SRNWP-Interoperability

Mike Bush, Claude Fischer, Uli Schaettler

For 34th EWGLAM and 19th SRNWP Annual Meeting 2012

08th – 11th October 2012 Helsinki, Finland

SRNWP-I short history 2008-2011

- Programme started in September 2008
- GRIB2 chosen as the underlying data format
- ECMWF's GRIB API chosen as the underlying conversion software
- "Adaptors" developed at consortia to allow the ingestion and output of model data in GRIB2 "standard format"
- In reality these adaptors are extensions of pre-existing change of geometry codes that are components of a full NWP system (e.g Full-POS, INT2LM, FIELDEXTRA, UM reconfiguration, FIELDCALC etc.)
- Documentation has been put together by each consortia, describing their model grids, geometries and the contents of test data files that have been exchanged.

SRNWP-I 2012

- The new Programme Manager (PM) Mike Bush has been working on the necessary legal documents to enable 2012 subsidy payments to be made to consortia on time.
- The Programme Decision document for SRNWP-I has been updated with the new milestones and deliverables for 2012 and this document can be found on the EUMETNET portal.
- There are seven deliverables for this year, five of which are reports or documentation and the remaining two concern work on lateral boundary conditions and surface parameters.

SRNWP-I 2012 Deliverables

Deliverable	Description	Status
E/ND0	Establish and document an agreed software maintenance regime before 31/12/12	Complete
H/ND0	Document adaptor and user guide	In progress
L	Assembly approves before 31/12/12 a licensing policy for the software	In progress
P/ND1	Work on lateral boundary conditions (specific work at each consortia)	In progress
Q/ND2	Work on surface parameters (specific work at each consortia)	To be started soon
R	Survey users and identify some real use cases so members can see how SRNWP-I is being used	In progress
S	Establish an up to date forecast of when all the LAM-LAM and Global-LAM adaptors will be completed and tested.	Not able to deliver

Adaptor software maintenance regime

- Document entitled “SRNWP-I: Adaptor software maintenance regime” completed in March 2012 and put on EUMETNET portal.
- It is the responsibility of Consortia to maintain their own adaptor and to provide minimal adequate documentation describing the model grids and model parameters included in standard format.
- It is proposed that the Systems Expert Team shall coordinate the maintenance of interoperability and the standard format, coordinating the dissemination of details of future model changes and their impact on consortia adaptors.

Annual adaptor testing

- The Systems Expert team shall coordinate an annual testing programme of the Interoperability adaptors ahead of the annual SRNWP meeting; reporting their findings.
- For the testing, data sets from all models will be delivered by an agreed date, together with up-to-date documentation
- ‘Contingency tables’ will be produced on an annual basis from this testing. These tables will show which LAM→ LAM and global →LAM conversions work.

SRNWP-I Progress to date

LAM Initial and boundary conditions → LAM forecast

	ALADIN & HIRLAM	COSMO	UM
ALADIN & HIRLAM			
COSMO			
UM			

Global initial and boundary conditions → LAM forecast

	ECMWF	ARPEGE	DWD ICON	UM
ALADIN & HIRLAM				
COSMO				
UM				

Key:
Blue – complete
White – work in progress

Licensing policy

- The software and documentation that has been developed as part of SRNWP-I is referred to as “Acquired knowledge” from an IPR point of view
- This acquired knowledge is owned by EUMETNET EIG as stated in the EIG agreement signed by participating countries on 17/09/09
- A document has been put together by the SRNWP-I PM (in consultation with the Secretariat and the SRNWP Consortia) that proposes that the IPR for the software is transferred from the EIG back to the respective consortia members
- Meanwhile it is proposed that the IPR for the documentation should remain with the EIG.
- This document is an agenda item at the PFAC5/STAC5 meeting in early October and it is hoped that Assembly will approve it in November

When will the adaptors be completed?

- The EUMETNET STAC met in Budapest on 27-28th March 2012. There was an action STAC4.09 (point 3) to: “Establish an up to date forecast of when all the LAM-LAM and Global-LAM adaptors will be completed and tested”.

- The PM has consulted with consortia representatives and the consensus is that this is "unknown at present" and that no reliable estimate is available.

