRM to COSMO



03/2011

Beginning of migration from HRM to COSMO

Supporting Users in migrating to COSMO and in running COSMO

01/2012

Currently 20 countries are using COSMO

Will be 23 countries by the end of 2013

6 countries are migrating at the moment

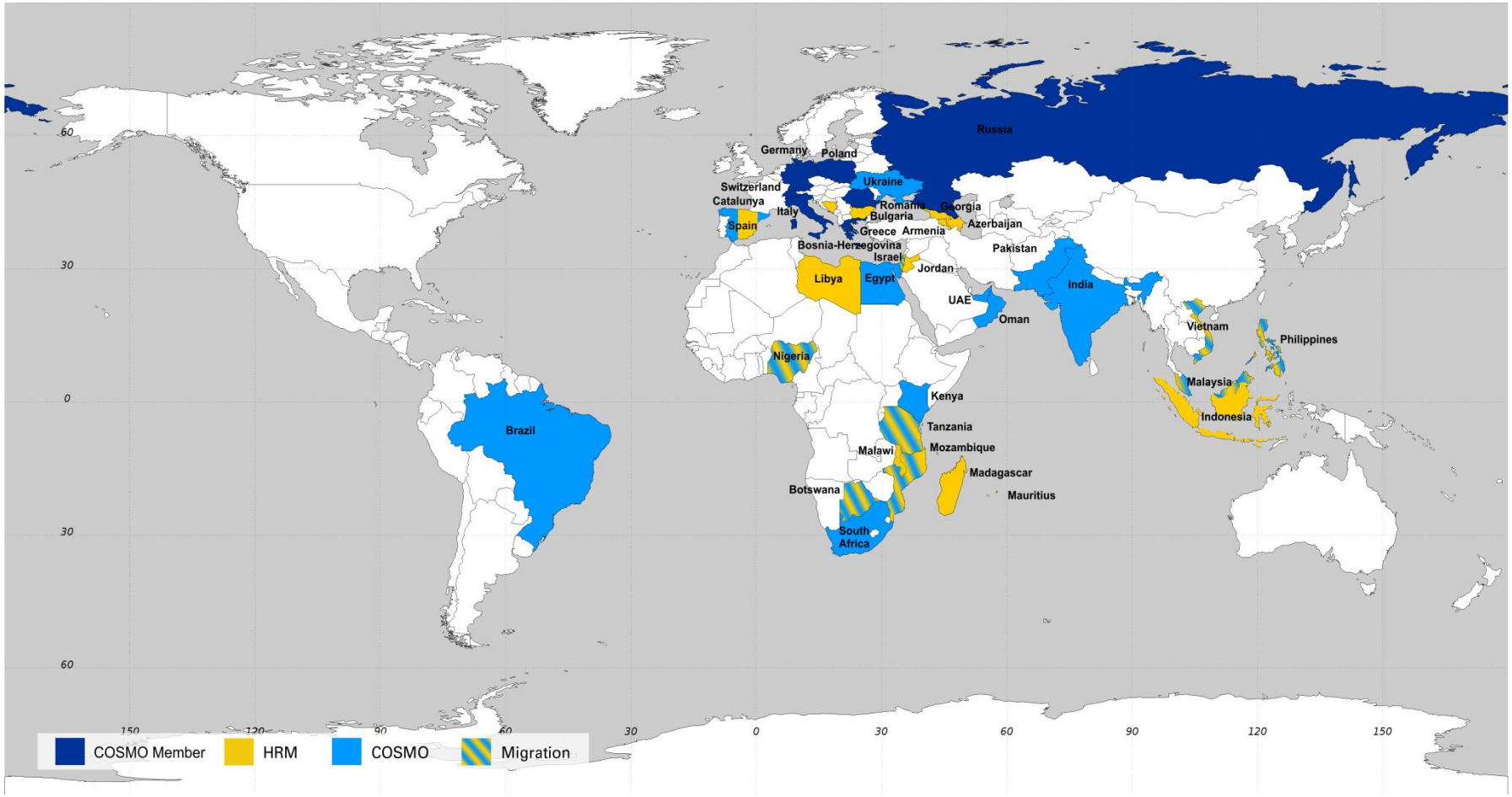
6 countries need to be moved into the migration process

