Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Home Affairs FDHA
Federal Office of Meteorology and Climatology MeteoSwiss

Postprocessing

Local or global activity? Coocking recepies or science?

Pierre Eckert
MeteoSwiss, Geneva

Postprocessing (usual)

- Models suffer from various (systematic) errors.
- End users may use parameters which are not directly included in the models (fog, electric power,…)
- A zoo of methods (MOS, Kalman filter, neural networks,…) connecting past forecasts with past observations have been developed.
- Results are distributed to the forecasters and end users
- Usually are applied on models of scale > 5 km
- Can be applied on EPS (not totally straightforward)
- Relatively cheap
- May cover strategic fields: aviation, energy
- Private services very active in this field

Postprocessing (usual)

- Most postprocessings are of national interest or are subject to intellectual property restrictions
- = *local, no science (not in science plan)*
- Exchange or development of methods at consortium level is (at least) difficult
- Bilateral exchange should however be promoted, eventually by maintaining a database of applications
- Strategic fields can be taken into account in larger collaborations (SESAR, …)

Postprocessing (new)

- As seen this week following tendencies can be observed in the modelling community:
  - ~1 km deterministic
  - ~2 km ensemble
  - Use basic quantities rather than end of chain values (CAPE rather than precipitation in convective situations)

As an illustration, let's go out for a short excursion in the Russian, Swiss and German mountains.

COSMO-Ru model's areas

COSMO-Ru7

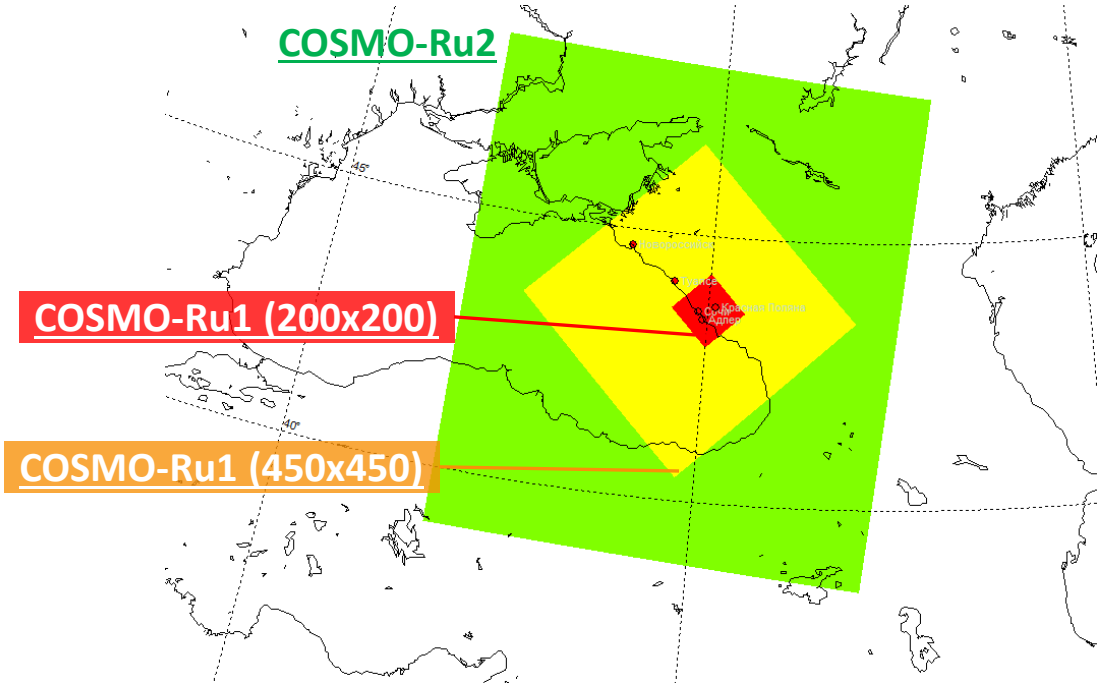
Domain: 4900 km x 4340 km
Grid: 700 x 620 x 40
Space step: 7 km
Time step: 40 s
Forecast: 78 h

COSMO-Ru2

Domain: 900 km x 1000 km
Grid: 420 x 470 x 50
Space step: 2.2 km
Time step: 20 s
Forecast: 48 h

COSMO-Ru1

Domain: 110 km x 110 km
Grid: 100 x 100 x 50
Space step: 1.1 km
Time step: 10 s
Forecast: 24 h



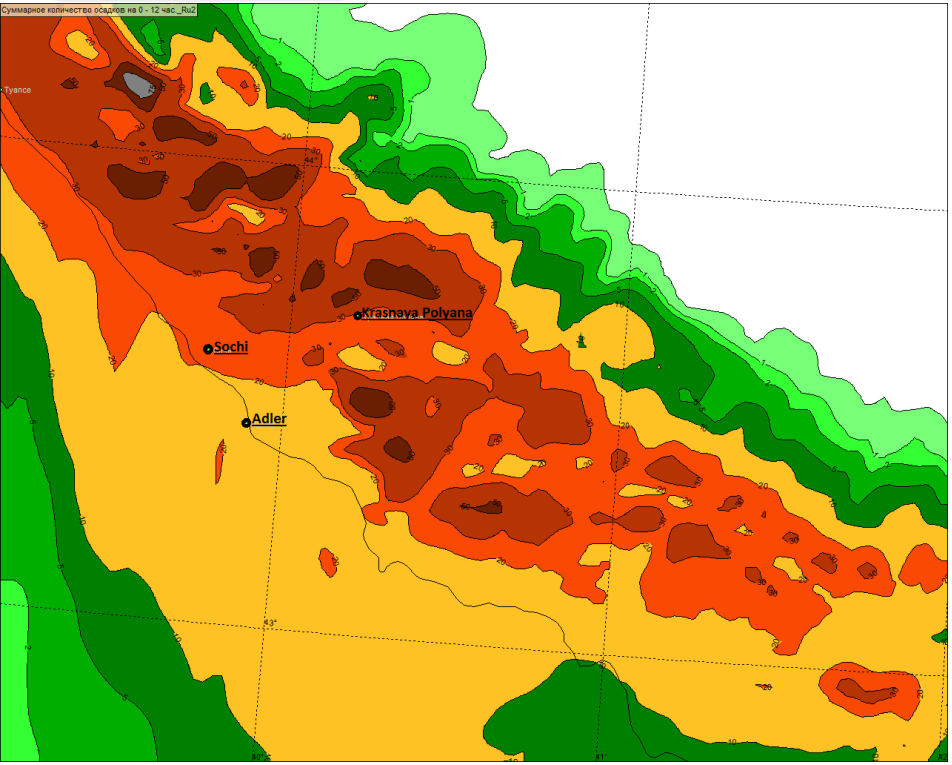
Domain: 220 km x 220 km
Grid: 200 x 200 x 50
Space step: 1.1 km
Time step: 10 s
Forecast: 24 h

