SMHI

SMHI HARMONIE RA progress

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What is HARMONIE?

During 2004 and 2005 HIRLAM and ALADIN consortia decided to deepen already existing cooperation in NWP. One of the main goals of the new cooperation is **to develop a km-scale operational NWP system.**

HARMONIE - Hirlam Aladin Regional/Mesoscale Operational NWP In Europe

For HIRLAM a clear need for a common system:
Combine all the important processes in one launch.

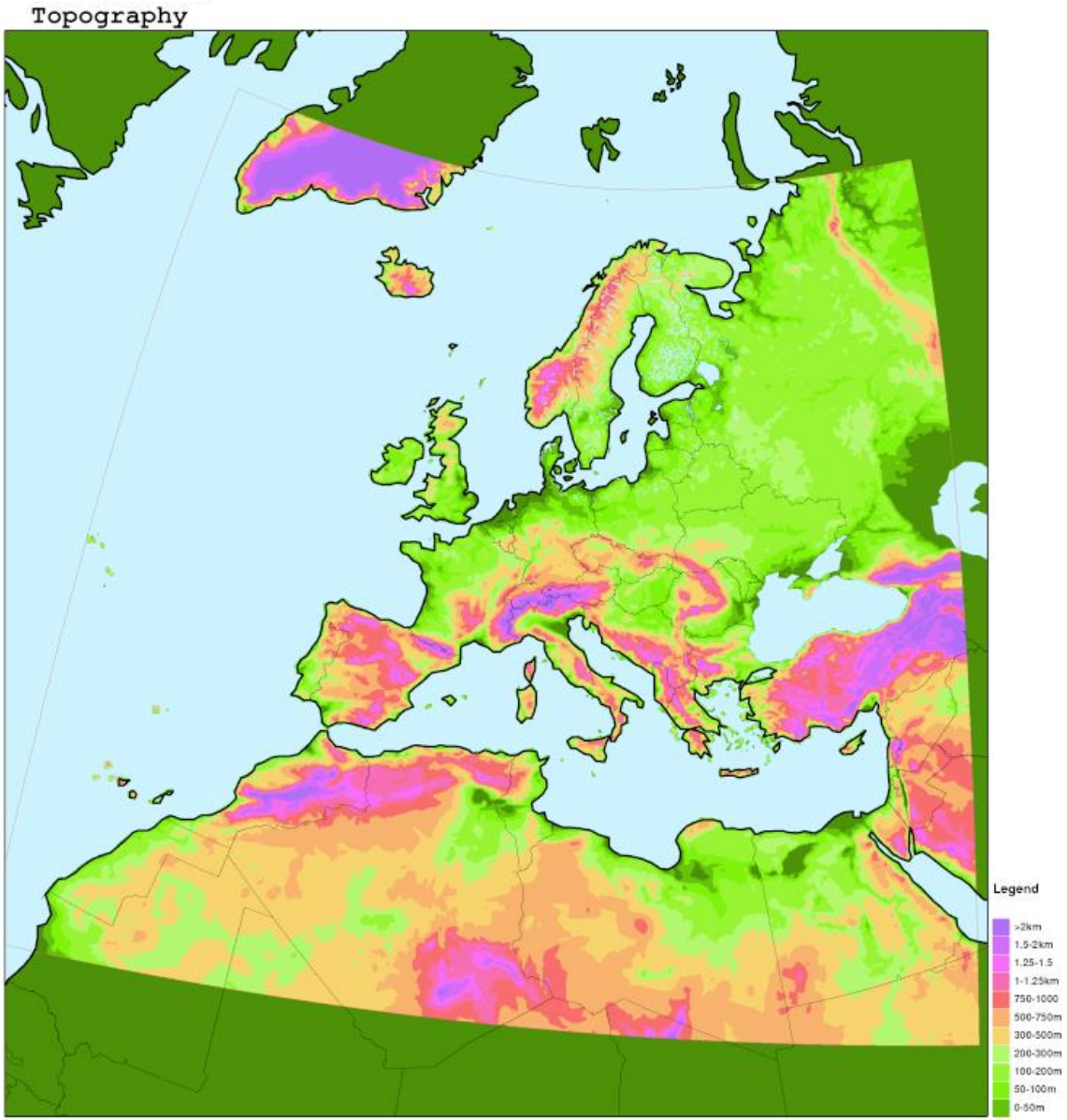
- Compilation.
- Climate and boundary generation (and data assimilation).
- Forecast (Arome, Aladin and Alaro with different physics options).
- Postprocessing and file conversions.
- Verification.

Model setup

576 X 576 points
11 km hor. res.
65 vertical levels,
13 below 1500m

6-hour cycle, surface assimilation and 3D-var upper air assimilation

00 and 12 UTC + 48H
06 and 18 UTC + 06H



Model setup

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	Aladin	Alaro
Dynamics	2TL Semi-implicit semi-lagrangian discretisation, hydrostatic	
Vertical	Hybrid pressure terrain-following coordinate	
Horizontal diffusion	Spectral diffusion	Traditional SLHD
Surface	SURFEX (Le Moigne 2012)	
Turbulence	TKE (Cuxart et al 2000) (prognostic equation)	pTKE (Geleyn et al 2006)
Mixing length	Bougeault Lacarrere (1989) Modified by the shallow cloud thickness and deep convection	Prandtl-type mixing length (Geleyn)
Shallow convection	KFB (Bechtold et al 2001) (Mass flux scheme)	Modified Ri (Geleyn 1987)
Deep convection	Moisture convergence (Bougeault 1985)	3MT (Gerard & Piriou 2007)
Clouds (PDF)	Smith (1990)	Xu & Randall (1996)
GWD	Catry et al. 2008	
Microphysics	Ql,Qi,Qr,Qs Lopez(2002) Bouteloup et al (2005)	Ql,Qi,Qr,Qs,Qg(diag)
Radiation	RRTM for LW (Mlawer et al. 1997), SW (Morcrette et al. 2001)	Modified old version of acraneb