10/2013

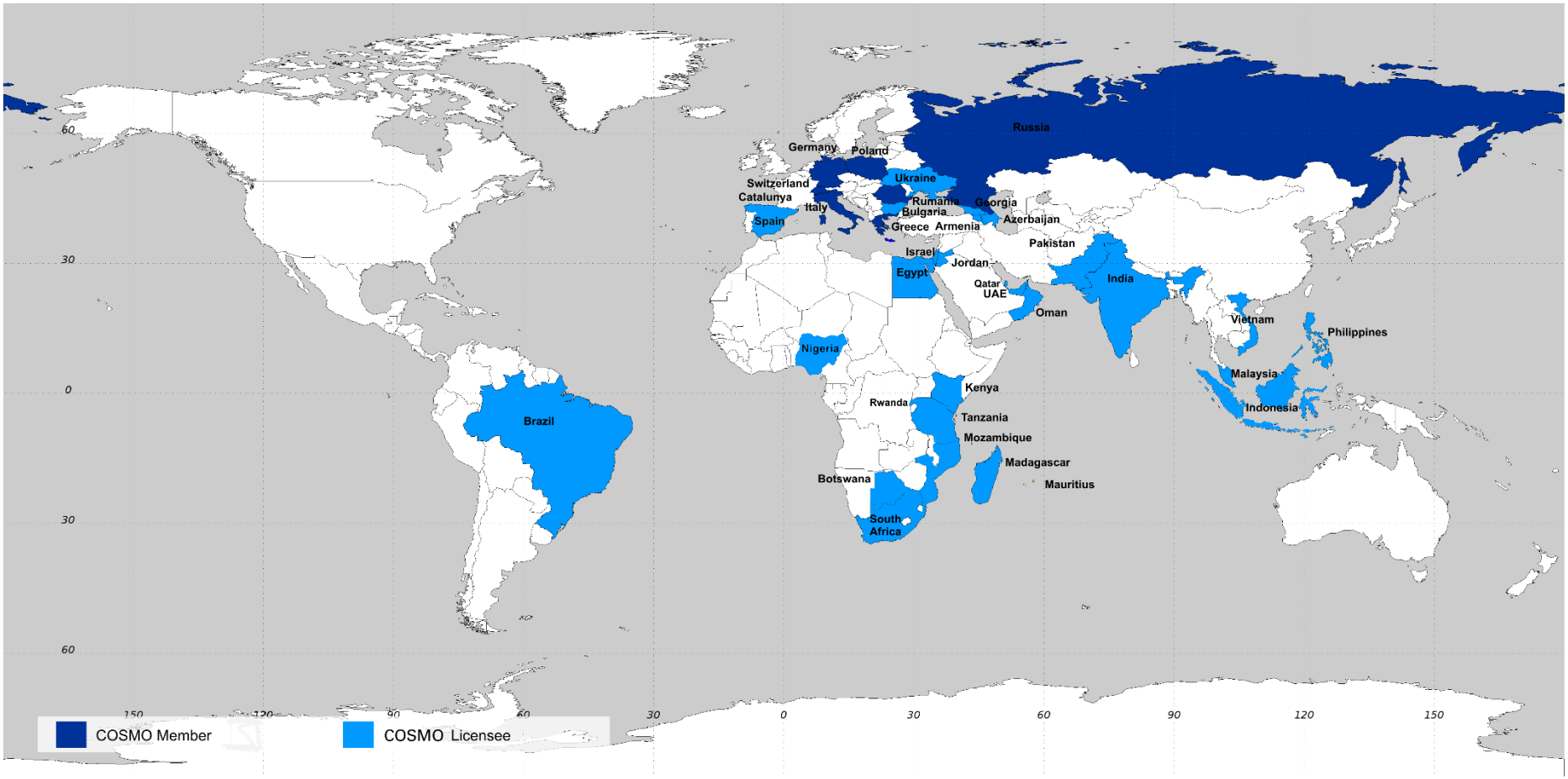
THE GOAL: All former HRM countries should be migrated to COSMO

