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

Plans for
COSMO-1
within the project COSMO-NExT

Marco Arpagaus
for the COSMO-NExT project team

COSMO General Meeting, 11 September 2012

Strategy of MeteoSwiss for its Numerical Weather Prediction system

- **Client expectations**
  - Two classes of products
    - **High(est) resolution in space and time** out to +24h, high update frequency
    - Regional **probabilistic forecasts** out to +3/5 days
    - Focus on Alpine region
  - Consistency of products across all scales (space & time)
  - High reliability (quality and availability of products)
- MeteoSwiss strategy is consistent with **COSMO Science Plan** and **ECMWF Strategy** 2006-2015

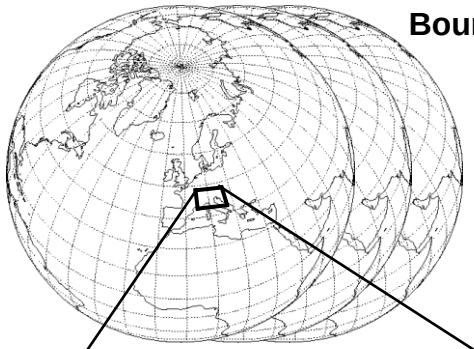
Strategy of MeteoSwiss for its Numerical Weather Prediction system

- Enabled by decision to implement national **HPCN Strategy**
  - Funding of MeteoSwiss HPC system at CSCS
  - Funding of necessary adaptation of COSMO software to future HPC architectures (HP2C initiative)

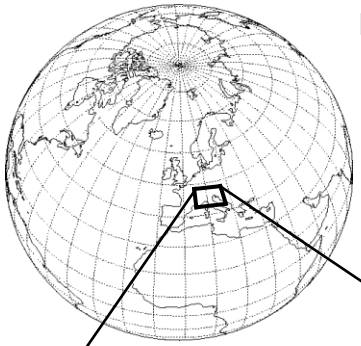
→ **Novel Expert Tools (NExT)**

- **COSMO-1**: 1 km mesh-size, deterministic
- **COSMO-E**: Ensemble-System, 3 km mesh-size

