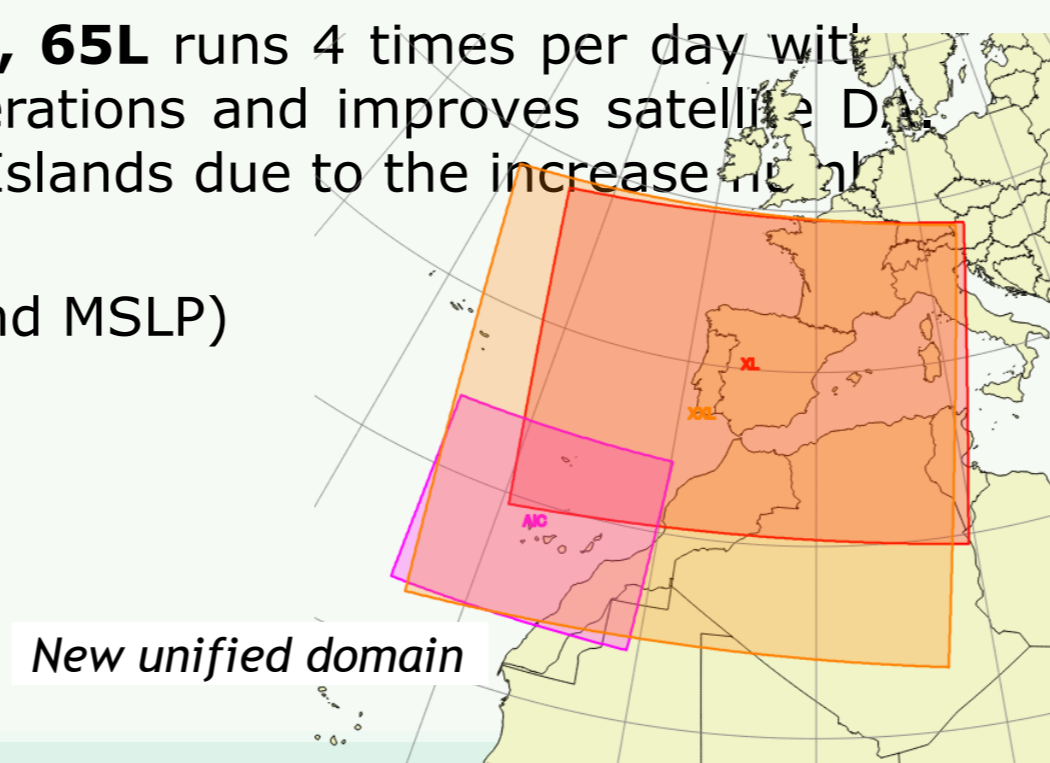


- Deterministic operational suite based on **cycle 43h2.1 2.5 km, 65L** runs 4 times per day with a forecast length of 72 hours for 2 domains (Iberian Peninsula and Canary Islands). **running on two domains up to 72 hours**
- SAPP preprocessing for conventional observations
- IFS humidity in the blending process (LSMIX). Assimilation of T2m and rh2m in 3DvarRadar reflectivity using OPERA from BALRAD preprocessing including Spanish, Portuguese and French radars.
- **3DVar analysis with 3hr cycle** incl. AMDAR humidity obs, radar reflectivities, ATOVS, GNSS ZTD, ASCAT wind, IASI and SEVIRI obs.

e-suite based on HARMONIE-AROME cycle 46h1.1.1:

- Running in real time and expected to enter in operations in June 2026. **2.5 km, 65L** runs 4 times per day with forecast length of 72 hour. A **single unified domain** is used what facilitates operations and improves satellite DA. Main impact is seen in upper air **RH and precipitation**, specially over the Canary Islands due to the increase in number of observations for this area.
- **Single precisión** in the forecast model produce a small degradation in RH field and MSLP
- **OPERA NIMBUS preprocessing and activate radar wind data** (*jsancheza@*)
- **Fine tuning of DA settings:** scales and observation errors ¹
- De Rooy scale aware shallow convection scheme ²
- CAMS climatological aerosols (*dmartinp@*)