Support for HRM expires

Map of model distribution until 2012



COSMO-Model – Worldwide distribution



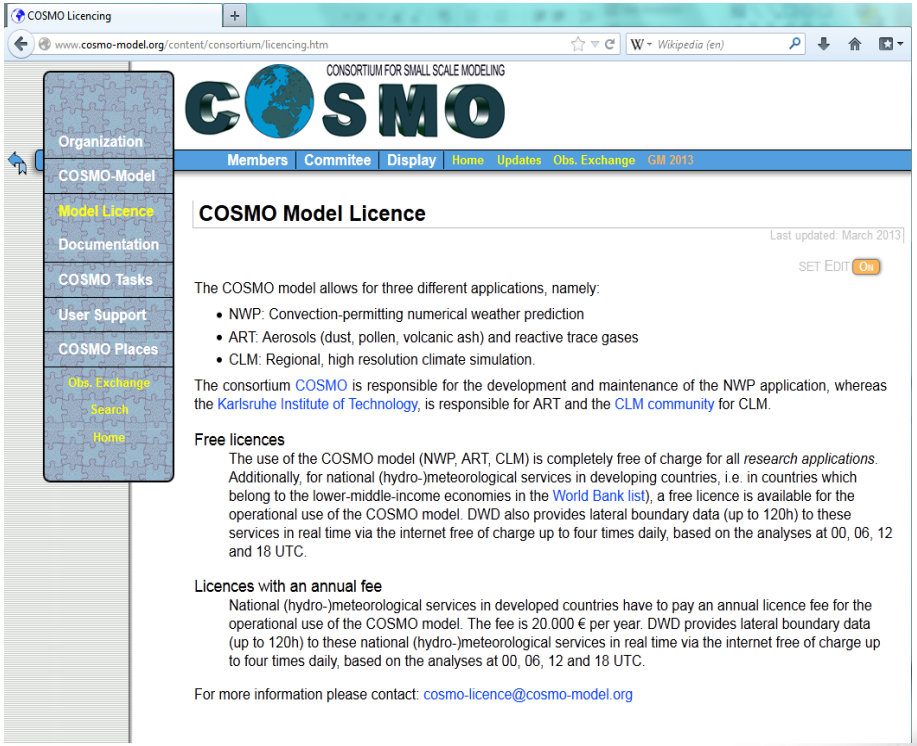
Migration from HRM to the COSMO model until October 2013 at latest!

COSMO Licenses

- Scientific usage: Freely available to universities, research institutes and national weather services; GME / ICON data are transferred in delayed (24 hrs old) mode.
- Operational numerical weather prediction for non-COSMO members:

Free for weather services in *developing countries* (see World Bank country classification!)

Otherwise: Annual fee of 20.000 €; current licensees: Brazil (INMET), Brazil (DHN), Oman (DGMAN), United Arab Emirates (NCMS) and Regional Met. Service of Catalunya (Spain).