Domain: **495 km x 495 km**
Grid: 450 x 450 x 50
Space step: 1.1 km
Time step: 10 s
Forecast: 24 h

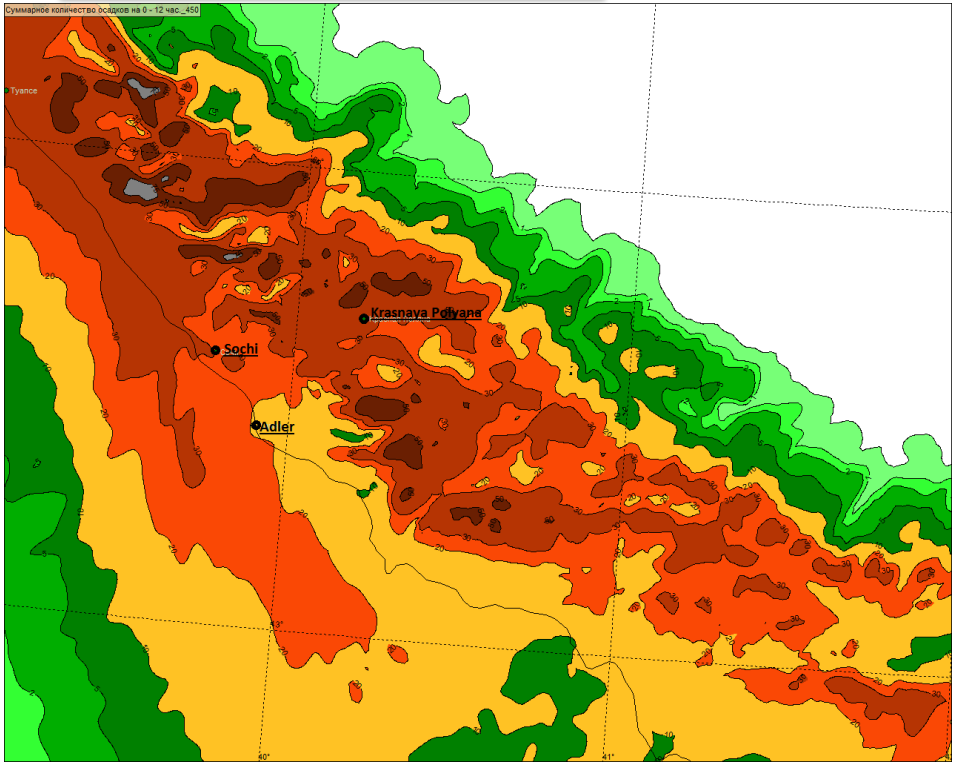
Case study: Heavy precipitation on 13.01.2013

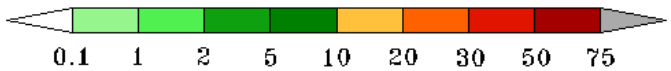
Forecast of the 12 hour precipitation sum (mm) from 13.01.2013, 00 UTC.

COSMO-Ru2



COSMO-Ru1 (450 x 450)