Enhanced Satellite Data Assimilation in the e-suite (*mdiezm@*)

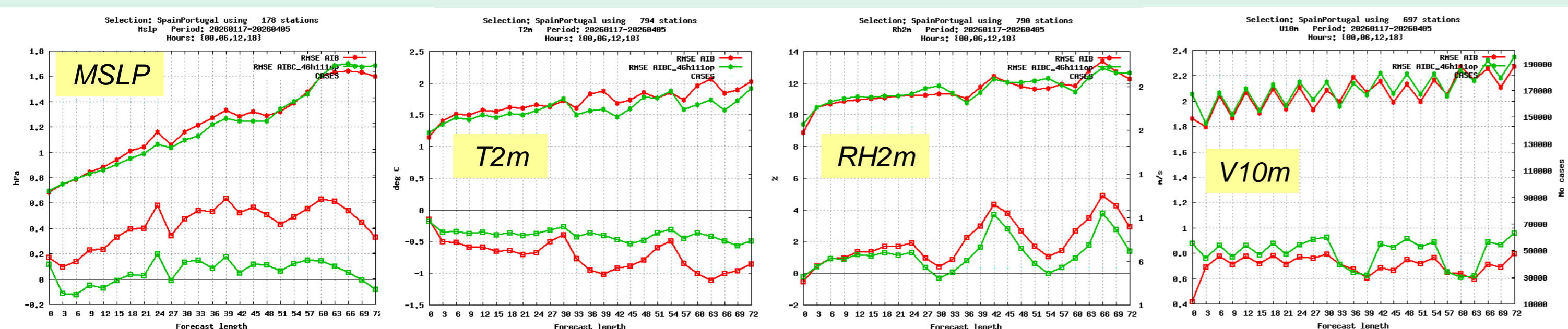
- New microwave instruments/satellites: **ATMS/Suomi-NPP**, NOAA-20 and 21, and **MWHS2/FY-3D and 3E**
- Low-peaking channels for AMSU-A and MHS
- New infrared instrument/satellite: **IASI/METOP-C**, **CrIS**/NOAA-20 and 21
- Changes in cloud detection scheme for IASI
- SEVIRI radiances, WV6.2 and WV7.3, at all cycles over sea and land
- AMSU-A and MHS from NOAA-18 and 19 are not longer assimilated
- The new system includes also change to GRIB2 output

SENSOR (SATELLITE)	00	03	06	09	12	15	18	21
AMSUA (METOP-B and C)				X	X			X
MHS (METOP-B and C)				X	X			X
ATMS (NPP, NOAA-20 & 21)								
MWHS2 (FY-3D)		X				X		
MWHS2 (FY-3E)			X				X	
IASI (METOP-B and C)				X	X			X
CrIS (NOAA-20 and 21)		X		X	X			X
SEVIRI (METEOSAT-10)	X	X	X	X	X	X	X	X

INFRARED Channels:
SEVIRI: WV6.2 and WV7.3
IASI: 28 for CO₂ and 25 for H₂O band
CrIS: 26 for CO₂ and 14 for H₂O band

MICROWAVE Channels:
AMSUA: 5-to-9
MHS: 3-to-5
ATMS: 7-to-10 and 19-to-22
MWHS2: 11-to-14

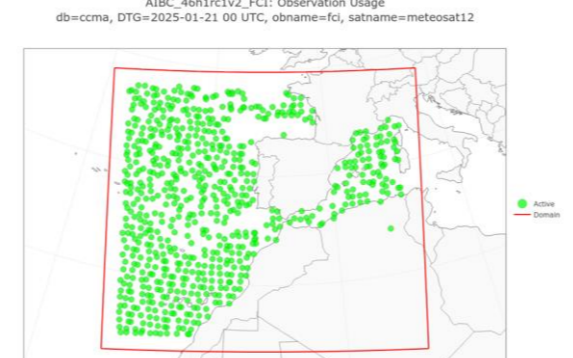
- **Impact** neutral to slightly positive (in green e-suite)