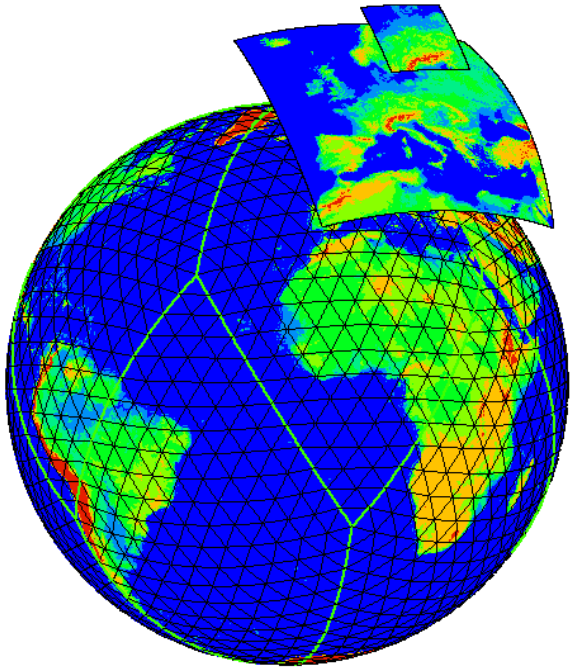


Global modeling at DWD will be substantially upgraded in the next few years!!

Installation of Cray XC30:	**Q3 2013**
Migration from NEC SX9 to Cray XC30:	**Q1 2014**
Upgrade of Cray XC30 by a factor of 3:	**Q4 2014**

Global model GME

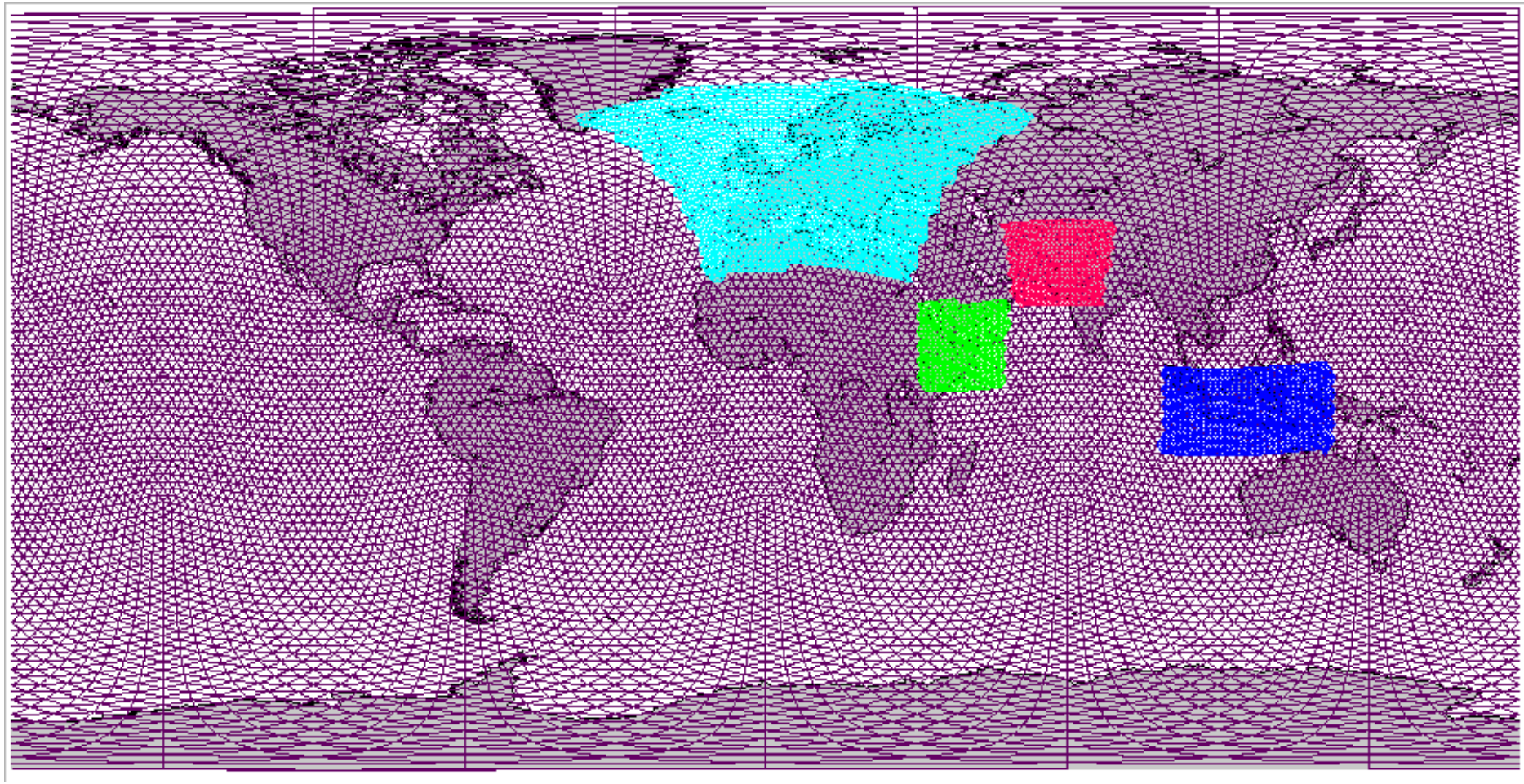
- Starting August 2013 Mr. Norbert Liesering (norbert.liesering@dwd.de) will start to distribute GME test data sets in GRIB2 format to all COSMO-Model users worldwide.
- The GME data in GRIB2 format contain in each field the bitmap, there is no separate (ASCII) bitmap like in GRIB1.
- In compressed form (bzip2) the GME data in GRIB2 format are not larger than in GRIB1 format.
- But in uncompressed form the GME data in GRIB2 format are much larger due to the bitmap in each field.



