

**Comments on the paper “Medicanes in an ocean-atmosphere coupled climate model” from N. Akhtar, J. Branch, A. Doppler, K. Beranger and B. Ahrens.**

The paper aims to assess the robustness of a coupled atmospheric climate limited area model with a one-dimensional ocean model in simulating marine mesoscale quasi-tropical cyclones that develop over the Mediterranean Sea (medicanes). The authors simulate 11 medicanes identified previously by Tous and Romero (2013) by using movies obtained from IR Meteosat images. The simulations are conducted using different spatial resolutions ( $0.44^\circ$ ,  $0.22^\circ$  and  $0.08^\circ$ ) in the atmospheric model and a fixed resolution in the oceanic model ( $1/12^\circ$ ). The authors perform various simulations using either the atmospheric model alone or the atmospheric and the oceanic models coupled. Additional simulations are carried out which apply spectral nudging to the atmospheric model. The findings show that increasing the spatial resolution of the atmospheric model produce better results for most of the analyzed medicanes. The life time, central pressure and temperature at 700 hPa are better simulated when compared with the MERRA reanalysis as well as surface winds when compared with NOAA SeaWinds dataset. The coupled frame also provides some better results than the atmospheric model alone. No improvements are obtained when applying the spectral nudging.

**General comments**

The paper attains the indicated primary goal that is “to investigate the impact of the air-sea interactions in the coupled model on the intensity of the medicanes as compared to the atmosphere only model and adequate atmospheric grid resolution essential to resolve medicanes features” (pag 2121, line 8-11). In fact, as previously indicated, the paper shows that  $0.08^\circ$  spatial resolution in the atmospheric model provides the better results. Also that the coupling of the 1-D ocean model offers some improvements in comparison to that obtained when only the atmospheric model alone is used.

The paper presents interesting findings, it is well-constructed and includes figures of quality. However in the present state the paper is a description of the results from the different simulations but lacks on any discussion on the physical mechanisms involved in the development of medicanes. It would be interesting to provide some physical explanation about why the coupled model provides better results than the atmospheric alone model. In particular, medicanes are strongly influenced in its development and track by surface fluxes (sensible and latent) as well as by latent heat release mainly in convective clouds. I suppose, because it is not indicated in the paper, that the configuration (parameterizations of physical processes) of the atmospheric model is the same in all the simulations (for the three spatial resolutions). Then some difference in the fluxes must exist between the atmospheric and atmospheric-ocean models, since the fluxes drive the medicane in quite different ways. How important are the differences in the surface fluxes and the latent heat release? Can the authors identify, from model results, why in some cases the track from CCP08 and CCLM08 simulations differ substantially from those obtained from the MERRA reanalysis?

**Specific comments**

Pag 2120, line 8: Fita et al., 2013 should be Fita et al., 2007

Pag 2120, line 16: Gualdiet al., 2012 should be Gualdi et al., 2012

Pag 2124, line 20: 'from the central region' should be 'from the western region'

Pag 2124, line 21: 'from the western region' should be 'from the central region'

Pag. 2125, line 5: After 'Aeolian Islands' add '(north of Sicily)'

Pag 2125, line 18: substitute 'the same day' by '6 October'

Pag 2127, line 13-14: Sentence 'In most cases .....(Table 2)' move to the next paragraph

Pag 2129, line 1: 'large scale low pressure system' is a reference to the medicane ME06?  
Perhaps it should be better 'a mesoscale low pressure system'

Pag 2130, line 15: 'ME02-ME05' should be 'ME01-ME05'

Pag 2130, line 32: Reference 'Liguang, W. U. .... 2005' is not in the text

Pag 2135, line 1: Reference 'Luque, A. .... 2007' add page numbers

Pag 2135, line 30: Reference 'Ruti, D. M. ....' if it is not published, the reference should not be used

Pag 2136, line 13: Reference 'Tous, M. and Remero, R. ....' should be 'Tous, M. and Romero, R. ....'

In Figures 2, 4, 6, 8 and 10: add: black dots represent the track of the medicane.