Issues

- A scientific decision was taken to avoid double interpolation by exchanging data on the native model grid. This meant developing as many adaptor versions as there are native grids.
- Each consortium could implement them in its own system as found "optimal“, but this has not always been trivial and has had to be prioritised with other system duties in the consortia.
- Inflexible native file formats (e.g. Met Office Fieldsfile) are an extra difficulty.
- GRIB2 had to be implemented in all consortia's solutions and there was the need to liaise with WMO to propose a new generalized vertical coordinate for the Grib 2 standard.
- Some adaptors are technically much easier to produce than others. Prototyping and coding new software is necessary and has probably required more effort than expected.
- Availability of skilled staff - interoperability developments have to be performed by competent System experts and there are only a few of them in any of our consortia.

Status of I-SRNWP adapters in Aladin/Hirlam

C. Fischer on behalf of the Aladin and Hirlam consortia

EWGLAM/SRNW Helsinki, Oct 8-11

METEO FRANCE
Toujours un temps d'avance

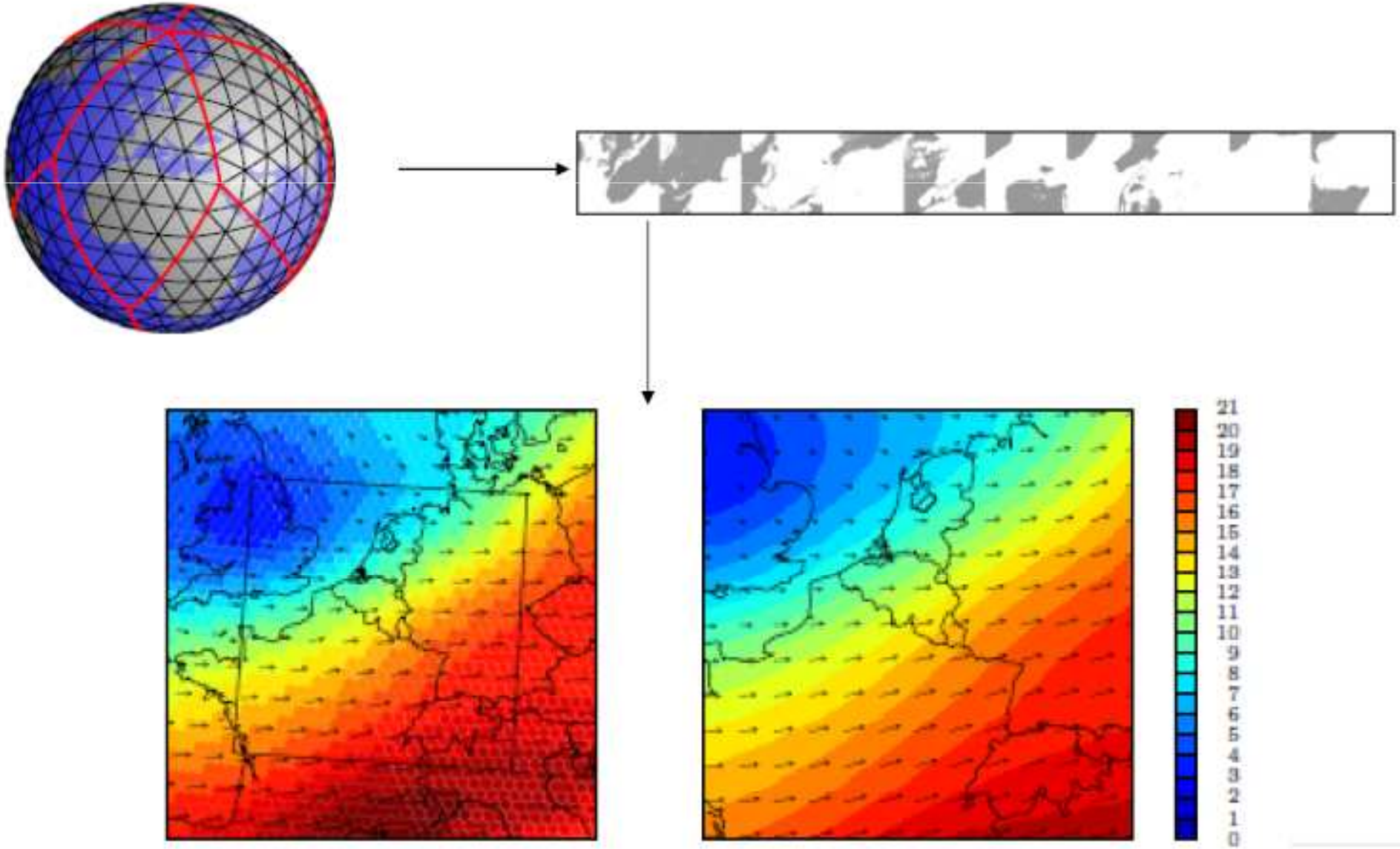
Adapter design (Daan Degrauwe, RMI/Belgium)

