



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

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



WG4: interpretation and applications

Pierre Eckert
MeteoSwiss, Geneva



Topics



- FIELDEXTRA → presentation by JM Bettems
- CORSO-A → presentation by Inna Rozinkina
- Introduction of High Resolution Models
- Seamless forecasting (nowcasting)



Use of high resolution models

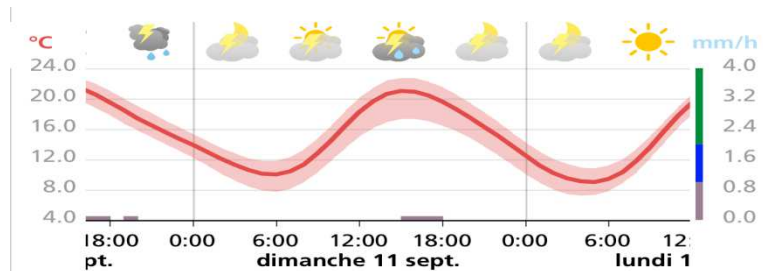
- COMSO-1 (1.1 km) and COSMO-E (21 x 2.2 km) operational last spring @ MeteoSwiss (cf. pres of Ph. Steiner)
- Along with the global models (mainly IFS Hres and EPS), they became the main source of information for forecasting (was already the case for medium range, but became true for short range).
 - Forecasters and modelers now share the responsibility for the issued forecasts (public, web, app, TV,...)
 - Choices are still possible : solid guidelines





Probabilistic forecasts?

- In weather services it is generally repeated that (only) probabilistic forecasts should be issued to the public, to authorities,.....
- Indeed you can provide the end user with an EPSgrams, or any type of boxplot, or probability maps.
- Or state that the probability of exceeding 5 mm of precipitation tomorrow is 30% 09 to 12h, 45% 12 to 15h,...
- Anyhow for some time we will continue to write texts, with statements of timing, regional differences, uncertainty.
- Or issue time series with deterministic symbols



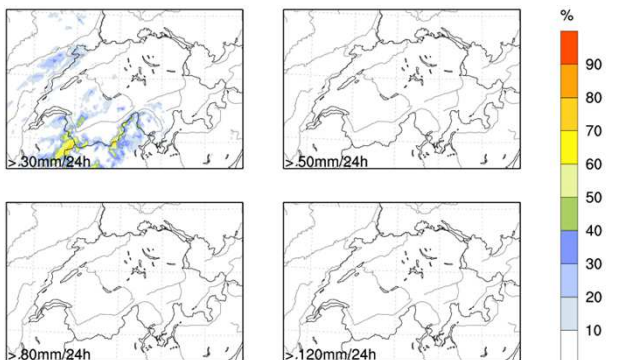


Interpretation of COSMO-e



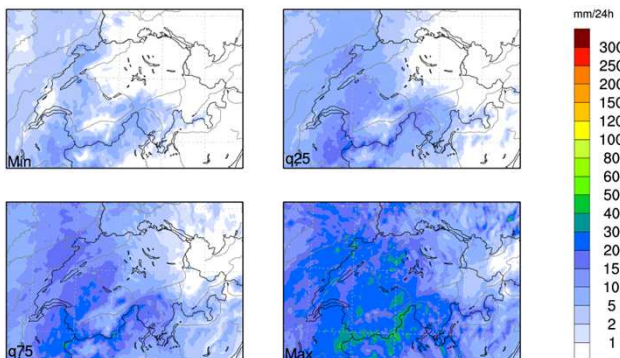
COSMO-E PROBABILITY_FORECAST
24h Sum of Total Precipitation

Sun 01 May 2016 06UTC
30.04.2016 00UTC +30h

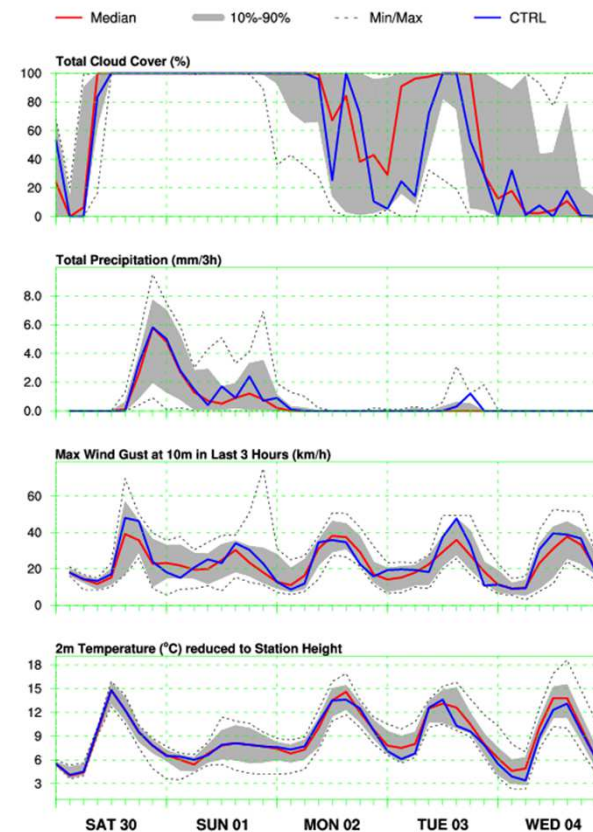


COSMO-E ENSEMBLE_FORECAST
24h Sum of Total Precipitation

Sun 01 May 2016 00UTC
30.04.2016 00UTC +24h



COSMO-E Meteogram
2016-04-30 00 UTC
Payerne 46.81N 6.94E 490m (COSMO-E 485m / CTRL 485m)