COSMO-NExT: Novel Expert Tools

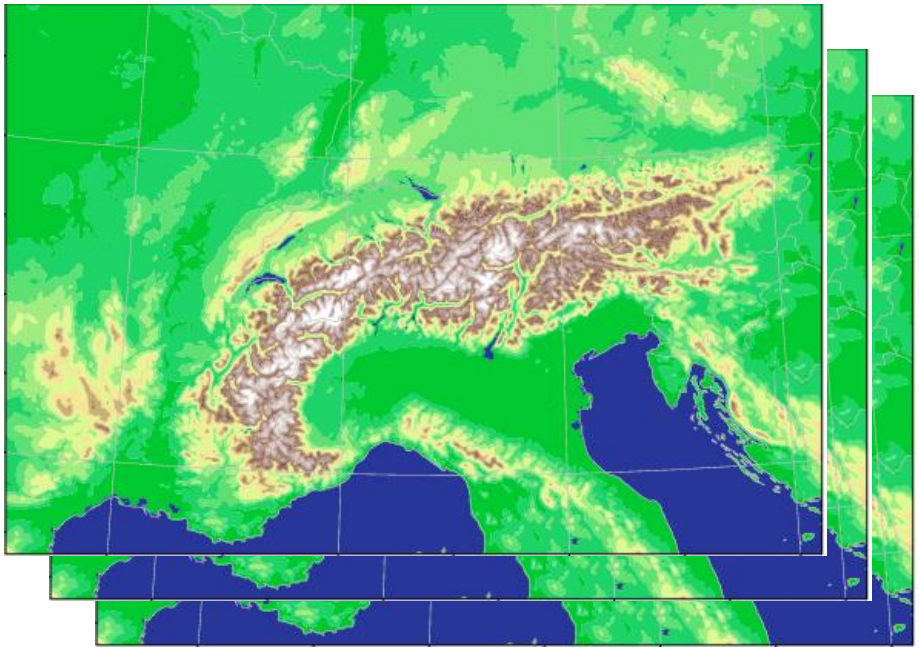


Boundary conditions: VarEPS
20km
2x daily

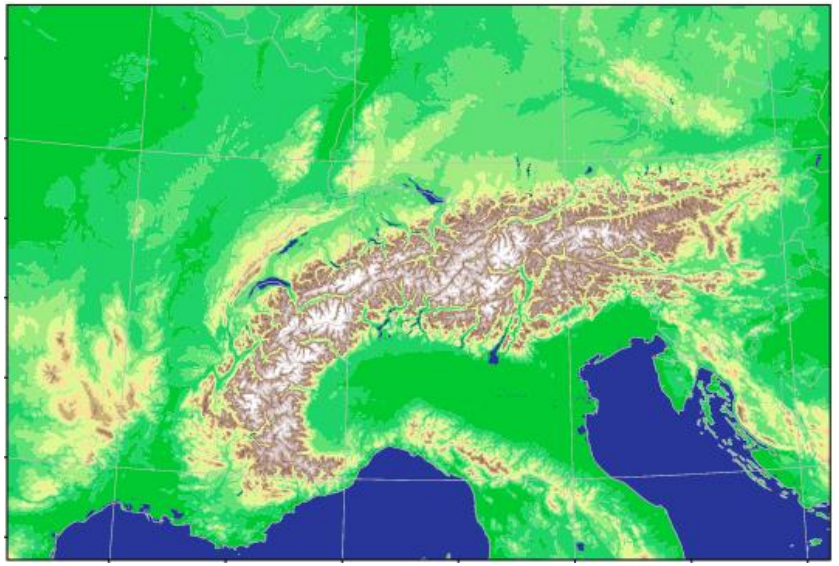


Boundary conditions: IFS
10km
4x daily

COSMO-E: 2x daily 5 day forecasts
3 km grid size (convection permitting)
21 ensemble members



COSMO-1: 8x daily 24 hour forecasts
1 km grid size (convection permitting)



Project COSMO-NExT: Structure and timeline

- **4 Sub-Projects**
  - KENDA (leader: Daniel Leuenberger)
  - COSMO-1 (leader: Oliver Fuhrer)
  - COSMO-E (leader: André Walser)
  - Infrastructure (leader: André Walser)
- Co-Projectleaders: Philippe Steiner & Marco Arpagaus
- **4 yrs** project (2012 – 2015)
- Project-phases and milestones **strongly coupled to development and extension of HPC platform at CSCS** (→ implementation of HPCN Strategy)

COSMO-1:
Open questions …

… many!

- see last talk by Guy

- ICs: Downscaled KENDA-Analysis (at 3 km)
- LBCs: IFS (or intermediate COSMO-x)
- External parameters: Update where feasible
- Dynamics and numerics: Numerically stable and accurate forecasts with minimally filtered orography and minimal numerical diffusion
- Physics: Use as many of the new/upcoming options as possible (e.g., FLake, tiles, multilayer snow, urban, …); look into turbulence (advection of TKE, truly horizontal diffusion operator, UTCS, …); retune microphysics; revisit shallow convection scheme; retune TERRA to new external parameters; change from 1D to (quasi-) 3D if needed; …
- Validation and Verification: What, and how …
- …