ICON 13 / 6.5 km / L90

- Grid spacing 13 km globally with one + three 6.5 km nests.
- Number of layers: 90 up to 75 km.
- Pre-operational tests of ICON started in Q2, 2012.
- ICON (13 km global) will be fully operational by **Q2, 2014 and replace the current global model GME.**
- ICON (13 km /6.5 km) will replace COSMO-EU (in Q4, 2014).
- ICON data (in GRIB2) will be distributed free of charge to all national meteorological services (in real time) and universities (in delayed mode) for regional modelling based on the COSMO model.

Global non-hydrostatic model ICON with four high-resolution (6.5 km mesh) nesting areas



GRIB2 and COSMO-Model

- In GRIB2, when there is a requirement for transmission of new parameters or new data types, new elements will simply be added to the set of Tables in the Manual (to be agreed by CBS). Table driven codes can transmit an infinity of information. There is total flexibility.

- The COSMO-Model users have to implement the latest version of *int2lm*, GRIB-API and corresponding GRIB tables on their computer system.

- *Int2lm* can read GME data in GRIB2 format and write the interpolated fields (initial and lateral boundary data for the COSMO-Model) in GRIB1 or GRIB2 format.

- Therefore each COSMO-Model user can decide himself/herself when to migrate his/her NWP system based on the COSMO-Model from GRIB1 to GRIB2 format.

Priority Task – "Support of COSMO licenses"

- Starting from September 2011, NMA Romania has been involved in the COSMO User Support Activities priority task:
  - supporting new COSMO users during the implementation phase through e-mail assistance and by remote access to their computer system;
  - helping the COSMO users to set up their operational COSMO applications;
  - running the COSMO - Model and the INT2LM software.
- As part of these activities, Romania offered support for sequential / parallel compiling without data assimilation of the model
- Requirements:
  - Fortran compiler: gfortran (vs. > 4.5); C compiler: gcc
  - DWD-libgrib1_20110128.tar.gz, GRIB_API.tar.gz
  - int2lm_130701_1.22.tar.gz & cosmo_130701_4.28.tar.gz

Romania gave support was to Indonesia, Nigeria, Oman, Brasil, Pakistan, Qatar, Tanzania.

Training support: (held at BTZ Langen, Germany)

- **COSMO/CLM Spring School**, February 18 - 22, 2013 – for students and scientists interested to work or already are working with COSMO/ CLM model.