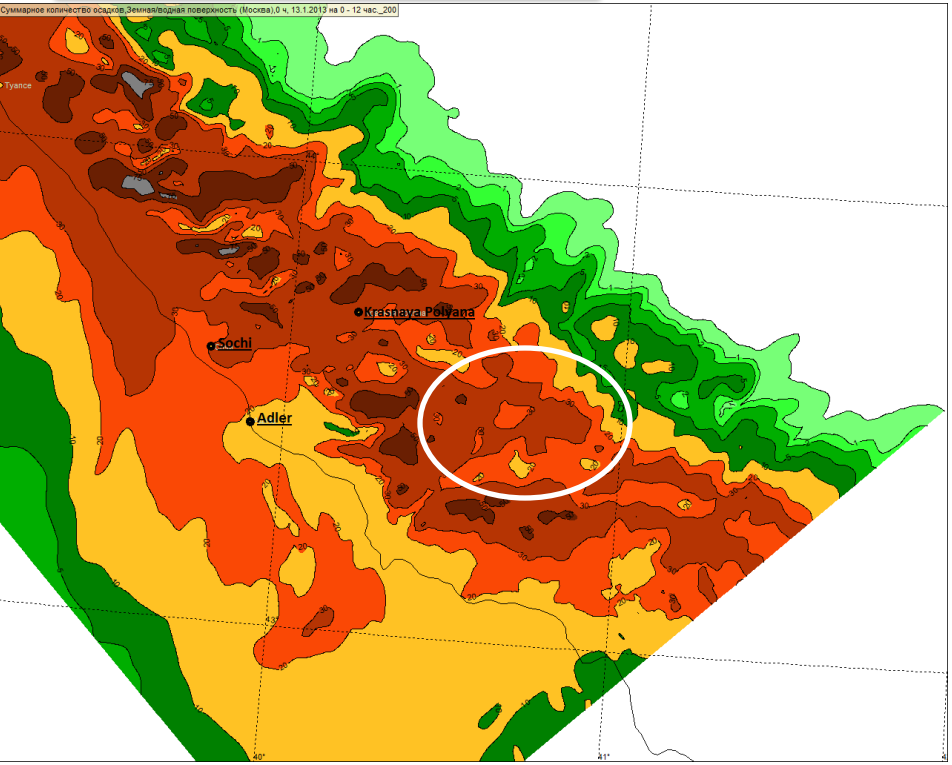




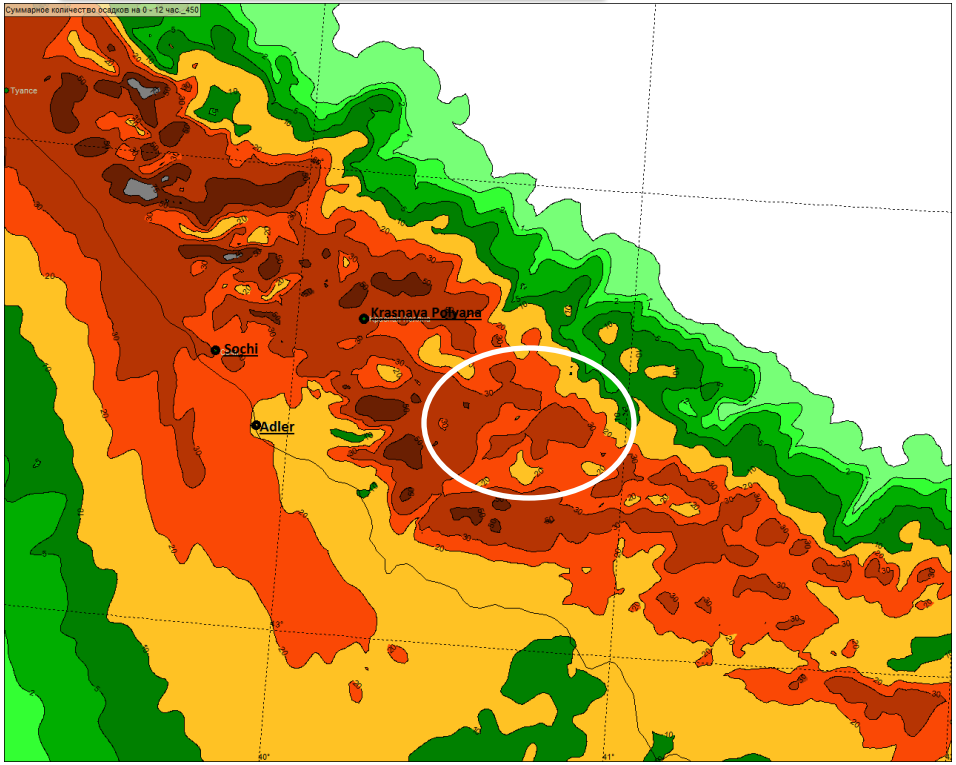
Case study: Heavy precipitation on 13.01.2013

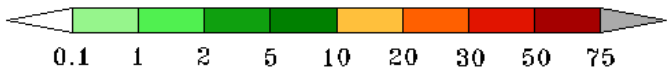
Forecast of the 12 hour precipitation sum (mm) from 13.01.2013, 00 UTC.

COSMO-Ru1 (200 x 200)



COSMO-Ru1 (450 x 450)

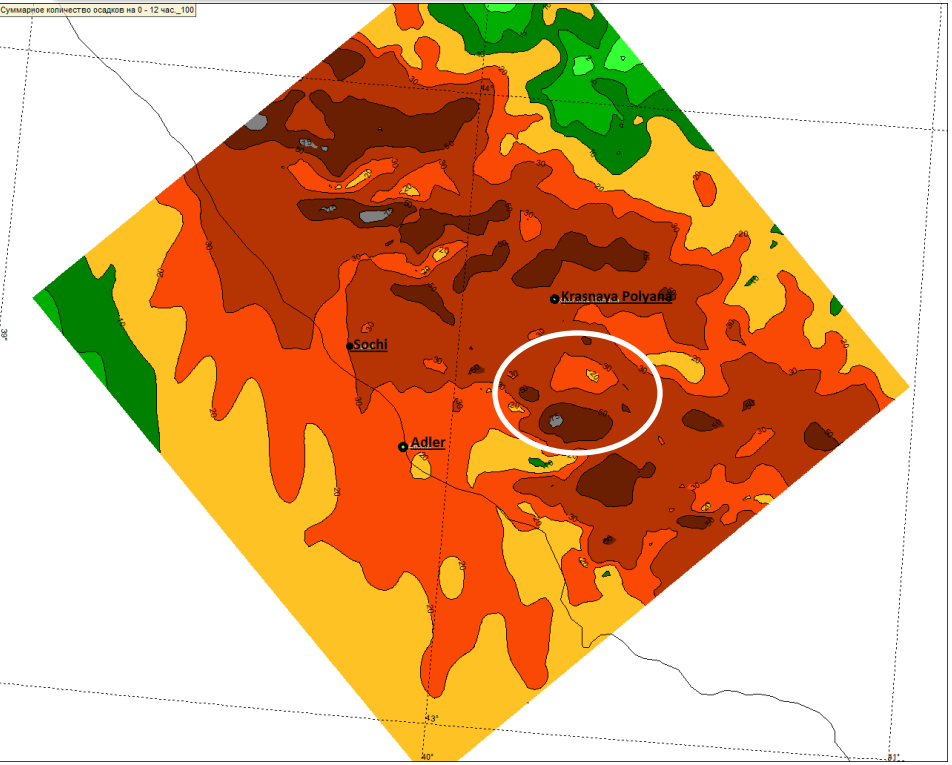




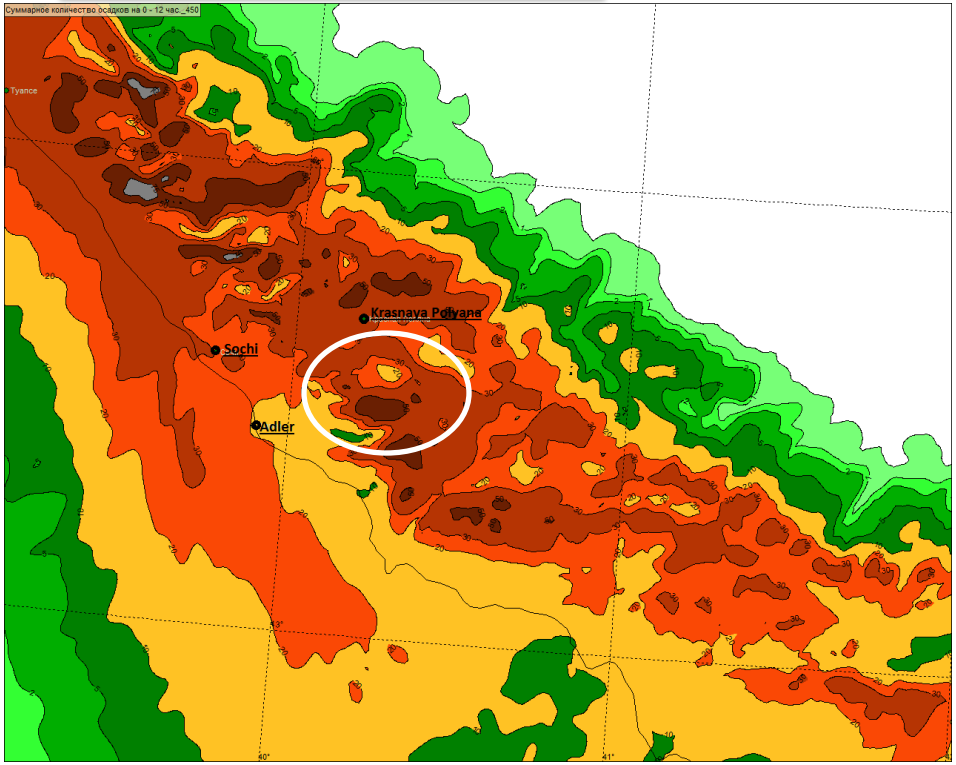
Case study: Heavy precipitation on 13.01.2013

