

Interactive comment on “Variations of the 630.0 nm airglow emission with meridional neutral wind and neutral temperature around midnight” by Chih-Yu Chiang et al.

Anonymous Referee #2

Received and published: 7 March 2018

Chiang et al. demonstrate the influence of meridional wind and neutral temperature to the intensity of 630.0 nm nightglow around the equatorial midnight, altering the SAMI2 model for the resulting plasma density and temperature with the inputs from NRLMSISE-00 for neutral densities and the HWM-93 for neutral wind vectors. The work is potentially interesting and novelty to the community, particularly the finding with respect to the neutral temperature. However, the literature survey by the authors seems to be hasty, the major lacking is that the role of meridional wind to the midnight 630.0 nm airglow enhancement seeing by ISUAL Imager has been studied and published (Rajesh et al.(2014) doi 10.1002/2014JA019927). In addition, the manuscript requires an editing for English before it can be published in the peer-review journal. Given the

C1

interesting result and a very valuable dataset, I encourage the authors in extending the content in greater detail that be able to deliver the science finding clearly. Please see further comment below. Summary: Consider for publication after substantial revision Major points: (1) Observation data Since the satellite data are used, it would be appropriate to cite Frey et al.(2016) (doi 10.1002/2016JA022616) for the instrument details and the first results of the limb imaging of 630.0 nm airglow using ISUAL by Rajesh et al. (doi 10.1029/2009JA014087). The authors put the observation data in the Supplement for some reasons, but it could be nicer if move the section to the main content. The observation data deserve more attention and discussion. (2) The effect of meridional winds to the 630.0 nm midnight brightness By reading this work and Rajesh et al. (2014), I happened to find many similarities in between. Both of the groups modulate the HWM-93 meridional winds on the SAMI2 model and apparently find that the meridional wind utilizes the location and intensity of the airglow brightness. What is the novelty of this work out of Rajesh et al. (2014) in the effect of meridional winds to the midnight brightness? The authors should include the comparison in the content and give the credit to the previous work properly. Line 116-117 What is special of O₊ density along the magnetic line with apex altitude between 265 and 315 km ? Can you show the model result between altitude 150 to 315 km for all latitude? Line 214-226 Again, what is the new finding out of fig.3 in Rajesh et al. (2014) ? Figure 1 has to be modified, what is the reason that the authors didn't convert [O₊] density to volume emission rate of 630.0 nm nightglow while the observation images are the airglow intensities?

Minor points line by line: Line 43 enhancement > increase Line 45-46 "...first reported the MTM... " should be "...reported the MTM phenomenon first" Line 61 What are the different mechanisms addressed in Chiang et al. (2013)? The readers would be pleased to learn the relevant work leading by the same author. Line 142-143 Rewrite the sentence please. Line 193-195 Rewrite the sentence please. Line 202-203 Rewrite the sentence please.

C2

End review

6th March, 2018

Interactive comment on Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2018-5>, 2018.

C3