- **Capacity Building in the Regional Numerical Weather Prediction based on the COSMO Model**, 15 to 26 July 2013. This training is very important for other national meteorological services which plan to use the COSMO model for operational NWP.

- two of the Romanian researchers (Rodica DUMITRACHE, Cosmin BARBU) attended the both events, as trainers for performing the practical exercises;

- assisting the students in implementing the COSMO model on their personal computers and running test cases for domains which covered their area of interest.

Training support: (held at BTZ Langen, Germany)

➢ **Training on COSMO Data Assimilation (DA),** 29 July – 9 August 2013.

- organized by DWD in collaboration with IBL company.
- participation from Qatar, Brazil-INMET, Brazil-NAVY, Oman and Tanzania.
- data sets for practical exercise were provided by DWD
    - Period: 1 July 2013 00 UTC until 3 July 2013 18 UTC.
    - GME data for 2013070100 until 2013070318 every 6 hours new analysis and forecasts (up to 48 hours at 3-hourly intervals) for the operational model domains.
    - Global Observations (in NetCDF-format) for the same period.
- students learnt to in implementing the COSMO DA packages model on the DWD workstation.
- comparisons between baseline, nudgecast, cold start and continuous DA experiments.

On-situ training support: (Indonesia)

➢**Training (in situ) on Regional Weather Prediction Based on the COSMO model,** 5-9 November 2012, Bandung, Indonesia

- organized by National Institute of Aeronautics and Space (LAPAN), Indonesia.
- all the trainees learnt how to implement, to set and run the COSMO model for some specific domains
- „*Training (in situ) on Regional Numerical Weather Prediction Based on the COSMO Model*“, Indonesia 2012, was a good opportunity to increase the visibility of COSMO consortium
- The Romanian COSMO Support team (C. Barbu, R. Dobre) gained experience useful for the next similar activities

On-situ training support: (Indonesia)

LAPAN Cluster

1 Master Node:
-Supermicro A+ Server 2022G-URF
-2x 2.60 Ghz @ 8 cores (total 16 cores) Opteron (6212)
-4U rack Chasis
-RAM : 8x 4GB DDR3 1600MHz, ECC DIMM (total 32 GB)
-High Performance RAID Controller with cache on flash
-8x 2TB SATA Disk (10 TB in Raid6 with one hot spare drive).
-Infiniband Port Mellanox COnnectX-2 40 Gigabit/s
-Suse Linux Enterprise Server 11 SP 2

6 Compute Node:
-Supermicro A+ Server 1042G-TF
-CPU: 4x Opteron 2.4GHz (6234) @ 12 cores (total 48 cores)
-64 GB (16 x 4 GB, DDR3, ECC 1600 MH)
-1x Hardisk 500 GB
-Infiniband Port Mellanox COnnectX-2 40 Gigabit/s
-Suse Linux Enterprise Server 11 SP 2

On-situ training support: (Indonesia)

Installation and running COSMO

1) **Directory structure on LAPAN Cluster**:

docs/ location of documentation & namelist samples
grads/ location of grads postprocessing tools
source/ contains the entire source code of all model components of COSMO and Int2lm:

- ✓ **arh/** - archive codes of COSMO and Int2lm
- ✓ **compile/** – path where we compile all packges
- ✓ **bin/** - location for the compiled binary files
- ✓ **lib/** - path of the libraries, which will be needed for COSMO linking

work/ working directory; contains namelists, run scripts, topographical data, out –and input folders, input data

On-situ training support: (Indonesia)

Installation and running COSMO

2) COSMO package & necessary libs

3) Compilation with gfortran:

i. The libraries: libgrib1 & libmisc
ii. int2lm_110311_1.18 (sequential, parallel - OpenMPI)
iii. cosmo_110525_4.18 (sequential, parallel - OpenMPI)

4) Setting the namelists for interpolation & model (10km resolution)

i. Learning to choose the domain
ii. Setting the namelists for tropics (INT2LM, INT2LM_COSMO)
iii. Running interpolation and model (sequential / parallel mode)
iv. ASCII outputs

