

WP2

Overview

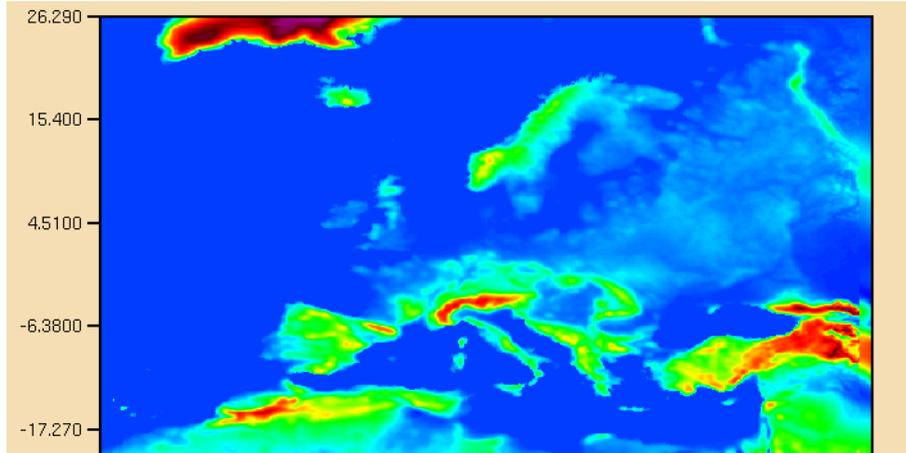
Achievements

Lessons learned

WP2 Scientists
and Per

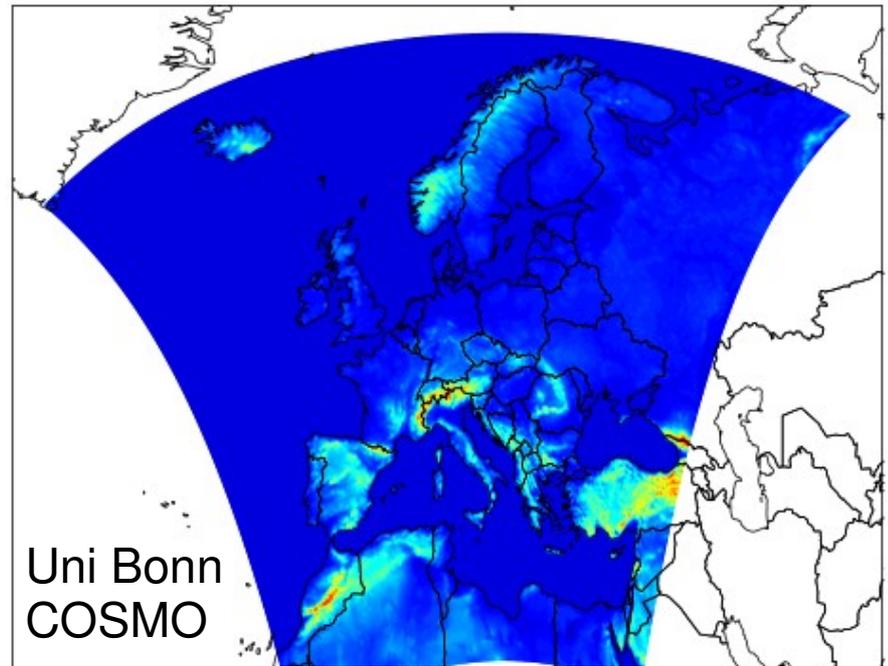
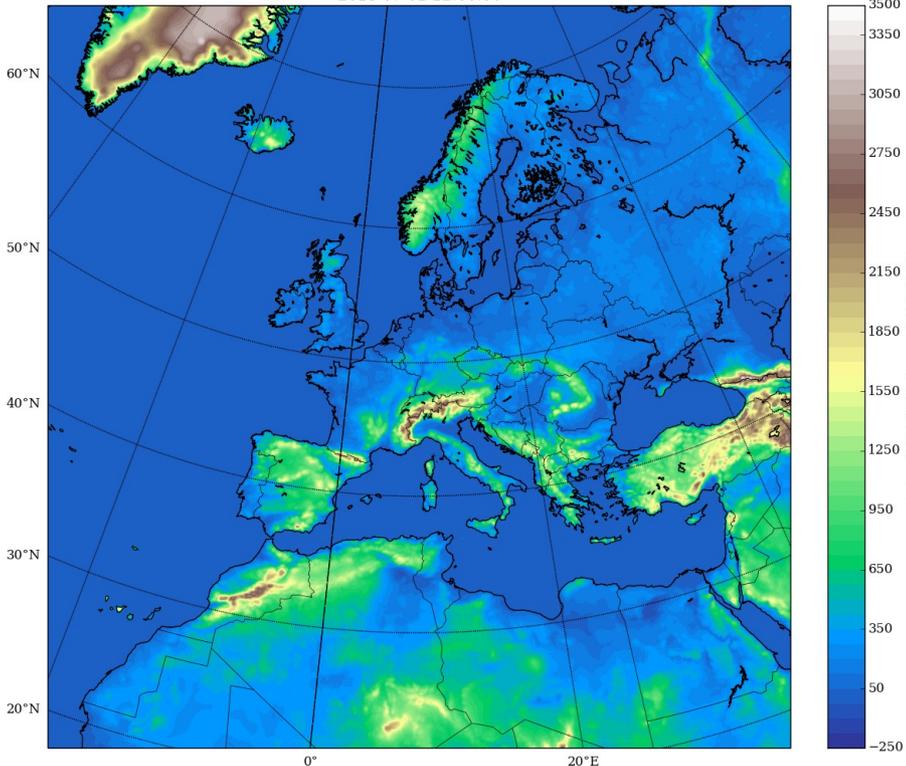
UERRA Domain & projections