Model setup, technical

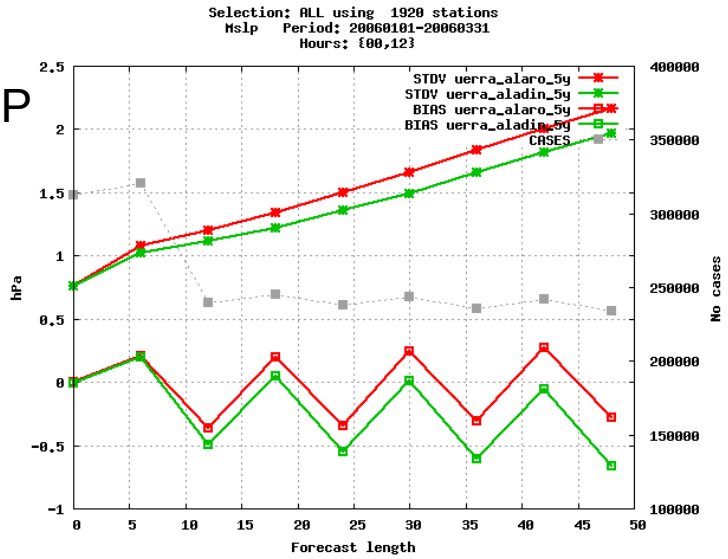
- Run on ECMWF – cca, compiled with gfortran
- mSMS used for scheduling
- Some difficulties with unexplained crashes and hangups, close monitoring essential
- Data stored on ECFS (grib1), to be converted to grib2 and stored in MARS

Five year runs

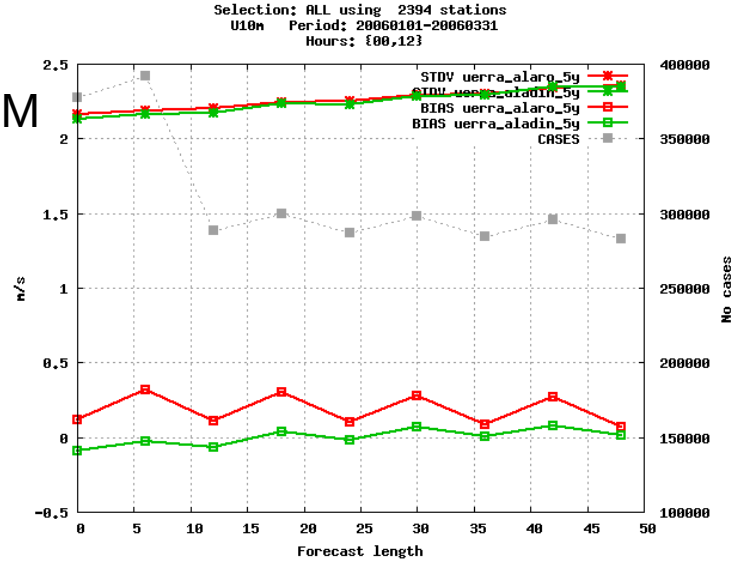
- Both models will be run for five years 2006-2010.
- It is expected to take about 100 days (ideally)
- Results from these runs will decide what model to use for the final RA.
- A few months completed so far.
- Some preliminary verifications presented below.

