WG7 - COTEKINO

Chiara Marsigli

ARPA Emilia-Romagna – SIMC, Bologna, Italy

Outline

- WG7 review
  - COSMO-DE-EPS
  - COSMO-E
  - COSMO-IT-EPS
  - COSMO-Ru2-EPS
  - Polish ensemble
  - COSMO-ME-EPS
  - COSMO-LEPS (next talk)
- COTEKINO Priority Project
  - Project ended
  - SPPT results presented in former meetings
  - Results from the soil/surface perturbation task in next talks
  - Technical Report will be prepared

COSMO-DE-EPS operational set-up & changes since last COSMO GM

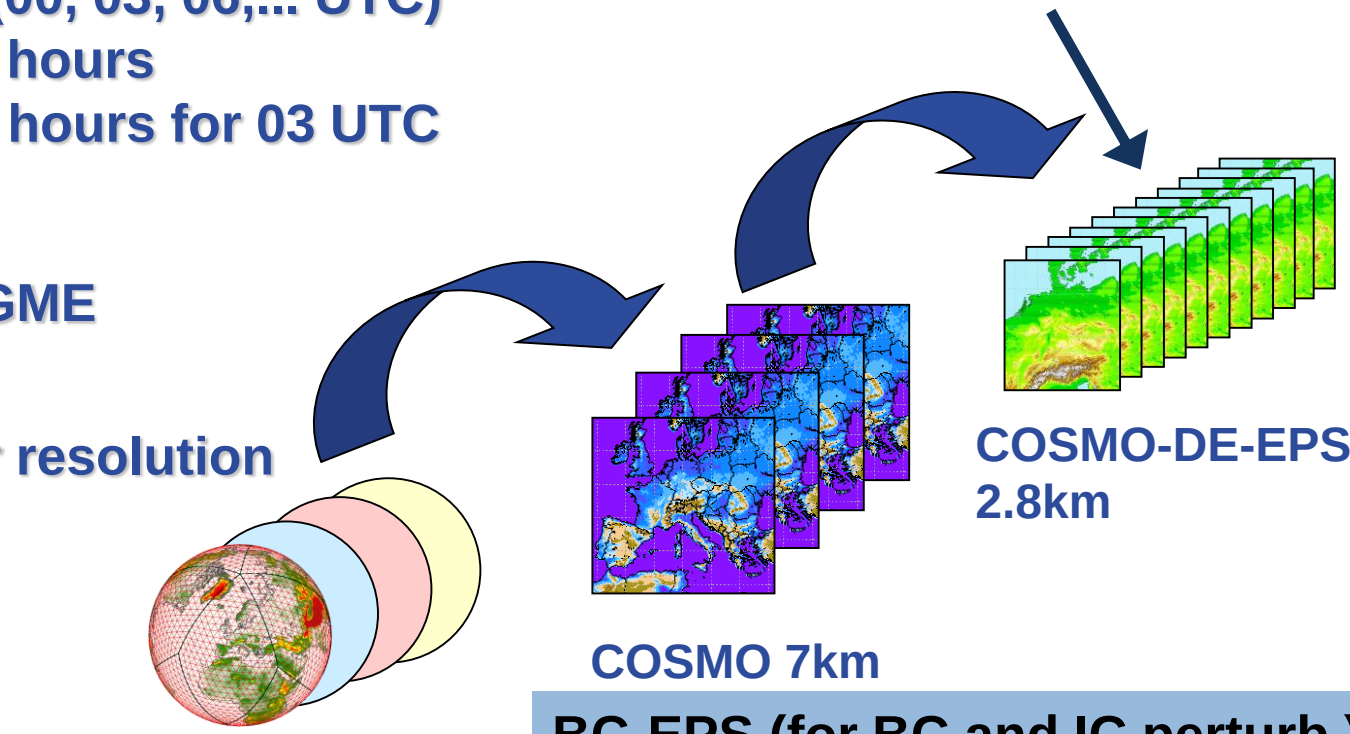
➔ 20 members, grid size: 2.8 km

➔ 8 starts per day (00, 03, 06,... UTC)
lead time: 0 - 27 hours
0 - 45 hours for 03 UTC