Met Office
CORDEX
EU 11 km



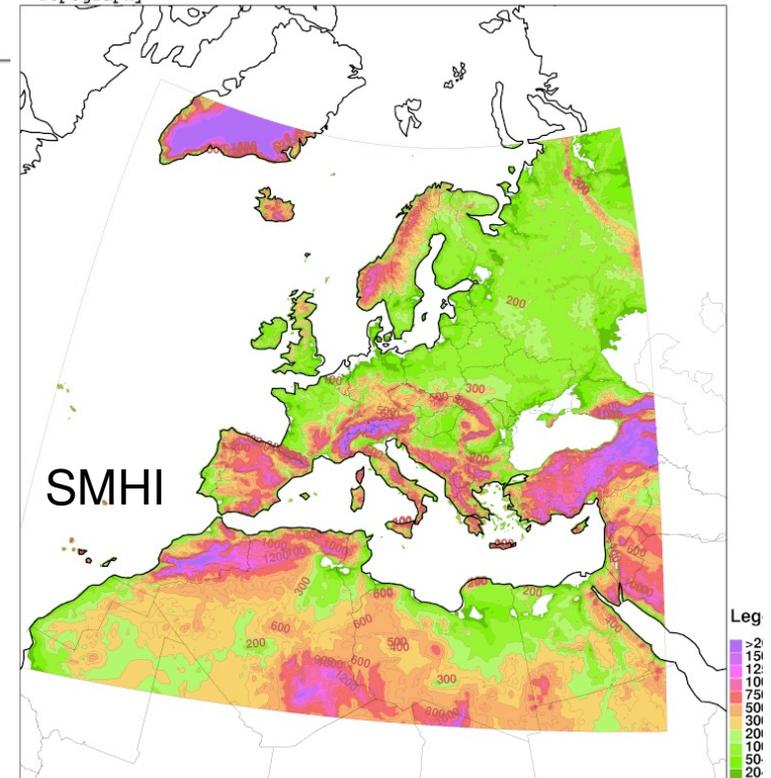
SPECSURFGEOPOTEN
2013-07-01 12:00:00

MF



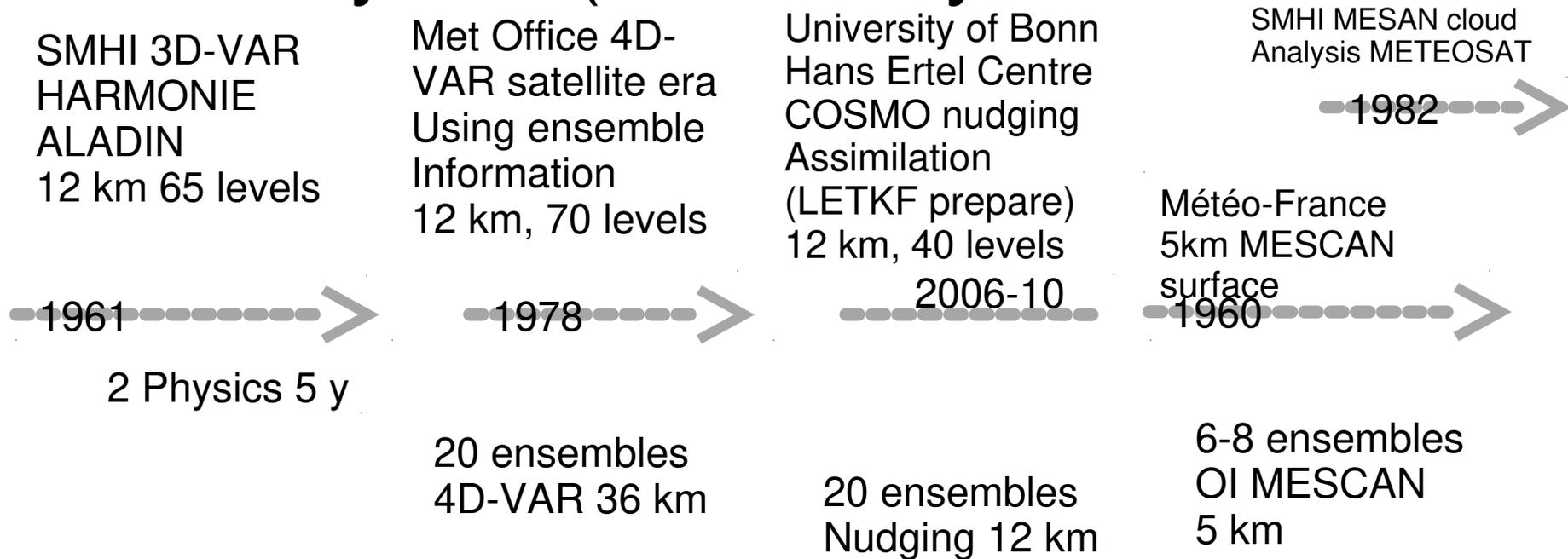
Uni Bonn
COSMO

Alaro UERRA
Topography



Mon 1 Jul 2013 00Z +06h
valid Mon 1 Jul 2013 06Z

European domain, Multi-model, Deterministic and Ensembles (2,20,20, 6-8 members), over 35-55 years (5 and 20 years UB/MESAN)



2-D surface fields analyses driven by 3D reanalyses

MF/SMHI
MESCAN

2D advanced
Statistical
Interpolation

Downscaled
ALADIN model
background

Surface and climate
stations
T, Td,
precipitation

5 km Europe
T2m, RH, 24 h
precipitation

1961 - ~2016

SMHI
MESAN

2D advanced
Statistical
interpolation

Downscaled
3D HIRLAM model
Climatological
adaptation background

AVHRR, METEOSAT
SEVIRI and
MVIRI

5 km Europe
Cloud fraction
hourly

~1994 - 2013

SMHI
HYPE

Hydrological
physical
model

ERA, EURO4M and
UERRA reanalyses
Precipitation and
temperature forcing

No input observations
Validation against
