UERRA Regional reanalysis systems

Uncertainties in Ensembles of Regional ReAnalyses

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Grant Agreement 607193

FP7 SPACE 2013-1

Project Partners

Swedish Meteorological and Hydrological Institute (SMHI)

Météo France (MF)

Het Koninklijk Nederlands Meteorologisch Instituut (KNMI)

The Met Office (MO)

Climatic Research Unit, University of East Anglia (UEA)

Federal Office of Meteorology and Climatology (MeteoSwiss),

subordinated to Eidgenoessisches Departement des Innern (EDI)

University Rovira i Virgili (URV)

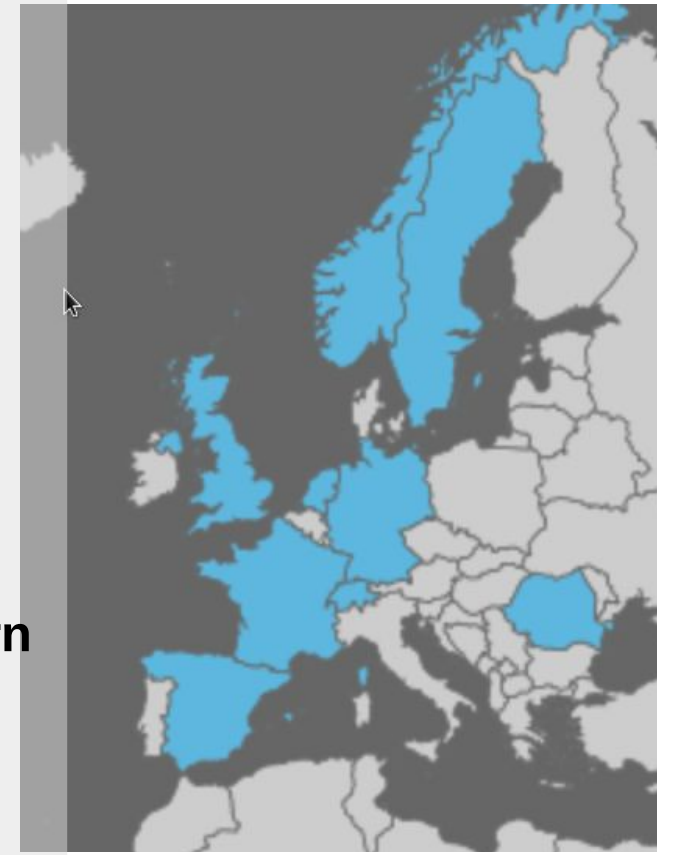
National Meteorological Administration (NMA-RO)

European Centre for Medium Range Weather Forecast (ECMWF)

German Meteorological Service - Deutscher Wetterdienst (DWD)

Norwegian Meteorological Institute (MI)

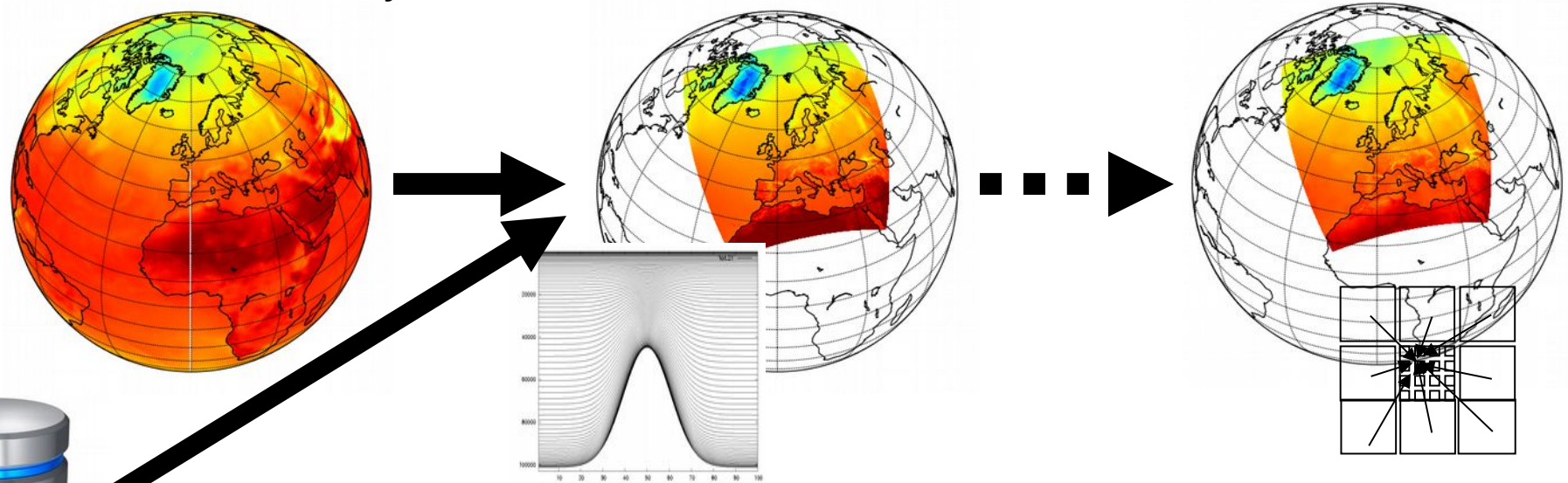
Meteorological Institute at the University of Bonn (UB)



