Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Eidgenössisches Departement des Innern EDI
Bundesamt für Meteorologie und Klimatologie MeteoSchweiz

Perturbations of lateral boundary conditions for a future COSMO EPS

Presentation Swiss COSMO User Workshop

Introduction

- Atmosphere & Climate Sciences at ETH
- Master's thesis embedded within project COSMO-NExT at MeteoSwiss:
  - Compare 3 different methods to construct lateral boundary perturbations for the future high-res EPS (COSMO-E)

    -> Differences in the development of ensemble spread over time and space?

- Analysis based upon specific case studies:
  - Different synoptic forcings

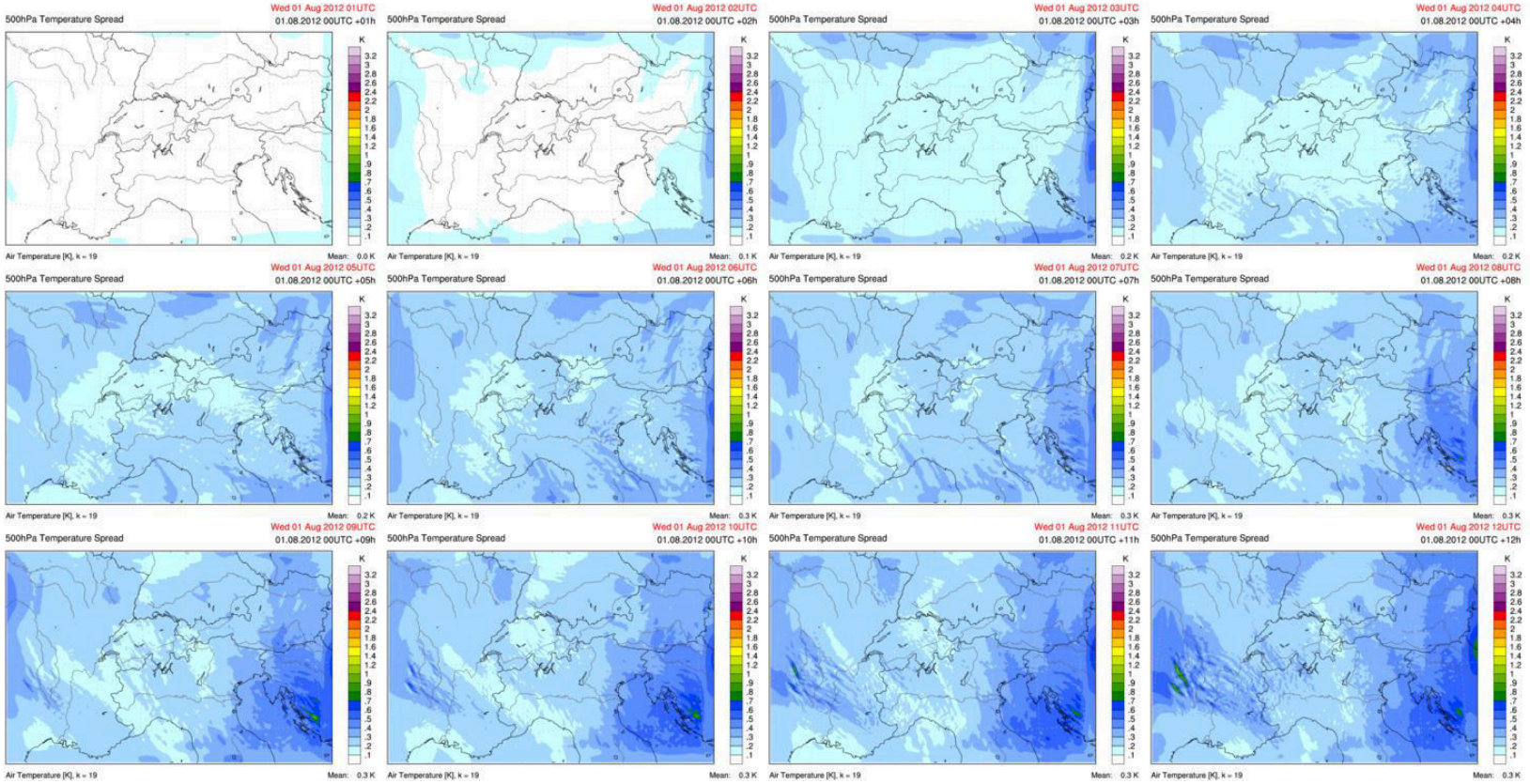
Approach

- Identical IC for each member
- LBC: $X^{j}_{k+1,i} = \underbrace{\bar{X}_{k+1,i}}_{\text{mean}} + \underbrace{\Delta X^{j}_{k+1,i}}_{\text{perturbation}}$