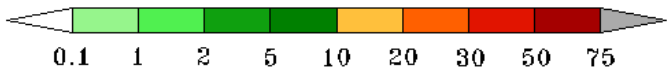
Forecast of the 12 hour precipitation sum (mm) from 13.01.2013, 00 UTC.

COSMO-Ru1 (100 x 100)

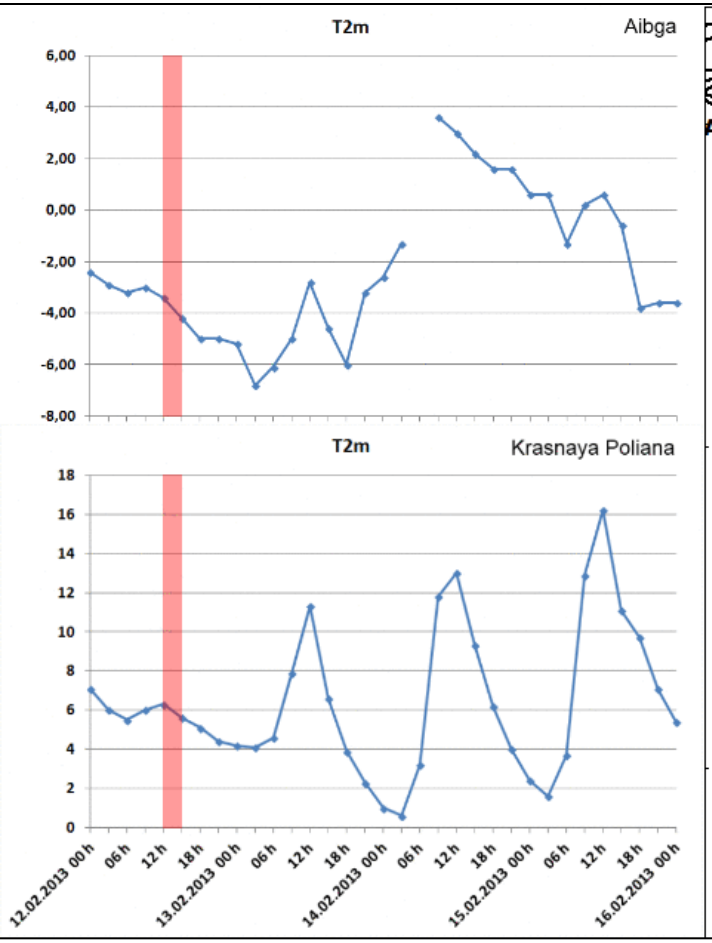


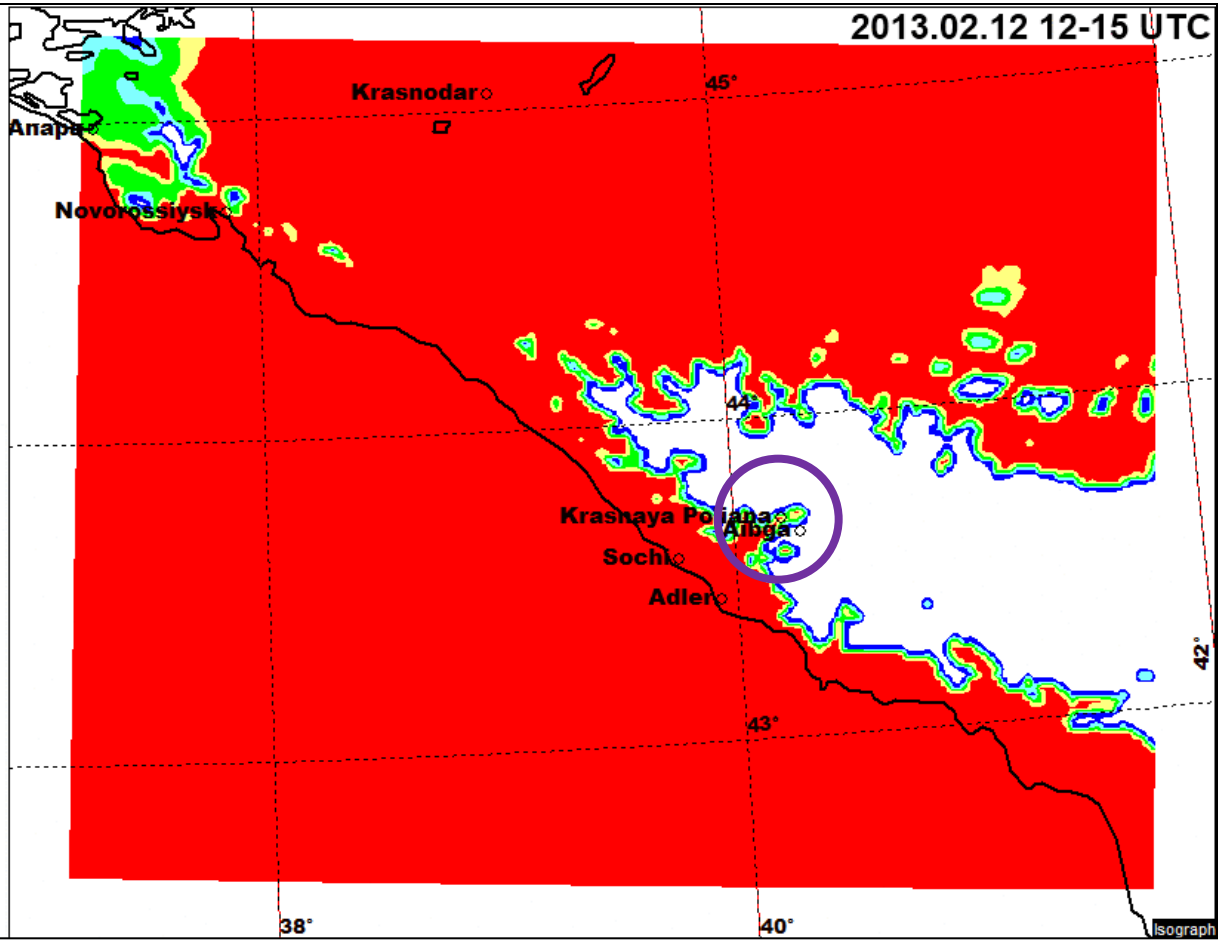
COSMO-Ru1 (450 x 450)