2-dim downscaling & reanalysis

3-dim regional reanalysis

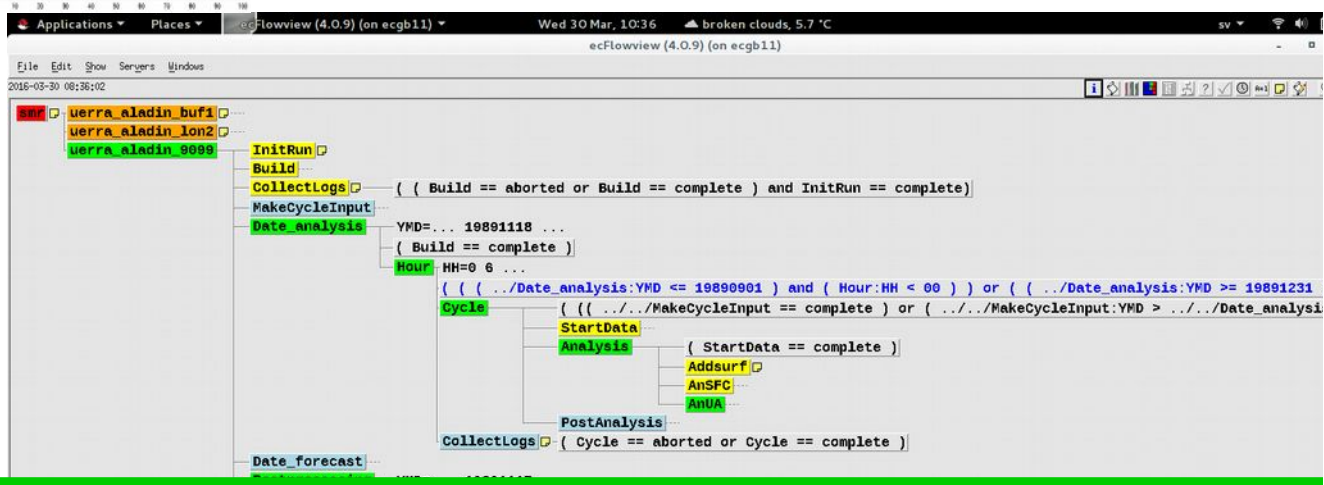
ERA-INTERIM reanalysis boundaries



OBSERVATIONS

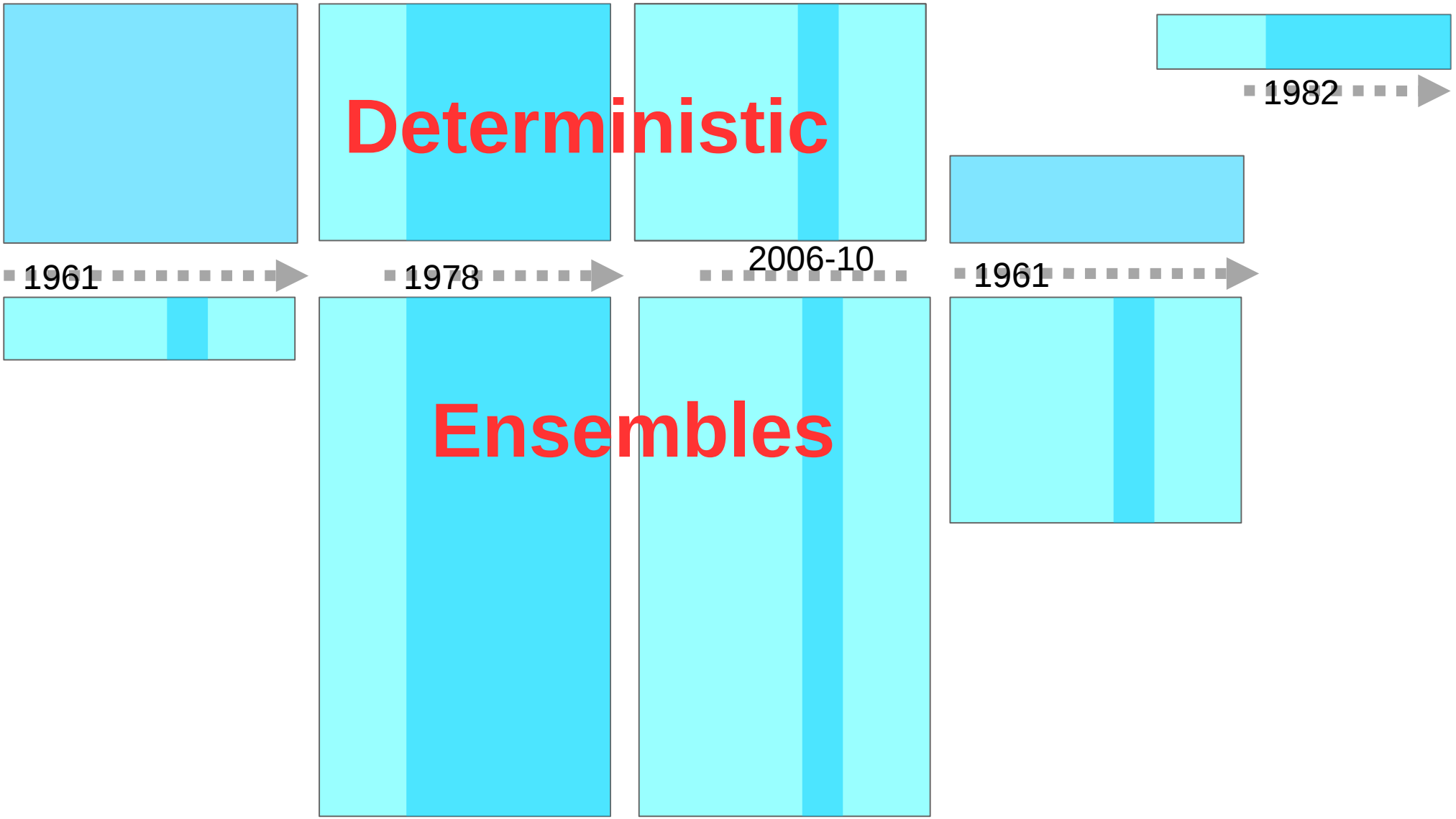
GLOBAL ANALYSIS

REGIONAL REANALYSIS



+ Regional reanalyses driven by global forcing and upper-air and surface observations using frozen systems
+ Multi-model and ensembles of reanalyses
+ Surface and upper-air parameters