perturbation of model physics (non-stochastic) and soil moisture

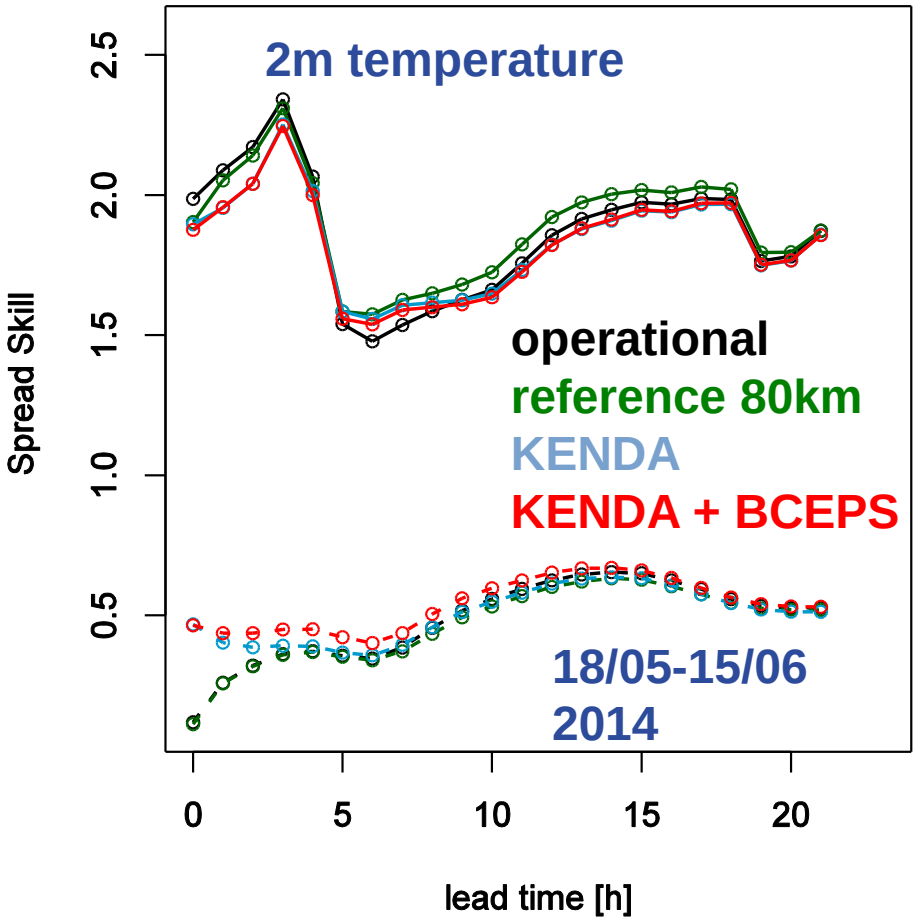
➔ ICON replaced GME (Jan. 2015)

