

VERIFICATION OF HARM-AROME MODEL AT 1.0 km OVER SPANISH HARBOUR AREAS

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INTRODUCTION

In the frame of SAMOA Project, funded by the Spanish National Harbour Authority, which aims to develop a meteorological and oceanographical support system for the national harbours, AEMET is running HARMONIE-AROME over 4 domains of 1 km resolution and 30 seconds time step twice per day in a semi-operational mode with a forecast length of 48 hours. Assessment of the results has been performed especially for 10 m wind and 2 m temperature.

CONFIGURATION FOR ha40h1.1

1.0 km resolution and 30 seconds timestep.
IFS 0.1° nesting.
Dynamical adaptation.
Predictor-corrector scheme.
Original HARATU turbulence (update reversed).
Semi-lagrangian horizontal diffusion (SLHD).
Applied to hydrometeors and spectral variables except temperature.

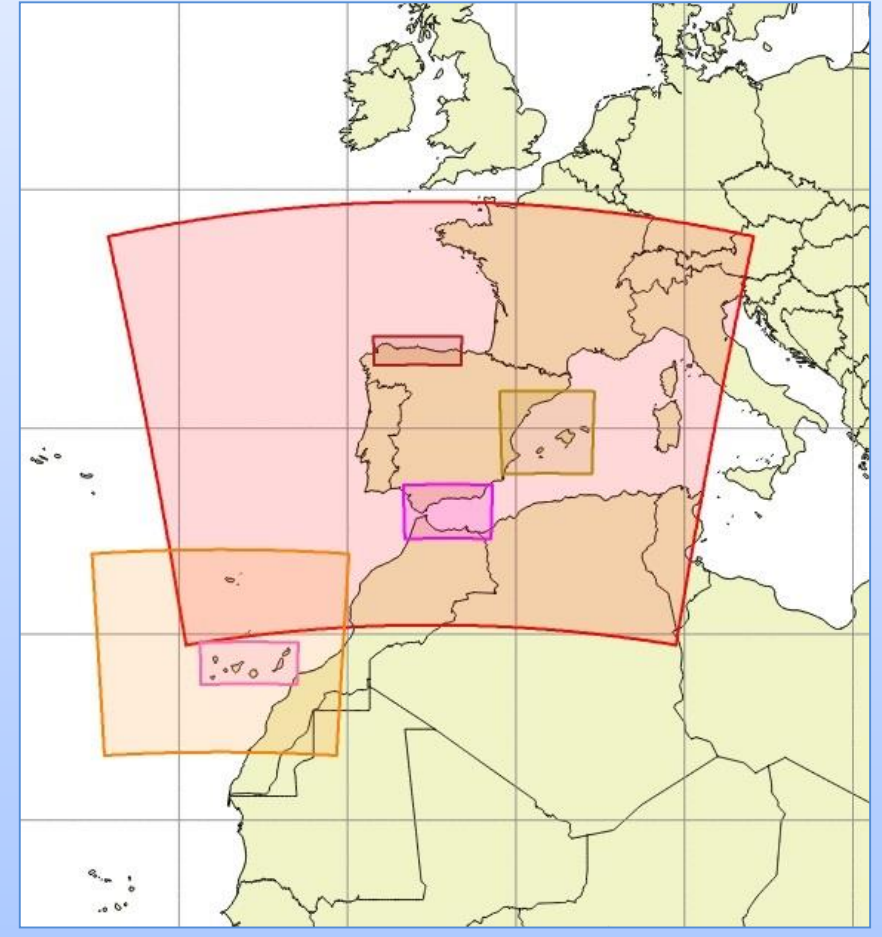
DOMAINS

On the right, figure showing the two AEMET operational 2.5 km domains:

Iberia (1152x864)
Canary Islands (576x480)

And the four 1.0 km new simulation domains:

Gulf of Biscay (432x150)
Mediterranean Sea (480x432)
Alboran Sea (480x300)
Canary Islands (576x256)