Verification against observations for 1 jan – 31 mar 2006

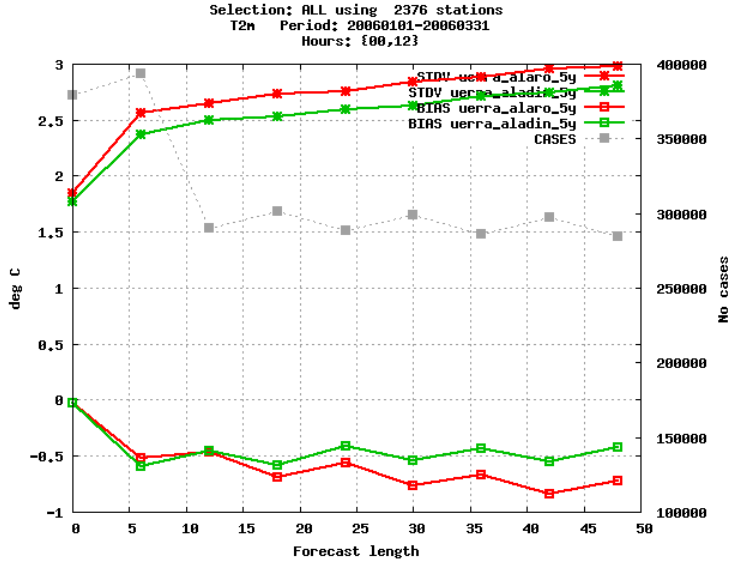
MSLP



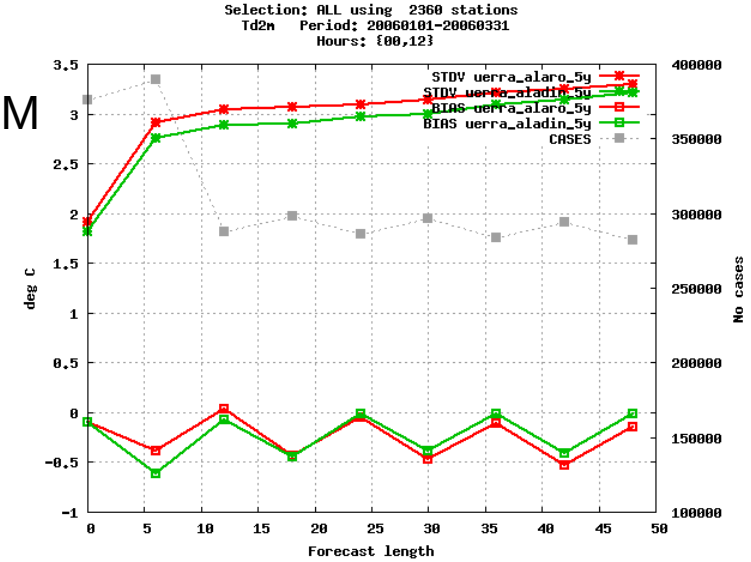
WS10M



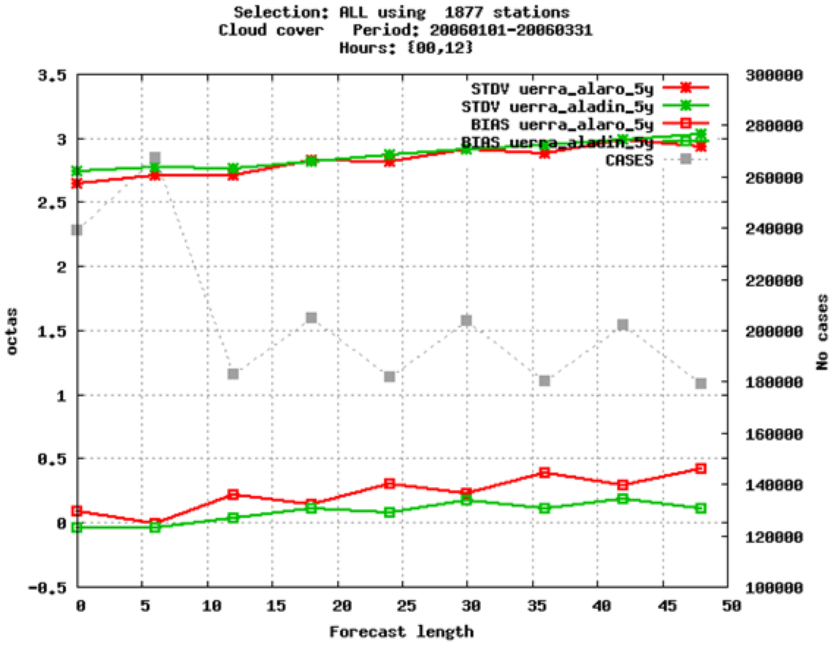
T2M



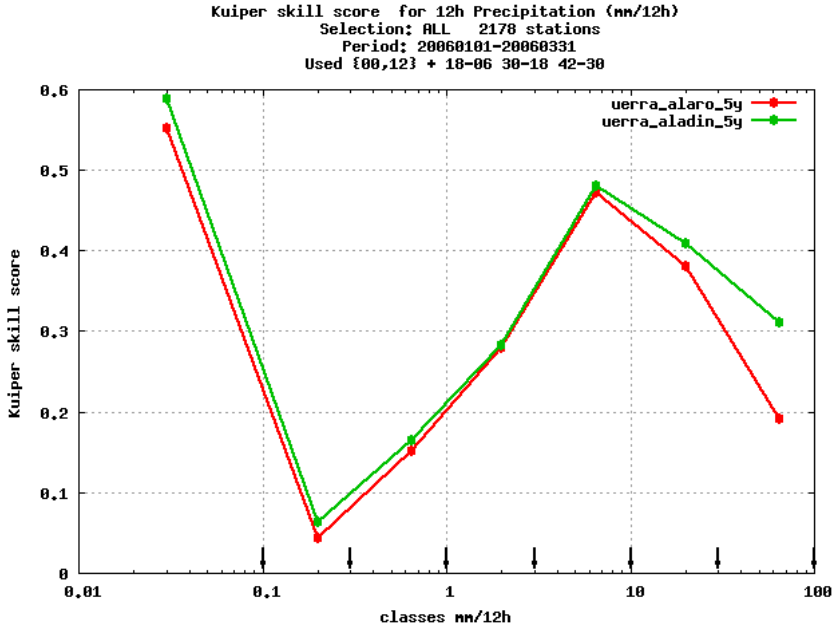
TD2M



Verification against observations for 1 jan – 31 mar 2006



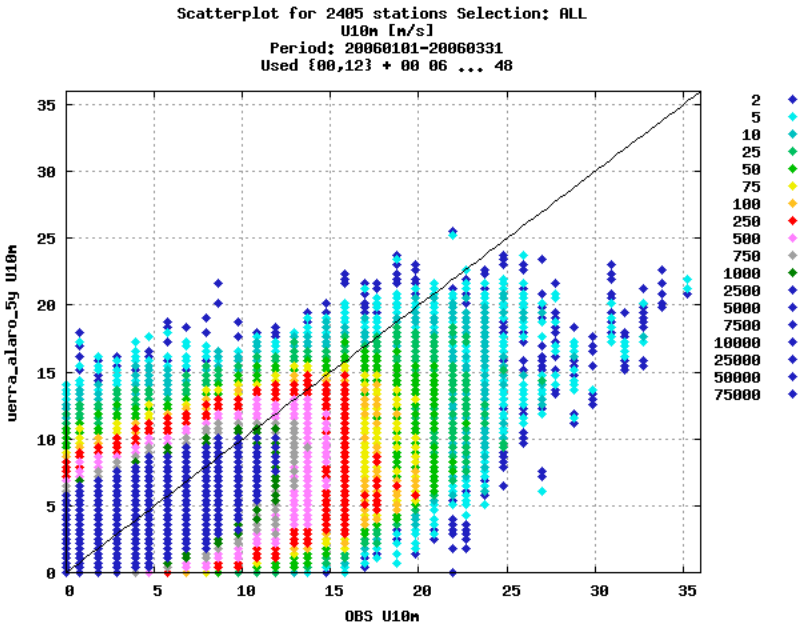
