AEMET-γ-SREPS: CONVECTION-PERMITTING EPS

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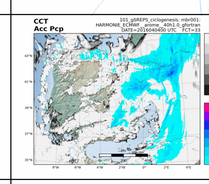
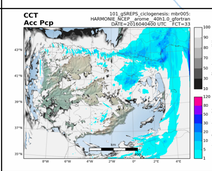
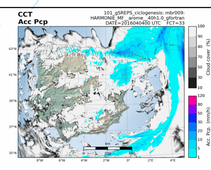
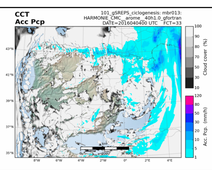
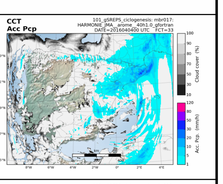
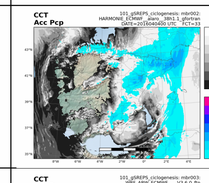
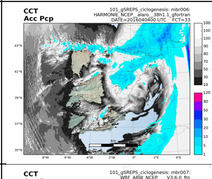
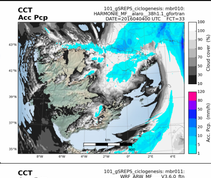
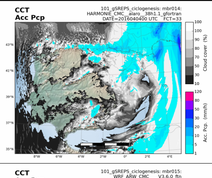
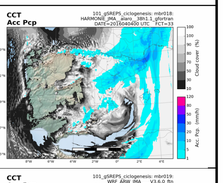
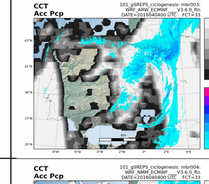
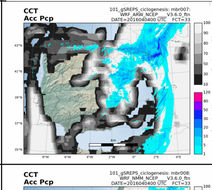
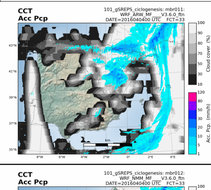
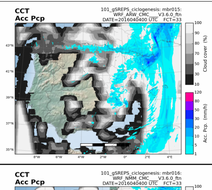
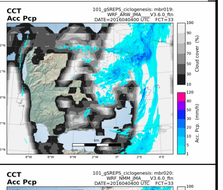
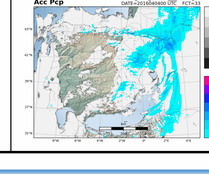
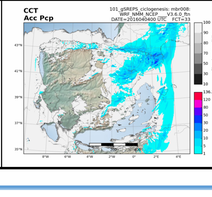
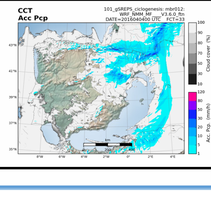
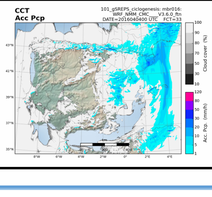
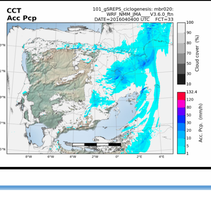
EPISODE I — AEMET-γ-SREPS

MULTI-BCS / MULTI-NWP	ECMWF / IFS	NCEP / GFS	MF / ARPÈGE	CMC / GEM	JMA / GSM
HARMONIE-AROME					
HARMONIE-ALARO					
WRF ARW					
NMMB					

CHARACTERISTICS

- 2,5 km 20-members convection-permitting LAM-EPS
- Multi-boundary conditions from 5 Global NWP models
- Multi-model with 4 non-hydrostatic NWP models

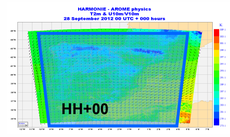
GOALS

Mesoscale forecasts but estimating uncertainties for:

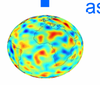
- Heavy precipitation events
- Convection organization
- Orographic effects: e.g. enhancement of precipitation
- Local surface with social impact variables: T2m, RH2m, Winds, etc.

UNCERTAINTY SOURCES

1 INITIAL CONDITIONS

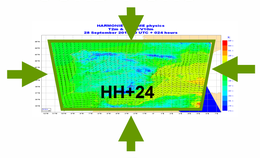


LETKF assimilation



* 2016-apr As MultiBCs

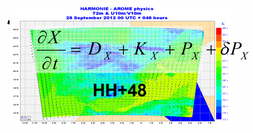
2 BOUNDARY CONDITIONS



Multi-BCs

- **ECMWF** – IFS
- **NCEP** – GFS
- **MétéoFrance** – ARPÈGE
- **CMC** – GEM
- **JMA** - JMA (Japanese)

3 MODEL *ERROR*



- **Multi-model + SPPT**
  - **HARMONIE-AROME**
  - **HARMONIE-ALARO**
  - **WRF-ARW**
  - **NMMB**

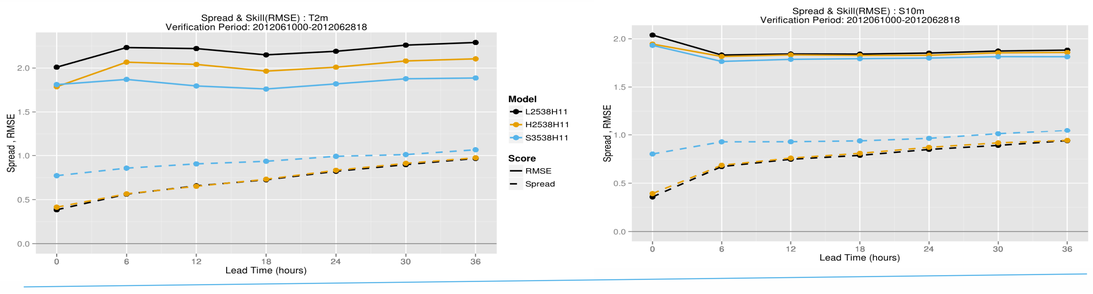
* 2016-apr SPPT not yet.