European Area 11 | 5 km || Multi-model || 2, 6, 20 Ensembles || 55 | 35 | 30 | 5 y



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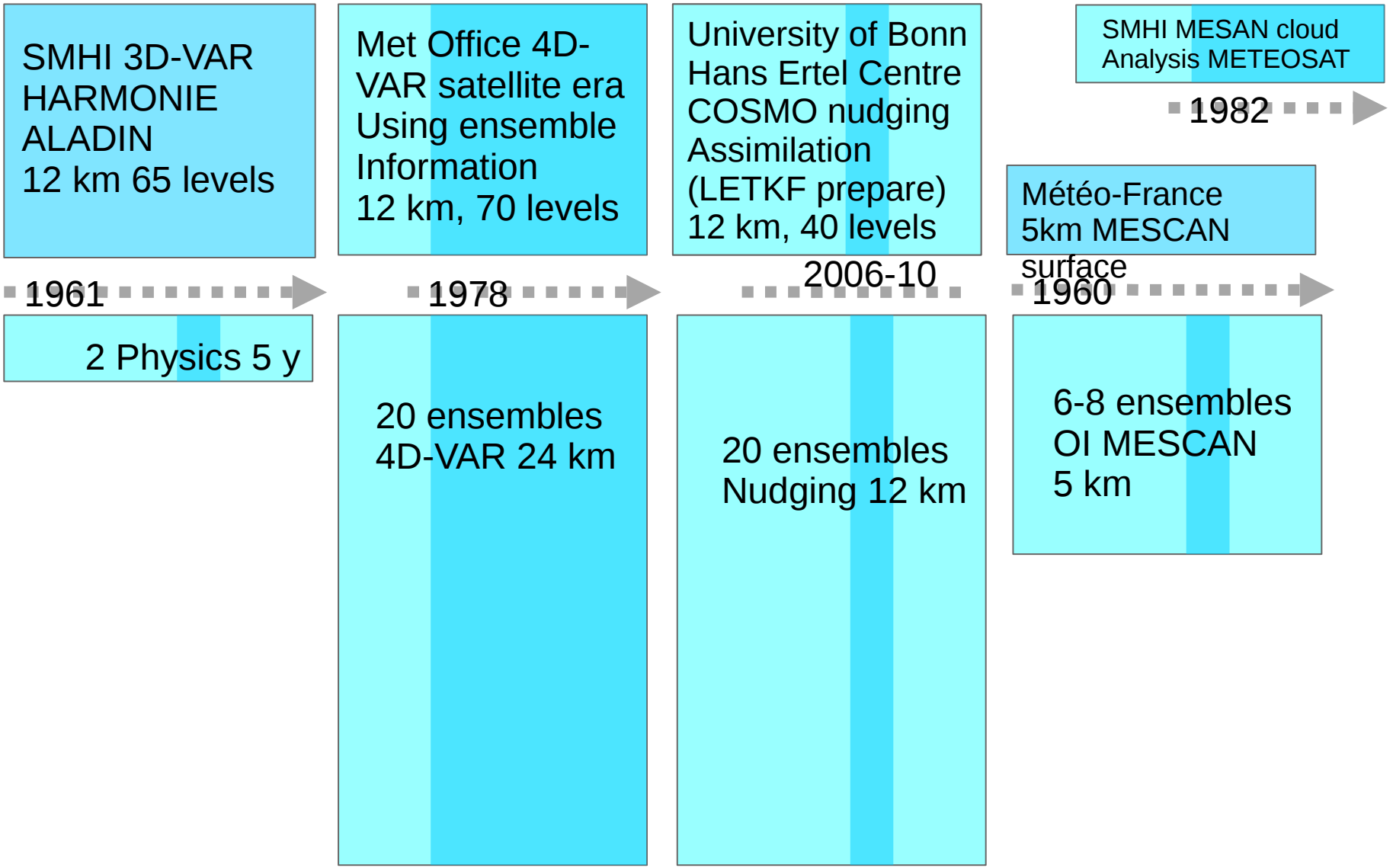
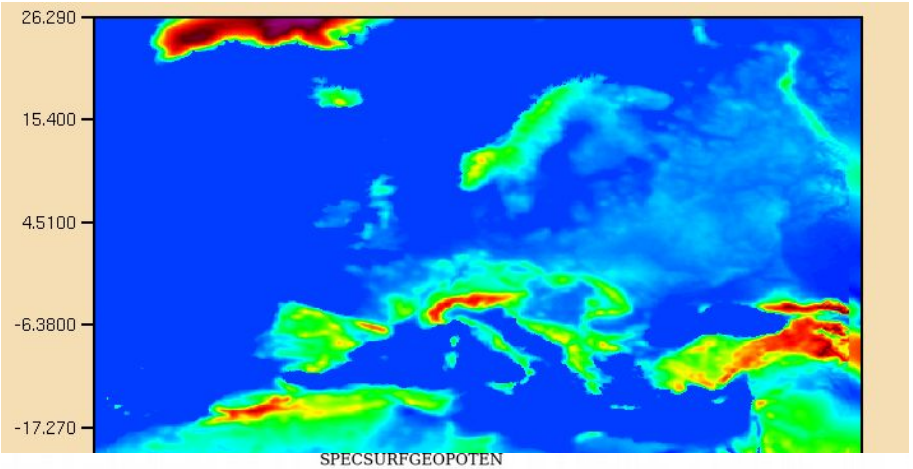
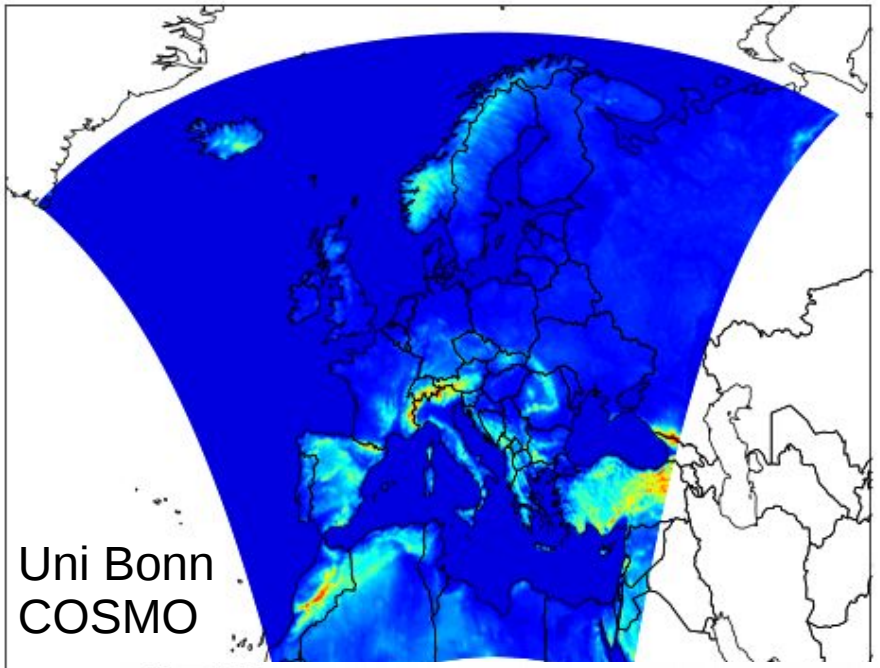