TCC



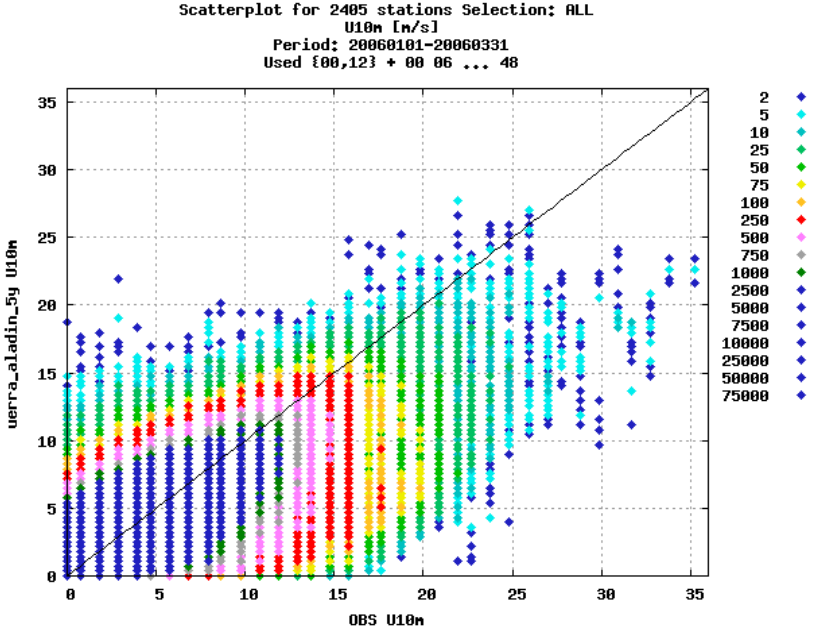
12H precip: Kuiper skill score

Verification against observations for 1 jan – 31 mar 2006

Scatterplots WS10M



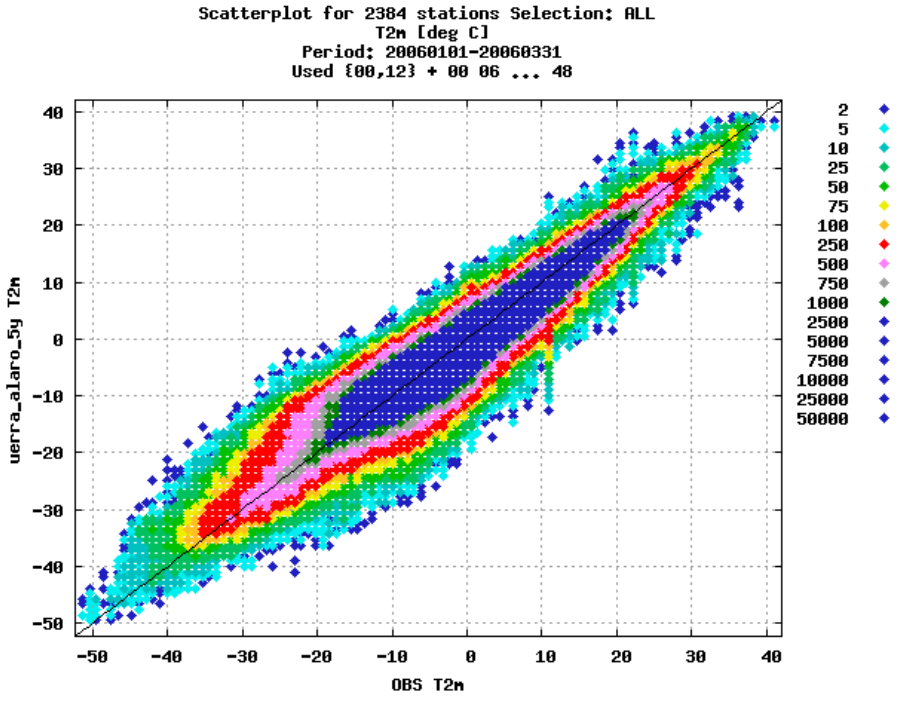
ALARO



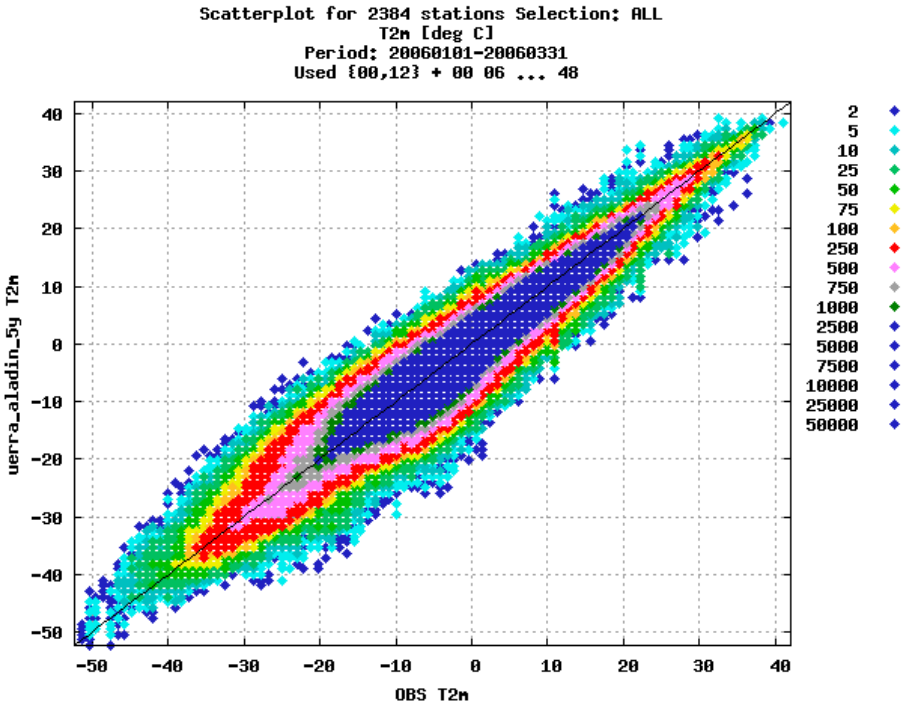
ALADIN

Verification against observations for 1 jan – 31 mar 2006

Scatterplots T2M