discharge data

River discharge
35000 catchments
Europe, median
215 km²

~1979 - 2010

MF SURFEX
and TRIP

Surface flux model
Hydrological physical
model

MESCAN
atmospheric
variables and
precipitation

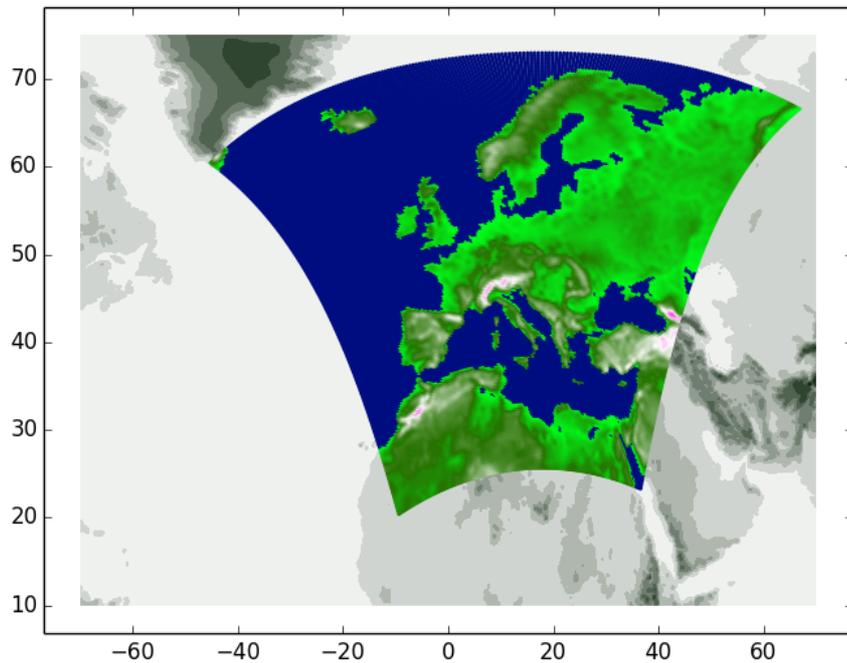
No input observations
Validation against
discharge data

River discharge
25 km -> rivers

~1981 - 2010

Variational Ensemble Data Assimilation

Met Office



Production slow:

1979-1989	done
1990-1999	50%
2000-2011	done
2012-16	mostly

Finish January 2018

Extra report to cover
evaluation for the 4 decades

HARMONIE-ALADIN re-analysis: 1961-2015

- HARMONIE
 - Cy38h1.1
 - 11 km horizontal resolution, 65 vertical levels
 - 30 hour forecasts at 00 and 12
 - 1 hour resolution up to 6 hours and 3 hour after that

- Data assimilation
 - 3DVar for upper air – Conventional observations (SYNOP, Ship, Buoys, Radiosondes, Pilot and Aircraft)
 - Large scale constraint – Jk
 - OI for the surface – T2m, RH2m and snow water equivalent