UERRA Domain & projections

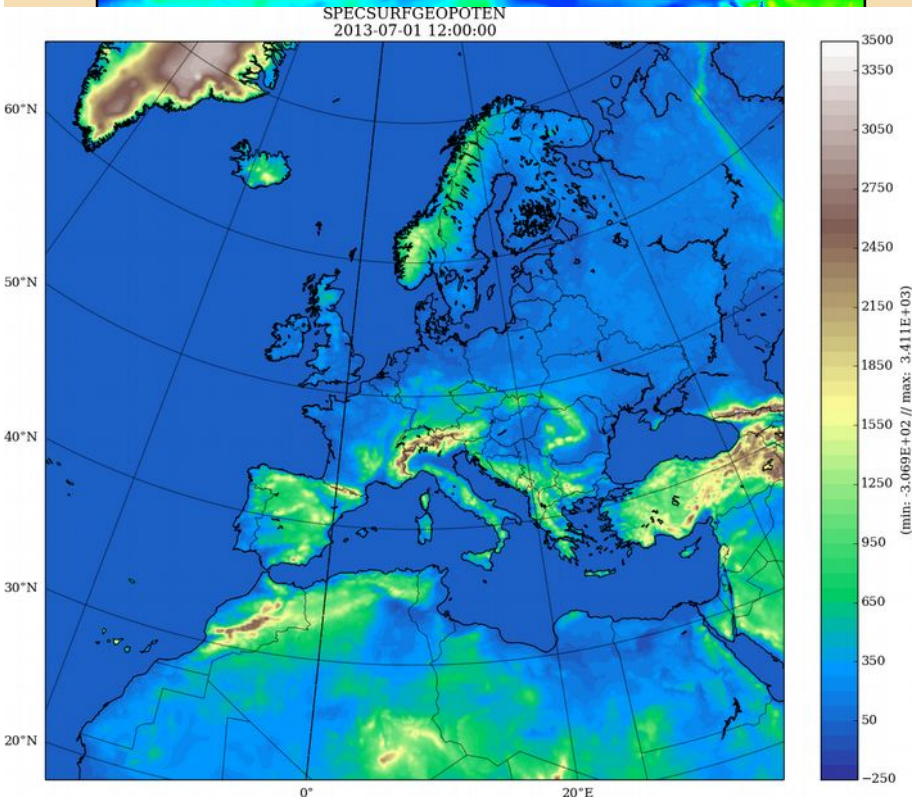
Met Office CORDEX EU 11 km



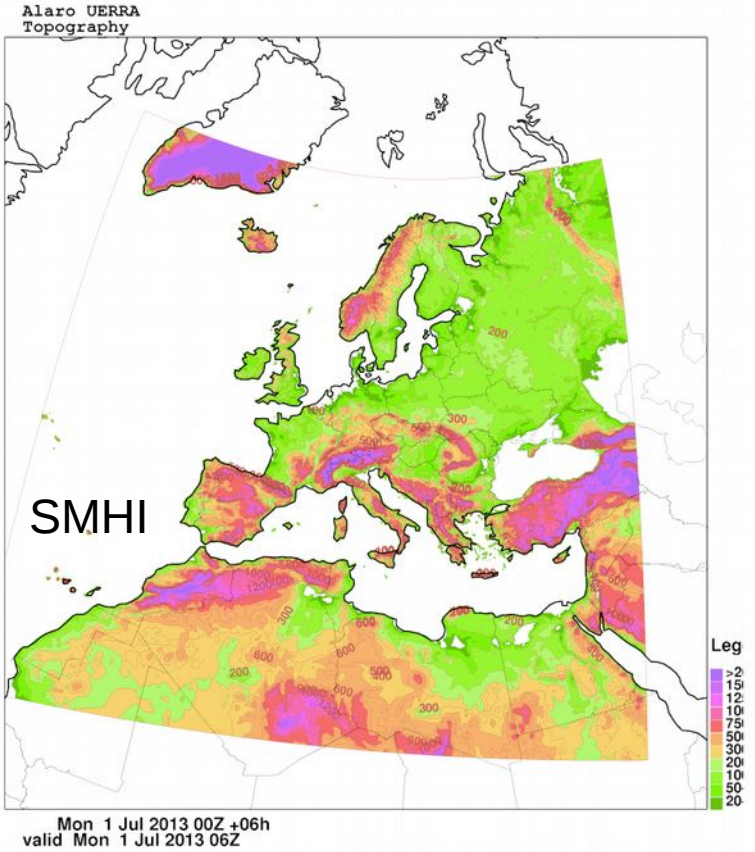
Uni Bonn COSMO



MF

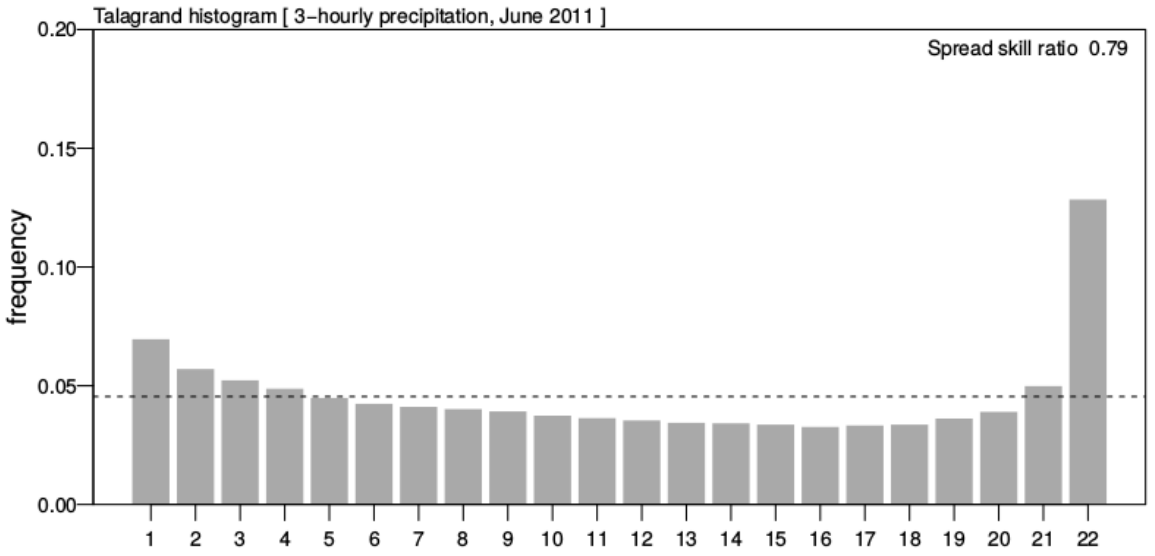


SMHI

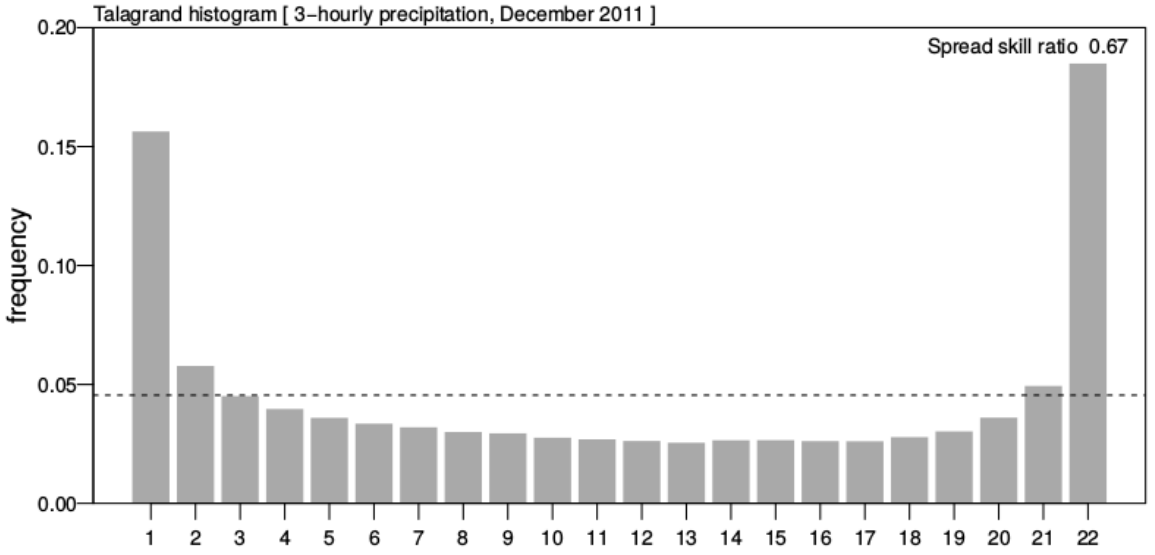


Analysis rank histogram - validating ensemble quality

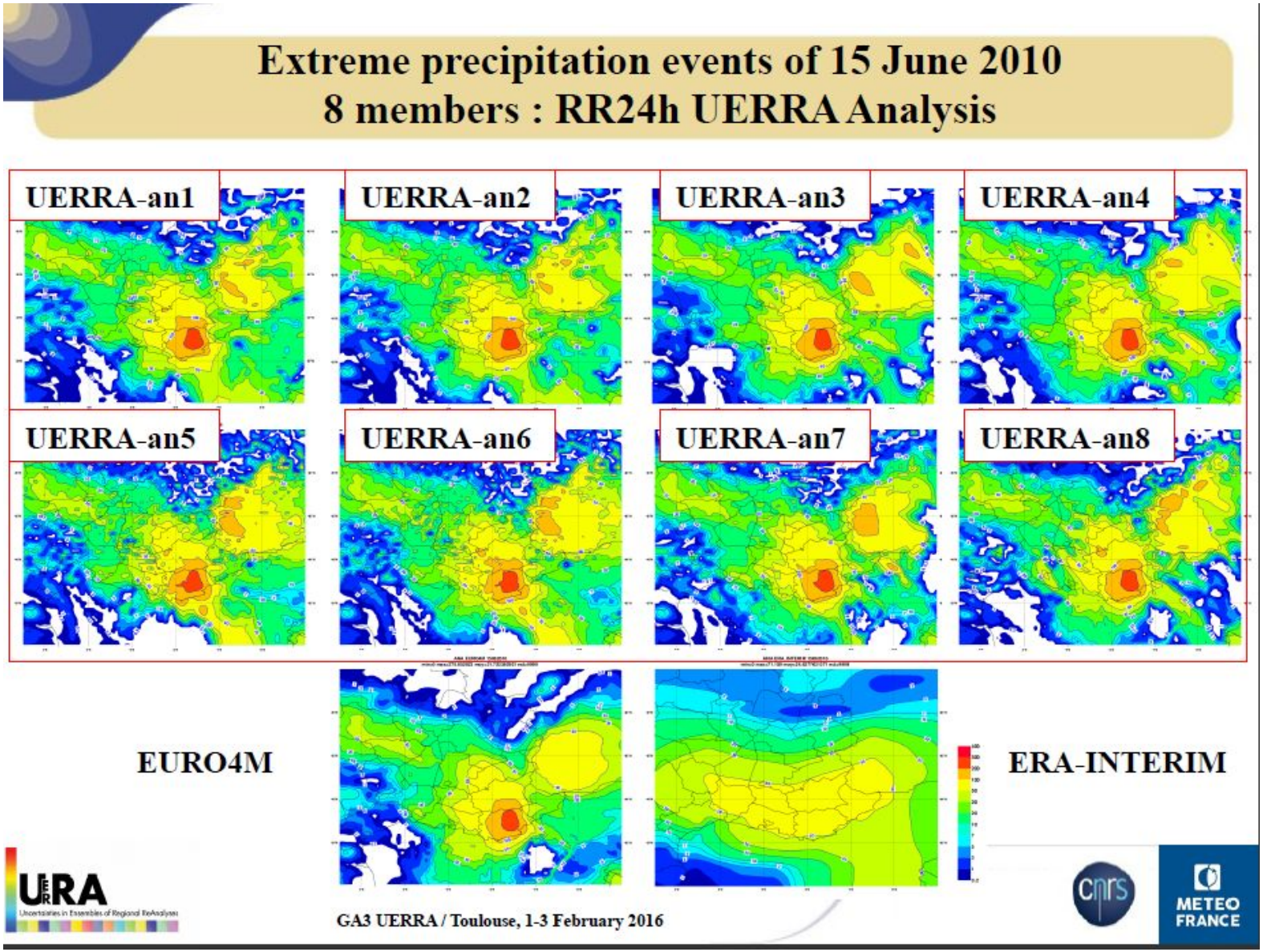
June



December



Ensemble members due to different model backgrounds