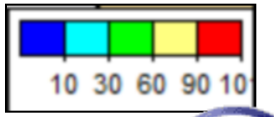




COSMO-RU2-EPS:
probability of T2M_MAX exceeding 5°C



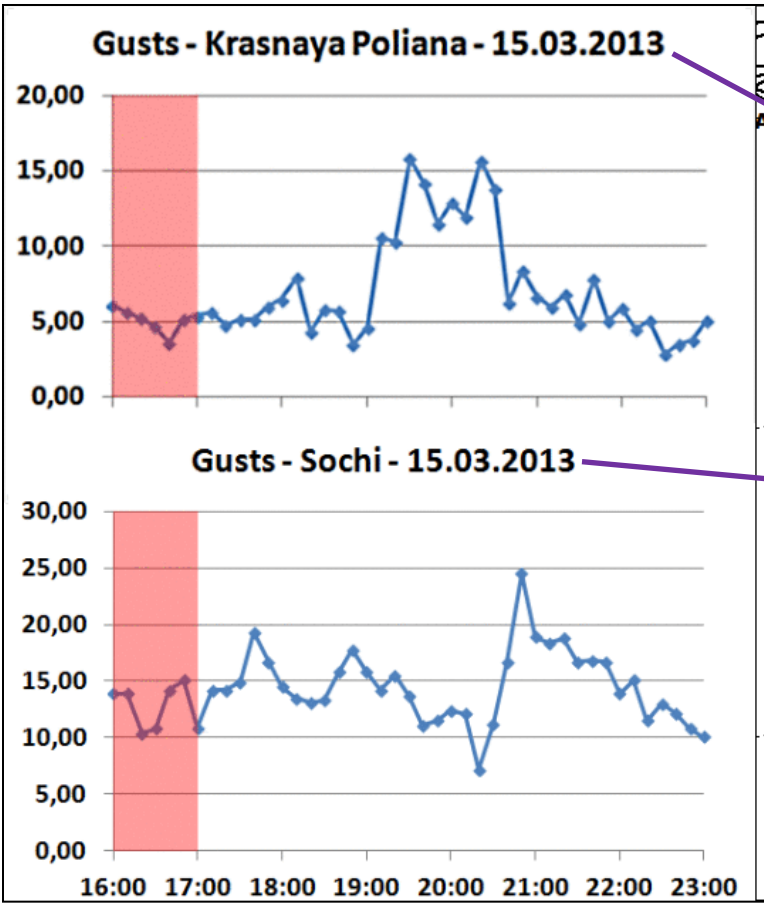


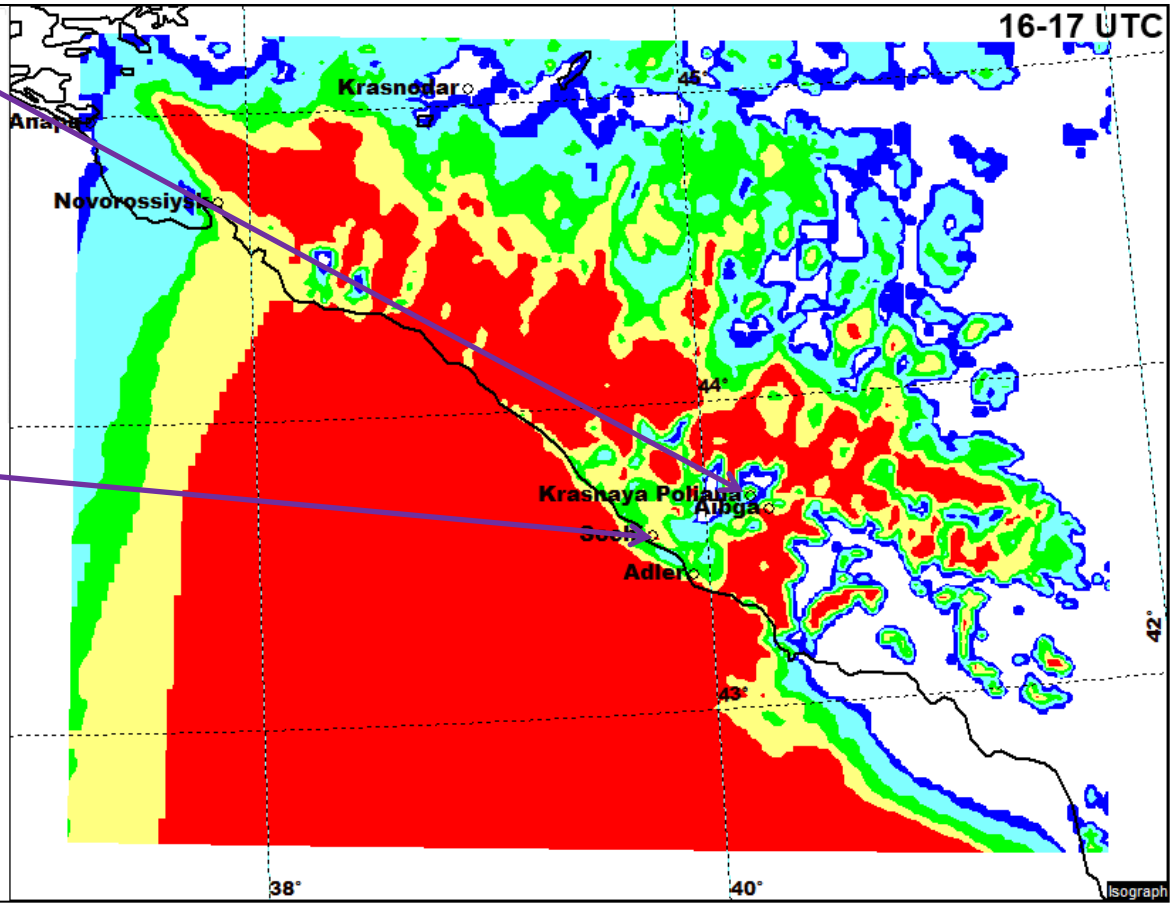


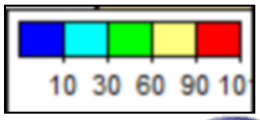
Initial time: 12 UTC 12.02.2013

COSMO-RU2-EPS:

