41th EWGLAM & 26th SRNWP Meetings, 30th Sep.-3th Oct. 2019 Sofia (Bulgaria)

NWP Activities at AEMET (Spain)

HARMONIE-AROME v40h1.1 is a Regular Cycle of Reference, RCR, used by HIRLAM Consortium to monitor the quality of the reference system:

- 2.5 km runs 8 times per day with a forecast length of 48 hours for 2 geographical domains (Iberian Peninsula and Canary Islands).
- ALADIN NRT dynamics and 1-hr boundaries from ECMWF
- 3DVar analysis with 3hr cycle incl. radar reflectivities, ATOVs, and GNSS obs.
- Surface data assimilation with optimal interpolation.
- AROME physics: Explicit deep convection, SURFEX and 2I3C microphysics
- Unified scheme for shallow convection (EDFMH)

Run in BULL-ATOS supercomputer 7760 processors with hypertexting

Mayoral updates:

- Radar reflectivity using OPERA processing including Spanish, Portuguese and French radars
- Inclusion of humidity of the host model (ECMWF) in the blending process to form the First Guess
- Assimilation of T2m, q2m and wind in the 3Dvar
- Improvements in the GNSS and ATOVs blacklisting
- Increasing wind drag coefficient to enhance surface roughness

Sant Llorenç des Cardassar case on 9th October 2018. A very harmful case in the SE of Mallorca causing 12 casualties, 150 mm were measured in 2 hours. The phenomena has a very small scale and hydraulic effects played a major role in the impact of the rain. The prediction is much better in the new setup. Anyway the exact location is not well reproduced because the scale of the phenomena is far from the model effective resolution.

Use of near real time aerosol from CAMS in HARMONIE-AROME

- Microphysics: Modify Cloud Condensation Nuclei
- Radiation: Replace climatological vertical distributions of aerosols (Tegion) with impact on SW radiation

CAMS aerosol optical depth (left) on 21st Feb, 2017 and difference (CAMS-Tegion) of accumulated global SW radiation on the surface from HARMONIE-AROME simulation

Km and sub-km modelling (asubiaza, dsquarez@aemet.es)

- Test bed over the Canary Islands has been established.
- Technical problems have been solved and we are looking for the optimal dynamical configuration


Highlights

- Major update in the operational suite including:
  - Radar reflectivities from OPERA
  - Humidity from host model in the Large Scale mixing
  - Assimilation of T2m and RH2m in Upper Air analysis
  - Increase wind drag to decrease wind bias

- Convective scale EPS, gEPS, in pre-operational stage with positive feedback from operational forecasters.

- Under development:
  - Scatterometer assimilation: slightly positive impact
  - Mode-S EHS assimilation: Technically working
  - Improvement of DA algorithms: Variational Constrains and ELKF
  - Improvement of surface scheme: use of climatic integrations for validation
  - Use real time CAMS aerosols in the model has a significant impact in dust intrusions
  - Km and Sub-km modelling: Canary Islands Test Bed established (working)
  - Test to simulate MSG SEVIRI imagery from HARMONIE-AROME forecasts, using RTTOV v12 radiative transfer model
  - Use of ECMWF’s SAPP pre-processing software: Conventional obs implemented