Sat Apr 30 03:45:51 UTC 2016 / © MeteoSwiss

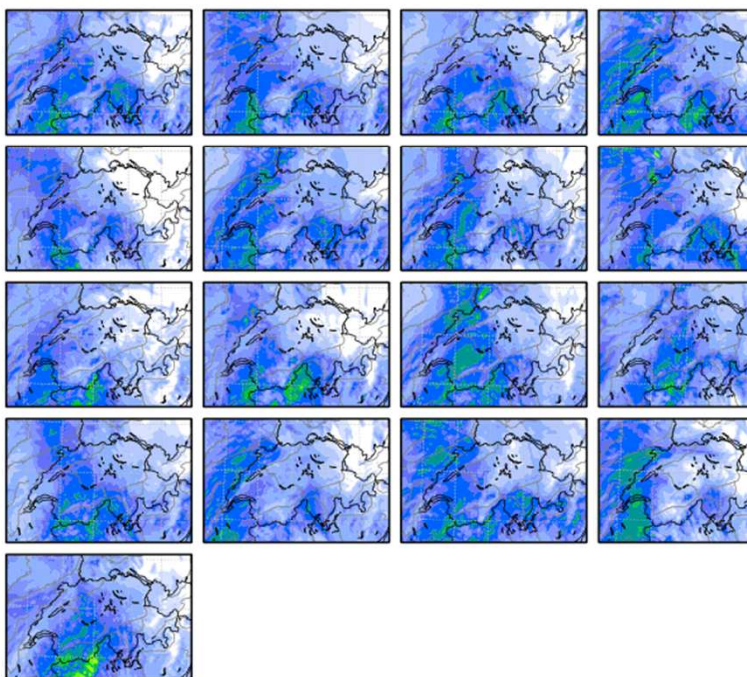
MAY 2016



COSMO-E members, median, control

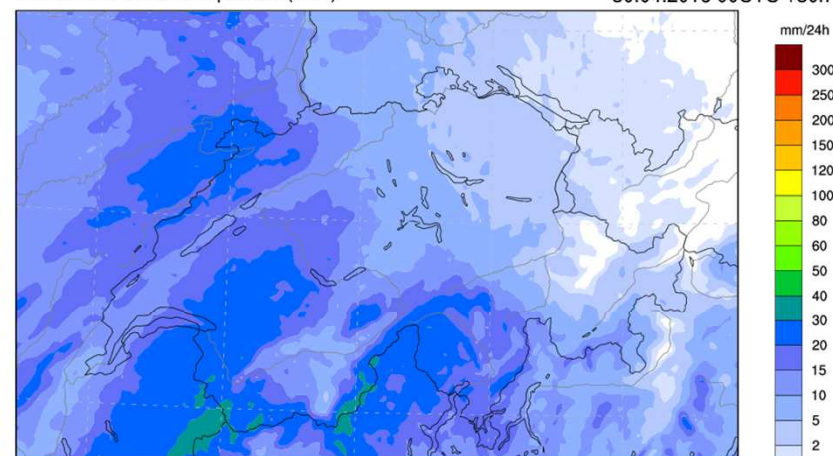


COSMO-E ENSEMBLE_FORECAST
24h Sum of Total Precipitation



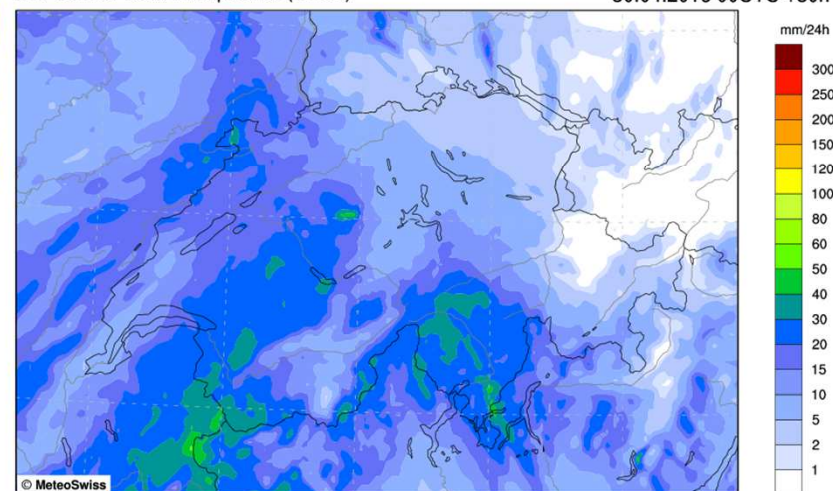
COSMO-E ENSEMBLE_FORECAST
24h Sum of Total Precipitation (Q50)

Sun 01 May 2016 06UTC
30.04.2016 00UTC +30h



COSMO-E ENSEMBLE_FORECAST
24h Sum of Total Precipitation (CTRL)

Sun 01 May 2016 06UTC
30.04.2016 00UTC +30h



© MeteoSwiss

Total precipitation [mm/24h]

Mean: 12.859 Max: 51.057 [mm/24h]

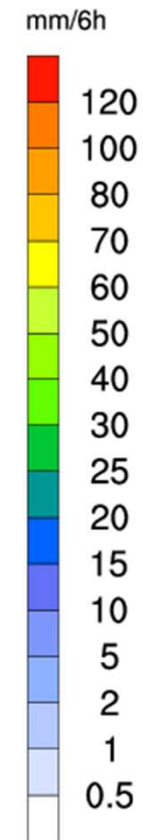
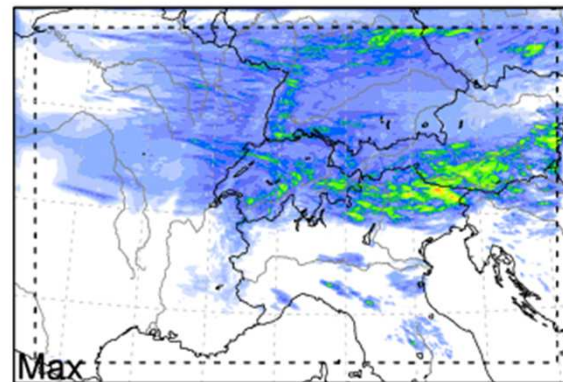
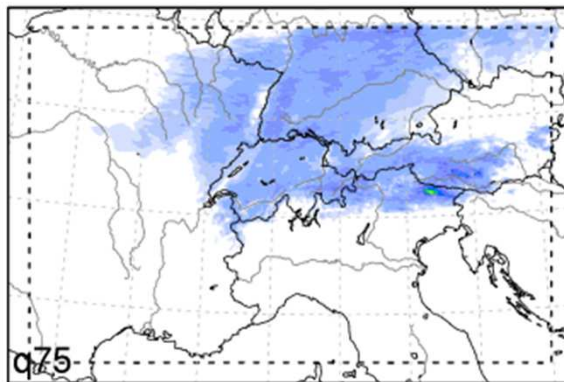
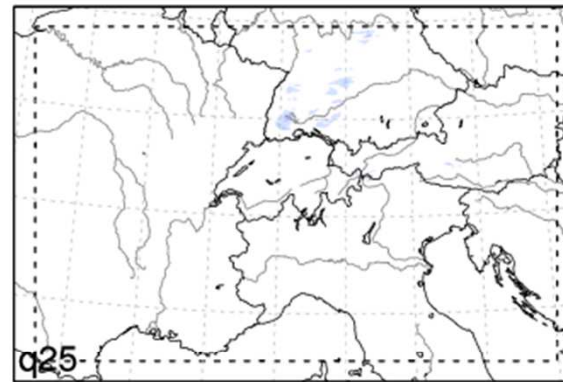
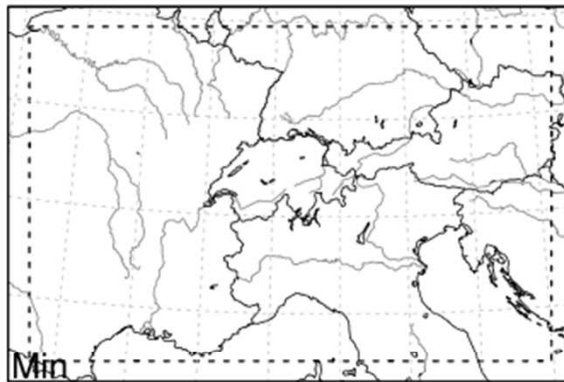


However...