On-situ training support: (Indonesia)

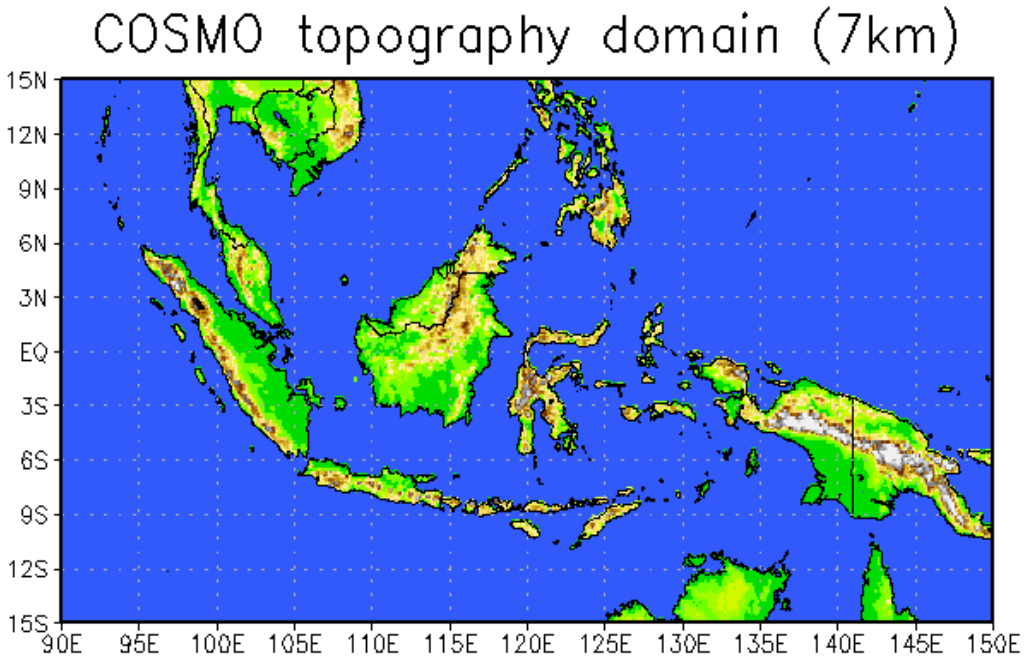
Post-processing with GrADS

- *Basics of GrADS*
- *Creating plots of COSMO model run*
- *Meteograms*
- *Sample of operative procedure using GrADS*
  - *GrADS & bash scripts*

On-situ training support: (Indonesia)

Practical exercises

- Setting and running int2lm and cosmo at 7 km in **parallel mode (using OpenMPI)**
- Split in teams of 2 members
- Each team will have to choose its domain of a given number of points (Size max. 165x70 or 70x165 grid points)



On-situ training support: (Indonesia)

Practical exercises

- running the interpolation for:
  a) Date - 2012102900
  b) Forecast range – 78 hours
  c) Number of processors – 48 (use BIN/int2lm.par binary)

```
mpirun –hostfile hostfile –np 48 BIN/int2lm.par
```

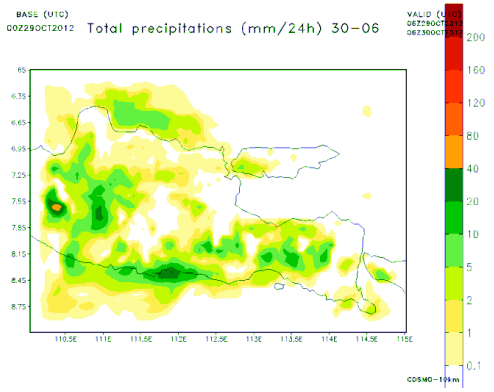
- running the model for (see a)-c) above)