- Prototype able to convert from any consortia grid to Aladin/Harmonie grid
- Major pre-requisite is that the grid can be represented as a series of longitudes along a fixed set of latitudes (for global DWD: "10-diamond" rectangular decomposition)
- Requires knowledge of pressure levels of the original vertical discretization
- Uses Full-POS framework (proof of concept)

Ancillary aspects:

- **Limitations:**
  - Only horizontal and vertical interpolations; surface conversions not handled so far
  - More sophisticated grid definitions might be harder to achieve
  - Flexibility w/r to GRIB headers is difficult: requires handmade specs for each test data
  - Robustness of extra code in Full-POS should be improved; multi-processor features should be coded and validated
- **Strengths of the solution:**
  - Builds on existing and maintained software
  - Able to use advanced features provided in Full-POS (land/sea mask handling etc.)
- **Eventually, this is why the present code is to be considered as a prototype, not suitable for regular use**

Example with global DWD grid:

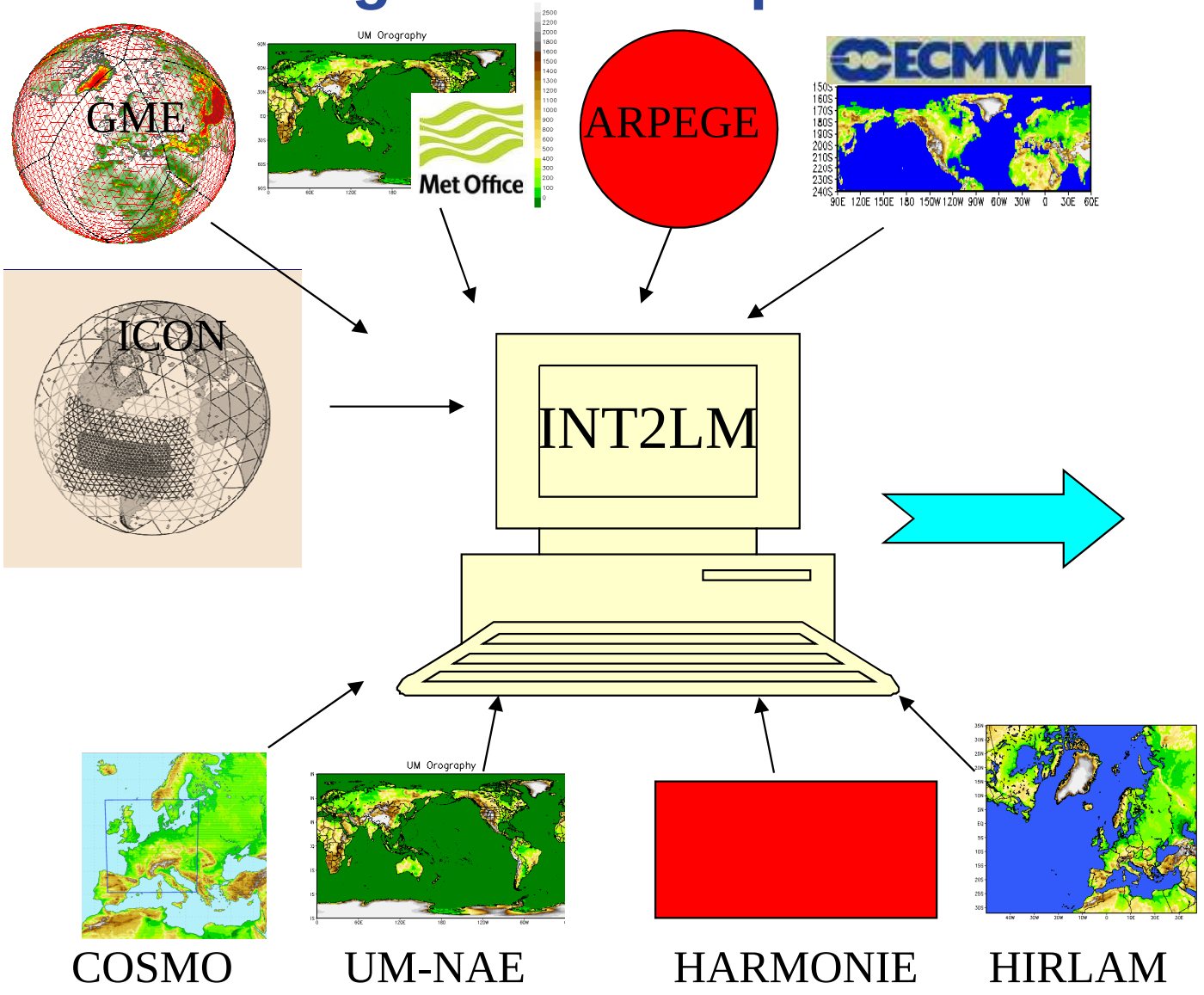


METEO FRANCE
Toujours un temps d'avance

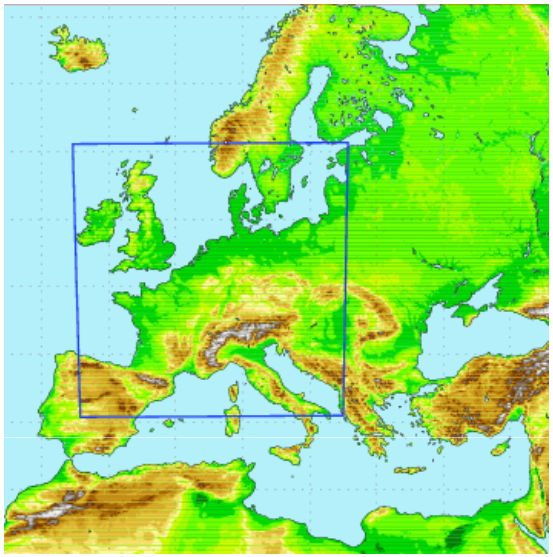
COSMO Progress in Interoperability

- INT2LM can now progress data from IFS, UM (global and regional) and HIRLAM
- Work is (still) in progress, to implement grib_api into INT2LM and the COSMO-Model (for reading and writing)
- Grib_api has been implemented in ICON
- No test data available yet from ICON and the COSMO-Model using the new „generalized vertical coordinate“. WMO proposal about to be validated next year.
- Test data will hopefully be delivered earlier.

