

Referee Comments

Contribution of the solar wind-magnetosphere-ionosphere-atmosphere coupling to rapid intensification of tropical cyclones and transition of Mediterranean subtropical cyclones to tropical-like cyclones

Authored by Paul Prikryl and Vojto Rušin

This work intends to investigate the contribution of space weather events on tropical cyclone rapid intensification and the transition of Mediterranean subtropical cyclones to tropical-like cyclones. The subject of this work is interesting and would contribute significantly to the community. However, there are several scientific questions that are not addressed adequately and the relationship between the space weather events and the tropospheric meteorological weather have not been established despite having presented clearly the aspect of space and tropospheric weather. Based on the following major concerns which need to be addressed, I will suggest the paper be subjected to major revision or a resubmission should be encouraged.

Major Comments

1. All the plots of solar wind parameters are difficult to understand throughout the manuscript. The vertical axis presented only the definition and range of the solar wind parameters without the scale range given. Such plot needs to be done as stacked plots with the same horizontal axis but different vertical ranges. See sample in the link below:
<https://community.plotly.com/t/setting-spacing-between-stacked-subplots/78332>
2. The structural composition of the entire manuscript is confusing. This made it quite challenging to follow the exact point the authors are aiming at. For instance, so many subjects (say typhoon, hurricane, tropical cyclone, convective burst, atmospheric gravity waves are introduced along the sections which are not presented chronologically. I do know and understand the exact connection the author intends to establish, however, this needs to be done with care, step by step and from one phenomenon to the other. I therefore encourage the authors to re-structure the entire manuscript, thereby outlining result and discussion section distinctly.
3. The superimposed epoch analysis is used mostly used for pattern determination. It is expected that after matching the occurrence times of the solar wind

parameters to that of the tropospheric weather event, some further analysis besides the time series matching analysis should be done to address questions such as:

- a. Which possible physical processes might be driving the occurrence preceding the rapid intensification of tropical cyclones and transition.
- b. Why does the intensification occur?
- c. How would the characteristics of rapid intensification / subtropical transition be in the absence of space weather events?

Such questions will help establish a more solid correlation. Kindly consider addressing such questions. This will help bring something novel, different from preceding works on this subject.

4. Section 7 is attributed to lower thermospheric gravity wave excitation at high latitude. However, the author only shows the propagation distance (vertical and horizontal) of the waves. Do the authors intend to show that AGWs are among the processes that link space weather events to subtropical/tropical tropospheric weather? If this is the case, what physical quantity (say, momentum, energy etc) are they using to establish such link? And if this is not the case, then why was gravity wave activity introduced?
5. Several space weather events backdated to 1995 are being reported in the manuscript, which were considered to contribute to the said tropospheric weather events. Why do the authors present only one AGW event. Are there no AGW events for other events? Please, this question needs to be addressed.
6. As mentioned earlier, the authors used several solar wind parameters as well as tropospheric weather parameters. However, there is no coherency in terms of the presentation, and which parameter leads to the other, especially for the tropospheric parameters. I suggest the authors make a detailed revision to address this aspect as well.
7. There are incomplete sentences throughout the text. Kindly make a thorough revision to rectify these issues.