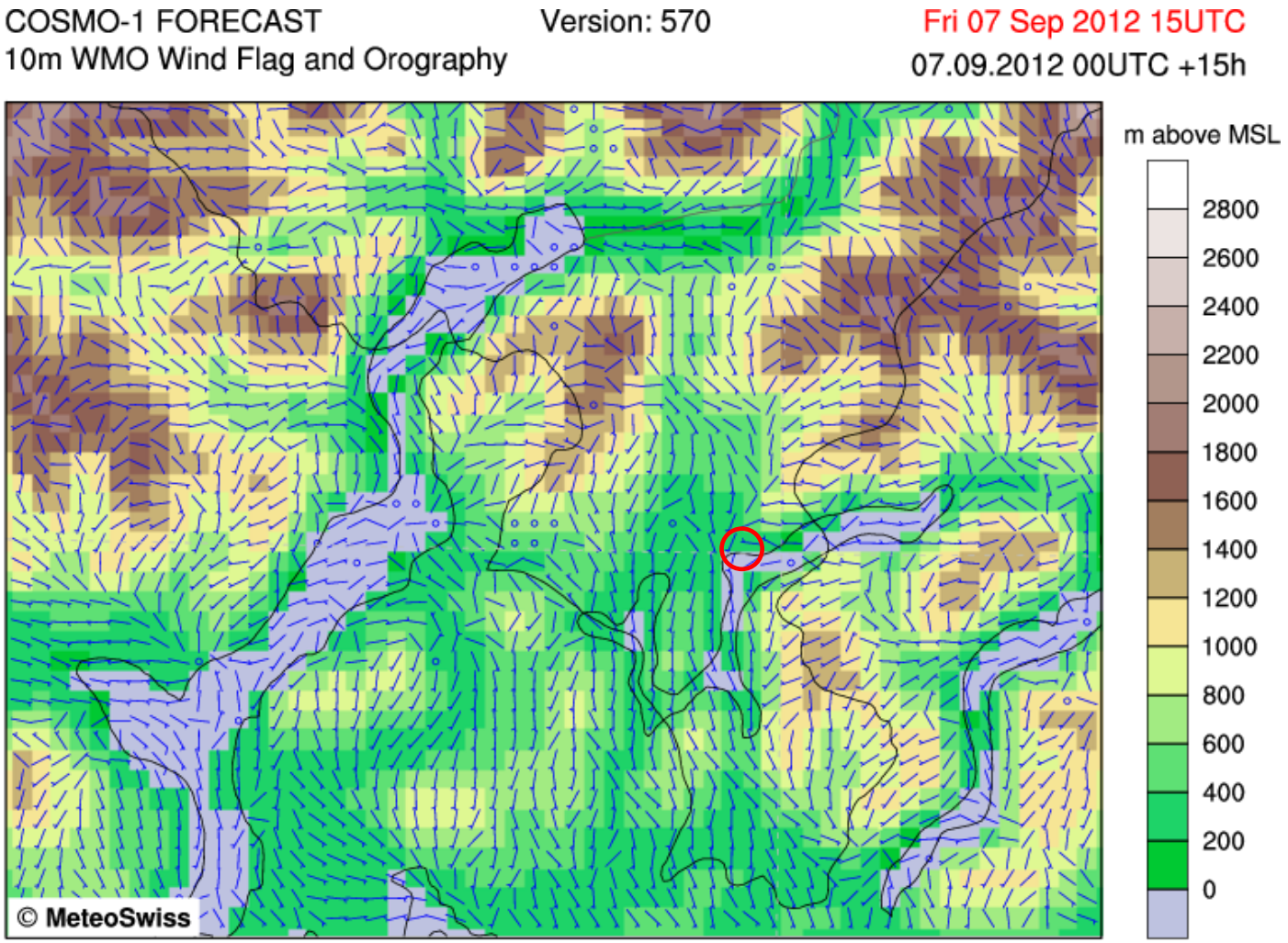
COSMO-1:
Regular runs (experimental!)