COSMO-E ENSEMBLE_FORECAST
6h Sum of Total Precipitation

Sun 04 Sep 2016 18UTC
02.09.2016 12UTC +54h



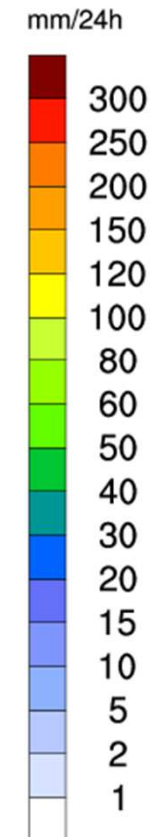
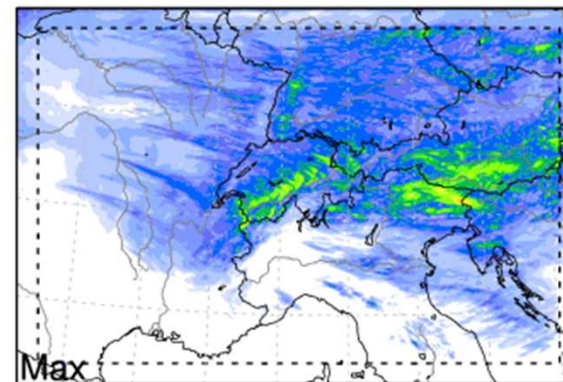
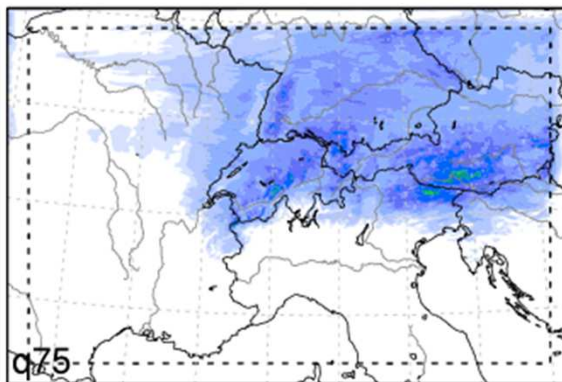
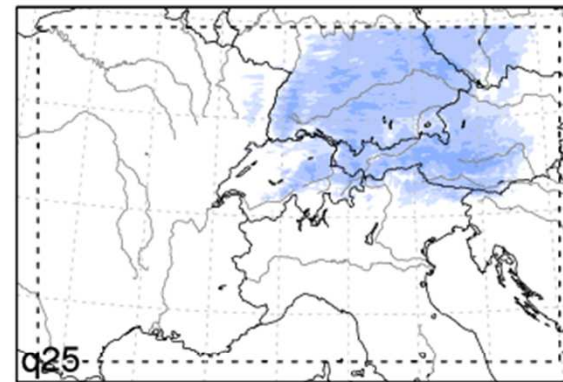
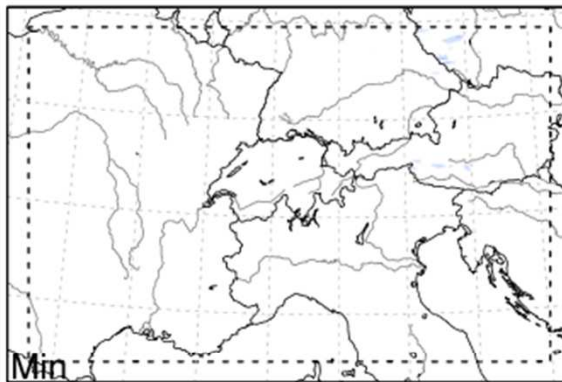


However...



COSMO-E ENSEMBLE_FORECAST
24h Sum of Total Precipitation

Mon 05 Sep 2016 00UTC
02.09.2016 12UTC +60h



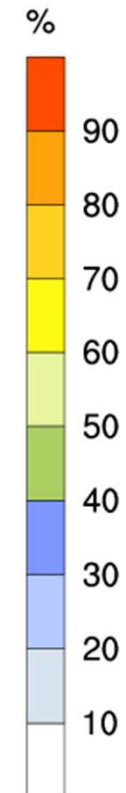
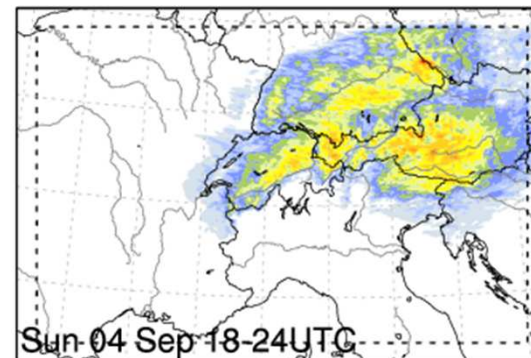
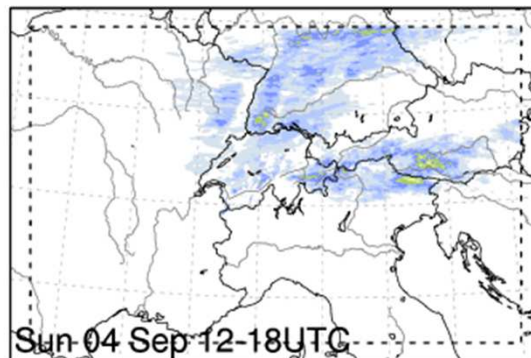
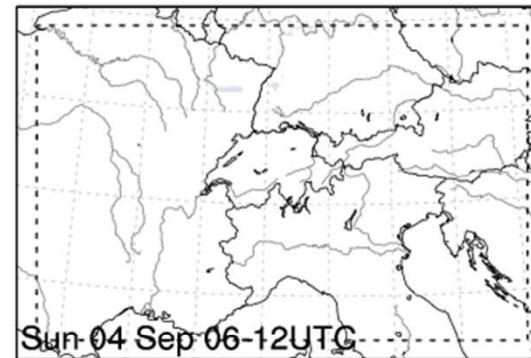
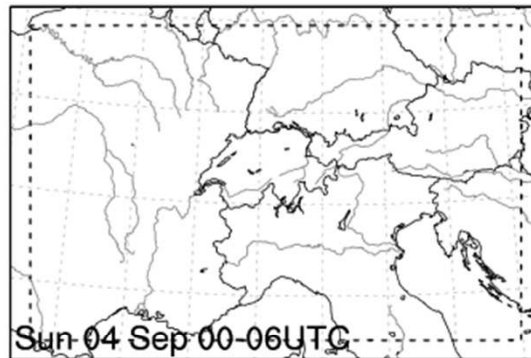


However...



