

## Second Referee Report on MS Angeo-2020-1

### Summary

-- This manuscript has been significantly improved and I am happy to recommend its publication. This case report forms an interesting analysis for space weather event in 1780 within the scarcity of solar observations at that time and improve our understanding of the transitions from the high solar cycles to the Dalton Minimum. Apart from my concerns on the sporadic aurorae, most of my comments are rather minor. I hope they could be of use to improve this manuscript.

### Major Comment

-- 1. Sporadic aurorae

-- The authors' statement on the "sporadic auroras" is not true. Here, I have meant there are some major geomagnetic storms even around the cycle minima or their immediate aftermath (Garcia and Dryer, 1987; Hayakawa et al., 2020c). On the other hand, sporadic aurorae are aurorae seen in mid to low magnetic latitude during moderate to quiet geomagnetic activity, as explained in Silverman (2003). Similar reports are found globally (Willis et al., 2007; Vaquero et al., 2007, 2011; Hayakawa et al., 2018; Oliveira et al., 2020). While their physical nature is not extremely certain, part of them are explained with short storms and CIR-storms (see Hayakawa et al., 2018; Bhaskar et al., 2020). Difference of major geomagnetic storms around the solar minima and sporadic aurorae should be clarified, to avoid any potential confusions.

### Minor Comments

-- Title: Bezier => Beausejour

-- P1L8 Aurorae Observations => Auroral observations

-- P1L12 Mid => mid

-- P1L27 The term of "Carrington event" generally describes

-- P1L29 For May 1921 storm and March 1989 storm, please cite Hayakawa et al. (2019a) and Boteler et al. (2019), respectively.

-- P2L33 Ridley => Riley

-- P2L34 auroras nights => aurorae

-- P4L126 Some bright aurorae are seen even under twilight. You could cite Silverman and Cliver (2001), Vaquero et al. (2008), and Hayakawa et al. (2019) for your explanation.

- P5L144-146 The sentence is too long and difficult to read. The authors should separate them and keep their sentence readable.
- P5L151-153 This sentence should be sent to the beginning of this section and continued with “However, as stated by Stephenson et al. (2019) ...”.
- P6L170 The presence of the full moon may have fainted the auroral display and made it apparently whitish due to their relative brightness. This possibility may make the authors discussions more plausible.
- P6L183 According with => According to
- P7L210 The scarcity of solar observations makes this study extremely important. This should be emphasised. Understanding of the space climate in this period improves our discussions on the transition from the high solar cycles to the Dalton Minimum (Usoskin et al., 2009; Karoff et al., 2015; Owens et al., 2015; Hayakawa et al., 2020b).
- P10L296 The solar depression angle should be done with the coordinate of Beausejour, not that of Bezier, although the resultant difference should be extremely minor.
- Figure 2: Auroras Observations => Auroral Observations
- Figure 4: The usage of sunspot number should appropriately credit SILSO (Clette et al., 2014; Clette and Lefevre, 2016) here.

### **Additional References**

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