COSMO-1 …

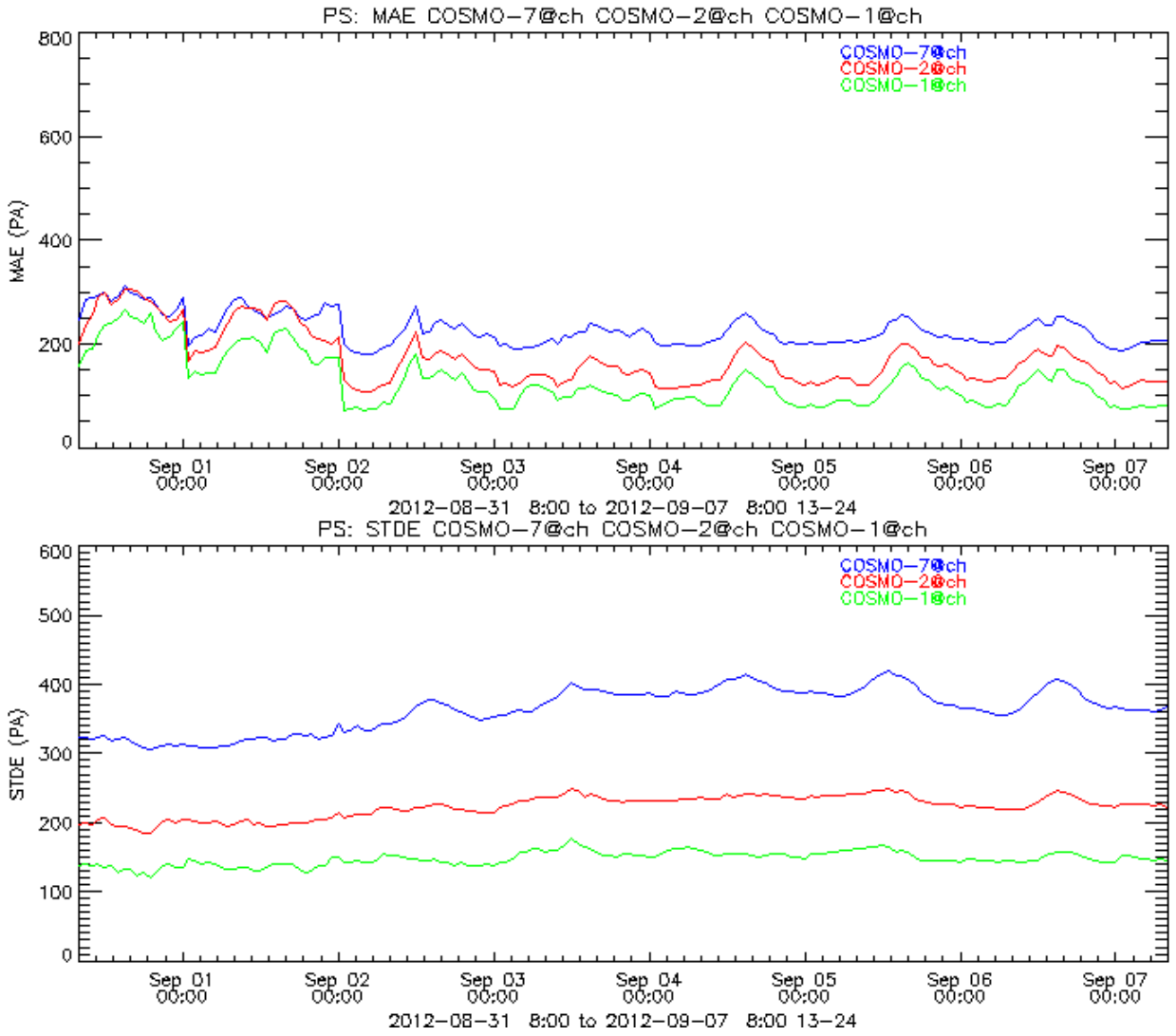
- is currently based on COSMO V4.23 and the new fast wave solver
- is driven by the operational COSMO-7 (which itself is driven by the IFS)
- is running twice per day (IT: 00 UTC and 12 UTC) out to +24h since the end of August
- runs at CSCS (on lema), needs approx. 2h elapsed time, runs during the night (i.e., is available in the morning)