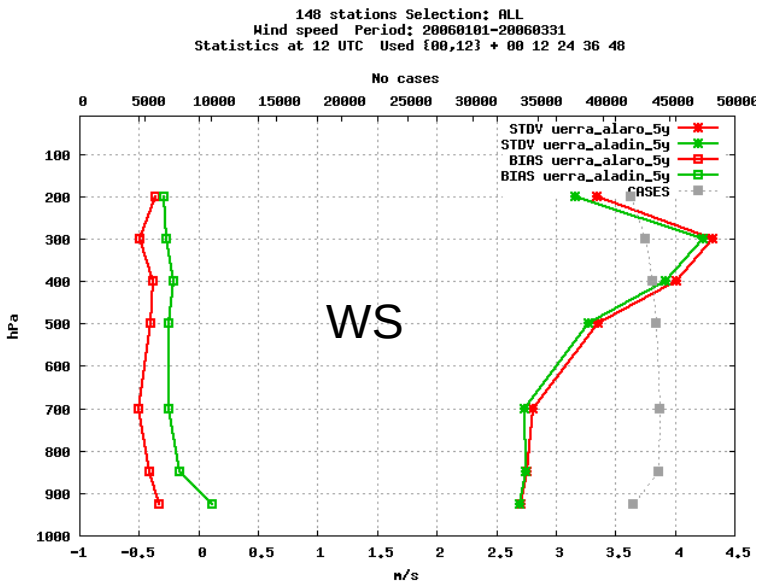
ALARO

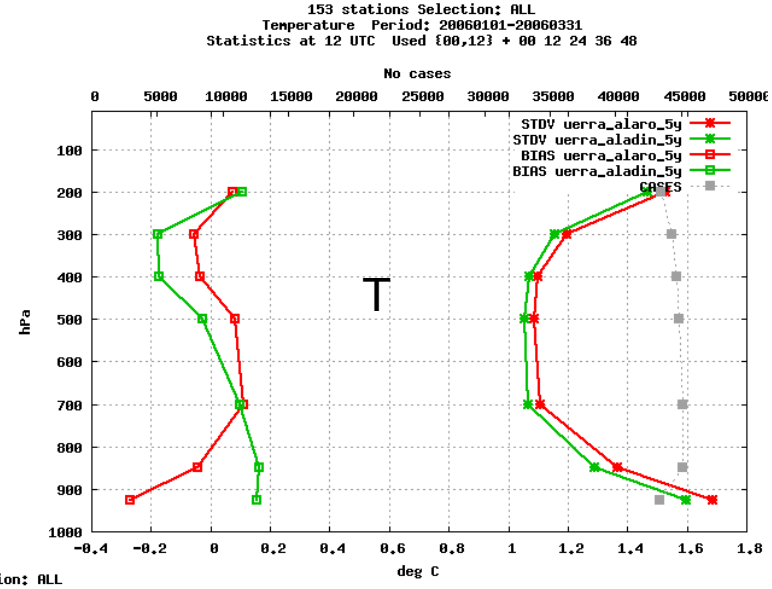


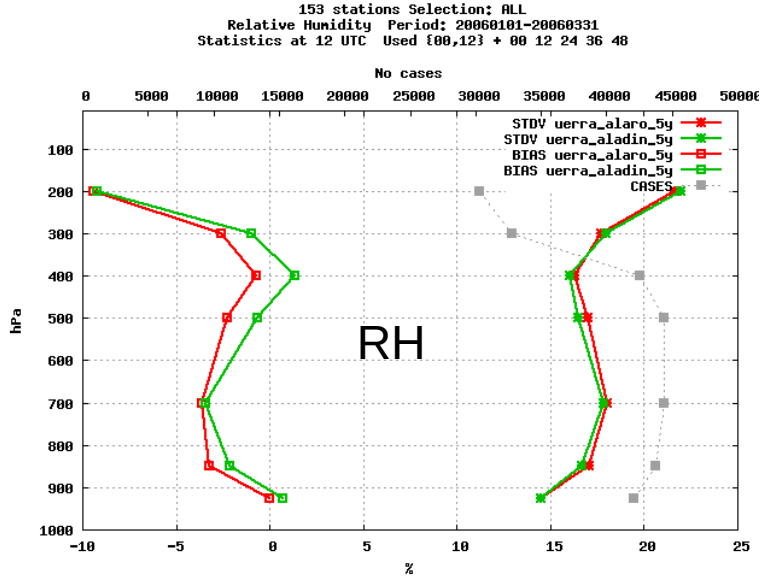
ALADIN

Verification against observations for 1 jan – 31 mar 2006

Profiles







Monthly mean bias 00UTC T2m, 24-hour forecasts, Jan 2006

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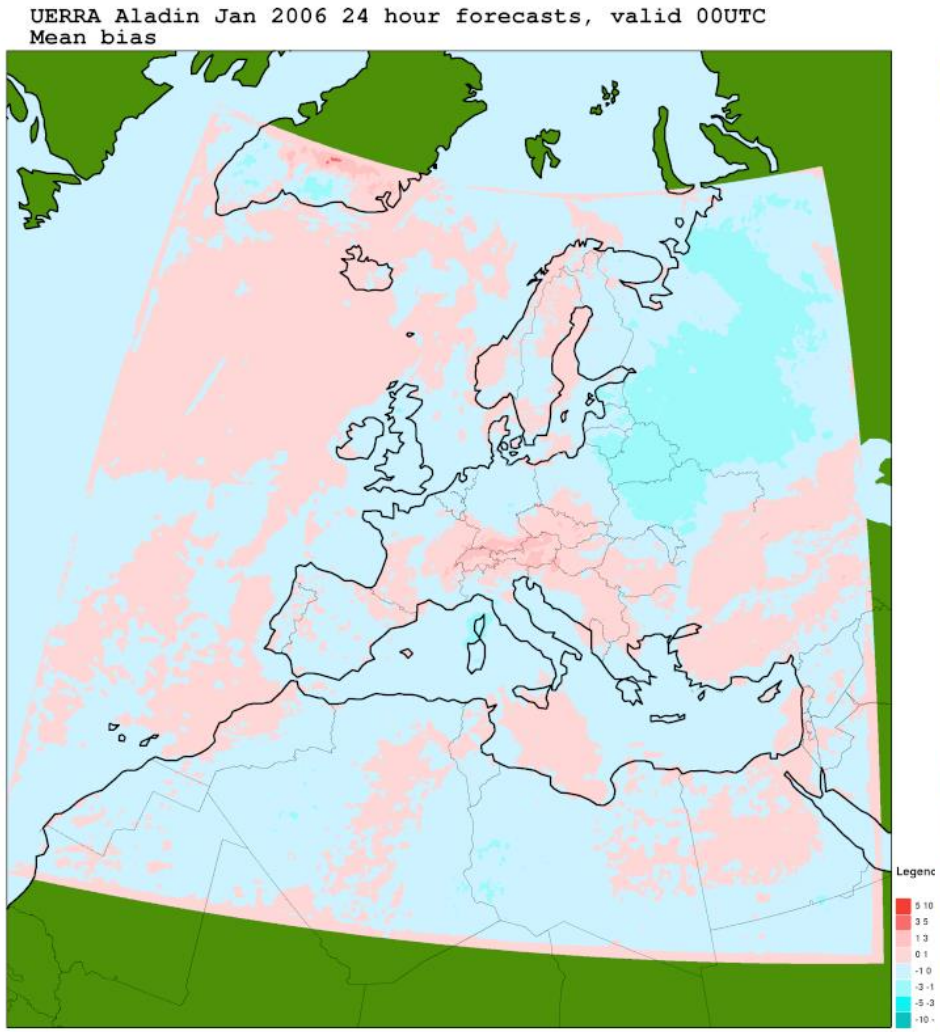