On-going tests to assimilate FCI from MTG (*mdiezm@*)

- Preliminary results show neutral to slightly positive

FCI use



Evident-ATOS-Bull High HPC

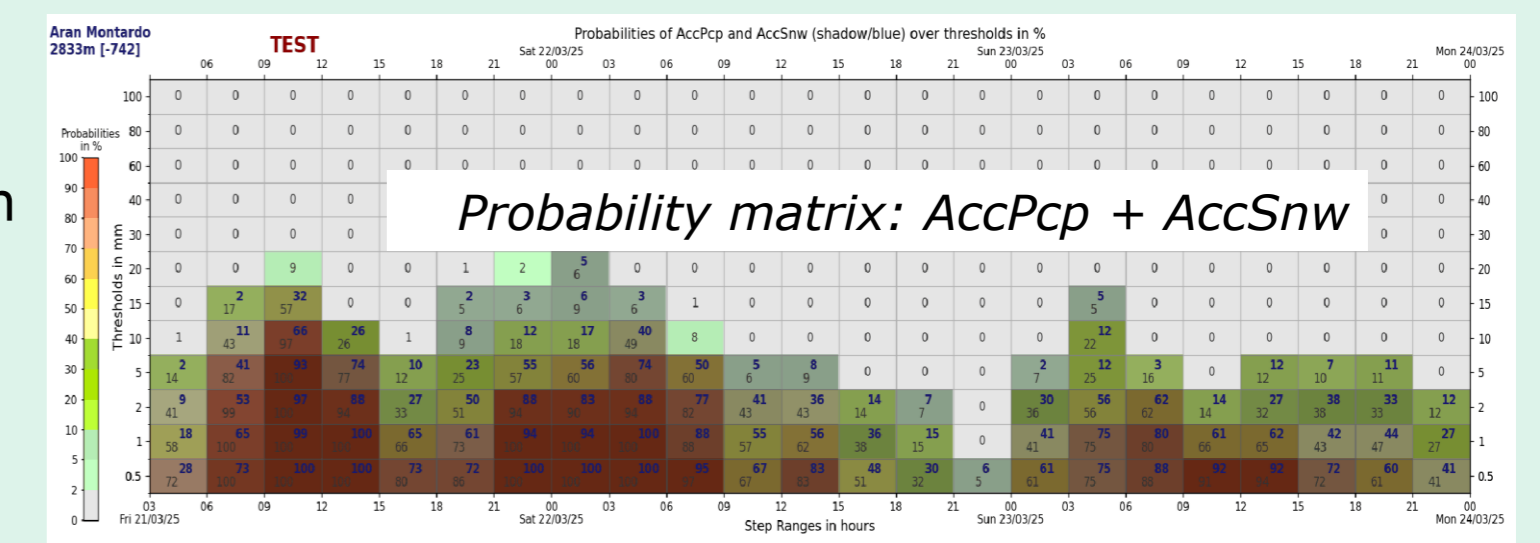
- It is composed of two identical clusters each with 188 compute nodes mounted on Bull Sequana X440 A5 chassis. Each node with
 - 2 AMD EPYC™7742 processors (64 cores)
 - 256 GB DDR4-3200 memory
 - 25% of the nodes with 384 GB
- On-going procurement for renewal of the HPC in 2026



AEMET-ysREPS

- Multi-model (4 mesoscale NWP models)
- Multi-boundary conditions (5 Global models)
- at 2.5 km on 3 domains: Iberian Peninsula, Canary Islands and Antarctica
- 2 cycles up to 72 hours each
- Running at ECMWF HPC expecting to enter TC2 in ...