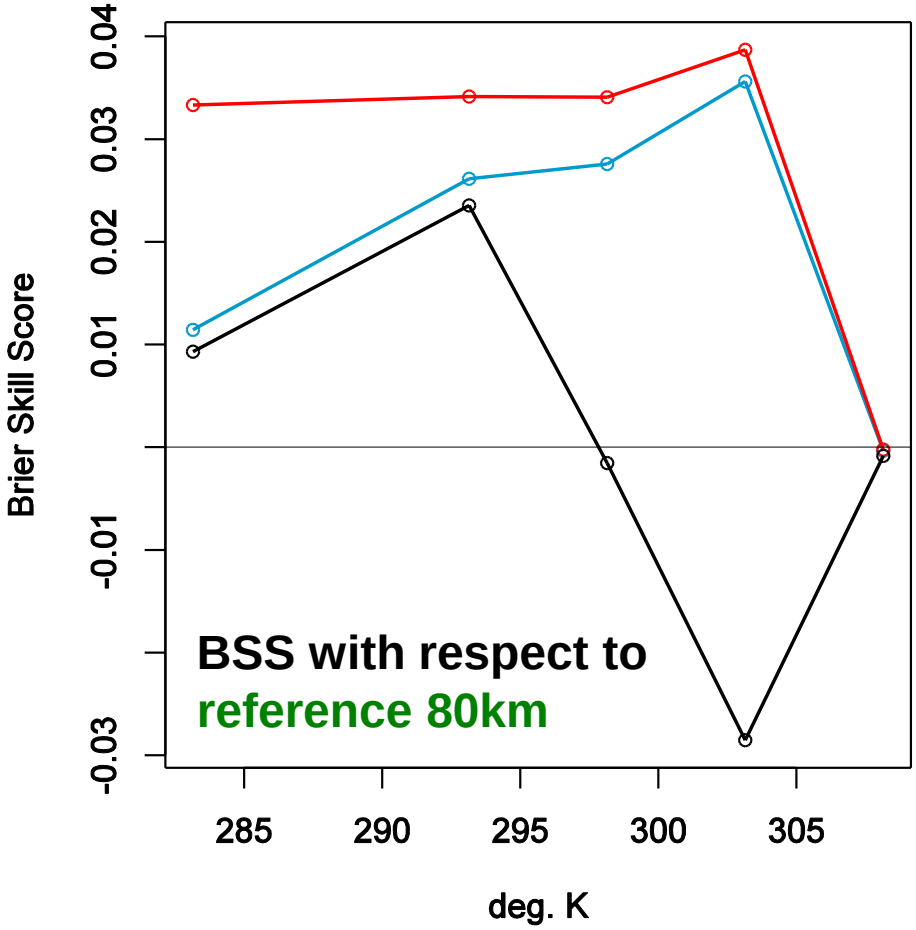
➔ GFS with higher resolution (Jan. 2015)