probability of hourly wind gusts exceeding 15 m/sec





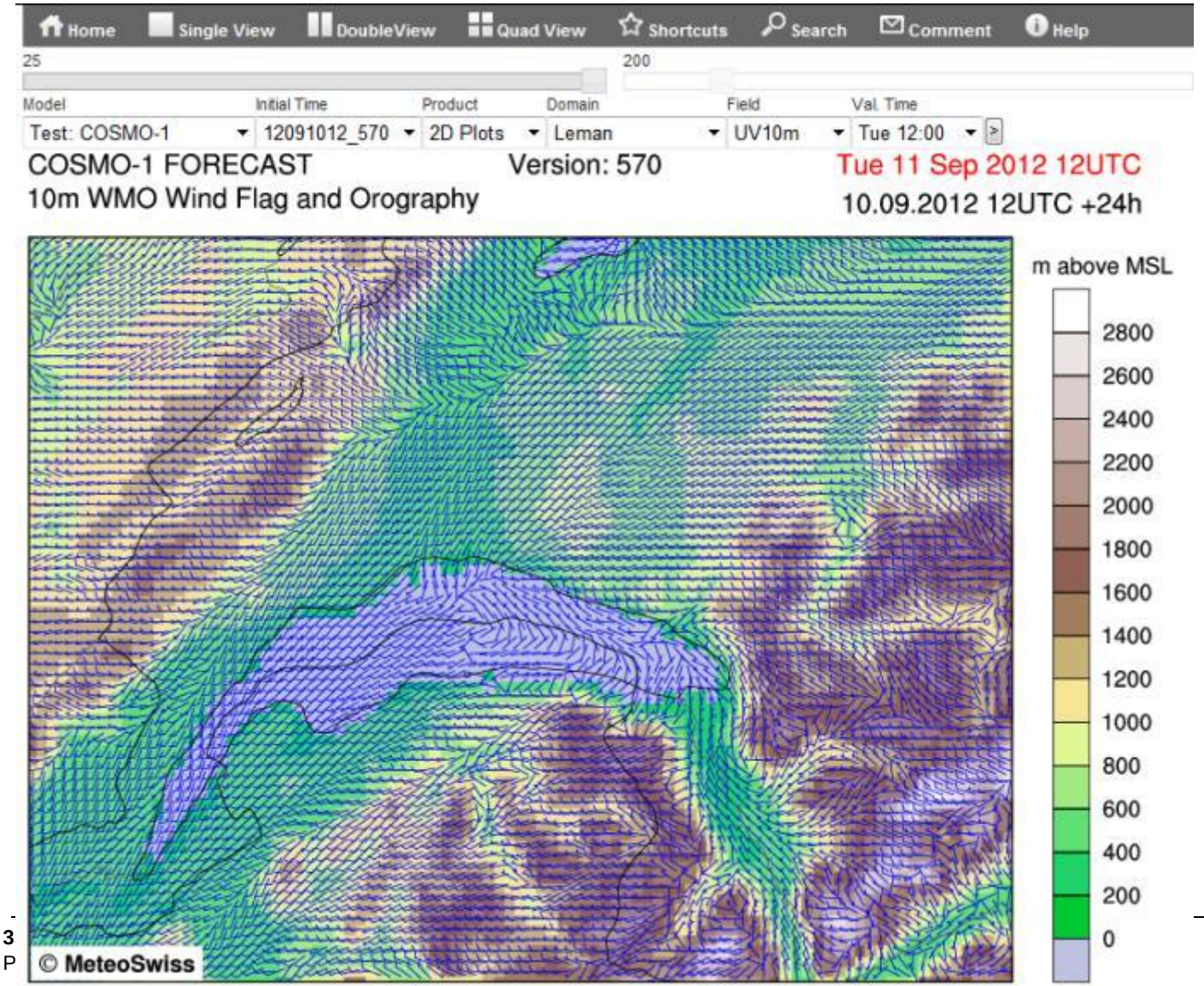


Initial time: 00 UTC 14.03.2013

Valid for 15.03.2013 16-23 UTC

COSMO GM2013. E.Astakhova,D.Alferov,A.Montani etal

COSMO-1


Home
Single View
DoubleView
Quad View
Shortcuts
Search
Comment
Help
25
200
Model
Initial Time
Product
Domain
Field
Val. Time
Test: COSMO-1
12091012_570
2D Plots
Leman
UV10m
Tue 12:00
COSMO-1 FORECAST
Version: 570
Tue 11 Sep 2012 12UTC
10m WMO Wind Flag and Orography
10.09.2012 12UTC +24h
m above MSL
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