Plans 2026:
Move to **harmEPS** system in a new HPC



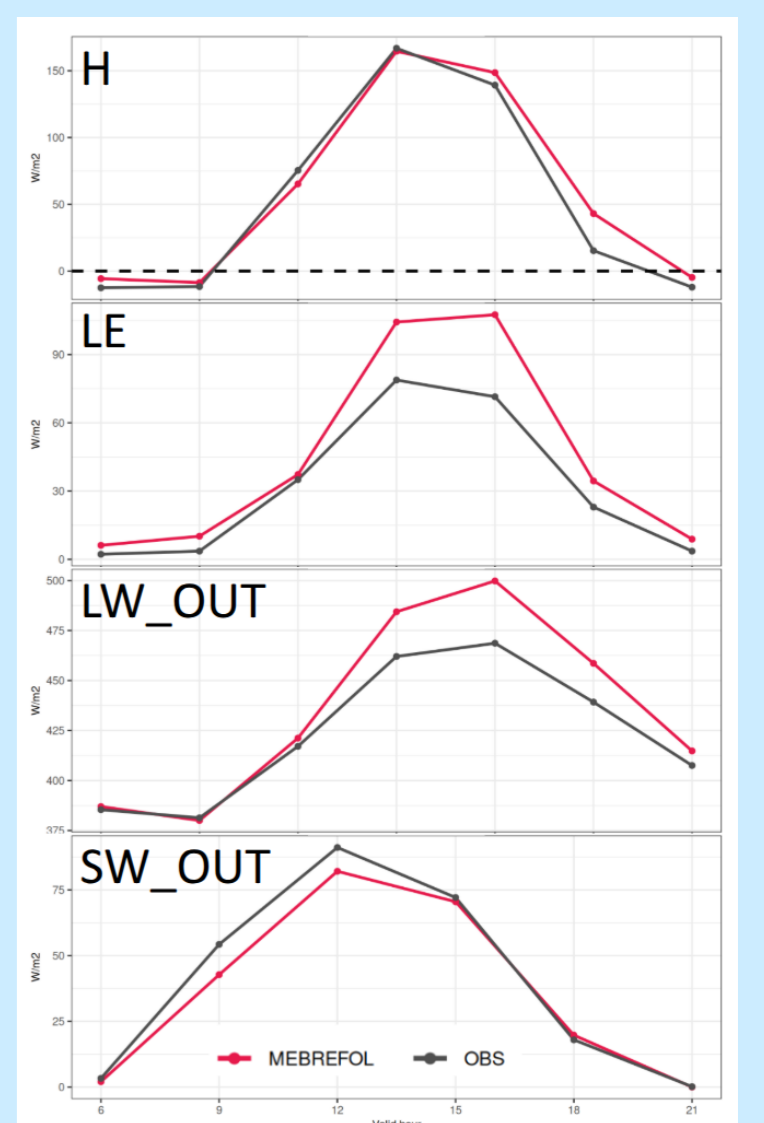
EPS activities
acallado@jgomezn@

Offline Surfex Validation System (OSVAS): A tool to provide a systematic approach for testing NWP-like SURFEX settings over specialized ICOS stations. Workflow:

1. Retrieve ICOS data & create forcing files
2. Retrieve ICOS observations for validation
3. Run SURFEX OFFLINE (PGD, PREP, OFFLINE)
4. Extract variables to validate from model output
5. Run HARP verification / validation tools
6. Visualize results (HARP's shiny apps)

OSVAS is **now fully operable** through python scripts and .yaml configuration files per Station
Code & step-by-step documentation available at:
<https://github.com/ACCORD-NWP/OSVAS>

Under development: Use of non-ICOS stations (Cabauw), use of soil variables (T,Q) for initialization and validation, force SEB closure in observations...