COSMO-E PROBABILITY_FORECAST
6h Sum of Total Precipitation > 5mm/6h

Mon 05 Sep 2016 00UTC
02.09.2016 12UTC +60h



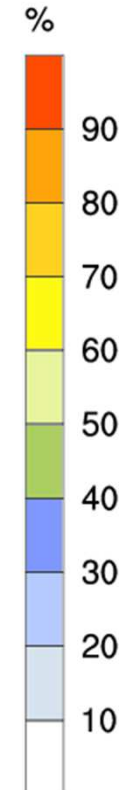
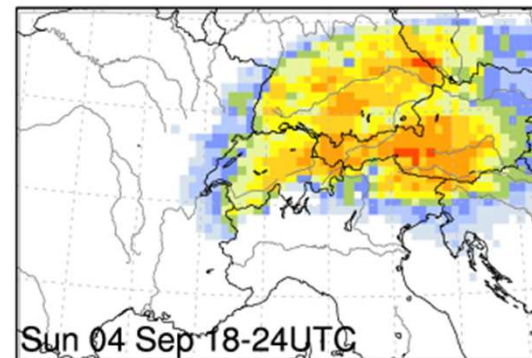
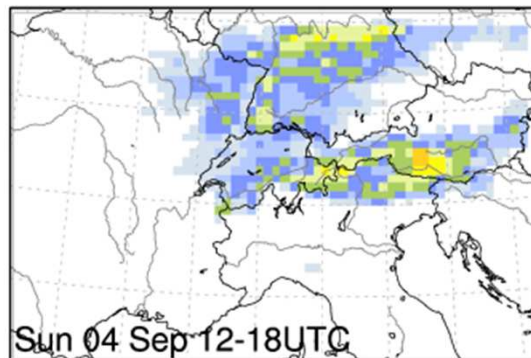
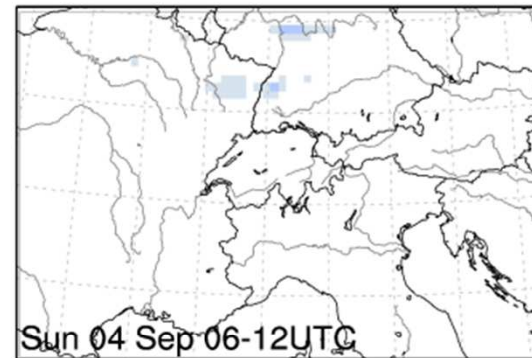
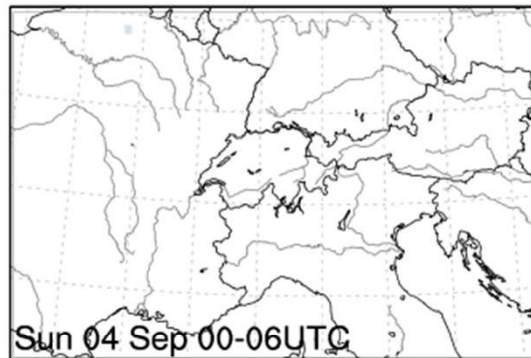


However...



COSMO-E PROBABILITY_FORECAST
6h Sum of Total Precipitation > 5mm/6h (upscaled)

Mon 05 Sep 2016 00UTC
02.09.2016 12UTC +60h





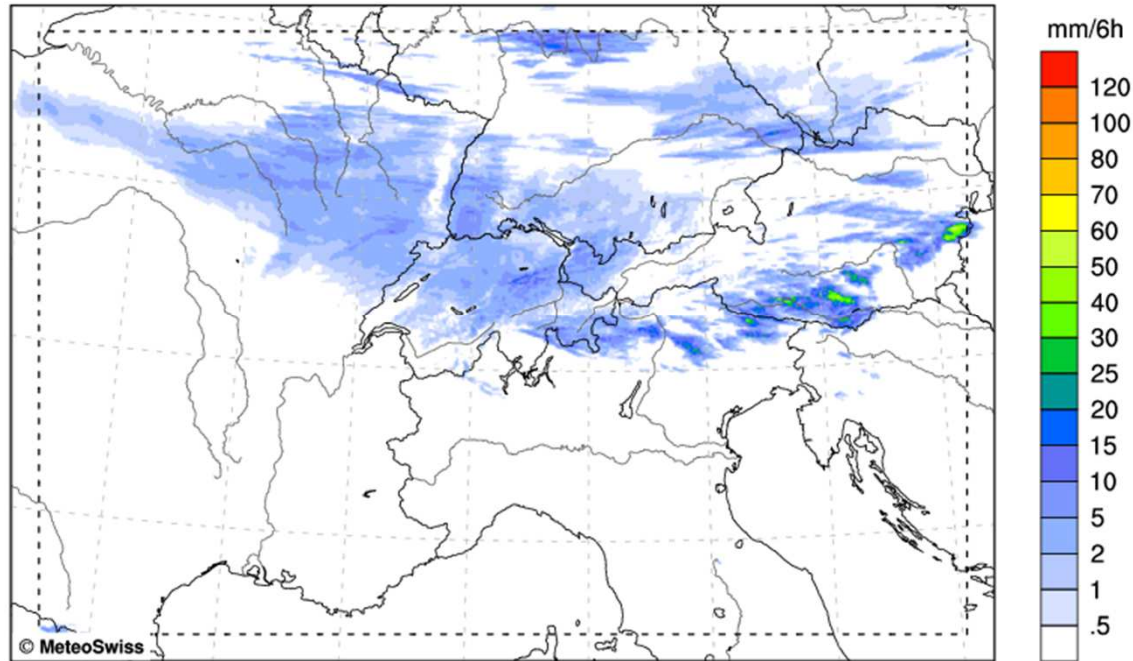
And COSMO-1 jumpiness



COSMO-1 FORECAST
6h Sum of Total Precipitation

Version: 100

Sun 04 Sep 2016 18UTC
04.09.2016 12UTC +06h



Total precipitation [mm/6h]

Mean: 0.681 Max: 57.903 [mm/6h]



One way to handle COSMO-1 and COSMO-e



- Use COSMO-1 most recent run, make your short term deterministic forecast. Have a look at the previous runs as well and check for jumpiness.
- Look at COSMO-e to check what kind of alternative weather (intensity, localization) could happen, for instance:
 - Prob of low level clouds
 - Gusts
 - Local strong convection (CAPE)
 - Use upscaled values (probabilities) in pure convective events
 -
- Use probabilistic terms to include uncertainty or confidence in your forecast
- Take some care: COSMO-1 and COSMO-E do not have the same initial state yet (Nudging vs LETKF).