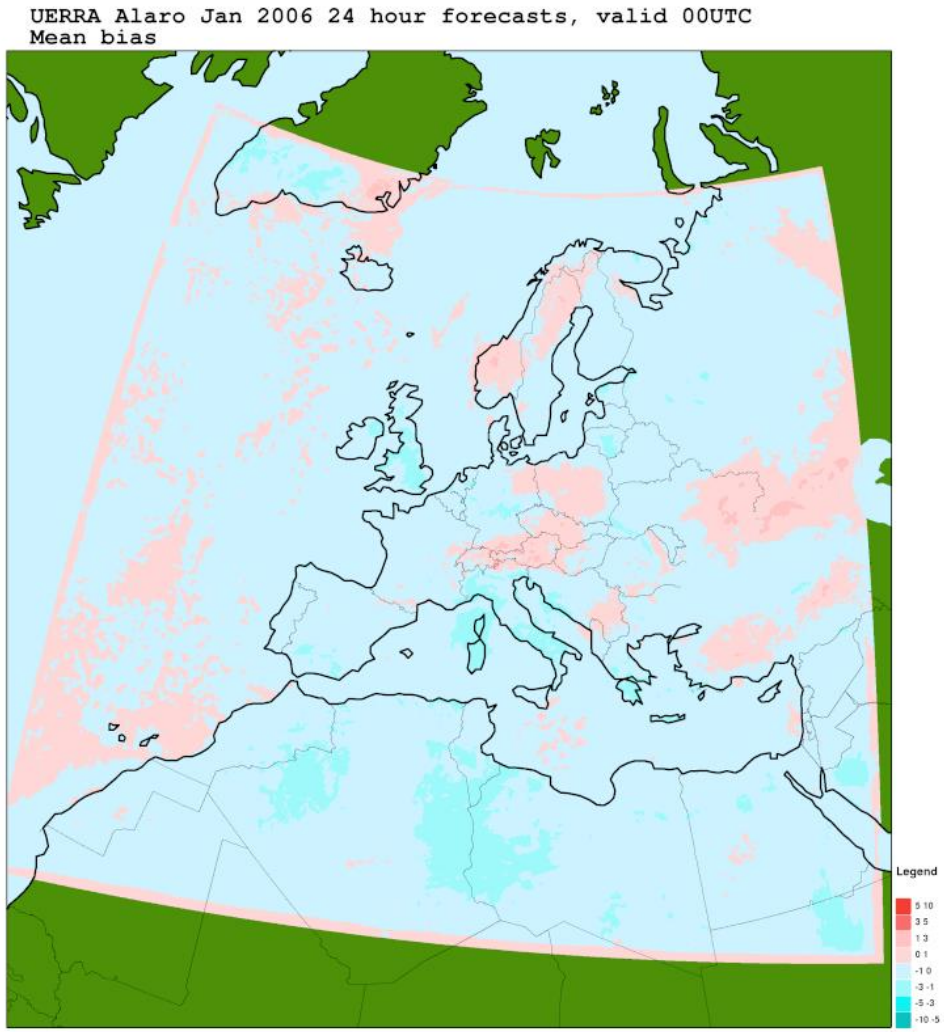

Monthly mean bias 12UTC T2m, 24-hour forecasts, Mar 2006

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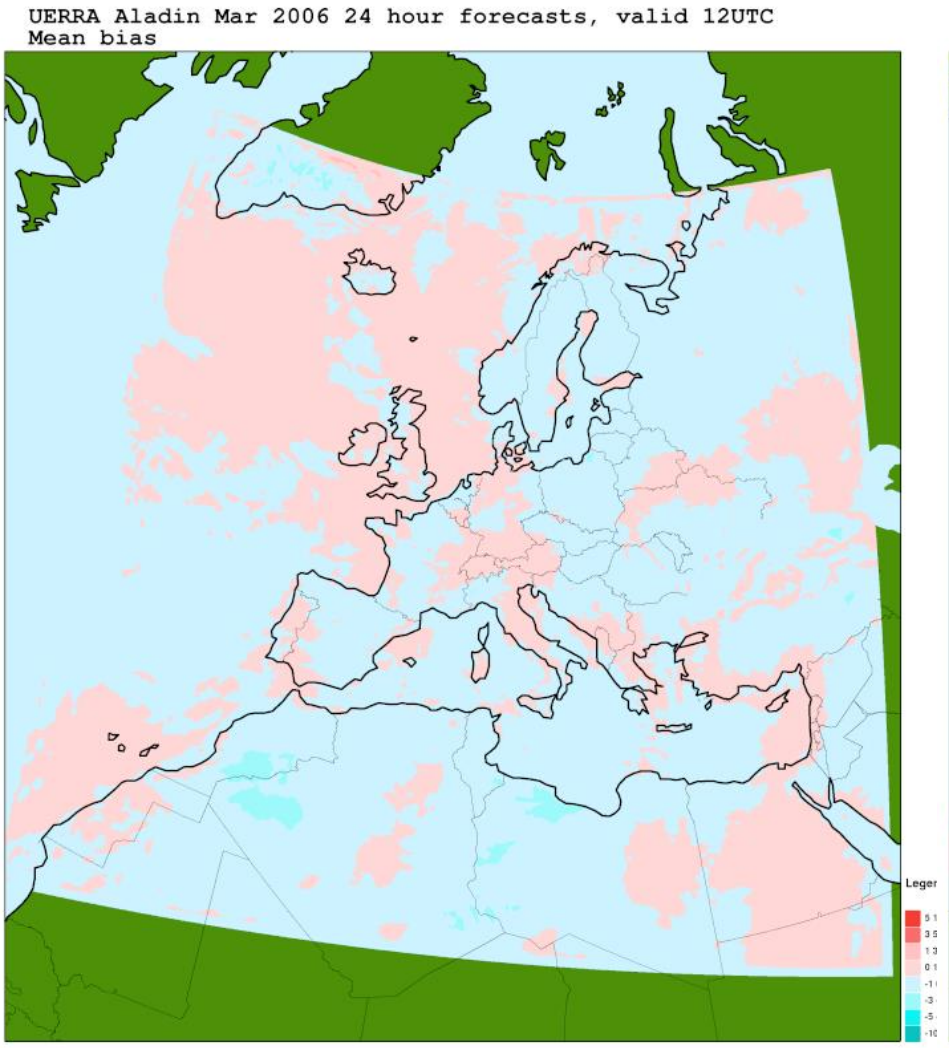