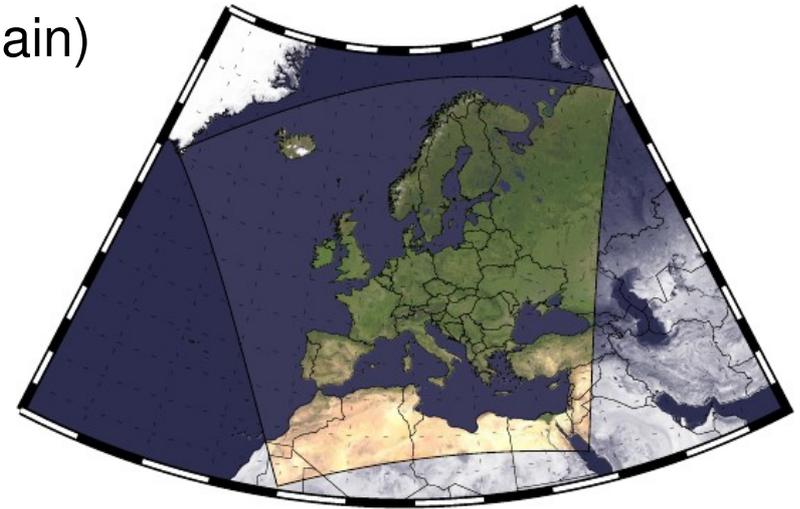
- Observations and Boundaries
 - 1961-2001 we used ERA40 observations with addition of Swedish and French observations in the early years. After that operational data
 - 1961-1979 we used ERA40 boundaries. After that ERAinterim

EURO-CORDEX domain 4
 576x576 grid points



COSMO-EN-REA12 SYSTEM SET-UP

- Based on COSMO-EU model (CORDEX domain)
- Conventional observations & wind profilers
- Ensemble nudging DA
- 21 ensemble members
- Includes external analyses of snow, sea surface temperature and a variational soil moisture analysis.
- 3-hourly LBCs from ERA-Interim
- Produced at 12-km grid spacing and with hourly resolution
- Available from 2006 to 2010



Observing system	Report type	Observed variable
Radiosondes	PILOT	Upper-air wind
	TEMP	Upper-air wind, temperature, humidity Surface-level wind temperature, humidity, geopotential
Aircraft	AIREP	Wind, temperature
	AMDAR	Wind, temperature
	ACARS	Wind, temperature
Wind profiler		Upper-air wind
Surface systems	SYNOP	Screen level pressure, wind, humidity
	SHIP	Screen level pressure, wind, humidity
	DRIBU	Screen level pressure, wind, humidity

Status of the Meteo-France production :

- MESCAN-SURFEX-Ens (5.5km): 2005-2010 : 8 members available on MARS archive
 - For each member :
 - Daily precipitation (ana,fc)
 - Every 6h : T2m (ana,fc), Rh2m(ana,fc),
 - Every 6h type fc : Ws, Wd, Ps, SWd_dir
 - Hourly (fc): surface runoff, albedo, $\bar{S}w_{net}$, Lw_net, Swd, Lwd, LH, SH, Tsurf, snowfall, snow density, snow depth, Snow Water Equi., soil temperature 14 layers, total soil water 14layers, total soil liquid water 14layers, soil heat flux
- MESCAN available for complete period
- For the 50 years production:
 - SURFEX should start from 1960 not possible to run several streams due to the long memory of the deep soil moisture
 - Completion mid-December 2017