COSMO-1 windfield over Lugano

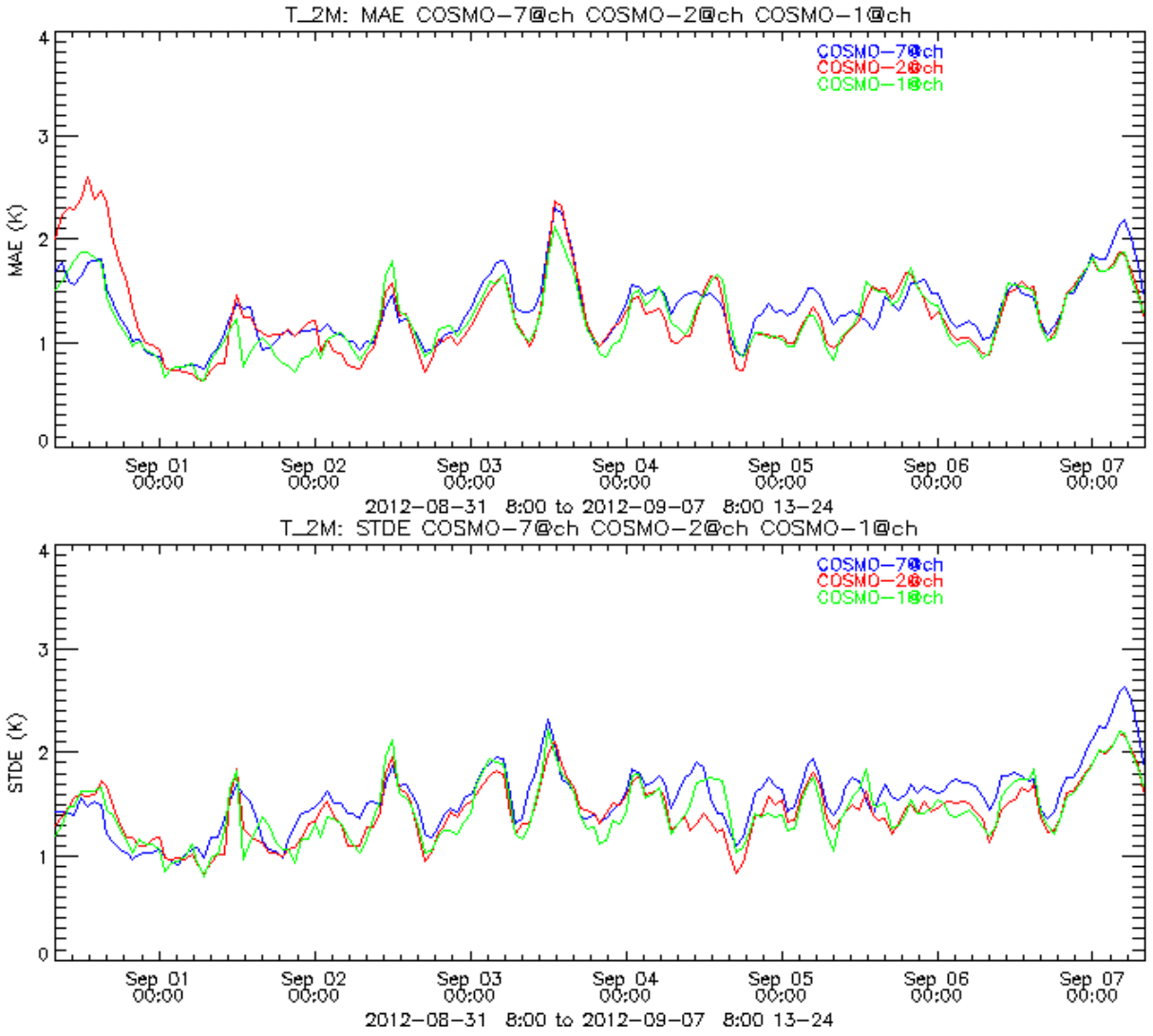
computed daily, see poster at the registration



