Wang et al. 2022, “A modelling study of an extreme rainfall event along the northern coast of Taiwan on 2 June 2017”

Summary:

This study examines the mechanisms responsible for producing extreme rainfall during the 2 June 2017 Mei-Yu front case in Taiwan using a series of modeling experiments. The authors study the impacts of terrain in the 3-km simulations, which were found to have negligible effects on rainfall when the northern terrain was removed, but large impacts when the whole terrain of Taiwan was removed. For this reason, they postulate that the terrain in northern Taiwan was not the main factor responsible for producing heavy rainfall. Next the authors compared two 1-km simulations–one driven by a successful ensemble member from Wang et al. (2021) and the other using the control 3-km simulation as a driver. They found that the F1 simulation produced rainfall amounts closest to observations (and closer to those previously obtained in other studies) due to a persistent rainband that was produced by a frontal disturbance that was not seen in S1. Overall, this was an interesting and well structured paper that only needs minor revisions.

General comments:

- How did you choose the microphysics scheme used in your study? Was it based on similar studies? And did you perform any sensitivity tests on how the microphysics scheme impacted your results?

Specific comments

- Line 55: Can you specify have much economic loss? It would helpful to have a number here.
- Lines 212-215: Did you specifically look at the relative height of cold hair behind the front to topography in your study? If not, please specify that this is a speculation and not actually examined.
- Lines 352–354: It is possible to compare the convergence values in observations to F1 to see if these values are similar? If so, that would be helpful to include.
- Figure 8: This is a nice figure but I suggest using a colormap that is more intuitive to distinguish early to late times. Something like using all shades of one color or cool to warms would work.
- Figure 13: This is an interesting figure but I had a hard time deciphering it. Why do you have two panels showing the same date for F1? How does the second plot below d) differ?

Technical corrections

- Lines 32–38: This is a long and confusing sentence. I recommend breaking this up into two separate sentences, such as “Under such conditions organized mesoscale convective (MCSs) systems such as squall lines can develop near the front and make landfall in Taiwan. The steep topography…”

- Line 53: Please remove “…the criterion to have one day off work and school” as it is not necessary information.
- Line 87: Please start a new paragraph at “A few questions remain…”
- Line 345: Please remove “As”