Dear anonymous referee #2,

thank you very much for your comments and suggestions. This discussion will definitely improve the quality of the paper. Regarding technical corrections we will include all your corrections in the final version of the paper. However regarding your specific comments:

Specific comments

It would be interesting to see the difference in the spatial and time representation of the sea surface temperature field, between the one prescribed as a boundary condition in the atmosphere-only run and the one obtained dynamically in the coupled run. For example a plot could be added, if possible, for one of the medicane cases, showing a snapshot of SST and/or the time-series of the field around the location of the storm.

Thank you very much for your interesting suggestion. In response to referee #1 comments, we have added two more figures of surface fluxes (latent and sensible heat flux) that explain the effect of coupled model and atmospheric grid resolution on the surface fluxes. To illustrate the SST differences, we showed here the results of 0.08° atmospheric grid resolutions only (Figure 1). The SST in the coupled and atmosphere-only simulations is consistent with the surface fluxes (for surface fluxes see our reply to referee # 1). In the present study, we are interested in examining the ability and added value of the coupled model to simulate medicanes (page 2127, line 28). Our plan is to discuss the air-sea interaction in more details in our next paper.

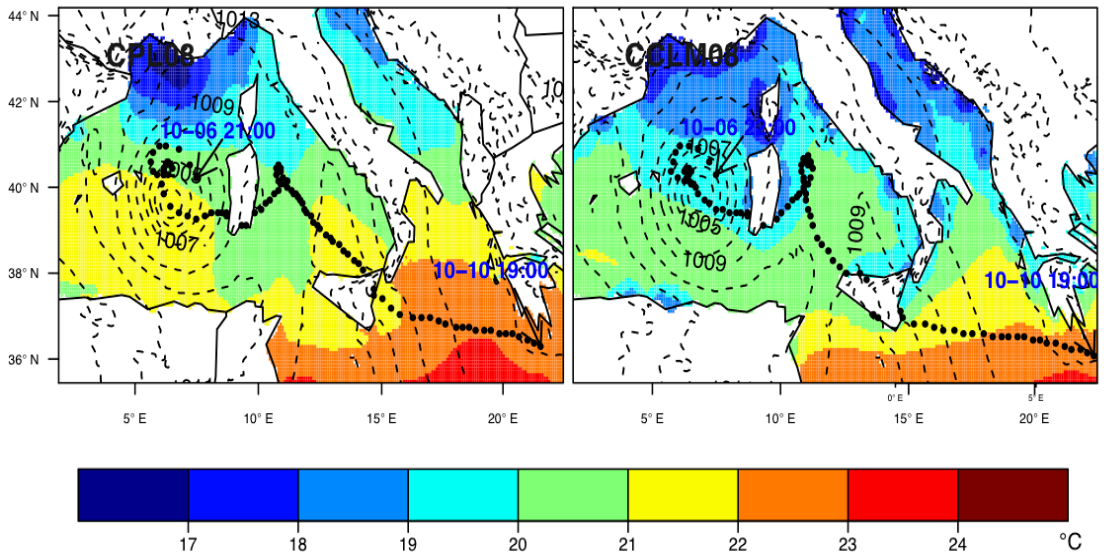

Fig. 1. ME08; mean sea level pressure (hPa; dotted contours lines at 2hPa intervals) and latent heat flux (°C: colored contours at 1 °C intervals) in coupled and atmosphere-only (0.08°) simulations on 7 October 1996 at 18:00 UTC. Black dots represent track of the medicane.

Spectral nudging: on what atmospheric variables are spectral nudging applied? What are the nudging parameters used?

We also have a similar question by M.M. Miglietta in his short comments. We will add the following paragraph on page 2123, line 1.

"The spectral nudging was applied on the wind field components above 850 hPa in the interior domain with the aim to keep the large-scale circulation close to the reanalysis data (as in Cavicchia and von Storch, 2012). The spectral nudging was applied at scales coarser than 4 ERA-Interim grid lengths. The wind field components at the lower levels are free to interact with local orography and other surface roughness features."

Are additional criteria, beyond the minimum in mean sea level pressure, used to define a medicane? (Page 2125, lines 23-24: "the criteria for medicanes are not met")

As mentioned on page 2124, line 6, "to simulate a medicane, one needs to find intense sea level pressure minima, a warm core at mid-troposphere, and strong cyclonic winds (Tous et al., 2013)". Therefore, we have only looked at the above-mentioned variables to define a medicane. To extract the medicane tracks, we used the hourly mean sea level pressure minima of all grid boxes with less than 40% of land fraction and discarded all tracks shorter than 6 h.

Cyclone tracks and length: is a threshold on the sea level pressure or its gradient applied in the tracking procedure? In case it is so, are the thresholds applied the same for the different atmospheric model resolutions and MERRA reanalysis fields?

The tracking procedure applied for the model and MERRA reanalysis was same. We did not apply any threshold on the mean sea level pressure, because we only simulated historically known medicane events. However, we also applied the following restrictions,

- Points with greater than 40% of land fractions are discarded.
- Tracks shorter than 6 h are not recorded

In the 0.22° simulations, the coupled simulations tend to have shorter lifetime compared to atmosphere-only, while in the 0.08° simulations the opposite effect is found. The difference in the track length are found in most cases in the final phase of the cyclone evolution, suggesting that coupling with the ocean tends to accelerate the storm deintensification at lower resolution. Based on model results, have the authors identified some mechanism that could explain this behavior and its dependence on the atmospheric model resolution?

The only difference in the coupled and atmosphere-only simulations is the SST, which is derived from 1-D NEMO-MED12 in coupled simulations, whereas in case of atmosphere-only simulations it is taken from the ERA-Interim reanalysis data. The ocean grid resolution ($1/12^o$ which is ~6 to 8 km in latitude and ~8.5 km in longitude) is almost similar to the of 0.08^o (~9 km) atmospheric grid. Thus one cannot consider any smoothing of SST gradients. However, in case of 0.22^o atmospheric grid resolution (about four ocean grid points in one atmospheric grid point) a small smoothing of the SST gradient is obtained. This is not negligible in the Mediterranean Sea where the deformation radius is about 10 km and where the main current width is of the order of 50 km or less (as well as meso-scale eddy radius). This can thus impact the exchange at the air-sea interface.

References

Tous, M., Romero, R., and Ramis, C.: Surface heat fluxes influence on medicane trajectories and intensification, Atmos Res., 123, 400–411, 2013.

Cavicchia, L. and von Storch, H.: The simulation of medicanes in a high-resolution regional climate model, Clim. Dynam., 39, 2273–2290, 2012.