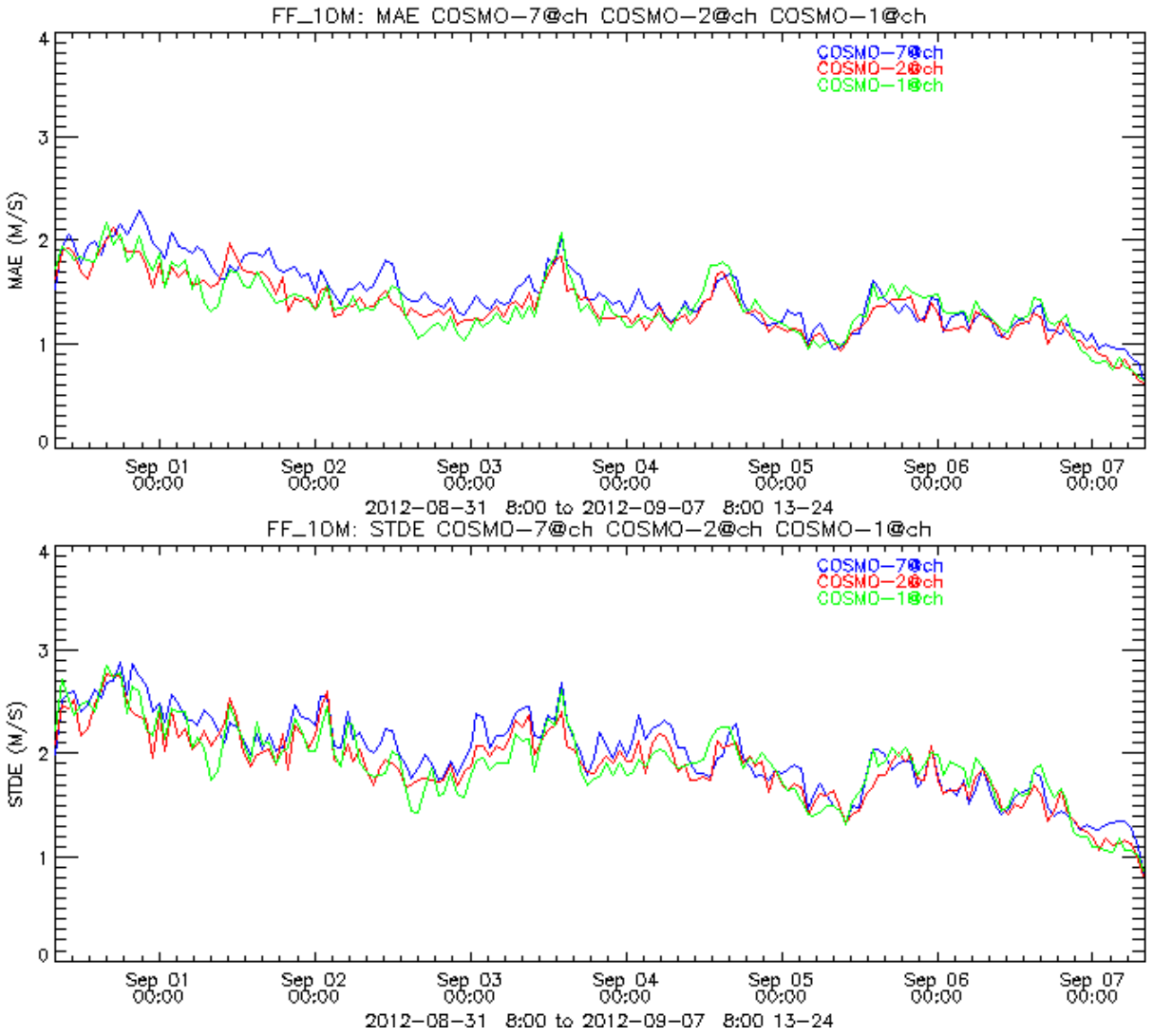
COSMO-1 monitoring: pressure



COSMO-1 monitoring: T2m



COSMO-1 monitoring: wind speed



COSMO-NExT and PP CORSO

Interest in 1km mesh-size COSMO:

- Roshydromet: Sochi-2014
- MeteoSwiss: COSMO-1
- ARPA-SIMC
- ARPA-Piemonte
- …

How can we collaborate and exchange our experiences?

- COSMO: PP CORSO, CGM, CUS, …
- Invitation by COSMO-NExT: myCOSMO-NExT

myCOSMO-NExT: Idea

Regular runs

You are **routinely provided** with **quasi real-time COSMO-1** test runs as well as COSMO-2 runs for reference. **You are then invited to look at (some of) the COSMO-1 runs and provide feedback to the COSMO-NExT project core team.**