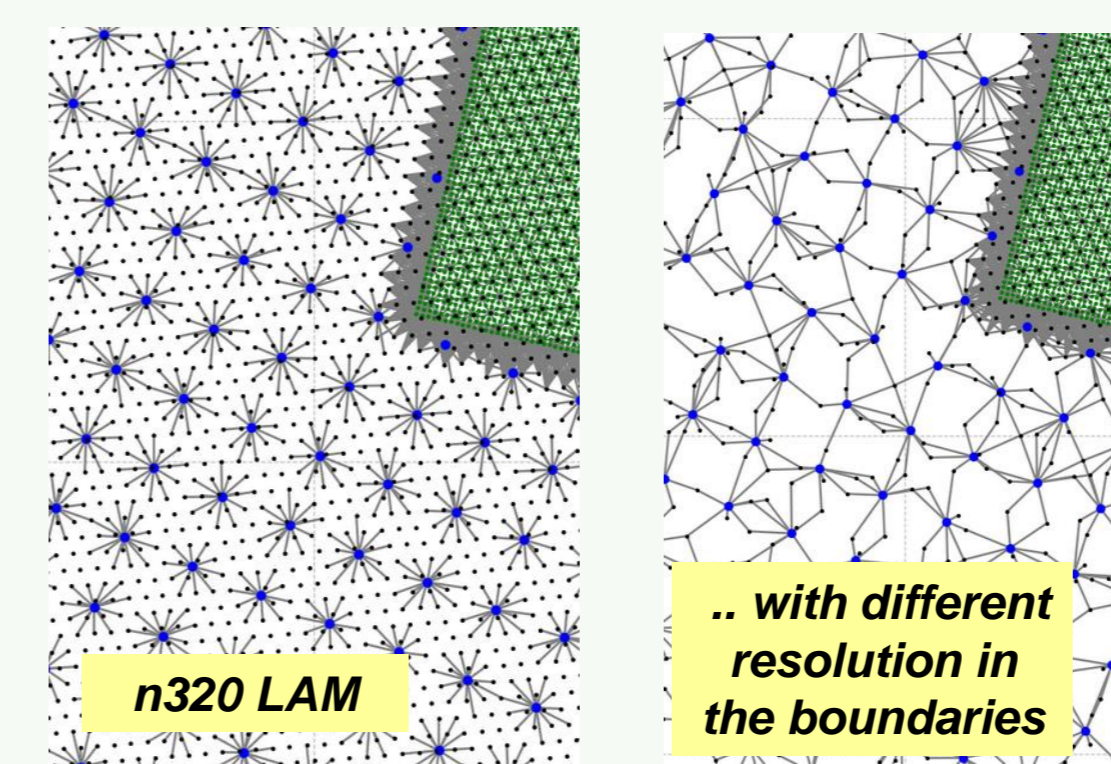


HARP verification showing average diurnal cycle of outgoing Surface Energy Balance components corresponding to a 12-month offline SURFEX simulation over Majadas del Tietar ICOS station in Spain