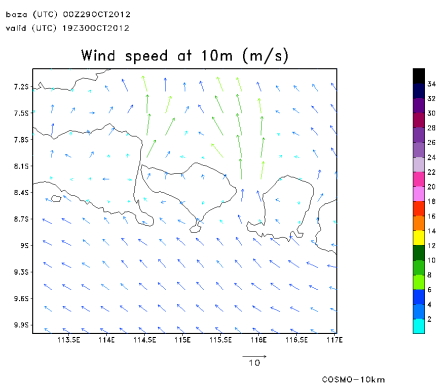
```
mpirun –hostfile hostfile –np 48 BIN/cosmo.par
```

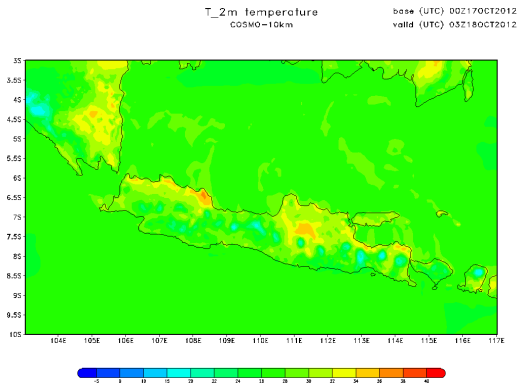
- Automatic post-processing
  using a bash script: make_photos.sh

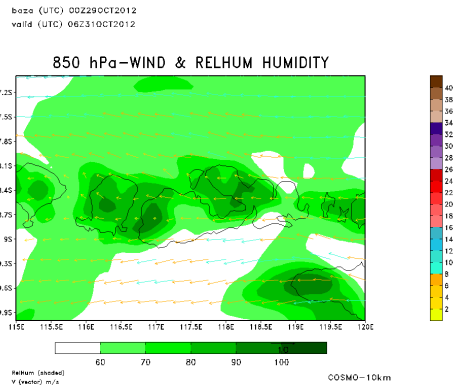
On-situ training support: (Indonesia)

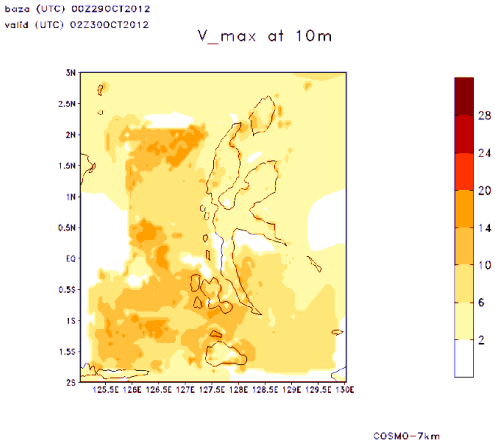
Results: COSMO – 7km (done by Indonesian teams)











On-situ training support: (Indonesia)

COSMO group picture

COSMO Help & usage

- COSMO contract for scientific evaluation; e-mail to detlev.majewski@dwd.de
- Support during installation of the COSMO-model: e-mail to cosmo-licence@cosmo-model.org.
- Topographical data for your COSMO-model domain, e.g. at a grid spacing of 0.0625° (~ 7 km); e-mail to detlev.majewski@dwd.de.
- GME data corresponding to your COSMO-model domain e-mail to norbert.liesering@dwd.de.
- Create COSMO-model products (e.g. via GrADS); if you need help, e-mail to helmut.frank@dwd.de.
- Implement the operational scheduler of M. Gertz; e-mail to michael.gertz@dwd.de.

Conclusions:

- The COSMO model has been successfully implemented in most countries which migrated from the HRM model;
- The training activities help potential users to get better acquainted with the COSMO model;
- All these activities can improve the communication between the COSMO consortium and the users of the model;
- Romania will be able to go on providing support in implementing the COSMO model to new users in 2013 – 2014 and participate with permanent activity in the "*SuPpoRT Activities"* priority task.

Thanks for your attention!

QUESTIONS?!