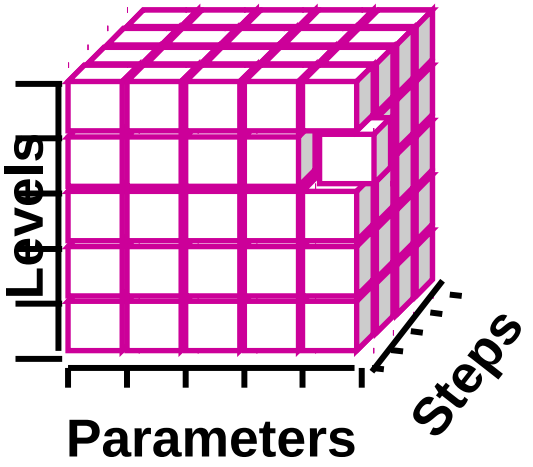


2-D surface fields analyses driven by 3D reanalyses

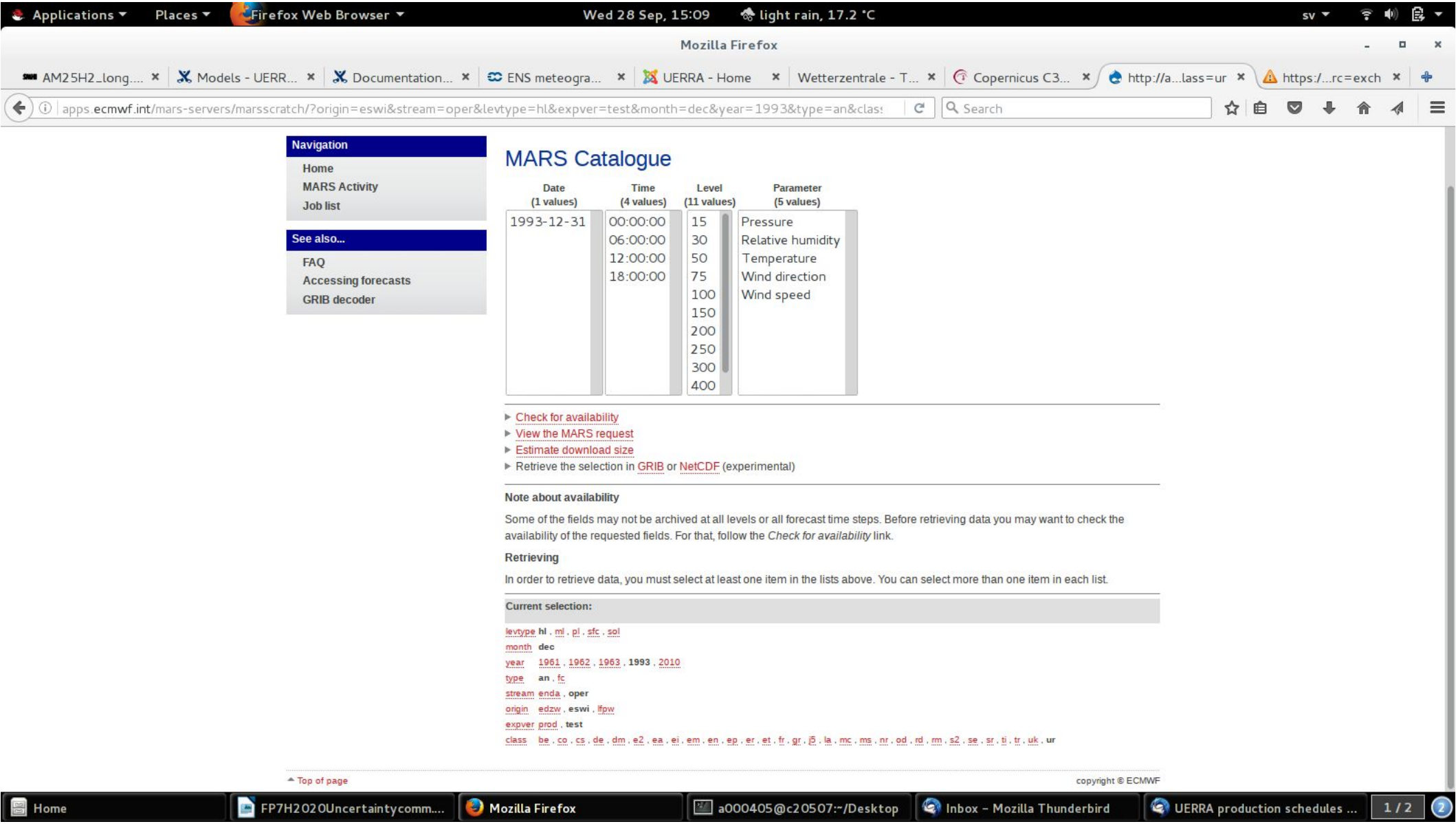
MF/SMHI MESCAN	SMHI MESAN	SMHI HYPE	MF SURFEX and TRIP
2D advanced Statistical Interpolation	2D advanced Statistical interpolation	Hydrological physical model	Surface flux model Hydrological physical model
Downscaled ALADIN model background	Downscaled 3D HIRLAM model Climatological adaptation background	ERA, EURO4M and UERRA reanalyses Precipitation and temperature forcing	MESCAN atmospheric variables and precipitation
Surface and climate stations T, Td, precipitation	AVHRR, METEOSAT SEVIRI and MVIRI	No input observations Validation against discharge data	No input observations Validation against discharge data
5 km Europe T2m, RH, 24 h precipitation	5 km Europe Cloud fraction hourly	River discharge 35000 catchments Europe, median 215 km^2	River discharge 25 km -> rivers
1961 - ~2016	~1982 - 2013	~1979 - 2010	~1981 - 2010

ARCHIVING IN MARS
Data Services

+ *The common UERRA archive is MARS at ECMWF*
  Common set of parameters chosen for all models
  GRIB2 (some new definitions)
+ *Data services from MARS and ESGF interface*
+ *Web Map Servers*
+ *Visualisation through Metview and WMS*

