

Ann. Geophys. Discuss., author comment AC2
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Reply on RC2

Leonid F. Chernogor et al.

Author comment on "Ionospheric effects of the 5–6 January 2019 eclipse over the People's Republic of China: results from oblique sounding" by Leonid F. Chernogor et al., Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2022-15-AC2>, 2022

RC2: 'Comment on angeo-2022-15', Anonymous Referee #2, 30 Jun 2022

Ionospheric effects of 5–6 January 2019 eclipse over the People's Republic of China: Results from oblique sounding

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Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2022-15>, 2022

Reply to Anonymous Referee #2

Dear Anonymous Referee #2,

Thank you very much for your valuable comments that have helped the Authors greatly improve the draft of their paper.

Your comments are placed together with the Authors' answers, whereas the changes made in the text of the draft of the paper are marked **in Bold**.

Authors.

RC2: 'Comment on angeo-2022-15', Anonymous Referee #2, 30 Jun 2022

This paper studied the ionospheric responses to the solar variations during the solar eclipse on January 6, 2019, by using the data of ionospheric oblique sounding from multiple propagation paths. The observation results are basically consistent with the theoretical estimates. There are no special new findings, and the article is too long. In addition, there are too many grammatical errors and redundant words. Therefore, it is suggested that the author should make necessary and sufficient modifications to the manuscript. The main comments are as follows:

- Although this paper cited a lot of literature, it did not clearly and logically introduce the progress of these studies, but just listed them.

Dear Anonymous Referee #2. Indeed, the presentation of the literature in the Introduction section looked bad.

Generally, any author compiling an overview of, say 50, papers and indicating the main result of each study, tries to find an unresolved issue to be addressed in his or her paper. When writing this Introduction section, concerned with ionospheric effects of eclipses, the Authors implied that there are no two identical reactions to two similar solar eclipses, and therefore, the Authors did not state the results of any study under consideration, since the results of the current study inevitably provides some new piece of information, which supports the statement mentioned above. Therefore, the authors consider it appropriate to just mention the main works that are concerned with the ionospheric effects of solar eclipses. The ionospheric effects are very varied.

To improve the presentation of the literature, the Authors

(1) have combined some paragraphs and have added the topic sentences, marked **in Bold**, “**Some eclipses attracted particular attention**” (Line 83), “**More recently, increasingly sophisticated models have been developed**” (Line 99);

(2) have inserted the following introductory text (Line 70):

The study of the ionospheric response to solar eclipses has advanced dramatically in the past 40 years. One should acknowledge that the manifestation of the ionospheric effects is dependent on many factors, including the measurement techniques. Thus, the involvement of techniques other than the conventional techniques (ionosonde, incoherent scatter radar, satellite radio beacon receivers, etc.) would be appropriate, including the technique used in this study. The important feature of the ionospheric response to note is that there are no two identical reactions to two similar solar eclipses. Therefore, the authors have restricted their review only to a listing of the main works in the field.

- It is not necessary to make a very detailed description of the space environment on the day of the eclipse and the reference day. The authors just need to briefly describe that the geomagnetic activity is at a relatively low level before and after the solar eclipse. Therefore, the ionospheric changes can be attributed to the impact of the solar eclipse.

Dear Anonymous Referee #2. The suggestion to make just a brief description of the space environment somewhat differs from the geoscience community experience concentrated in the National Science Foundation Program on Coupling, Energetics and Dynamics of Atmospheric Regions (CEDAR). The last document “CEDAR: The New Dimension” states that the near-Earth environment is a “system that exhibits complexity – characterized by having multiple drivers, by featuring adaptive feedback and memory, by

its nonlinear response and instabilities, and by exhibiting sensitivity to initial conditions,” and further, “Aspects of this complexity include the importance of initial conditions, precondition, and memory; instability; nonlinearity; feedback; and emergent behavior.”

Thus, a priori decision to analyze the geomagnetic activity before and after the solar eclipse alone should not be considered sufficient.

The authors have provided the briefest analysis of the state of space weather, and it is expedient. In addition, it is customary for other authors to do so.

If one placed the limitation “briefly describe that the geomagnetic activity is at a relatively low level”, which the reviewer suggests, then the analysis would be unconvincing and unfounded.

- It is not necessary to describe the results of each oblique probe in detail, just briefly describe the changes during the eclipse and summarize the common characteristics of these observations.

Dear Anonymous Referee #2. Regarding the results of each oblique probe, each oblique probe is a HF communication link which operates at its own frequency, have its own great-circle range of 910 km to 1,875 km (Table 2) and orientation shown in Figure 2. Each radio-wave propagation path can provide information on processes acting at propagation path midpoints (Table 2) at the reflection level. On the other hand, processes caused in the ionosphere by solar eclipses are altitude-dependent (Verhulst, T.G.W. and Stankov, S.M.: Height dependency of solar eclipse effects: the ionospheric perspective. *J. Geophys. Res.: Space Phys.*, 125, e2020JA028088, <https://doi.org/10.1029/2020JA028088> , 2020.). Therefore, for instance, Anonymous Referee #1 advises to employ more advanced techniques to analyze each propagation path. Moreover, the larger number of the propagation paths, the wider geographic and more extended altitude coverage of the event.

In the absence of illustrations and descriptions of the effects along different propagation paths, this work would provide unproven results. This is not acceptable in the scientific literature. Note that other reviewers consider that the usage of a large number of propagation paths provides a considerable advantage, in terms of encompassing both significant geographic regions and a wide range of altitudes.

- There are too many paragraphs in this article, which need to be allocated more reasonably.

Dear Anonymous Referee #2. We have combined some paragraphs and marked them in red letters. Where needed, topic sentences have been added, marked **in Bold**. For example, “**Some eclipses attracted particular attention**” (Line 83), “**More recently, increasingly sophisticated models have been developed**” (Line 99), or “**The results may be summarized as follows:**” (Line 562)

- There are too many grammatical errors and redundant words. Please refer to the attached PDF file for specific English grammar comments.

Dear Anonymous Referee #2. We are sorry for making so many grammatical errors. Thank you very much for your great efforts to improve our English. The corrections we have made in the text are marked **in Bold**.

Please also note the supplement to this comment:

<https://angeo.copernicus.org/preprints/angeo-2022-15/angeo-2022-15-AC2-supplement.pdf>