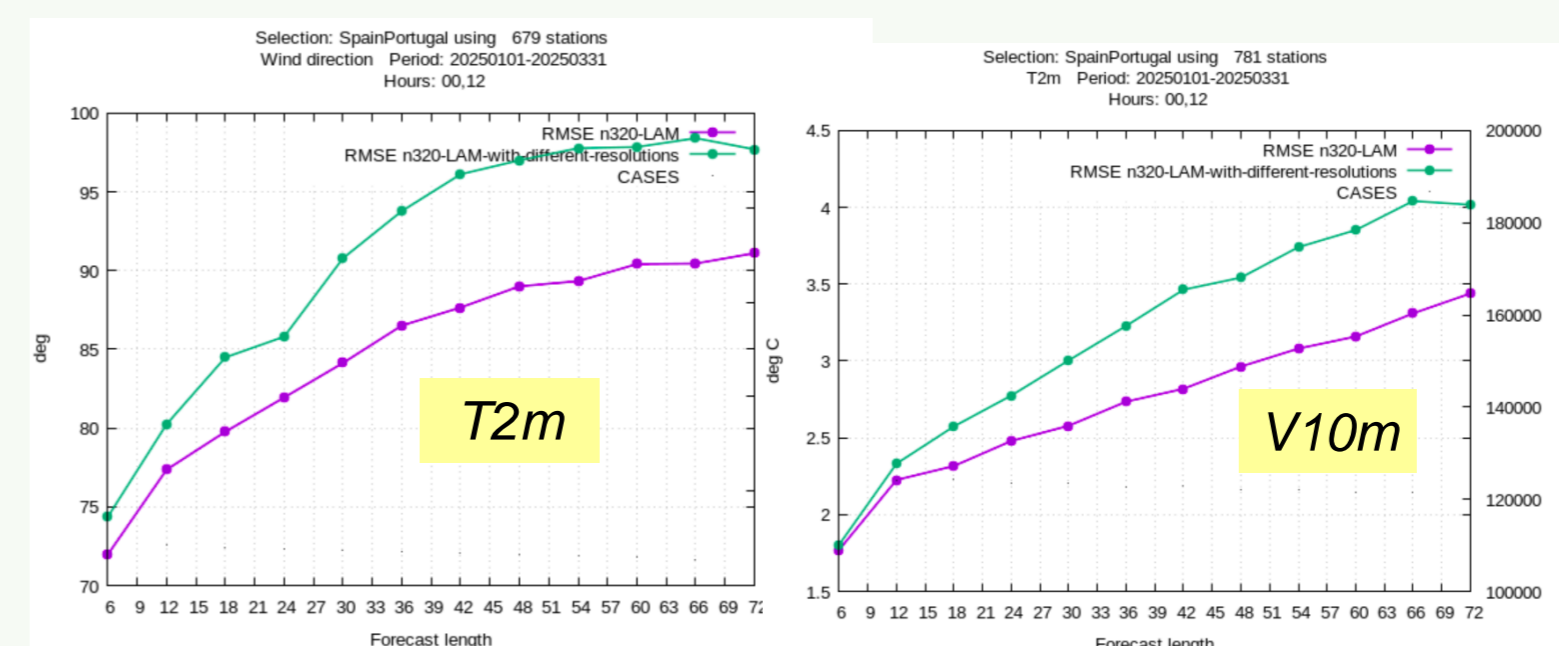
OSVAS: Surface Validation
svianaj@

LAM AI/ML modeling using LAM approach: Sensitivity to the boundary treatment

- We conducted experiments using data from the HARMONIE-AROME analysis combined with n320 ERA5 boundary conditions.
- Our objective is to assess the influence of the boundary when the hidden-mesh resolution is changed



- The **green nodes** represent HARMONIE-AROME data within the high-resolution domain.
- The **blue nodes** correspond to n320 ERA5 resolution (~0.25°) prescribed at the lateral boundary.
- The **black nodes** denote the **hidden mesh nodes**. In the n320 LAM configuration, the black nodes maintain uniform resolution both inside and outside the Iberian region, whereas in the n320 LAM with different resolutions configuration, the resolution varies spatially.