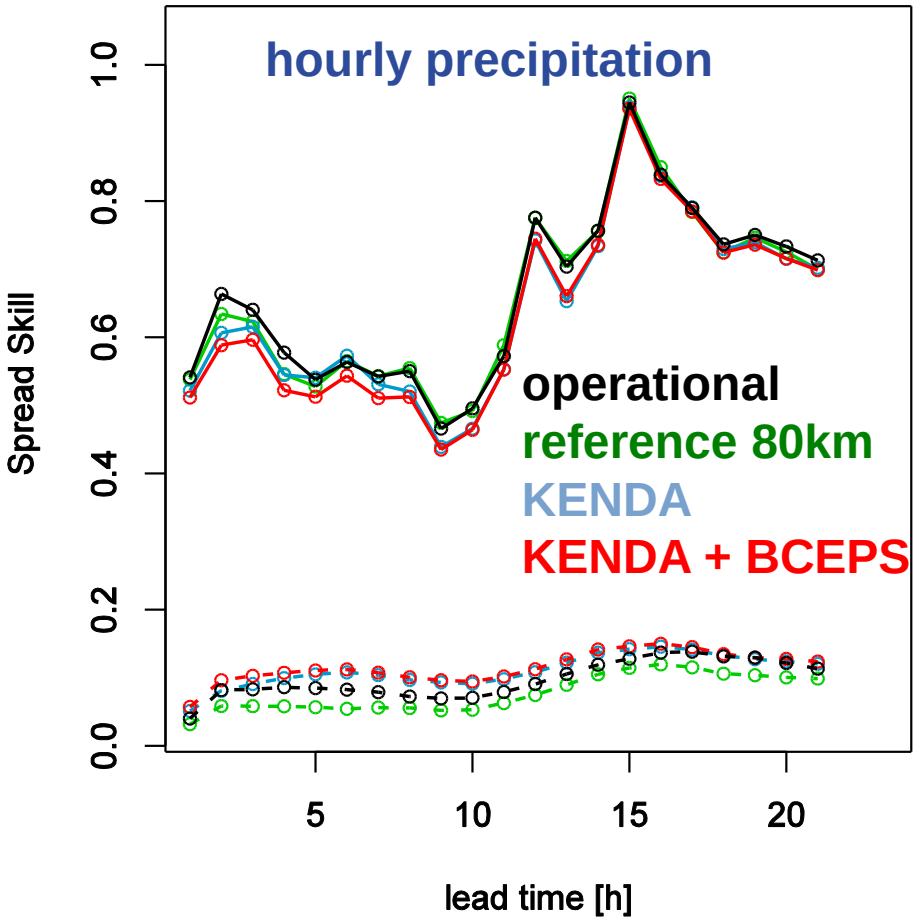
EWeLiNE

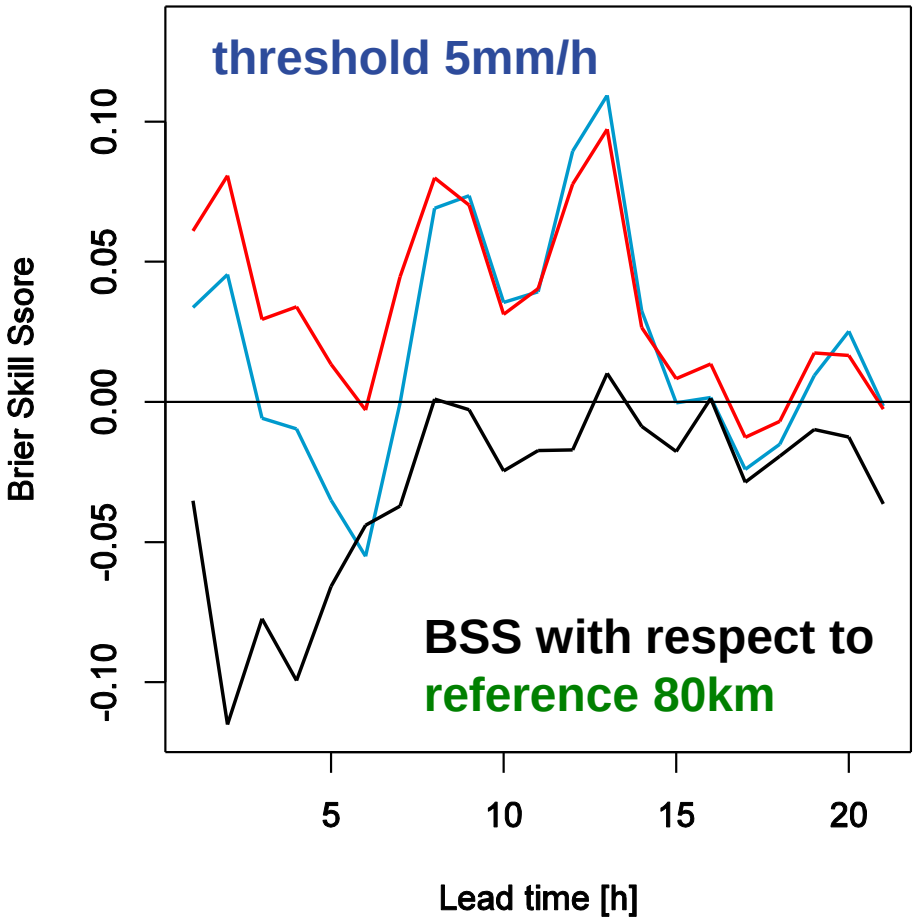
KENDA in COSMO-DE-EPS





KENDA in COSMO-DE-EPS





EM-scheme – a model for the model error (E. Machulskaya)

$$\frac{\partial \psi}{\partial t} = \left[\frac{\partial \psi}{\partial t}\right]_{\det} + \eta(t)\frac{\partial \eta}{\partial t} = -\gamma\eta + \gamma\lambda^2\nabla^2\eta + \sigma\xi(t)$$

ψ :prognostic variables (T, QV, U, V)

γ, λ and σ areweather-dependentandarederivedfrompastdata,

mostimportantpredictoris $\left|\frac{\mathrm{d}T}{\mathrm{d}t}\right|$

Upcoming changes

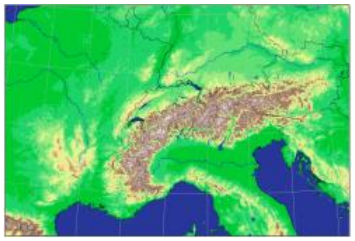
➔ KENDA operational (second half of 2016)