Seamless forecasting from time zero, incl. nowcasting

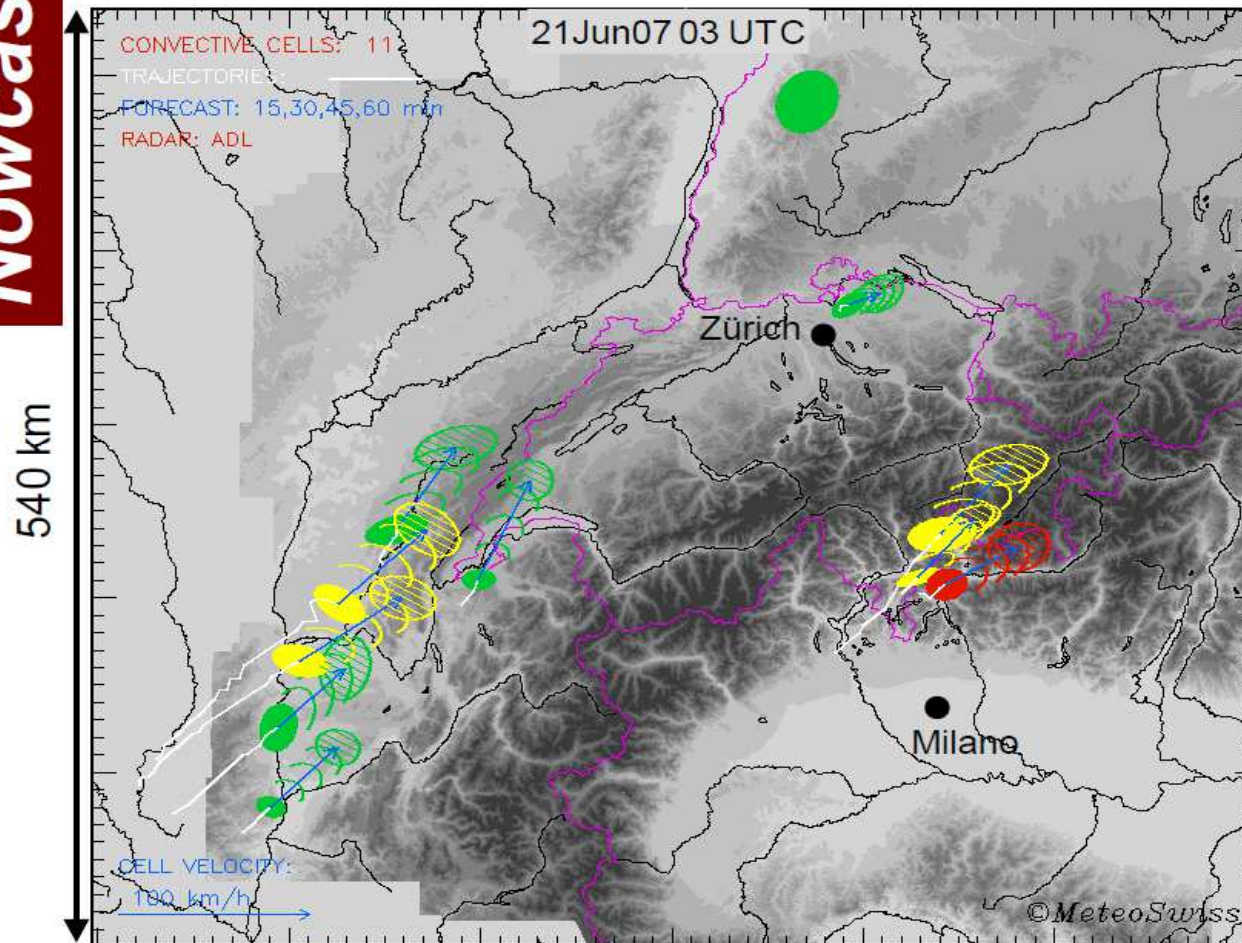


- Tell her to make me a cambric shirt
Parsley, sage, rosemary and thyme
Without no seams nor needle work
Then she'll be a true love of mine
- Seamless rather understood as timely, from past observation series to climate forecast.
- But the space aspect has to be kept in mind.
- I would add the probabilistic / ensemble aspect

- Various initiatives to merge analysis, nowcasting and NWP
- Parallel session on Tuesday

Thunderstorm nowcasting

Nowcasting



Legend

Solid: present position
Hatched: 1 hour forecast
Blue vector: cell velocity
White line: trajectory

Cell severity ranking:

WEAK

MODERATE

SEVERE

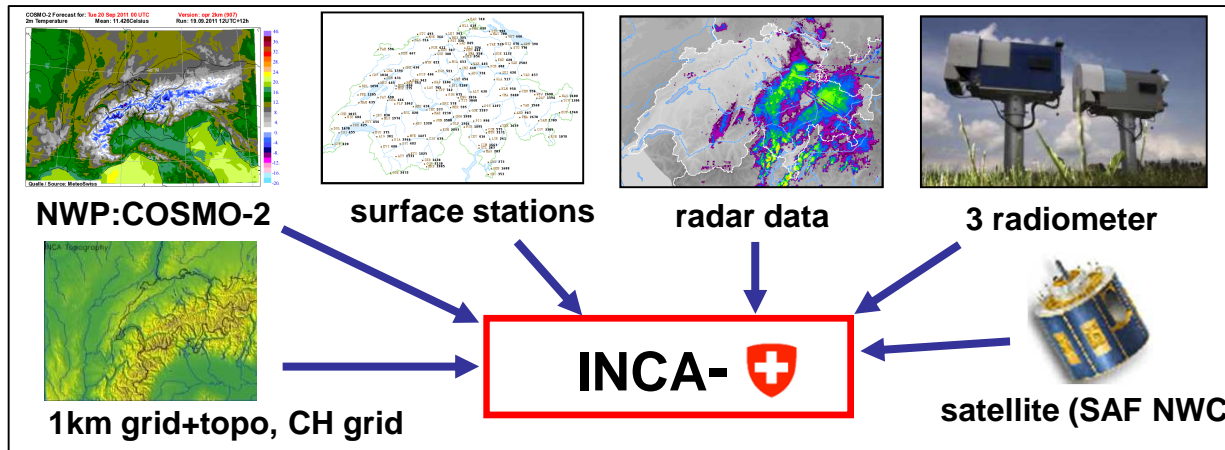
VERY SEVERE

based on vertically integrated liquid water, 45 dBZ echo top, max dBZ and area > 55dBZ