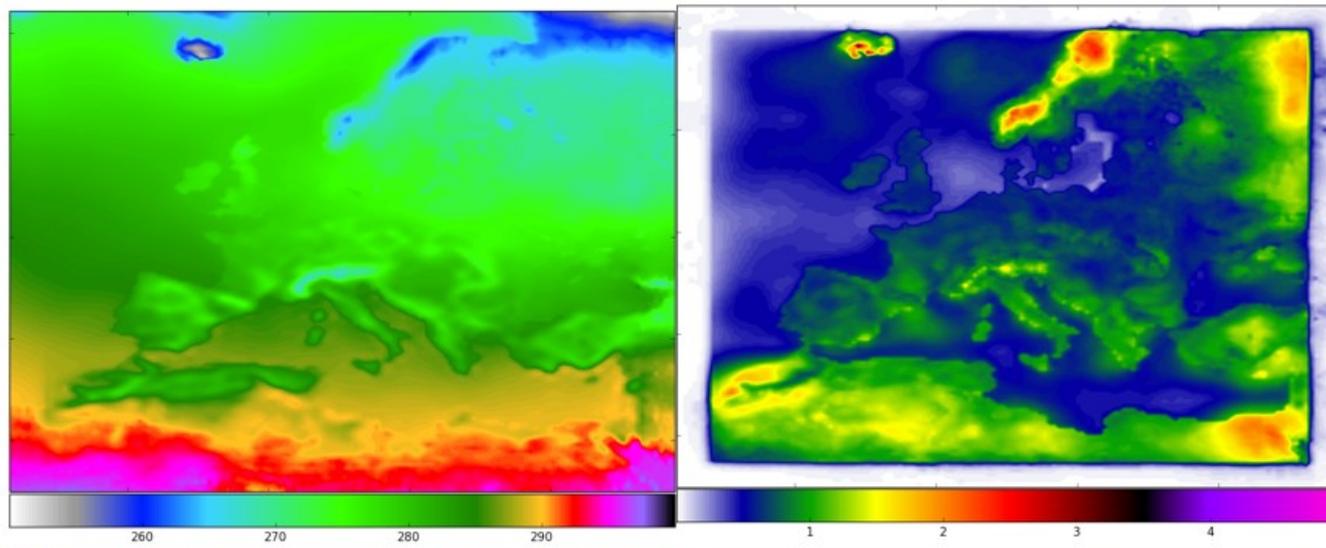




- D2.3 : Preliminary report with ensemble diagnostics [month 30] Dec 2016
- D2.4 : Ensemble diagnostics report and documentation [month 42] June 2017
- D2.7 : HARMONIE reanalysis report of results and dataset [month 45] Oct 2017
- D2.8 : MESCAN reanalysis dataset and report 1961-present [month 45] Dec 2017**
- D2.9 : Ensemble surface reanalysis report [month 30] June 2017
- D2.13 : KFENDA ensemble diagnostics report and documentation [month 45] Nov 2017
- D2.14 : RA uncertainty evaluation: EVDA/HARMONIE/KFENDA uncertainty evaluation report [month 45] Oct 2017

D2.3

Preliminary report with ensemble diagnostics
Peter Jermeý, Richard Renshaw, Jemma Davie



D2.4

Ensemble Variational DA documentation Peter Jermey, Jemma Davie, Richard Renshaw

Setting	Value
Upper limit of hybrid zone	16km
Lower limit of static zone	21km
Number of vertical modes	20
Vertical localisation type	Gaspari-Cohn
Vertical localisation cut-off	1.5 scale-heights
Maximum horizontal wave number	40
Number of error modes	20
High pass filter scale	$\frac{1}{\sqrt{2}}$
Horizontal localisation scale	200km
Hybrid climatology weight	100
Hybrid ensemble weight	30

Table 1: Summary of hybrid settings.

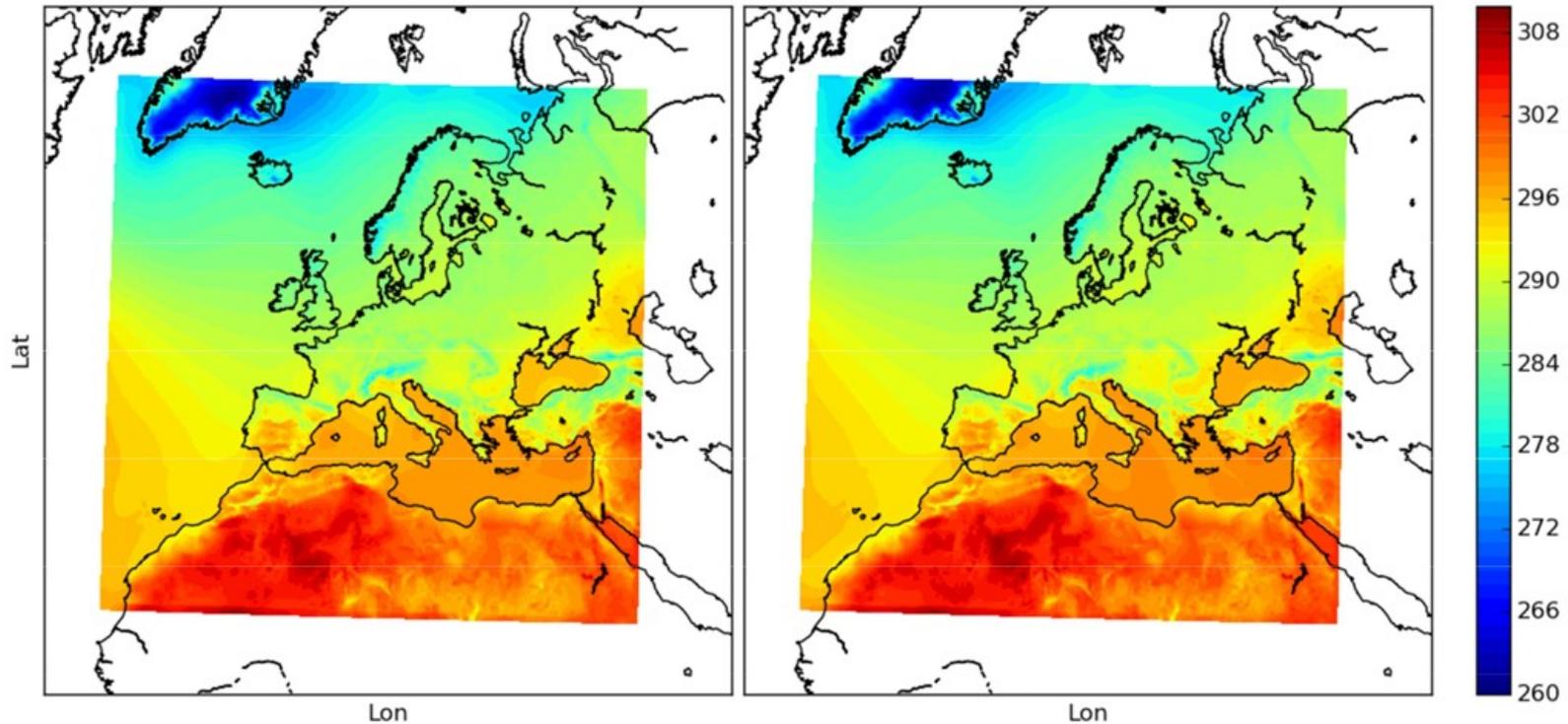


Figure 4. Mean values of two meter temperature for July during the periods 1961-1980 (left) and 1981-2014 (right). Unit on the color bar is degrees Kelvin.