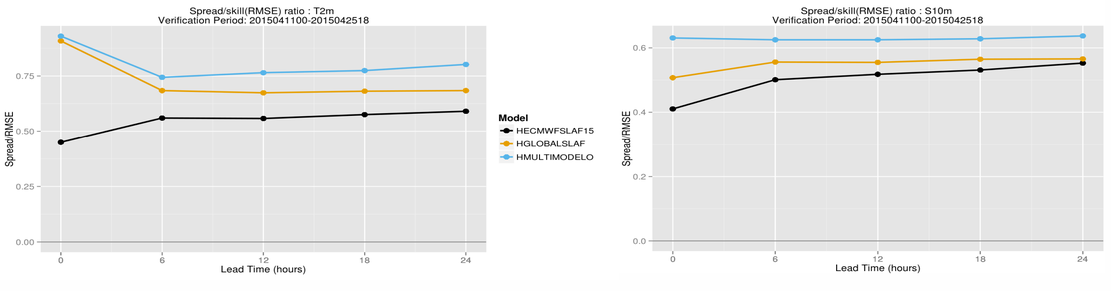
EPISODE II — TOWARDS MULTI-BOUNDARIES AND MULTI-NWP MODELS

MULTI-BOUNDARIES THE BEST

SLAF with ECMWF deterministic performs better than ECMWF-EPS as boundaries

SLAF with ECMWF-DET (16 km) ECMWF-EPS (16 km) ECMWF-EPS (32km)

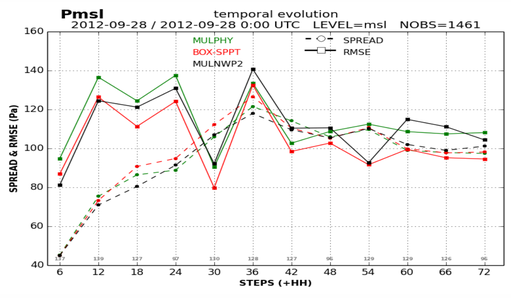


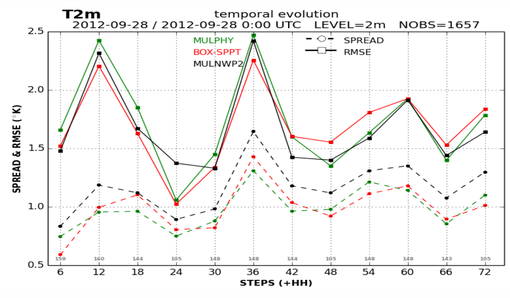


Multi-boundaries performs better than SLAF with ECMWF-DET

Multi-boundaries SLAF with ECMWF-DET SLAF with multi-boundaries

MULTI-MODEL IS BETTER THAN MULTI-PHYSICS AND SPPT

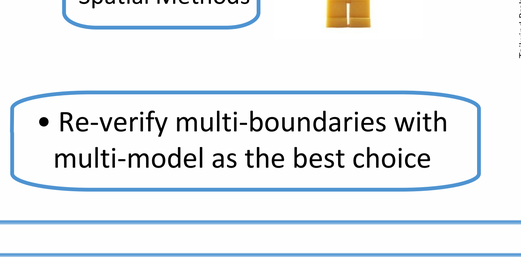


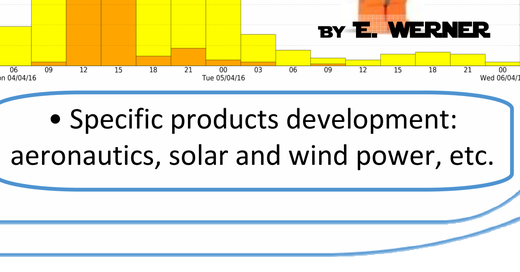


Multi-model ➔ HARMONIE-AROME + WRF-NMM

Multi-physics ➔ AROME and ALARO (HARMONIE)

SPPT ➔ Applied to HARMONIE-AROME





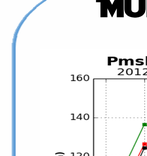
EPISODE III — AEMET-γ-SREPS APRIL-2016

TOWARDS OPERATIONS

- Currently daily running at 00 and 12 UTC up to 36 hours, but without assimilation

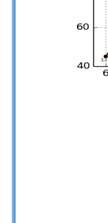
- Subjective (plots) and objective verification of each member
- Monitoring through EcFlow
- Probabilistic verification

EPISODE IV — THE FUTURE



Running every 6 hours up to 48-72 hours operationally

Combining multi-model, SPPT and surface flows perturbations



Assimilation with LETKF

Verification with Spatial Methods

- Re-verify multi-boundaries with multi-model as the best choice

- Specific products development: aeronautics, solar and wind power, etc.

MAY THE $-2m\Omega \times v \; -m\nabla_p \Phi$ BE WITH YOU.