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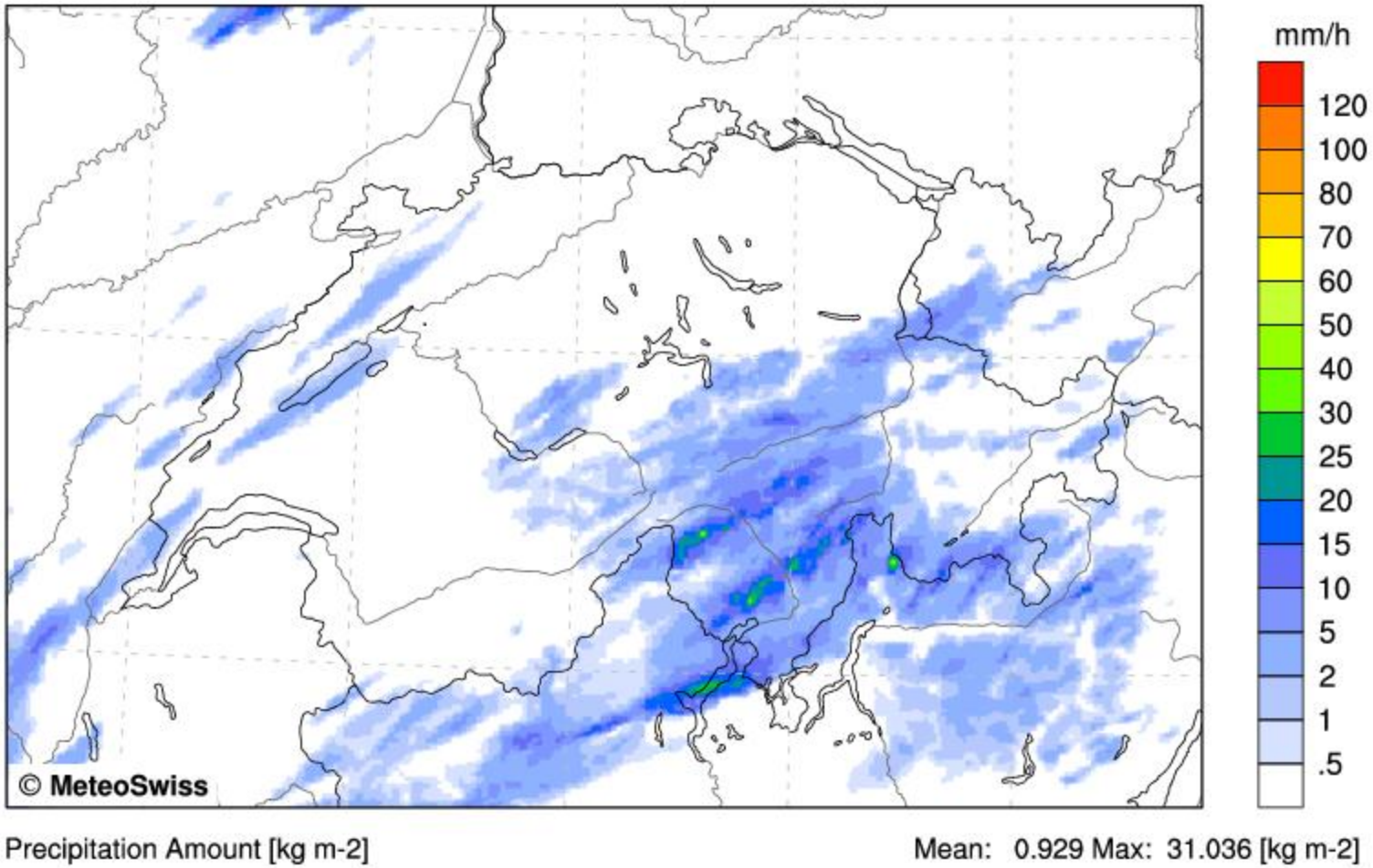
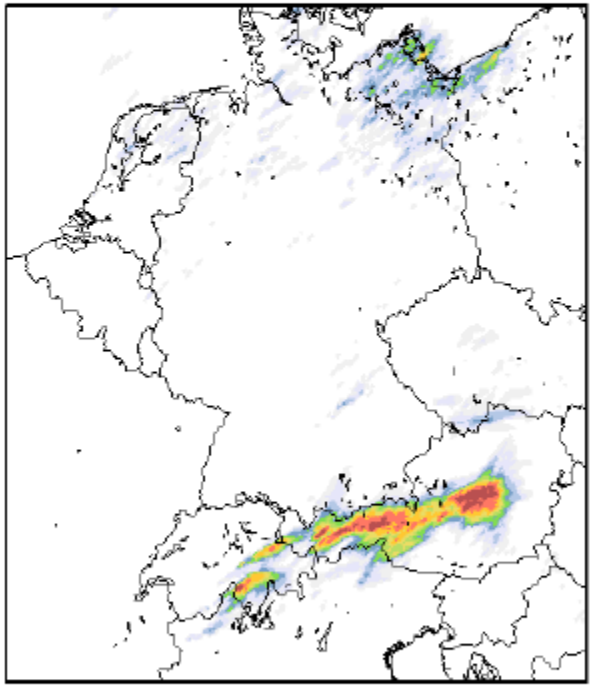
© MeteoSwiss

COSMO-1

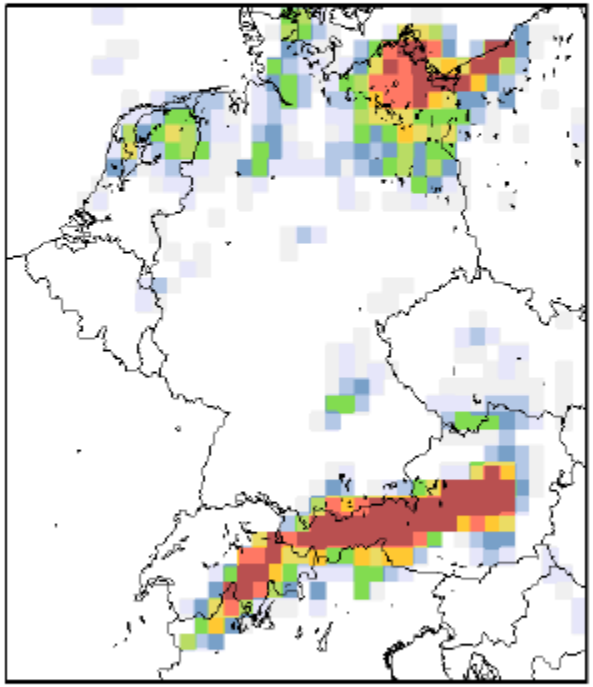

COSMO-1 FORECAST
Hourly Sum of Total Precipitation
Version: 3
Mon 18 Jul 2005 13UTC
18.07.2005 06UTC +07h
mm/h
120
100
80
70
60
50
40
30
25
20
15
10
5
2
1
.5
© MeteoSwiss
Precipitation Amount [kg m-2]
Mean: 0.929 Max: 31.036 [kg m-2]

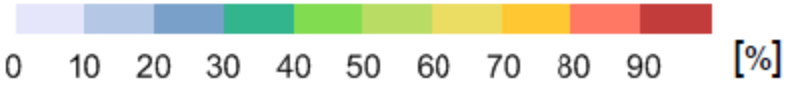
Date : August 4, 2012, valid at18UTC Threshold : **10mm/6h**