gridpoint i, member j, time k+1

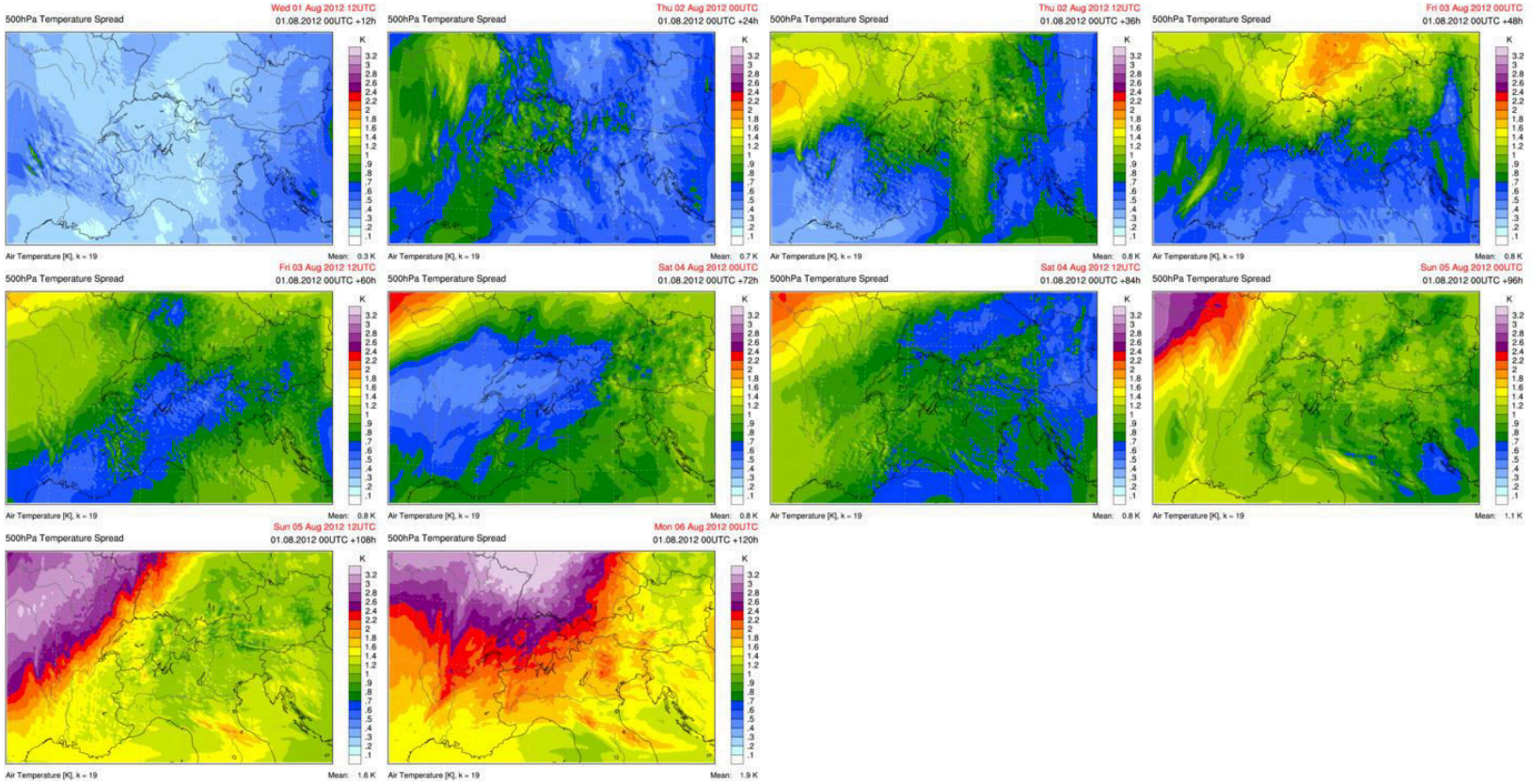
- Method 1: Simple downscaling of EPS
  - Mean and perturbation from global EPS (ECMWF, ca. 30km)
- Method 2:
  - Mean from deterministic global model (ECMWF, 16km)
  - Perturbation from global EPS (ECMWF, ca. 30km)
- Method 3:
  - Mean from deterministic global model (ECMWF, 16km)
  - Perturbation from climatology (ECMWF, 16km or COSMO-7, 6.6km)

First results



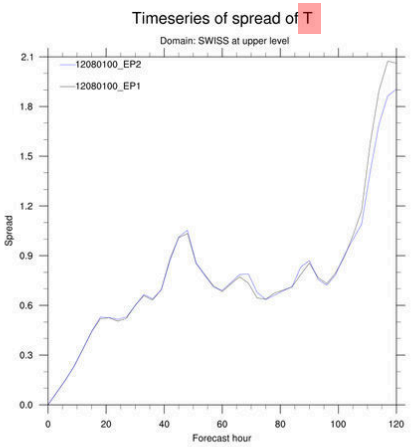
Temperature spread 500hPa (fcst 1h-12h), case 1, method 1