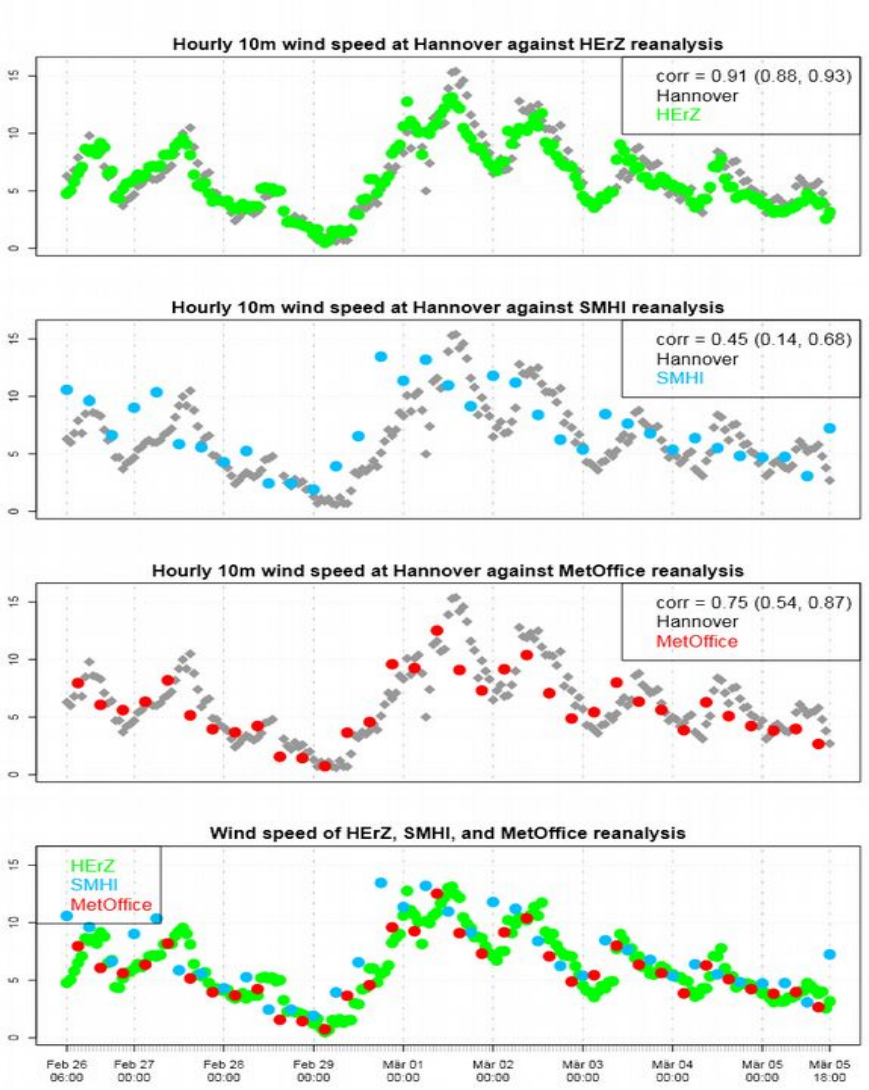


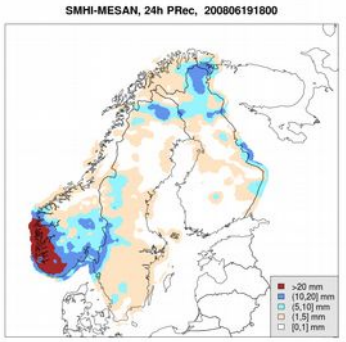
Mars contents

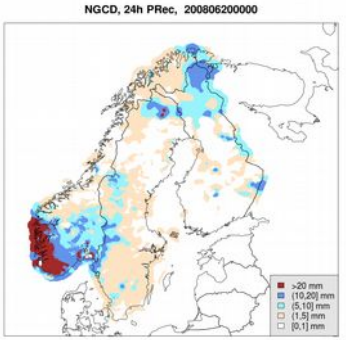


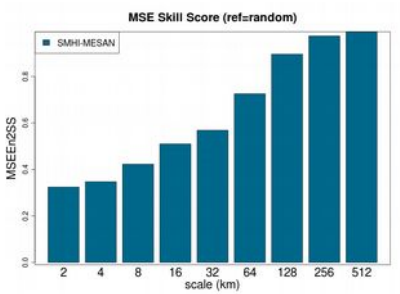
Evaluation

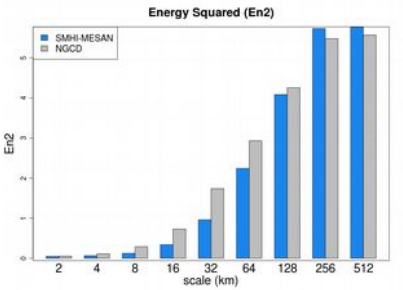
Nordic Gridded Climate Dataset as one reference











Evaluation R-library for spatial verification PDF based

UERRA user workshop

- Participants presented their applications and requirements
- About 50% had some experience with re-analyses data
- The list of UERRA data products seems fairly complete
- Time and spatial resolution requested for was very variable; some cannot be provided by UERRA
- Most users were not familiar with ‘Feedback’ information provided by the re-analyses systems,
- Easy access to re-analyses data is the most important requirement
- Evaluation tools and visualization tools are of interest to a significant number of users

Link to agenda, presentations and full workshop report: http://www.uerra.eu

Timeline

2015 – SMHI HARMONIE 2006-2010 2 physics

2016 – HARMONIE another 25 years now –> 1961 – 2015

- Météo-France MESCAN -> 5 + 25 years
- SMHI MESAN cloud analysis 25 years
- Met Office UM 4D-VAREnsemble 4D-VARs 20-30 years
- Uni Bonn COSMO Ensemble 5 years

2017 – HARMONIE complete

- MESCAN - > 1961 -2015
- UM Ensemble 4DVAR -> 1978-2015 years

Operational

2015 – SMHI HARMONIE Regional reanalysis

2016 – Uni Bonn COSMO Nudging reanalysis

- Uni Bonn Cosmo Nudging Ensemble reanalysis
- Météo-France MESCAN near surface reanalysis
- Met Office UM 4D-VAR Deterministic reanalysis
- Met Office UM 4D-VAR Ensemble of 4D-VARs

2016-11-23/24 – Showcase Event at ECMWF

Research and to be proven

2016 – Archiving and data services

- Uncertainty evaluation and user oriented uncertainties, user evaluation and feedback
- Refinements in surface, biosphere and cryosphere climate evolution or interactive feedbacks – more modelling
- Always more observations from data records, affected by restrictive national data polices
- Reprocessed satellite data and quality control of conventional and remote sensing data

2017-2018 - User products

End

Showcase Workshop afternoon 23/11 -24/11
ECMWF, Shinfield Park, Reading

Read more on www.uerra.eu

www.uerra.eu