myCOSMO-NExT: Idea

Cases / phenomena

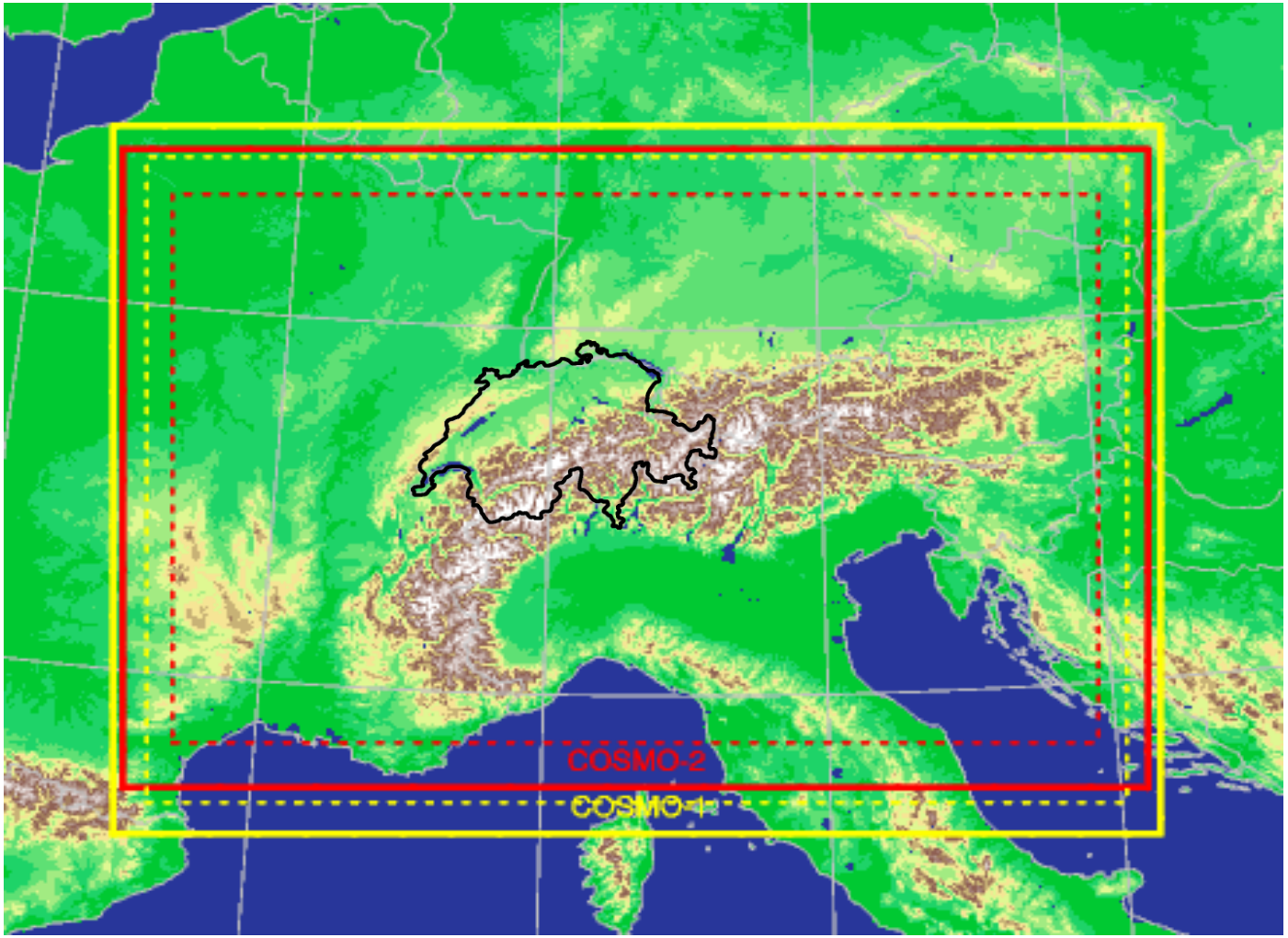
You may define **your case(s) and/or meteorological phenomenon of interest** and will then **receive** a **COSMO-1** run with the latest COSMO-1 test version for your case(s) / phenomenon upon every major update in the modelling system. COSMO-2 runs for the same test cases will also be provided. - **You are then invited to analyse your case(s) and provide feedback to the COSMO-NExT project core team.**

myCOSMO-NExT: Setup

- We will put the data of your preference on your ftp-server. – Start: early 2013.
- Discussion and exchange of experience
  - We will assign a contact person of the COSMO-NExT project core team for each weather phenomenon / participating group.
  - Documentation of findings on public wiki pages.
  - CGM, CUS, dedicated workshops, …
- …

→ Next step: Let me know in case you are interested!

COSMO-1 Domain



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