Working on the Adaptors

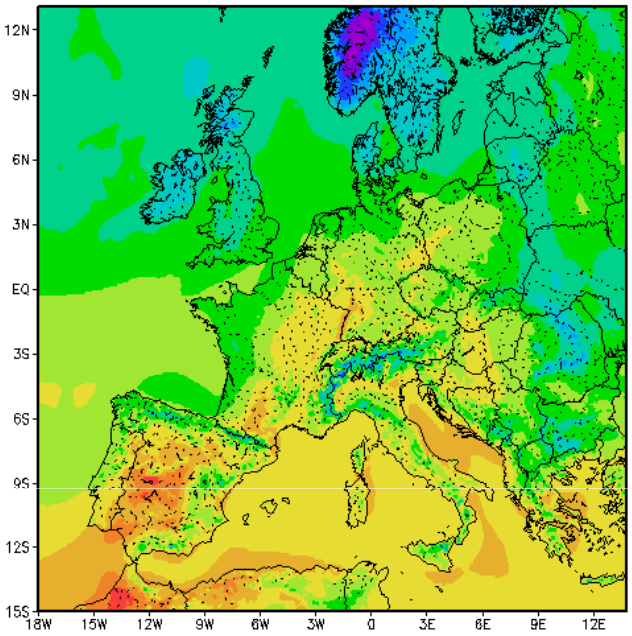


ICON

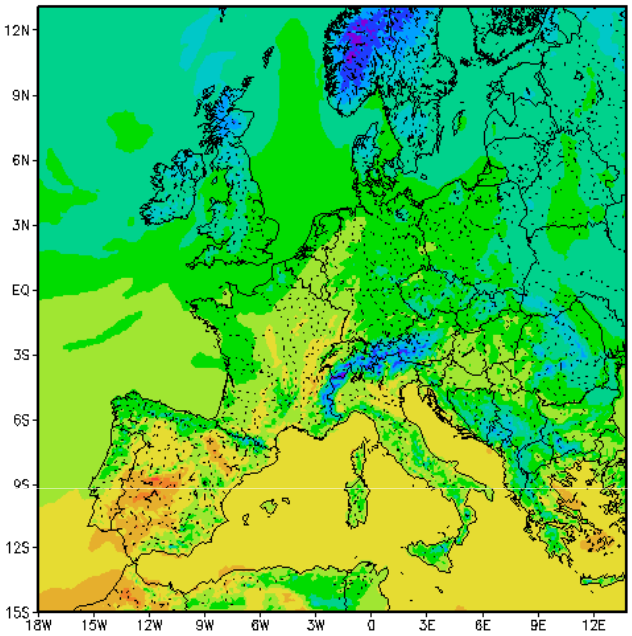


Temperature on lowest COSMO model level interpolated from

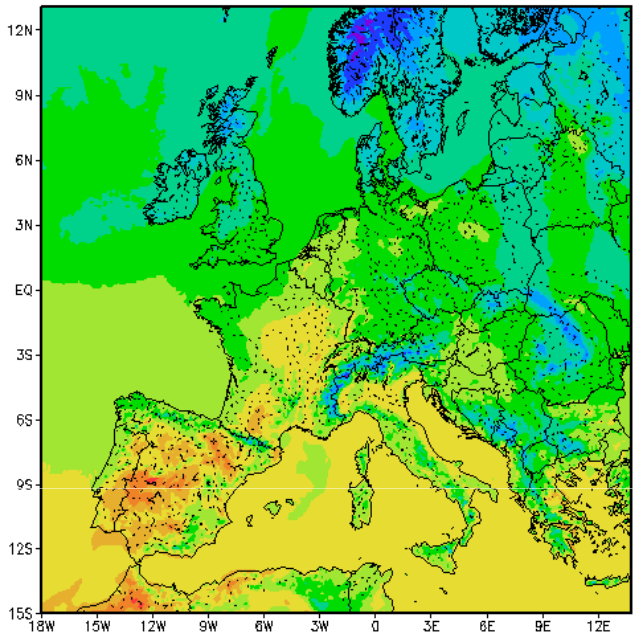
GME



IFS



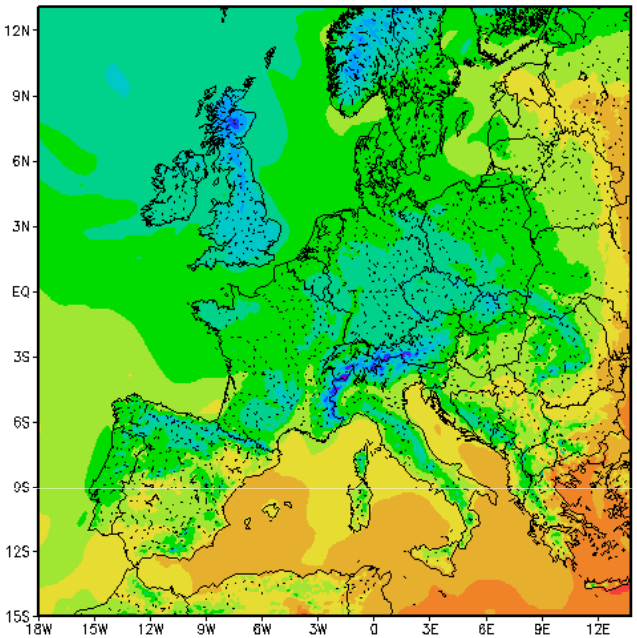
HIRLAM



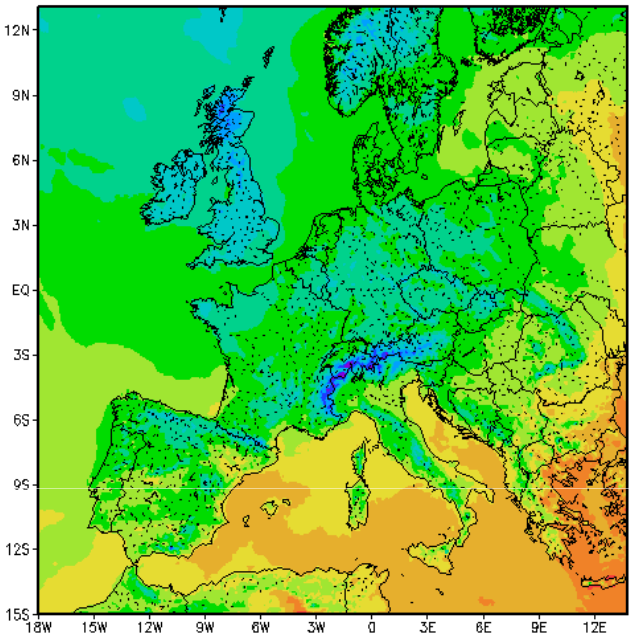
Date: 8th May 2009, 00 UTC

Temperature on lowest COSMO model level interpolated from

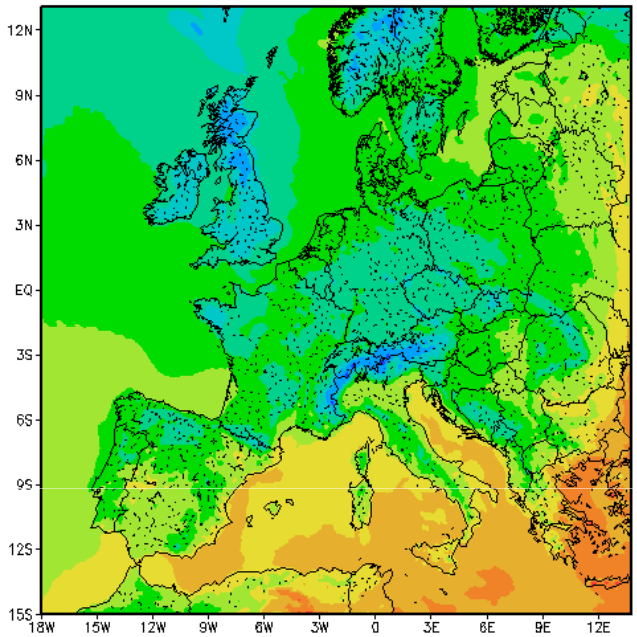
GME



IFS



UM-NAE



Date: 18th August 2010, 00 UTC

Met Office status 2012 (1)

- A decision has been taken to prioritise the operational implementation of the new dynamical core known as ‘ENDGame’ (Even Newer Dynamics for General atmospheric modelling of the environment) over the next couple of years.
- The global model configuration will be the first, followed by the limited area models (LAM’s). This has important consequences for SRNWP-I in terms of other Consortia’s ability to run from ENDGame UM data, the updating of documentation and the supply of test data.

Met Office status 2012 (2)

- Work is continuing on the efficiency of Lateral Boundary Condition (LBC) files and the following changes are scheduled for the UM8.4 release:
- The removal of three mandatory advective wind fields.
- The removal of w, density and Exner (apart from level 1) fields (balanced lbcs)
- The LBC formulation in the UM no longer requires the external halos in the LBC file and work is in progress to deal with no external halos (or single-point halos) in the LBC fields.

Met Office status 2012 (3)

- Work is in progress to enable grib2ff to handle land packed fields. This functionality is needed to make surface fields interoperable
- Work is also in progress to enable fftogrib to handle variable resolution data
- ‘SWIFT’ (Strategic Weather Information Forecasting Tool) is the new Met Office forecaster workstation system and it will replace the current ‘Horace’ system.
- There are plans to use the SRNWP-I adaptor to convert UM data from fieldsfile to grib for ingestion into SWIFT.
- This will allow the phasing out of the current ‘Horace fieldsfile’ file format and simplify the current production process (which involves a number of file conversions on different platforms).

SRNWP-I Looking to the future

- What happens after 31/12/12?
- End of Programme (for now) but could it restart again in the future?
- Aviation: Functional Airspace Blocks (FABs) and the Single European Sky (SES)
- Interest in making use of SRNWP-I functionality to possibly use other models to drive production processes
- http://www.eurocontrol.int/articles/fabec