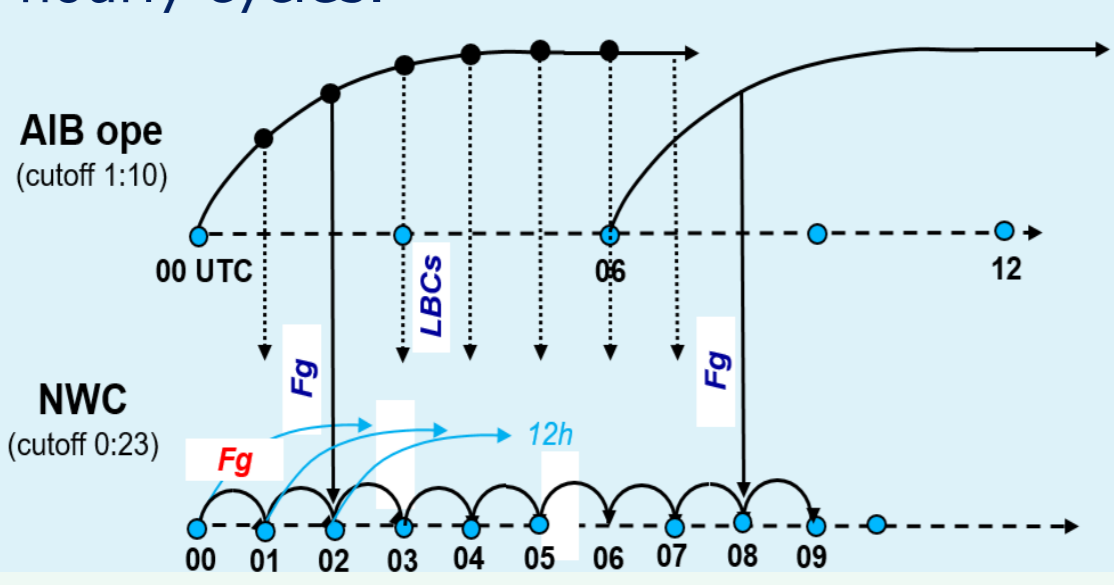


It is not possible to extract conclusions due to the small period used in the training but results seem to be sensitive to the treatment of the boundary conditions (work will continue)

AI/ML modeling using LAM approach

Nowcasting suite : H+12 with hourly cycles

- Running over the Iberian peninsula and Balearic Islands. Based on Harmonie-Arome cycle 43h2.1.1 with **1.25 km resolution**, Harmonie-Arome nesting, 3DVar hourly cycle with **+23 min cut-off time**. Using conventional observations + radar reflectivity + GNSS-ZTD (**fast processing**) + SEVIRI WV + **Mode-S**. H+12 in hourly cycles.

