Dear Dr. Igo Paulino,
Topical Editor
Annales Geophysicae (ANGEO)

Ref **:** angeo-2019-97
Title **:** Historical Aurora Borealis Observations in Anatolia during medieval period: Implications for the past solar activity
Journal **:** Annales Geophysicae (ANGEO)

Thank you for your constructive comments. I have just revised the manuscript in view of the your comments as outlined in detail below and the paper is now ready to resubmit the journal of Annales Geophysicae (ANGEO) titled “Historical Aurora Borealis catalog for Anatolia and Constantinople (hABcAC) in the medieval period: Implications for the past solar activity”. Please find our response to reviewer’s comments step by step below.

I would like to thank the reviewers for their thoughtful comments. Responses to comments are presented in the following pages along with explanations.

Thanks again and looking forward to hearing from you soon.

Best regards,
Dr. Nafiz MADEN
Corresponding author

Detailed Response to Editor

Comments to the Author:

Dear Dr. Nafiz Maden!

I sincerely ask apologies for the delay in accepting your manuscript. But, in my option, there are several points that need to be addressed before sending the manuscript for the production. I have revised the reviewer comments/suggestion for the previous round of revision and I have also found out that your scientific argumentation is really poor and there is no evidence for some statements that you have written. I would like you to do a final careful revision of the manuscript and attempt to address all the concerns listed below. Please, if you need extra time, do not hesitate to contact me, but do not submit the revision before be sure that you have solved all points.

Reply: Thank you for your constructive comments. I have just revised the manuscript in view of the your comments as outlined in detail below and the paper is now ready to resubmit the journal of Annales Geophysicae (ANGEO) titled "Historical Aurora Borealis catalog for Anatolia and Constantinople (hABcAC) in the medieval period: Implications for the past solar activity". Please find our response to comments step by step below.

Major points:

1. Figure 1: Remove the modern border. It is at best misleading and contradicts what the author claimed in the previous rebuttal letters.

   Reply:The* modern *border in the Figure 1 is removed.

2. Figure 2: Remove the first panel for humidity and third panel for agricultural development. They are not scientifically supported in this article and not relevant with their scientific results.

   Reply: Figure 2 is revised.

3. If the author still wishes to claim his result as a constraint for the medieval climatology, the author must show plot and visualize correlation of the local magnetic disturbance (with Turkish magnetograms) and local humidity or precipitation. Without such a figure based on the modern scientific data, the author's claims on climatology (L276-324) must be removed. Science must be developed based on scientific data and scientific evidence.

   Reply:The climate change interpretations are removed (L276-324).

4. The author must clarify that they have not consulted the original historical documents but only compiled the existing catalogs. There are no originalities for these records, as the author has not conducted an original investigation. This must be clarified.

Reply: The aim of this research is to establish a relationship between historical Aurora observations recorded in Anatolia and Constantinople during the medieval period and the past solar activity. Anatolia and Constantinople have not been studied until now with respect to historical-climatological data and aurora observations. The available catalogs present a number of records covering Europe, Japan, China, Russia and Middle East regions. This research may also contribute to the understanding of public perception of the historical auroras.

Minor points:

1. The title should be revised as 'medieval' => 'Byzantine'. There are no Ottoman records. The author has only investigated Byzantine reports, not medieval Anatolia and Constantinople.

   Reply: The title of the manuscript is revised as "Historical Aurora Borealis catalog for Anatolia and Constantinople (hABcAC) during the Byzantine period: Implications for the past solar activity."

2. P1L7-8: In this paper, it is reviewed the relationships between the aurora observations, past solar activity and climatic change in Anatolia during the medieval period. => In this paper, Anatolian aurora has been reviewed based on the existing catalogs. [NB the author has not conducted an original survey but compiled existing published catalogs.]

   Reply: The sentence is revised as "Herein, Anatolian aurora has been reviewed based on the existing catalogs to establish a relationship between the aurora observations and past solar activity during medieval period."

3. For this purpose, it is presented two historical aurora catalogs for Constantinople, Anatolia 9 and Middle East regions at various dates by using historical texts, chronicles and other 10 auroral records. => For this purpose, historical aurora catalogs for Constantinople and Anatolia are compiled based on the existing catalogs and compared with those in Middle East regions. [NB, Again, the authors have not consulted historical documents]

   Reply:Revised

4. P3L64-65: However, these criteria actually contradicted auroral behaviour during the extreme space weather events (Kimball, 1960; Kataoka and Iwahashi, 2017; Kataoka et al., 2019; Kataoka and Kazama, 2019). => However, these criteria directly contradicted auroral behaviour during the extreme space weather events, as overhead aurora can extend down to ~25° in magnetic latitude (vs 40 – 50° in Anatolia) and the whitish aurora

appears more equatorial side (Kimball, 1960; Kataoka and Iwahashi, 2017; Kataoka et al., 2019; Kataoka and Kazama, 2019).

Reply:Revised

5. P4L77-79: The goal of this study is to compile a historical aurora catalog to analyse the past solar activity of interrelated social, economic and climate change impacts during the medieval period. => The goal of this study is to compile a historical aurora catalog based on the existing catalogs, in order to analyse the past solar activity during the medieval period.

Reply:Revised

6. P4L80-81: Constantinople and Anatolia have not been studied up to now with regard to historical-climatological data and aurora observations. => Constantinople and Anatolia have only been peripherally discussed up to now with regard to auroral observations. [NB: the author has compiled this catalog based on the existing catalogs. So previous scholars have already known these aurorae.]

Reply:Revised

7. P6L133: Harrak (1999) listed two aurorae records => Harrak (1999) and Hayakawa et al. (2017) listed two aurorae records.

Reply:Revised

8. P6L135, P7L141, P12L269, and P15L348: Amida (Turkey) => Amida

Reply:Revised

9. P10L225: Constantinople and Anatolia during the medieval period. => Constantinople and Anatolia during the medieval period based on the existing catalogs.

Reply:Revised

10. P11L235-236: They are the longest direct observational records available for studying solar and space weather dynamics. => That's not true. What about the cosmogenic isotopes? Just remove it.

Reply:Removed.

11. P12L276-P14L311: Discussions on climatology => Remove it. Not supported by scientific evidence.

Reply:Removed.

12. P14L316-324: Remove it. Not supported by scientific evidence.

Reply:Removed.

13. Table 1: Sources => Existing catalogs

Reply:Revised.

14. Table 3: Giving a spot coordinate for Asia Minor is highly misleading. Remove it.

Reply:Revised.

15. Table 4: Reports 3 – 6 are not from the Middle East but from Byzantium. Remove them.

Reply:Removed.

16. Table 5: This is irrelevant to what the author has scientifically shown. Remove it.

Reply:Removed.

We thank to you and reviewers for constructive and helpful comments.

Sincerely,
Dr. Nafiz MADEN