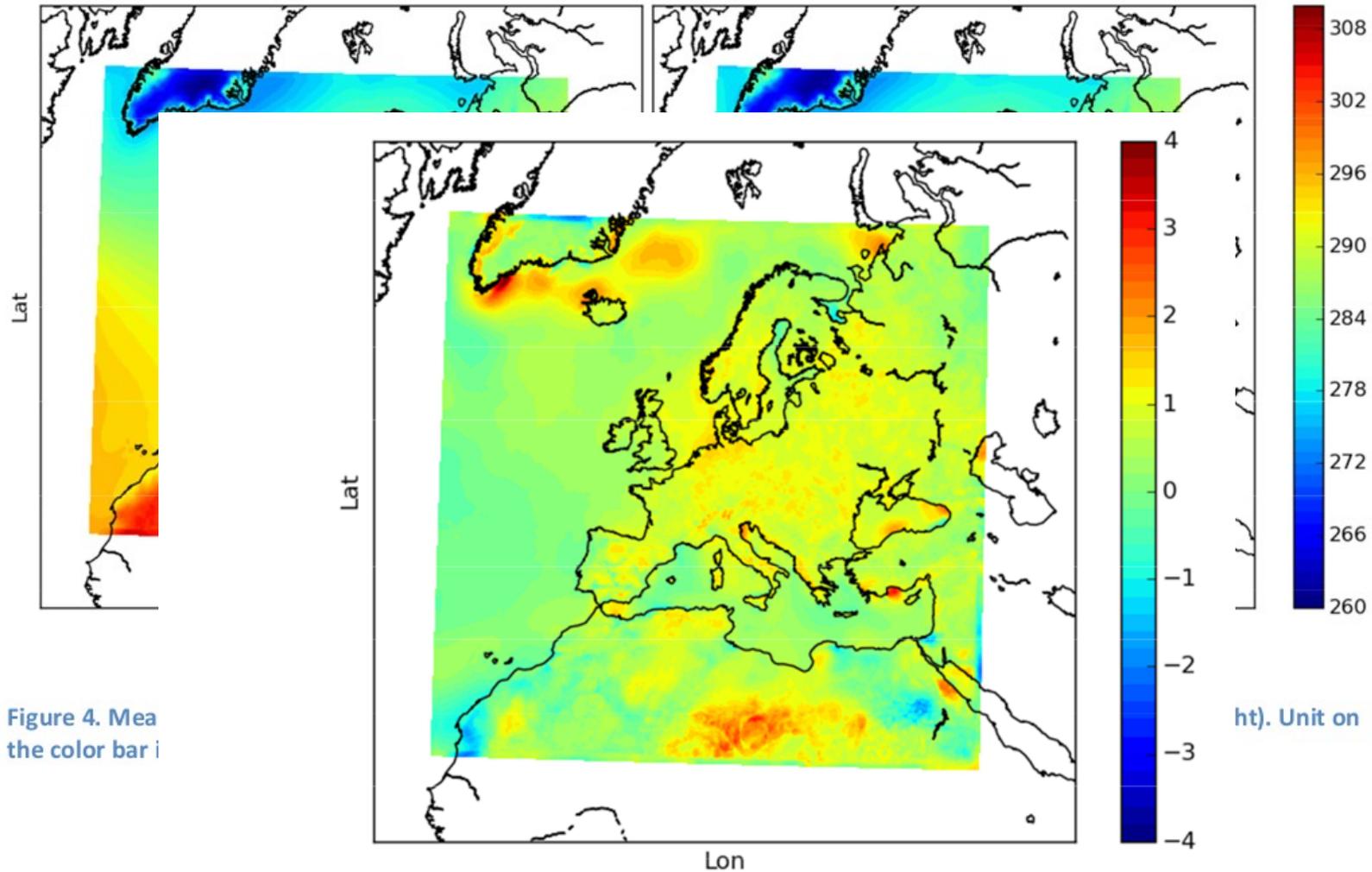
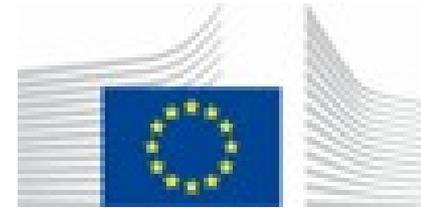


Figure 4. Mean
the color bar i

Figure 8. The difference, in degrees Kelvin, between the right and left panels in Figure 4.