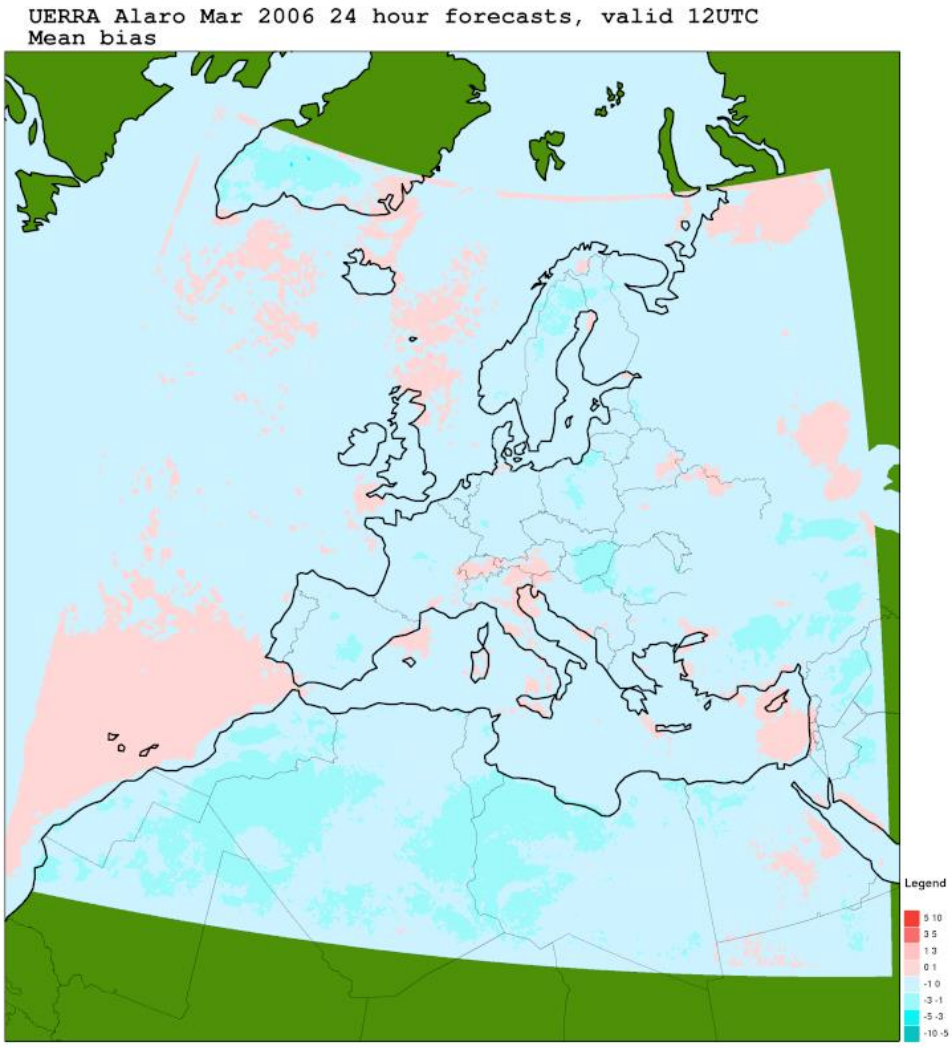
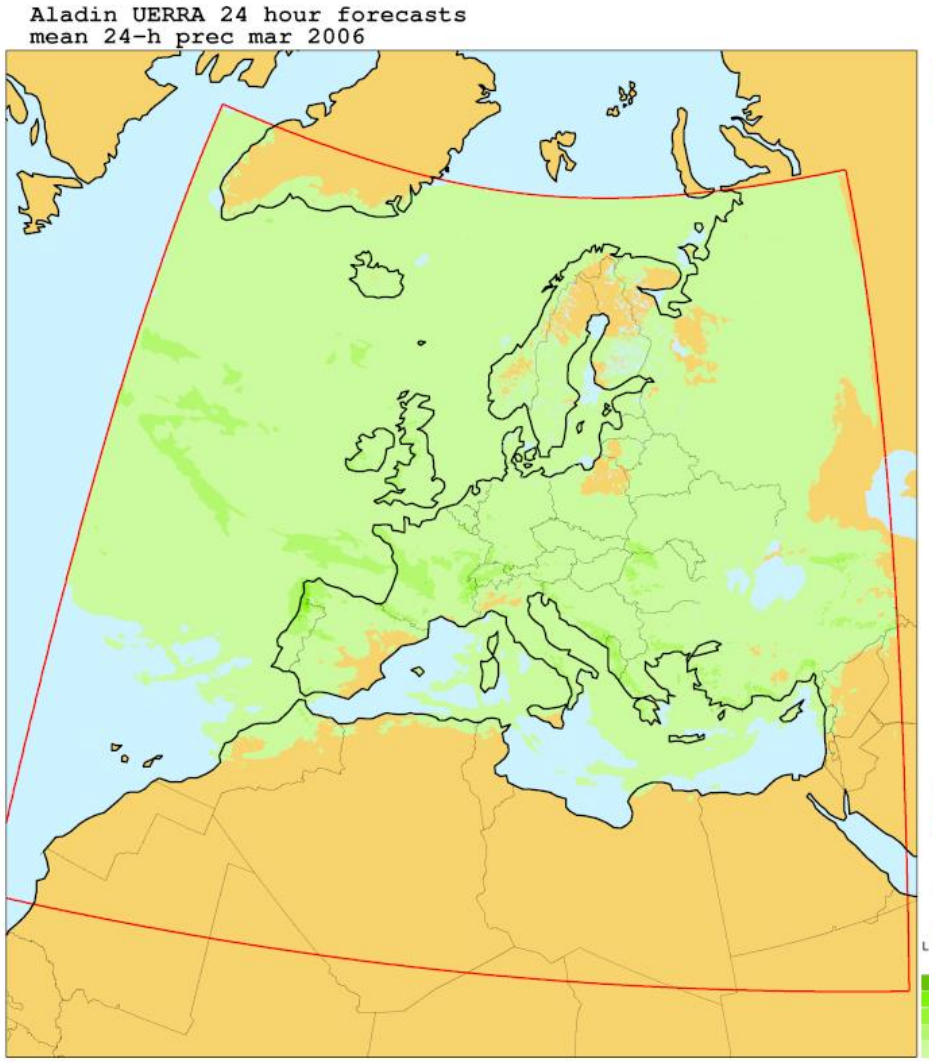
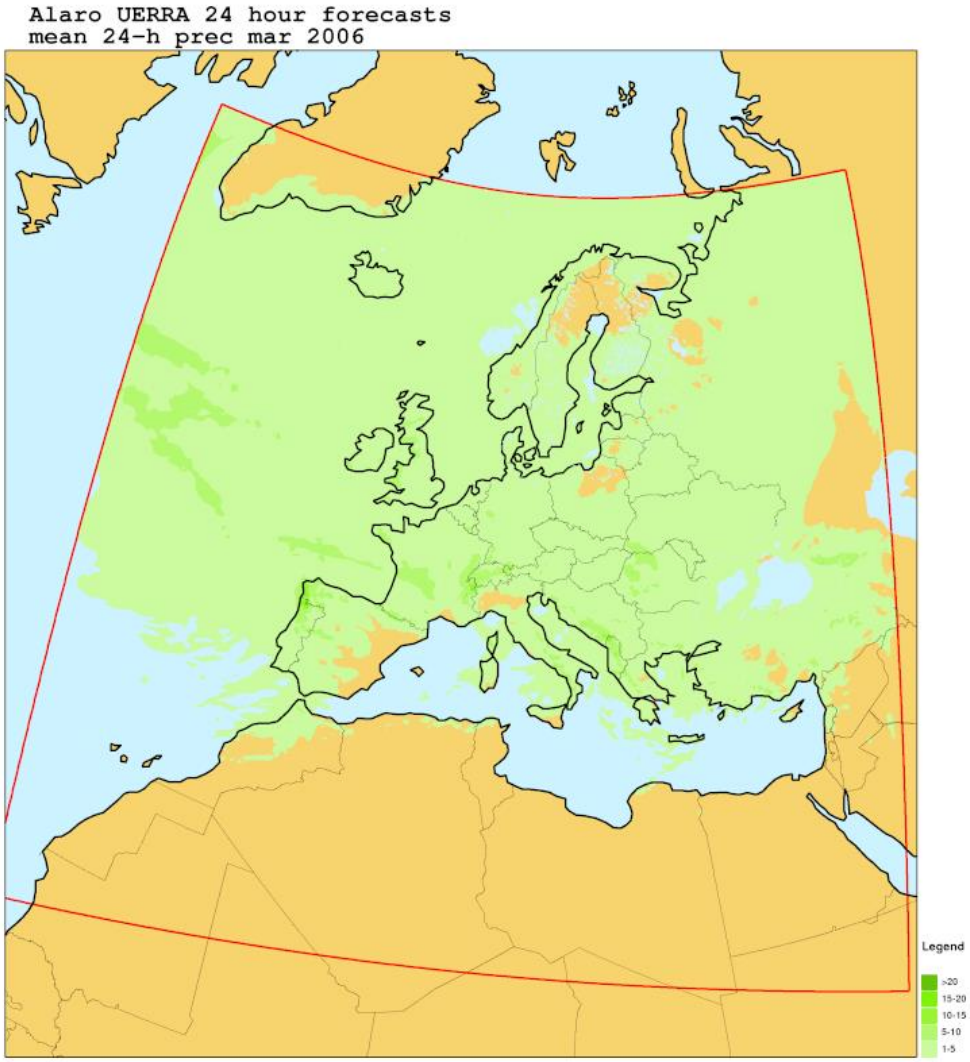




Mean 24-hour precipitation Mar 2006, starting 00UTC





Summary

- Running HARMONIE – Aladin and – Alaro for a five year (2006-2010) test period
- Results will be analyzed to decide what model to use for the 50 year RA
- So far (only 3 months), a small advantage for Aladin

Thank you

Any questions??