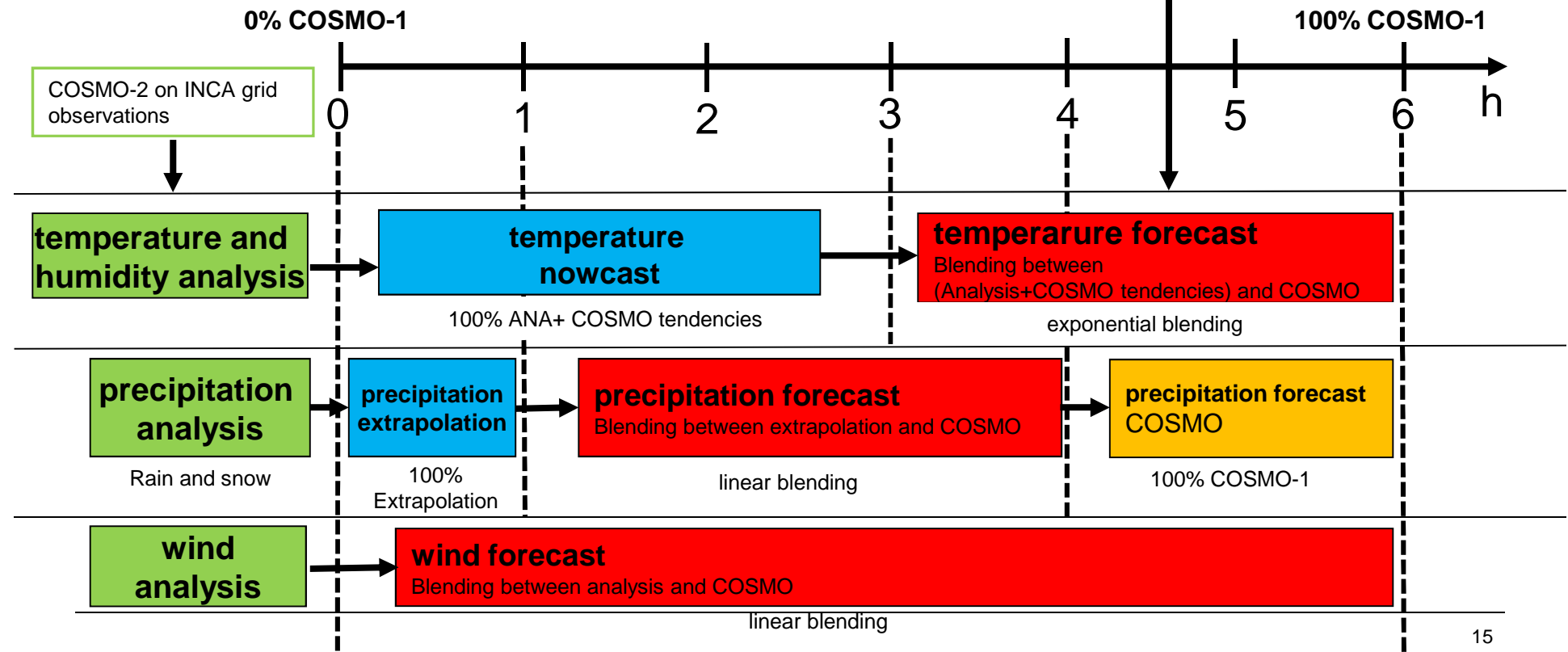
TRT by A Hering



Overview: seamless nowcasting system

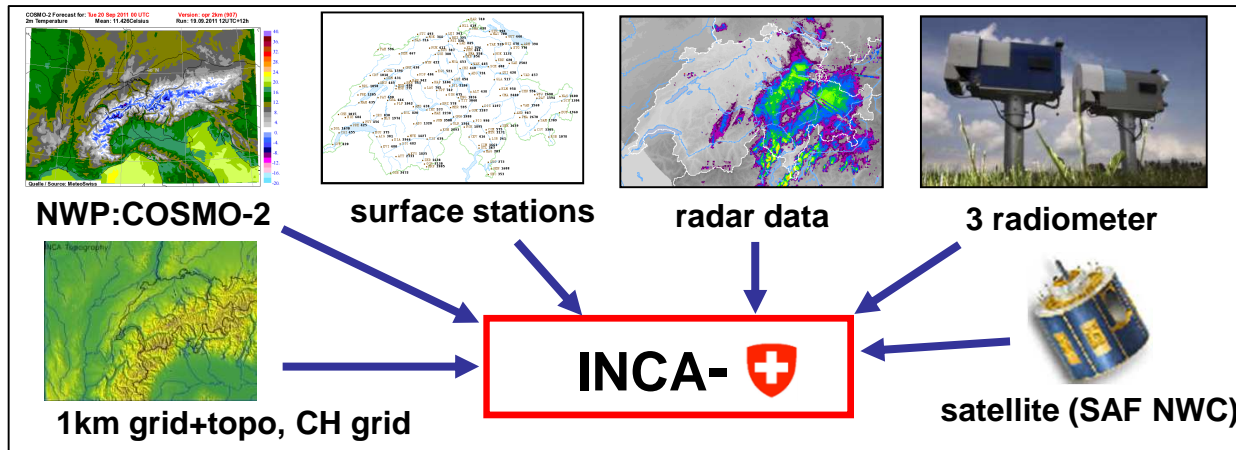


Very rapid update frequency:
10 minutes

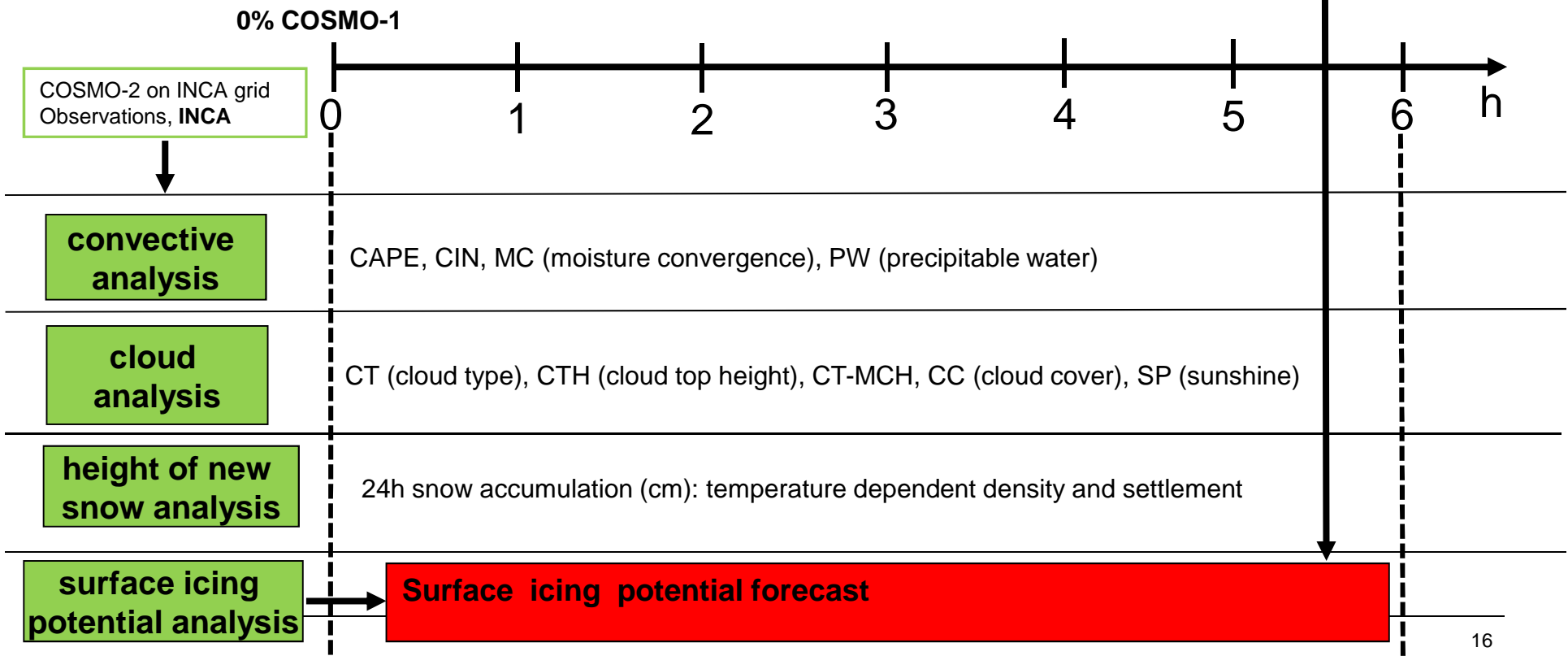




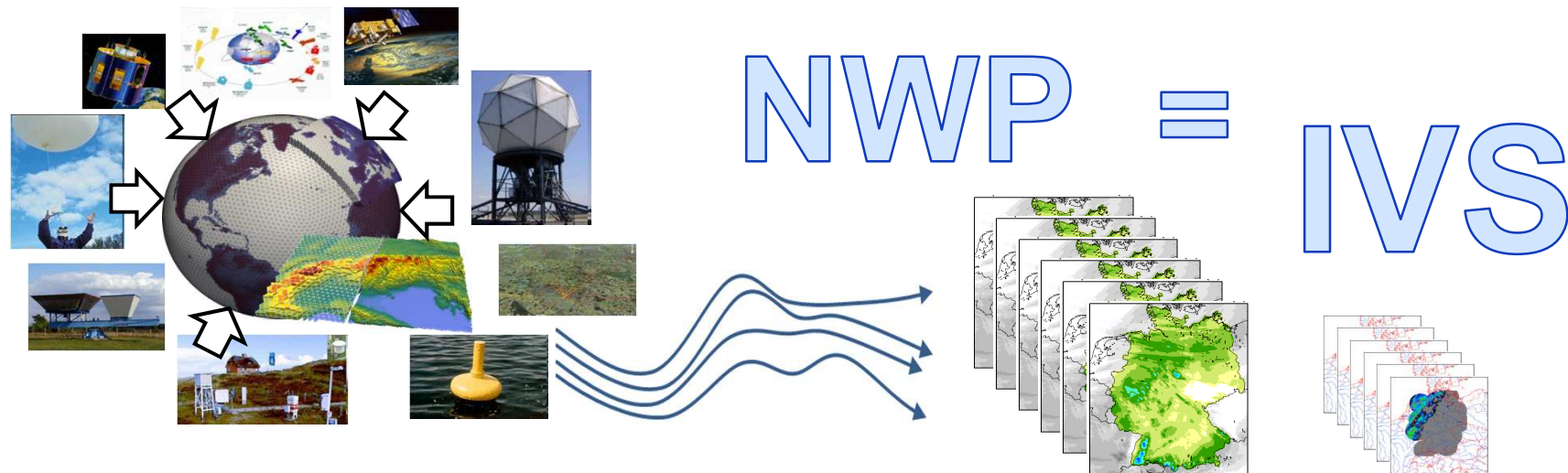
Overview: seamless nowcasting system 2