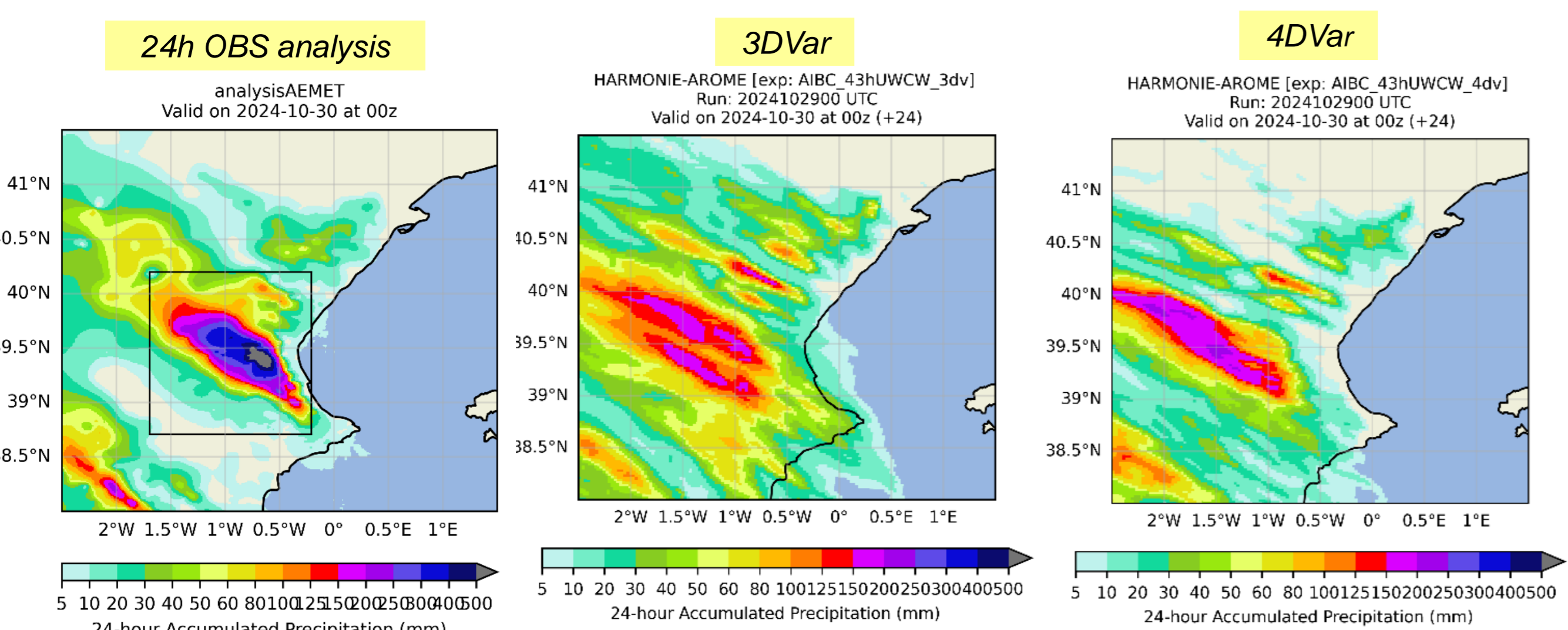


To benefit from the better obs coverage in the operational suite, every 6hr and H+2 First Guess from the host is used for upper air fields

Nowcasting suite

Comparison of 4DVAR with 3DVar (*jsancheza@, pescribaa@*)

- **Valencia flooding Case study (october 2024)** Experiments based on Cy43h2.1.1 with 3h cycle, over the big domain AIBC and using all the operational observations: conventional, radar, GNSS ZTD, and satellite AMSUA, ATOVS, ASCAT wind, IASI, SEVIRI
Radar, GNSS and SEVIRI assimilated hourly in 4DVar



Better extremes and spatial distribution are seen in 4DVar probably due to more frequent observations used and the flow dependent features of this scheme

Although the impact is small in terms of general statistical scores, added value is seen in case studies. Work will continue to assess if the extra cost of 4DVar can be assumed operationally
On-going work on OOPS version of 4DVar which is compared with MASTERODB: Currently, it is properly cycling in an operational domain and we are working in making possible to assimilate all available observations.

4DVar activities
pescribaa@jsancheza@

Highlights

- **E-suite based on Cy46h1** is running in real time with the aim to become operational soon in 2026. It uses a large unified domain including the Canary islands. The suite includes updates in the clear sky DA with several new satellites/channels as SEVIRI over land, ATMS, NWSH2 and CrIS. The updates give a small positive impact. The benefit is larger over the Canary Islands due to the increase number of observations. The update also includes moving to GRIB2 output.
- **EPS**. Multi-model and multi-boundaries approach is still used in operations. This system is freeze and work has started to build a system based on HARMONIE-AROME EPS with SPP and overlapping Windows.
- **Offline Surfex Validation System (OSVAS)**. A set of tools are available to facilitate the validation of Surface processes using data from ICOS station network.
- **AI/ML forecasting**. The collaboration within ML Pilot Project has proven to be very fruitful. Transfer learning technique and a stretched-grid approach is already providing good results compared to NWP models. Additional benefits are expected when the on-going reanalysis at 2.5 km resolution could be used in the training
 - In this poster we show preliminary tests using a LAM approach and playing with the treatment of the boundaries.
- **4DVar**. Added value has been seen in high impact case studies. Work will continue to assess if it can be used operationally.

See also presentations in this workshop:
- Samuel Viana: HARP point verifications in DEODE
- Alfons Callado et al.: of LAM-EPS systems at AEMET: past, present and future
- María Díez et al.: IBERA Reanalysis
- Carlos Geijo: Flow dependent background error covariances for variational EDA (poster)

Contributions:
Javier Calvo, Fernando Belinchón, Alfons Callado, Jose L Casado, María Díez, Pau Escribà, José Fernández, Teresa García, Juan-José Gómez, Alberto Jiménez, Daniel Martín, Javier Martínez, Gemma Morales, Jana Sánchez-Arriola, Cristina Toledano, Samuel Viana

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