

We thank the reviewers and editor for the minor comments and catching the technical errors. We have addressed the comments below and corrected the manuscript.

Anonymous referee #2 comments

I found a sentence that I think might be incomplete (probably a word missing) in line 77: “Therefore, regional models, which have much finer spatial and temporal resolution compared to observations, [MISSING WORDS?] to study PBL clouds in midlatitude cyclones and CAO.”

We have modified this sentence and added the missing words: “Therefore, we use regional models, which have much finer spatial and temporal resolution compared to observations, to study PBL clouds in midlatitude cyclones and CAO.”

Anonymous referee #4 comments

With all the change in the revised version the first aim of the paper as stated by the authors is still too broad for a paper that is based on a single case study (line105). I suggest setting it as the broader scope of the paper, and then setting the two aims to first evaluate the COAMPS model and second to examine the PBL and cloud properties across the front.

We have modified the broader scope of the paper and the objectives as the reviewer suggested: “Here we apply the Naval Research Laboratory Coupled Ocean/Atmosphere Mesoscale Prediction System (COAMPS, Hodur 1997) regional model to a case study of a wintertime midlatitude cyclone over the Eastern North Atlantic. We apply our understanding of boundary-layer clouds, largely relevant to barotropic atmospheres in the subtropics, and expand it to boundary-layer clouds accompanying the midlatitude baroclinic synoptic system. We have two linked objectives: 1. to evaluate to what extent COAMPS represents the synoptic controls on cloud regime and PBL evolution within a midlatitude cyclone, including an analysis on the model’s sensitivity to the microphysical parameterization; and 2. to examine the transitions of synoptic, cloud, and boundary layer properties across different regions of the cyclone in both observations and COAMPS, in a way that minimizes errors associated with cyclone strength and phase.”

Minor corrections -

Line 32 – missing the word “lower” in the sentence

We have added “lower” before albedo in this sentence.

Line 61 – the wording at the end of the sentence is unclear, please check

We have modified this sentence to read: “They found that the post-cold-frontal region had stronger winds and subsidence compared to regions of northerly or northwesterly flow and subsidence that are far away and not associated with the cold front.”

Line 73 – missing “can be used”/“are used” before “...to study PBL clouds in midlatitude cyclones...”

We have modified this sentence and added the missing words: "Therefore, we use regional models, which have much finer spatial and temporal resolution compared to observations, to study PBL clouds in midlatitude cyclones and CAO."

Line 129 – remove one "combines"

We have removed one of the "combines".

Line 139 – missing year in the reference.

We have added the year "2014" to the citation.

Line 355-356 – The second part of the sentence is not clear (the reference?), rewrite

We have modified this sentence to now read: "The reason for the larger COAMPS indices is because the coarse model resolution causes the top of the PBL to be above the inversion and therefore the upper PBL layer is warmer and drier than the surface layer."

Figure 13 + 14 – the difference between the darker and lighter colors is not strong enough

The dark colors representing COAMPS are already near saturation and the light colors representing the observations are as light as they can be without the colors being washed out. Any further lightening of them makes them too gray that their color cannot be seen. We have made many versions of this plot and tried many colors, and we believe this to be the best color scheme. Therefore we have not made any changes to Fig. 13 and 14

Editor comments

In addition, I recommend to rework the abstract to sharpen the statements, in particular:

1) Please resolve the apparent contradiction in these two sentences: "However, the simulated clouds are mostly too thick, with too much liquid water and too little cloud-base drizzle, compared to observations from satellite and retrievals from ground-based observations at Graciosa Island in the Azores. The transects reveal a shallow, conditionally unstable boundary layer in the warm sector, accompanied by overly shallow clouds with low liquid water content."

While the warm sector clouds in both the observations and model have lower liquid water content than clouds in the cold sector, the cold sector clouds in the model have much more liquid than the observed clouds. We have clarified that the underestimation of liquid water occurs in clouds in the warm sector while the overestimation of depth and liquid water occurs in the cold sector.

2) "unique insights into cloud and boundary layer evolution throughout a cyclone." do you mean in the context of a cyclone, or throughout the life cycle of a cyclone?

We mean in the context of the cyclone. In addressing comment #3 below, we have removed this sentence.

3) Please add one sentence that clarifies the implications of your work for model evaluation and more generally for our understanding of the state and/or behaviour of the atmosphere and climate, which is the main requirement for publication in ACP.

We have modified the final sentence to be more specific about the impacts of our study. "Our analysis framework serves as a unique approach to model verification, and our results offer

insights into differences in boundary-layer cloud behavior between subtropical and synoptic cold-sector regimes.”

Please remove one of the first of the two References section title and the empty page.

We have removed the blank References page so now there is only one References header and no empty pages.