Very rapid update frequency:
10 minutes



NowCasting x

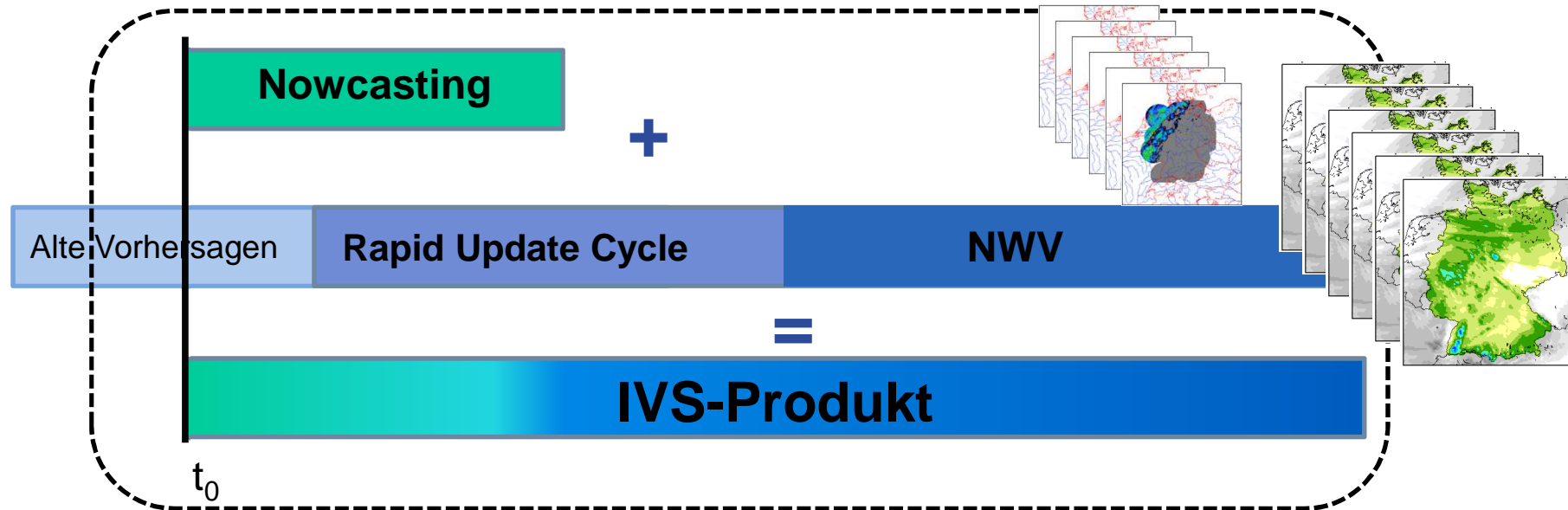


Integrated Forecasting System – State and Planning –

Julia Bachmann, Marcus Paulat, Roland Potthast, Axel Seifert und Kathrin Wapler
with many contributions from FE1 and FEZE

