

## ***Interactive comment on “Dynamic processes in the magnetic field and in the ionosphere during the 30 August–2 September, 2019 geospace storm” by Yiyang Luo et al.***

### **Anonymous Referee #2**

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The paper by Luo et al. investigated the storm energy input and ionospheric storm effects during a storm event. They estimated the energy, power, magnetic field variation, F-region density decrease, E-region lifting, and density modulation. They interpreted that the density modulation is caused by atmospheric gravity waves.

The paper presents interesting data but gives very little data interpretation. It is difficult for readers to find out what physical mechanisms contributed to create the ionospheric storm. Please extend the discussion of the key observation results of the ionospheric storm. The storm energy and magnetic field variation have already been studied in earlier works and I don't think that the present paper gives any new aspects of them.

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I suggest to remove them from the conclusion and focus on the findings on the ionospheric storm.

Line 15-23 Basic properties of storms (energy, power, duration and magnetic field variations) are already documented more in details in existing papers (e.g., Gonzalez et al., 1994, Knipp et al., 1998, Feldstein et al., 2003). I don't think these are not unique features. These sentences should be removed and the abstract should focus on the ionospheric storm part.

For the same reason, the title of the paper is not very informative. I suggest to remove the magnetic field and instead specify what dynamic processes are the major finding of this paper.

The paper uses the network of radio wave observations but does not discuss how the ionospheric storm effects vary in latitude or longitude. What spatial dependence of the ionospheric storm effects do the authors see? Are those localized in specific areas or do they propagate in any direction? Such information will be useful to interpret the mechanism of the ionospheric storm.

What is the cause of the negative ionospheric storm? Is the F-region density decrease created by vertical motion of the ionosphere, horizontal motion, or change in thermospheric composition?

What is the interpretation of the driver of the increased height of the reflection from 150 to 300 km? Is it because of the penetration electric field?

Have the authors looked at the total electron content data from GNSS receivers for this storm? The total electron content covers much wider areas and could be useful to show how the distribution of the ionosphere density changed and what density structure gave the negative storm.

The authors suggest that the quasi-periodic variations are caused by atmospheric gravity waves generated in the auroral oval. In the radio wave data, do you see that the

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quasi-periodic variations propagate from higher to lower latitudes? If the equatorward propagation is seen, it could be a supportive evidence of the auroral source.

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