

Interactive comment on “Assimilation of Himawari-8 Imager Radiance Data with the WRF-3DVAR system for the prediction of Typhoon Soulder” by Dongmei Xu et al.

Anonymous Referee #2

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This paper studies the effect of assimilating satellite observations on the prediction of typhoon. The predictions are made with WRF model, and initialization is performed by its 3D-VAR system. The technique is not new but the claim of novelty is that the system incorporates the newest data from a geostationary (in contrast to polar-orbiting) satellite, namely Himawari-8. Improvements in the predicted track and intensity of typhoon Soudelor are found with the assimilation of the satellite data. This is a timely study with potentially useful results. Nevertheless, clarifications are needed on some of the technical details:

(1) The conclusion of this work relies on a small number of runs without exploring

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the dependence of the prediction on tunable parameters in WRF-3DVAR, for example those for the spatial correlation length and the scale of background variance. Previous studies have shown that the predictions of typhoon/hurricane tracks depend on those parameters (Xu et al. 2019, Meteorol. Appl., doi:10.1002/met.1820; Chou and Huang 2011, Adv. Meteorology, doi:10.1155/2011/803593). If this study just uses the default setting of those parameters, it would be useful to provide justifications or demonstrate that the results are robust with respect to tuning of the parameters.

(2) Since only clear-sky data is assimilated, one would guess that most of the satellite data over the cloudy area surrounding the core of typhoon are rejected. Yet, from Figs. 10(a) and 10(b) it appears that some distinctive small-scale structures (e.g., multiple spiral bands of high humidity) are created over the vortex core of the typhoon after the assimilation of satellite data. Are those structures artificial (e.g., due to numerical schemes of the model) rather than a realistic effect of assimilation of satellite observation? Related to this, it would also be interesting to compare the detail of the wind field near the center of the typhoon, but the vectors in Fig. 10 are hard to read. It would be useful to modify the figure to improve clarity.

(3) Figure 11(a), which shows the key result for typhoon tracks, is hard to read. The 3 tracks all look like solid lines that it is not possible to identify which is which. There seems to be random drawings in the background but it is not clear what they are (continental boundaries?) The labeling at left for the ordinate is cut off. Also, only one set of predictions is shown. What about other predictions made at different initial times? Do they exhibit similar behaviors? [This is also related to the comment in (1) concerning the robustness of results, given the small number of runs.]

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