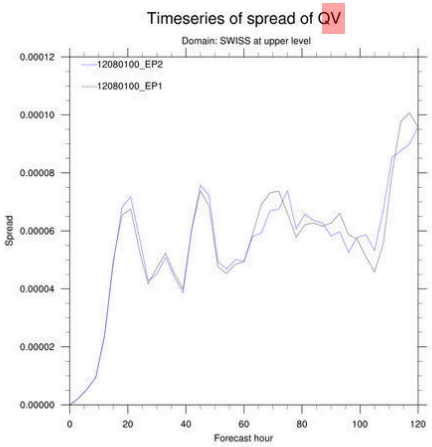
First results

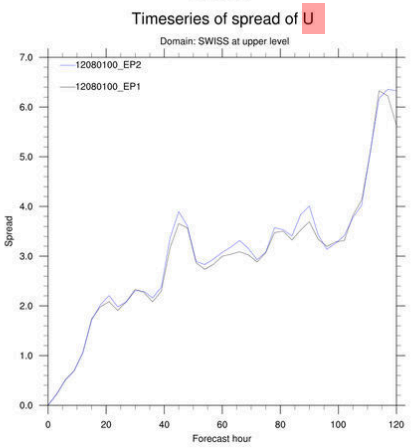


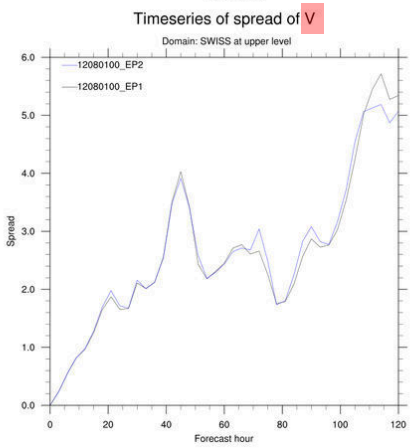
Temperature spread 500hPa (fcst 12h-120h), case 1, method 1

First results







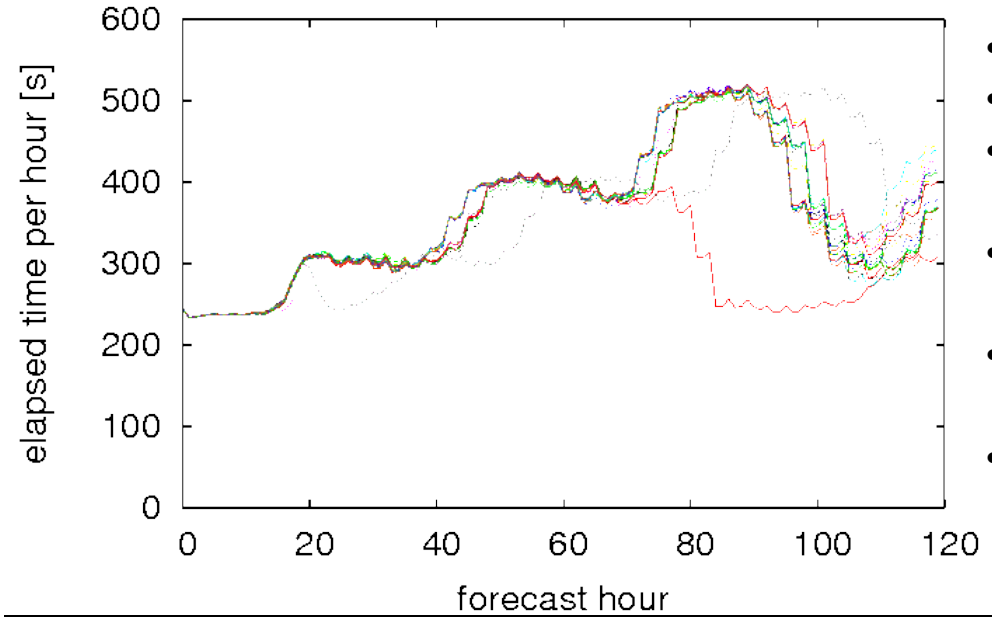


Only small differences between method 1 and 2

- Also after longer lead time

Experiences

- Experiments need longer than expected:
  - 21 ensemble members → ~12h on 21x6 nodes (on lema)
  - post-processing ~7h
- Interference between different ensemble members?



- all member started together
- expected elapsed time: 8h
- about 240s per fcst hour for the first hours
- slow down afterwards (correlated)
- timings show strong increase in communication
- related to interconnect overload?