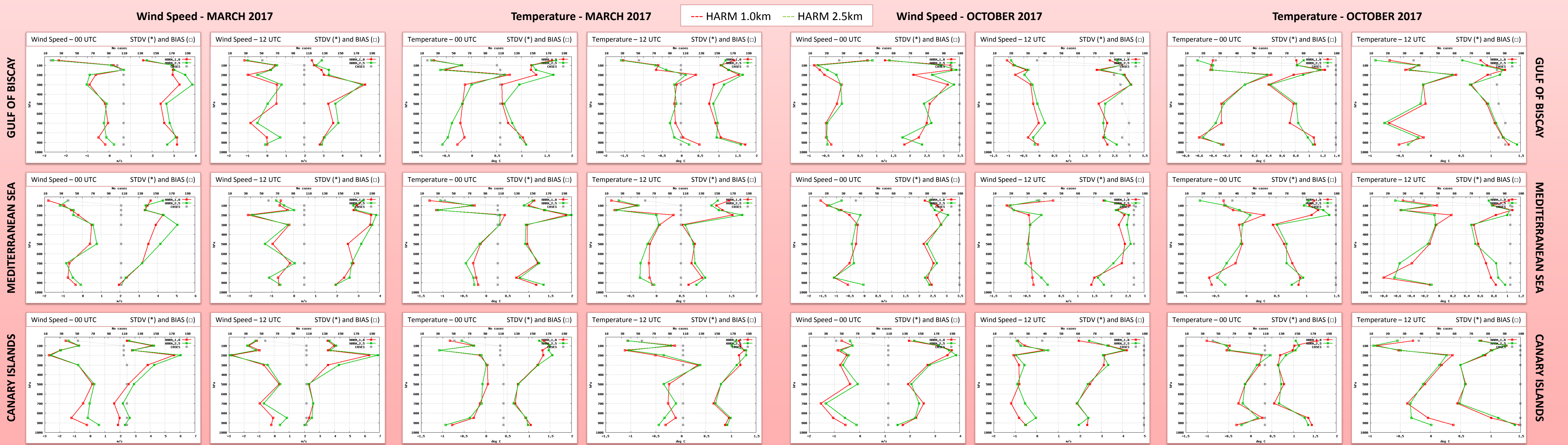


SURFACE VERIFICATION



HEIGHT VERIFICATION

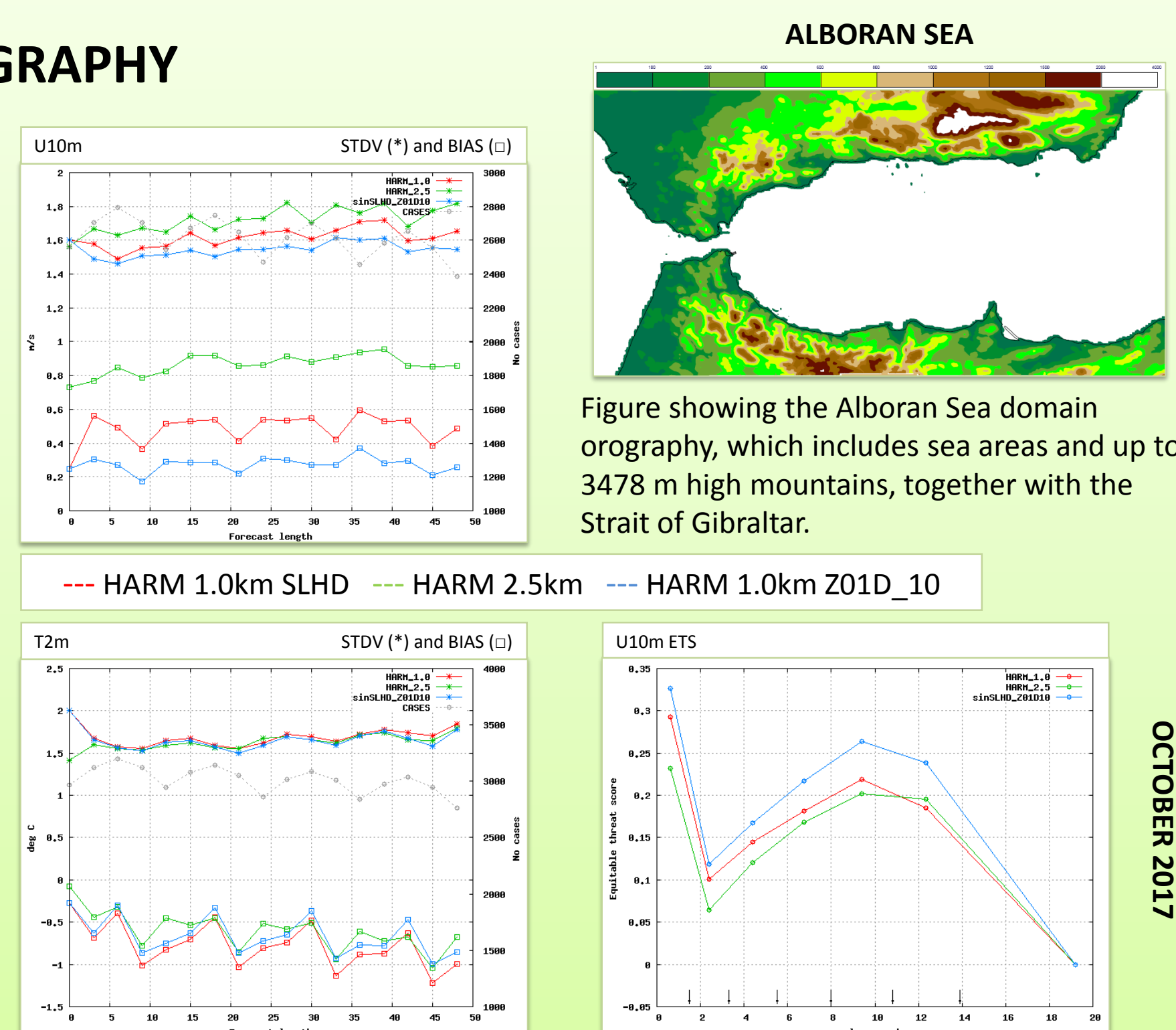
Verification has also been performed at different pressure levels for the two configurations in March and October of 2017. Due to the scarce availability of vertical observational data, three of the four domains use just one station data and no vertical verification has been possible for the Alboran Sea domain. The obtained scores are quite similar for the two resolutions and no clear conclusion can be drawn from the uneven behaviour at the different cases.



NEW TESTS – SUBGRID SCALE OROGRAPHY

Some new tests are being developed to assess the effect of the semi-lagrangian horizontal diffusion use and the possibility of substituting this strategy by a subgrid scale orography scheme to smooth 10 m wind.

The chosen domain to start the test is the Alboran Sea, as it probably has both, the most complex orography and atmospheric dynamics, and it showed almost not improvement with the higher resolution runs until SLHD was activated. After trying different SSO configurations, the one selected shows strikingly positive impact for the two surface magnitudes on the spot with no expected repercussion on the vertical.



CONCLUSIONS

Verification results confirm the improvement of the chosen very high resolution configuration of HARMONIE-AROME with respect to the operational one. This results reaffirm what had been already observed at the richer and more detailed output maps. It is remarkable the betterment in the 10 m wind forecast accuracy at all experiments, despite not just the different domains shape and dimensions but also the completely disparate orography and atmospheric dynamics.

The results for the other variables are quite similar for the two model resolutions considered except for the 2 m temperature, which shows a slight bias worsening at certain situations. Height verification shows irregular and difficult to interpret figures but there seems to be a general similar behaviour of the two configurations.

ONGOING WORK

Several possibilities are considered to continue configuration work: use of subgrid scale orography instead of semi-lagrangian horizontal diffusion, tuning of HARATU scheme or introducing a higher resolution orography.

The use of less and bigger domains is also under study.