Prob. forecast at **2.8km**



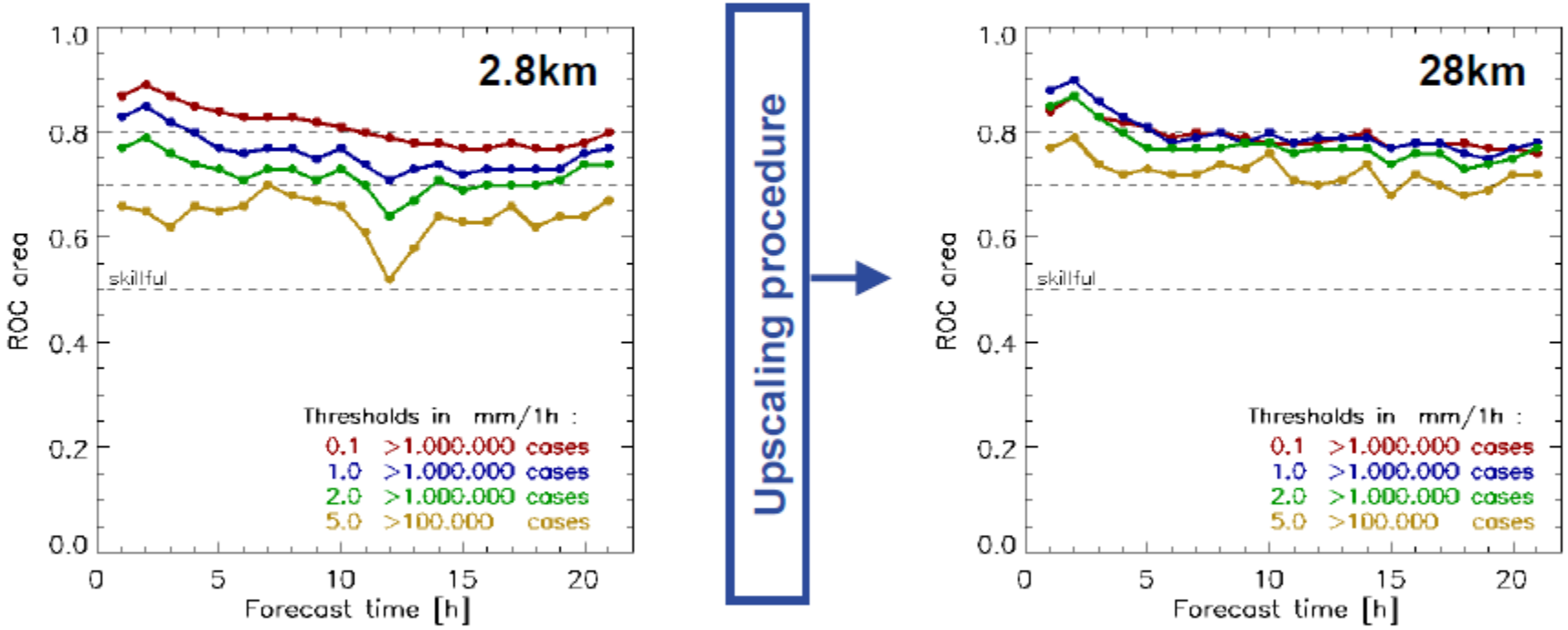
Prob. forecast at **28km**





Upscaled probabilistic products

- Verification results: August 2012 - hourly precipitation - radar observations

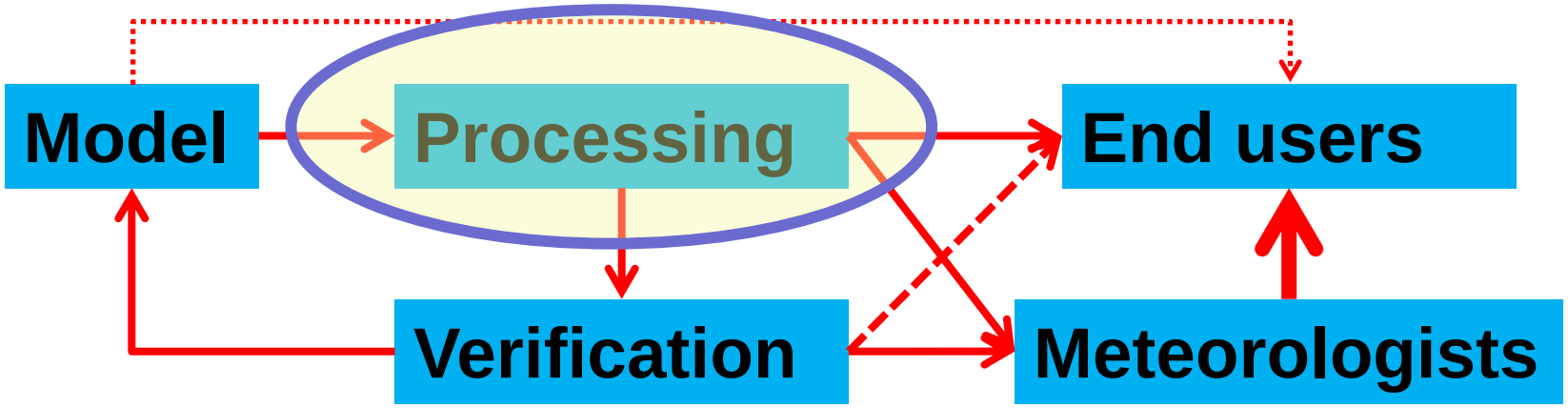


(Ben Bouallègue et al. 2013)

Model processing

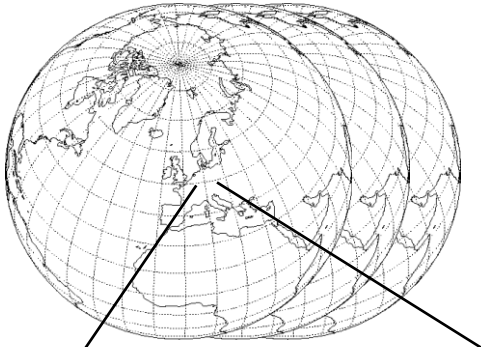
- The new models need some processing already just to be verified (cf. talk by M. Mittermaier / C. Wilson this morning)
  - Gridpoint statistics (spatial aggregation)
  - Time aggregation
  - Ensemble member statistics
  - Use of primitive parameters
  - Any mixture of the previous

My personal view



Principles postprocessing at consortium level (science plan)

- Help to understand the characteristics of model output by analysing (space, time, parameter, ensemble member) combinations of the output fields
- Fix validation criteria for new model versions
- Provide the users of models (including meteorological forecasters) with recommendations of use of model output



Thank you