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Plans of MeteoSwiss for 2012-2015:

COSMO-NExT

Marco Arpagaus

Swiss COSMO User Workshop, 17 January 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

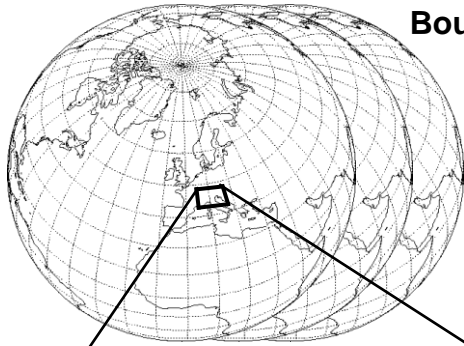
- Enabled by decision to implement national **HPCN Strategy**
 - Funding of MeteoSwiss HPC system at CSCS
 - Funding of necessary adaptation of COSMO software to future HPC architectures (HP2C initiative)

→ **Novel Expert Tools (NExT)**

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

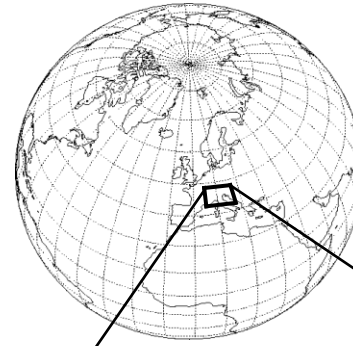
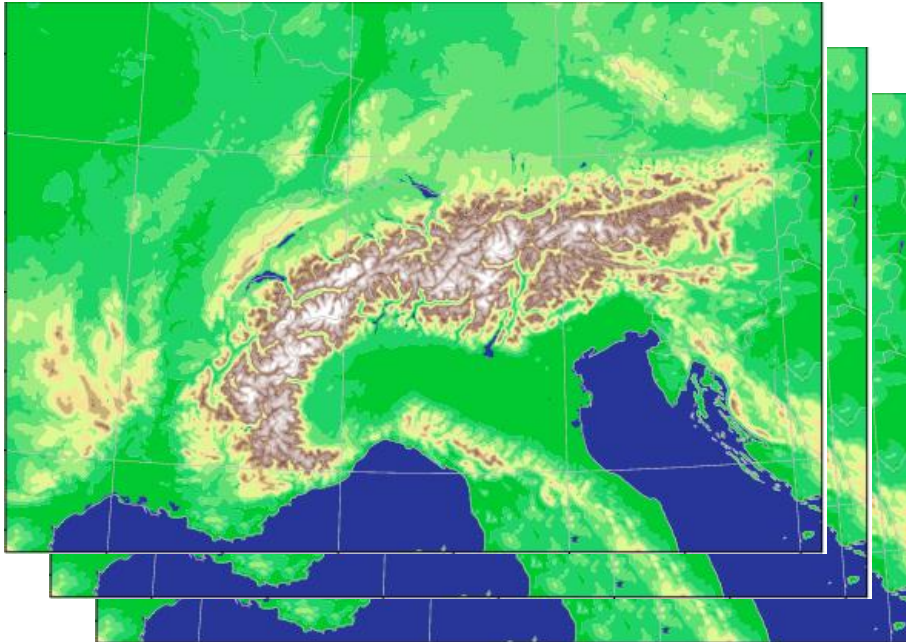


Novel Expert Tools



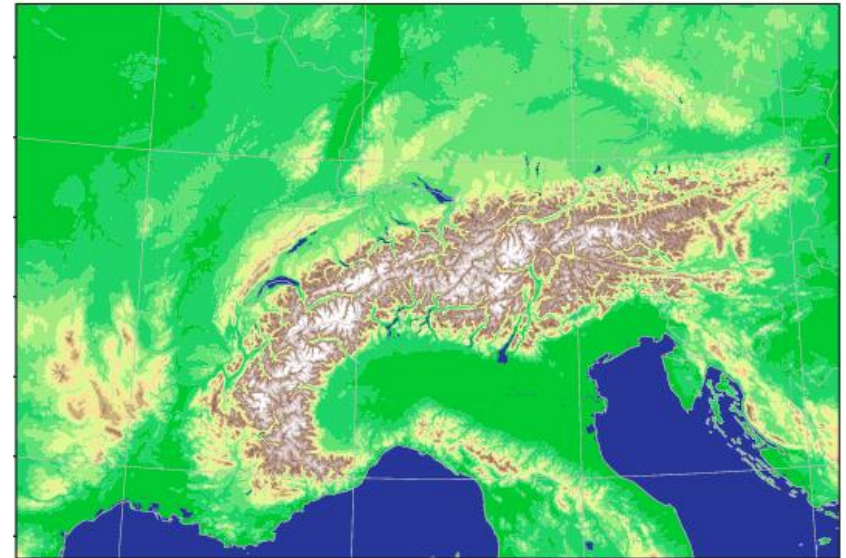
Boundary conditions: VarEPS
20km
2x daily

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



Boundary conditions: IFS
10km
4x daily

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





Challenges

- **Ensemble-based data assimilation system (KENDA)**
 - ...
- **COSMO-1**
 - Numerically stable and accurate forecasts with minimally filtered orography (1 km mesh-size)
 - (Full) Exploitation of increased horizontal (and vertical) resolution
 - External parameters / lower boundary conditions (soil, etc)
 - Adapted physical parameterisations; change from 1D to (quasi-) 3D where needed
 - ...



Challenges

- **COSMO-E**
 - Initial conditions; IC perturbations
 - Lateral boundary conditions; LBC perturbations
 - Model errors; model perturbations
 - New probabilistic products
 - ...
- **Infrastructure**
 - ...



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)



Project COSMO-NExT: Mission statement(s)

- «**COSMO goes ensemble**»
 - in-line with COSMO Science Plan
 - making best use of experience at DWD
 - preparing for the probabilistic future
- «**COSMO goes kilometre**»
 - pushing ahead the (operational) resolution frontier
 - develop and maintain specific know-how for state-of-the-art modelling over complex topography
- «**COSMO goes massively parallel (and/or GPU)**»



Project COSMO-NExT: Your contribution is most welcome!

The project has just started ... – there are plenty of open issues to be tackled.

→ Add your questions / feedback / input now (or even better: continuously)!

Thank you.