Eric Bazile, Rachid Abida, Camille Szczypta,
Antoine Verelle, Cornel Soci, Patrick Le Moigne

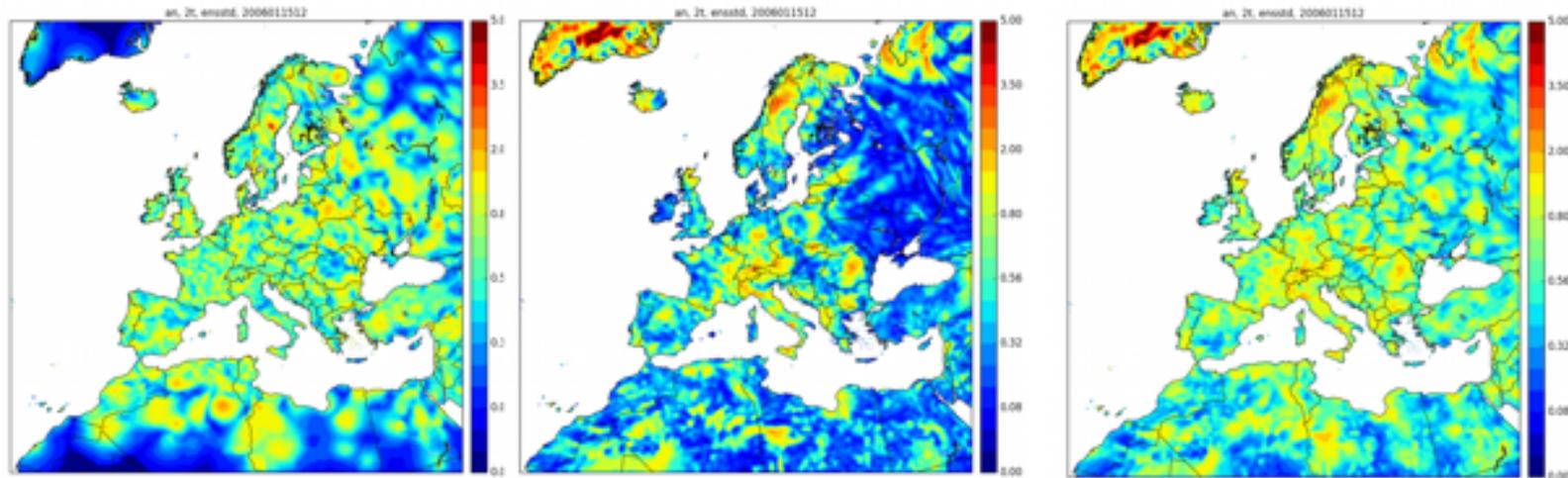


Fig 10. T2m standard deviation for the 15th January 2006 at 12UTC. Left : 4 members perturbed observations. Middle: 4 members 2 backgrounds and two networks. Right: the combined ensemble ENS-8-UE.