➔ COSMO-D2-EPS
with 2.2km, 65 levels, westward extension of domain
(second half of 2016)

➔ 40 members (2016/17)

➔ ICON-EPS as BC for COSMO-DE-EPS (not before 2017)

COSMO-E setup



- 21 members (control and 20 perturbed runs)
- convection-permitting resolution (2.2 km mesh-size, 60 levels)
- two forecasts per day (00 and 12 UTC)
- up to +120h for Alpine area
- initial condition (perturbations): KENDA assimilation cycle
  - KENDA ensemble mean for control
  - KENDA members 1-20 (out of 40)
- lateral boundary condition (perturbations): IFS-ENS 18 & 06 UTC:
  - IFS-ENS control for control
  - IFS-ENS members 1-20 (out of 50)
- model uncertainty: SPPT
- COSMO version 5.0+/GPU using single precision

COSMO-E

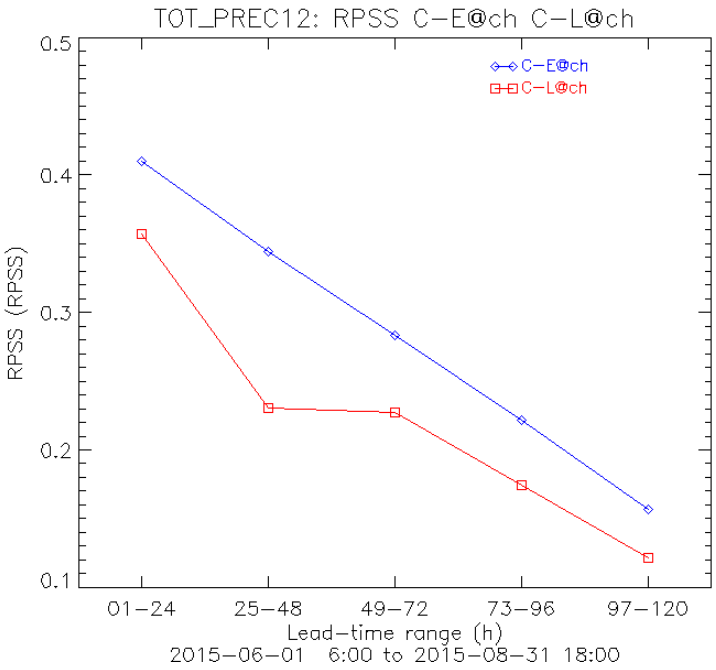
performance against COSMO-LEPS
Summer 2015, all lead times, Swiss

Parameter	RPS(S)	Outliers	Spread/ Error	Resolution Thrs1	Resolution Thrs2
T 2m	☑	☑	☑	☑	☑
Td 2m	☒	☒	☒	☑	☑
ff 10m	☑	☑	☑	☑	☑
Prec 12h	☑	☑	☑	☑	☑
Prec 1h	☑	☑	☑	☑	☑
Gusts	☑	☑	☑	☑	☑