– Basic Goal

Seamless assimilation and prediction on all temporal scales

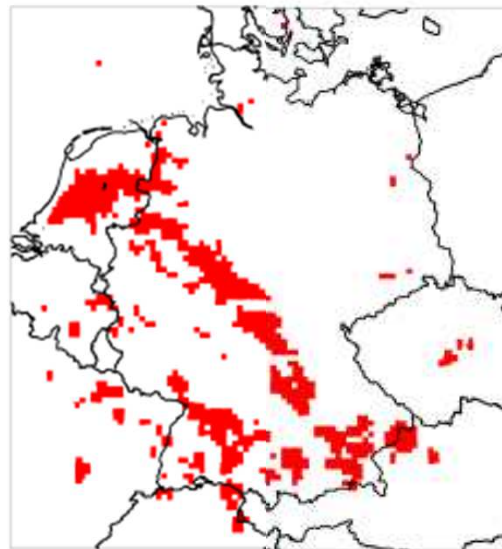


Combination of improved Nowcating and improved Numerical Weather Prediction

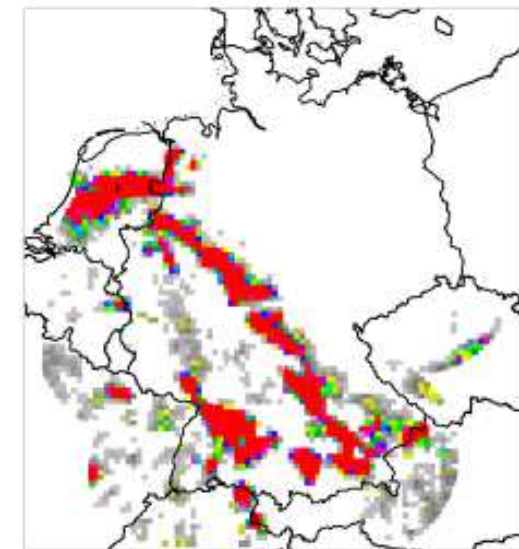
Integriertes Forecasting System

Consistent through all scales

Deutscher Wetterdienst
Wetter und Klima aus einer Hand



obs exceeding 20dBZ
20140526150000
ppi at elev. 0.5deg



#fg_ens_members exceeding 20dBZ
20140526150000
ppi at elev. 0.5deg

Nowcasting
Radarprognose +2h

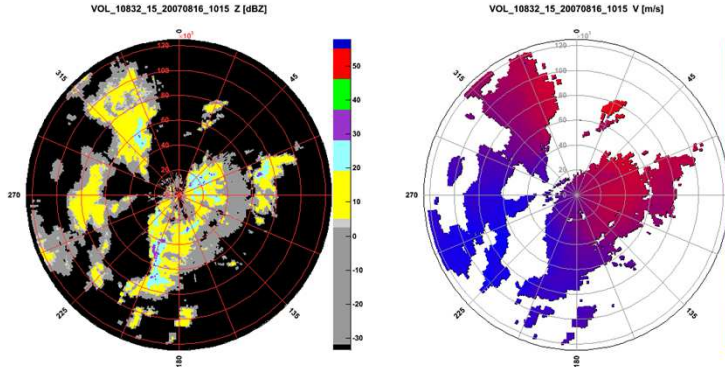
RADAR Nowcasting EPS and NWP Ensemble

Integriertes Vorhersagesystem – Stand und Planung, 6.9.2016



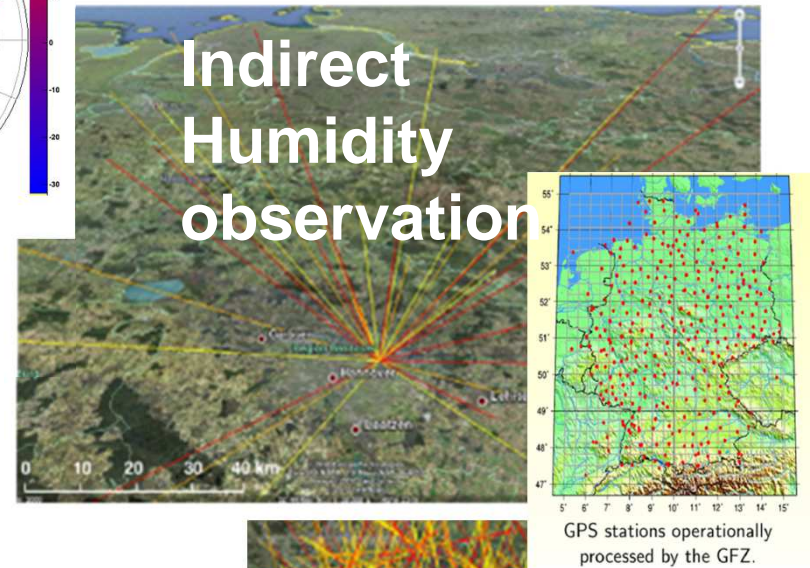
Temporally High-Resolution Observations with 1-5 min: Radar, Seviri, GPS, etc. ...

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

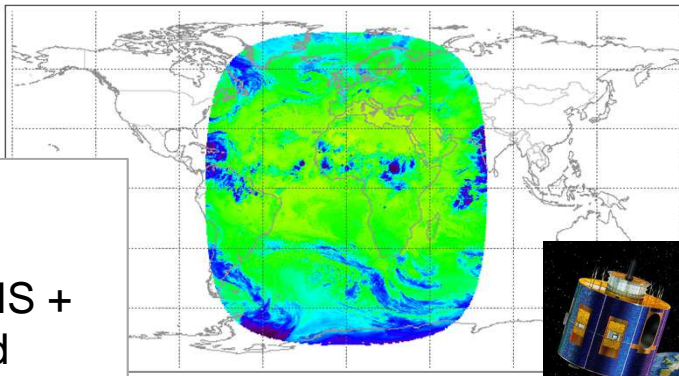


RADAR 3D

Lightnings ...

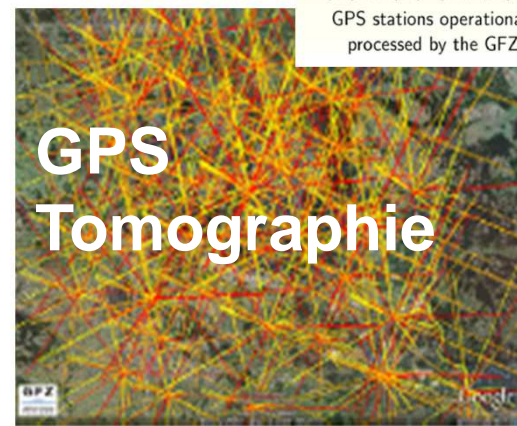
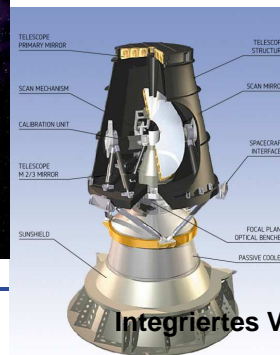
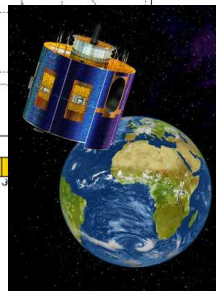


GPS stations operationally processed by the GFZ.



SEVIRI
Visible,
Near VIS +
Infrared

10min Synop



GPS Tomographie



Cameras ...



Some indications (seamless)



- The direction goes rather to full 3d rapid upcycling analyses, using as many sources as possible.
- Incremental updates of analyses also possible
- Post-processing is important: recognition of (high impact) phenomena, generation of warnings,...
- No common COSMO activity, but WG4 will be kept informed.



Danke für die nahtlose Aufmerksamkeit