D2.10

MESAN cloud analysis

Tomas Landelius, Jelena Bojarova

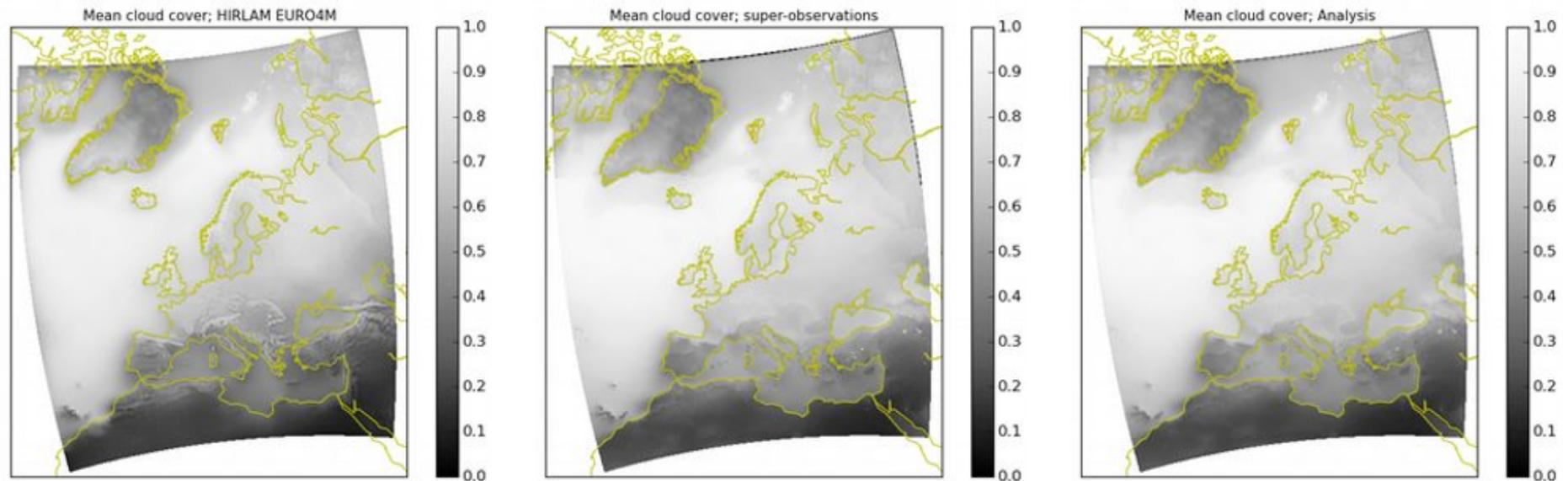
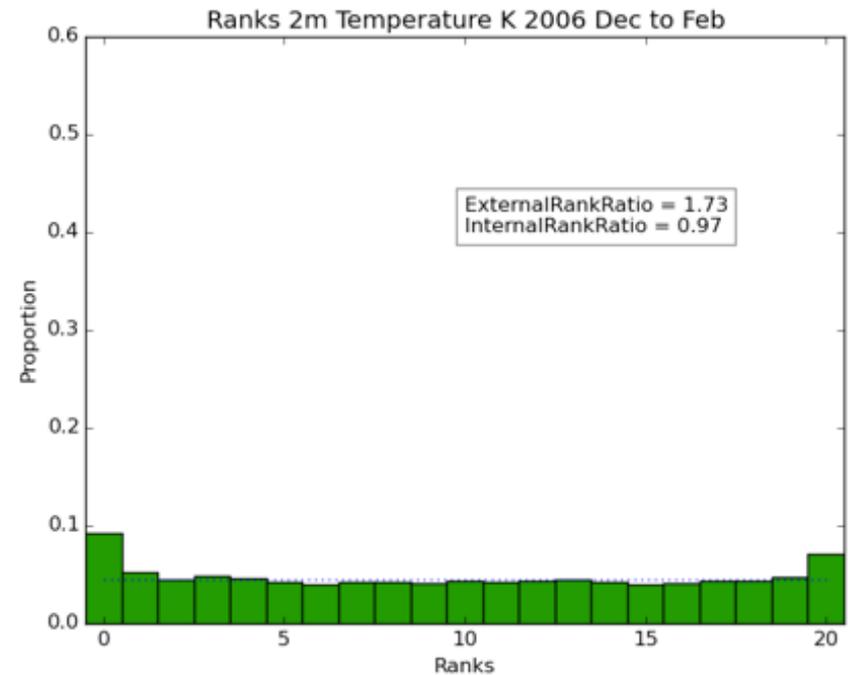
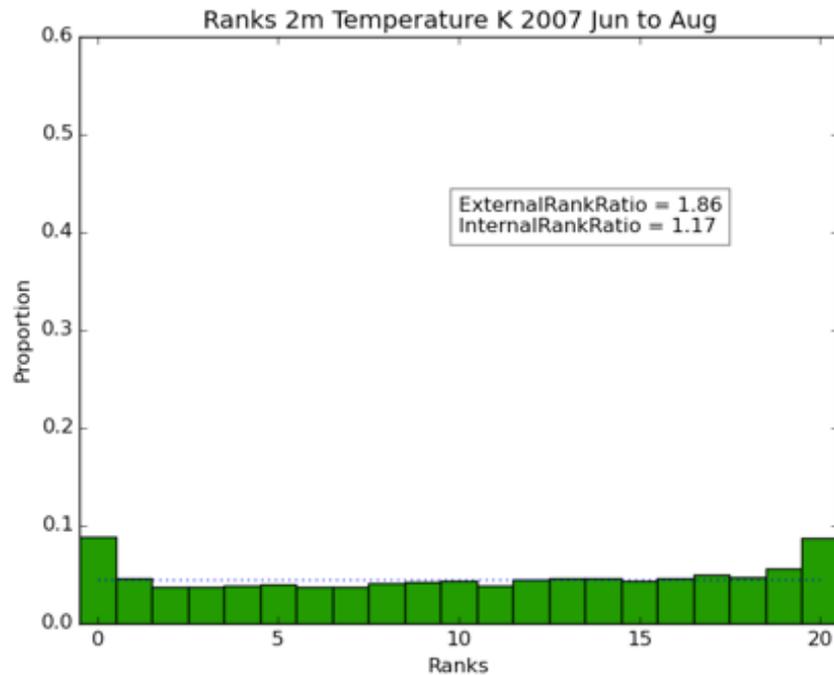


Figure 7: Mean cloud cover for the years 2004 – 2009 (left: EURO4M HIRLAM, middle: super-observations, right: analysis).



Peter Jermeý, Jelena Bojarova, Maarit Lockhoff,
Richard Renshaw, Martin Ridal, Per Unden



delays





Project: 607193 UERRA

Full project title:
Uncertainties in Ensembles of Regional Re-Analyses

Deliverable D9.3 **Lessons learned**

WP no:	9
WP leader:	KNMI
Lead beneficiary for deliverable :	SMHI, KNMI
Name of <u>author</u> /contributors:	Albert Klein Tank, Per Undén
Nature:	OTHER
Dissemination level:	PU
Deliverable month:	24

Lessons learned

Research + development
=> Production
=> Evaluation



Lessons learned

Complexity:

More complex than standard NWP

Small teams – reliant on support from experts

Reliance on key staff

Difficulties of using historical data

Lessons learned

Size:

IT requirements

- demands on systems
- changes in the environment

Volume of data

- archiving
- monitoring

Slow production

- high cost to correcting mistakes

Positives



All reanalyses complete or near completion
A full set of long-period high-resolution data
over Europe



Thank you