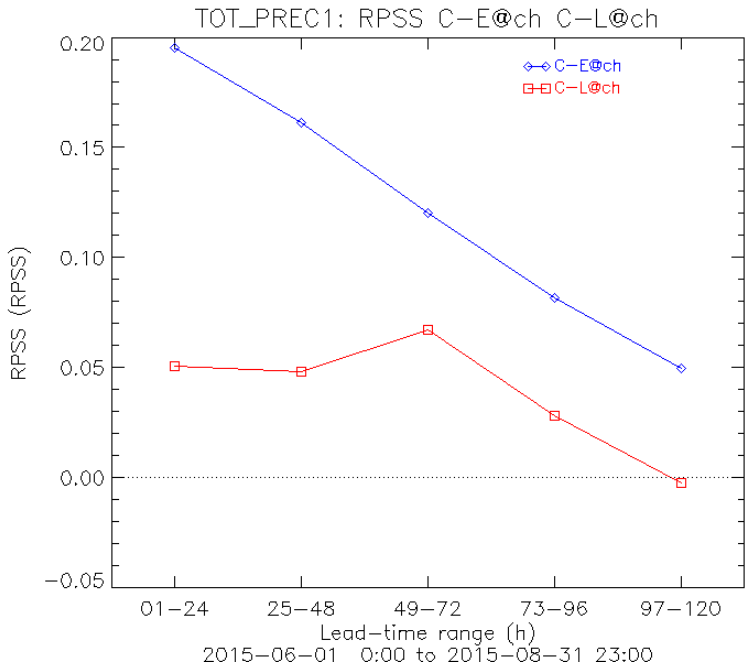
RPSS, JJA 2015

COSMO-E
COSMO-LEPS

12h precipitation



hourly precipitation



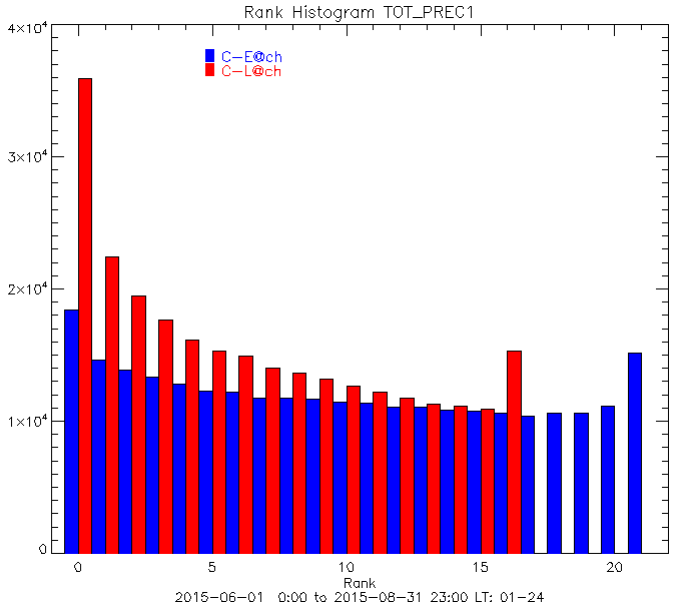
Thresholds: 0.1, 1, 2, 5, 10, 20, 30, 50mm

- skill until end of forecast range
- COSMO-E clearly outperforms COSMO-LEPS for Swiss domain

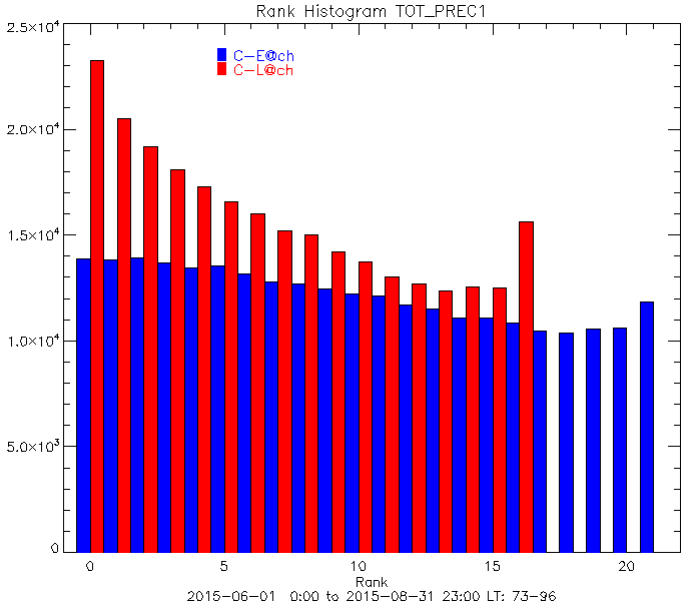
Rank histograms, 1h precip, JJA 2015

COSMO-E
COSMO-LEPS

Swiss, +1-24h



Swiss, +73-96h



- COSMO-E shows quite nice, flat distribution, while the COSMO-LEPS distribution is somewhat tilted

CONSORTIUM FOR SMALL SCALE MODELING

COSMO

arpa
agenzia
regionale
prevenzione e
ambiente dell'emilia-romagna

Thank you for your attention