

Auroras in Arabian Peninsula

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Abstract: This paper describes aurora displays in the central and the West sides of Saudi Arabia. The list of the auroral events includes date, place and source of information for visually observed parameters such as: colors, shape, distribution on the sky and time duration of the phenomena. One of them, the aurora of 4 Feb. 1872G at Makkah (latitude $\approx 21.5^\circ$ N) is considered to be one of the greatest auroras of the last two centuries.

1. Introduction

It is very important to have an idea about past solar activity in order to have a better understanding of the Sun-Earth relationship and its impact on the Earth's atmosphere and climate. Just as the sunspots observations have been used as an indication of the solar activity, so the occurrence of auroras can also be used for this purpose. Records of auroral occurrences have been used^[1] as tracers of the past sunspots activity. The appearance of the aurora at low latitudes is closely connected to the high level of the solar activity, which cause the auroral zone to shift towards the equator^[2-4]. A search through Islamic texts of Arabian cultural history (mainly from Iraq, Egypt, Syria, Morocco, Spain and Yemen; between latitudes 15° - 38° N) has revealed 22 auroral occurrences during 9th to 16th centuries^[5,6]. These events have listed at Table 1 (A corrected form of Table 2 by Basurah^[5]) which contains slightly different dating than that reported earlier. In this table there are 4 auroras which have been reported from South of

Arabian peninsula, Yemen. Here in present paper we will draw descriptions for possible auroral records during 1831-1833G, reported from the central of Arabian peninsula, 25° N. - 43°E around Riyadh (Capital of Saudia Arabia). Also, a description of the great aurora of 4 Feb. 1872G, as seen from Makkah (21.5° N.-39.5° E) West side of Arabian peninsula. This aurora was characterized by an equator ward extension to be seen in a range of 20°-35°N^[7]. Most of the event which we have described here as reddish, and this is a typical color of the low latitude aurora^[8].

Table 1: Auroras displays as reported in the Islamic history.

| No of event | Periods and Date | Country |
|-------------|-----------------------------|---------|
| 1 | 816, Aug – 817 Jul. | Yemen |
| 2 | 817, Oct 29 | Iraq |
| 3 | 879, Oct 11 | Morocco |
| 4 | 897, May 7 – Jun 4 | Egypt |
| 5 | 931, Nov 9 | Iraq |
| 6 | 939, Oct 17 | Syria |
| 7 | 941, May 6 | Spain |
| 8 | 977, Aug 23 | Egypt |
| 9 | 979, Sept 29 | Morocco |
| 10 | 991, Mar 17 – 992, Mar 7 | Egypt |
| 11 | 1050, Apr 25 – 24 May | Egypt |
| 12 | 1060, Nov 9 – Dec 7 | Egypt |
| 13 | 1176, Sep 6 – Oct 5 | Syria |
| 14 | 1179, May 7 | Syria |
| 15 | 1203, Oct 9 – Nov 7 | Yemen |
| 16 | 1223, Oct 26 | Syria |
| 17 | 1264, Jul 20 – 30 | Syria |
| 18 | 1321, Jan 30 – 1322, Jan 19 | Yemen |
| 19 | 1370, Nov 27 | Syria |
| 20 | 1422, Dec 14 – 1423, Dec 3 | Egypt |
| 21 | 1449, Aug 26 | Yemen |
| 22 | 1570, Jun 4 – 1571, May 24 | Spain |

2. Description of the Aurora

Events During 1831-1833G.

An Arabian historical book titled: “*Enwan Al-Majed fi Tarekh Najd*” [A glorious history of Najd, Najd is the central part of Arabian Peninsula]^[9], contains some entries that can be interpreted as aurora.

1- The year of the event is recorded: “*In this year (1247H, H: Hejri, Islamic calendar, which corresponds to the interval from 1831-1832G) mysterious things were happening (in the sky) before sun rise and after sun set a reddish*

luminous appeared before day break from North direction. This stayed for three days”.

2 - Two specific dates have been given for two events during month of August 1831G:

a - The First date is about *appearance of light like that of the Moon in the sky for five days (the last five days of Safar, the second lunar month in the Hejri Islamic calendar) 4-9 August.*

b- The second one is August 23 about *appearance of a large reddishness after the Maghrib prayer [Just after sunset] starting from Al-Gedi [Polaris, North direction] and moved toward the West. It illuminated the ground and walls and became greenish and reddish that made people think that the Sun did not set”.*

3- Another year just of an event is recorded: *“During the year 1248H, (which corresponds to the interval from 1832-1833G) a reddish and yellowish appeared in the East and West after sun set and this stayed for months”.*

Event of 4 Feb. 1872G.

This event is recorded in a historical book about Makkah titled as *“Al- Tarekh Al-Gaweem le-Makkah wa-baet Allah Al-Kareem”* [The straight history book on Makkah and the noble house of God]^[10] : *“On Four hours after Sunset reddish glow appeared from the sky between the East and the North and continue for two hours. It was like fire peoples thought that fire on Al-Moabdah . Al-Moabdah is 7 km North-East of the central part of Makkah.*

3. Discussion

In this article we have presented historical records which describe the appearance of atmospheric phenomena, some of which could be considered to be auroras, during 1831-1833G, and on 4 Feb. 1872G. These records are interesting to give an idea about the aurora distribution during the solar activities. During 1831 there were an extraordinary number of sunspot groups which could indicate a period of high solar activity situation^[11], that could make auroras to be visible at low latitudes such as the central part of Saudi Arabia. The events between 1831 and 1833, especial which have been described as being visible for many nights or weeks, it seems, more likely to have been due to dust in the atmosphere coming from a the Babuyan Claro (Phillipines) volcanic eruption 1831G^[12].

The event of 23 August 1831G could be considered as an aurora event. While the aurora of 4 Feb. 1872G is will known as one of the greatest aurora, which was seen

from widely separated meridians` USA, EUOPRE, NORTH EFRICA, and INDIA, during the last two centuries^[13].

4. Conclusion

Two events which could be considered as auroras, reported from low latitudes in Arabian peninsula. First one the event of 23 August 1831G which was reported from center of Saudi Arabia, and the second event of the 4 Feb. 1872G which was observed at Makkah on the West side of Saudi Arabia. The last event was surely one of the greatest aurora observed widely throughout the whole word. These records with the previous events which covered the last 12 centuries^[5,6], could be conceded as being the first collection of auroras for this region of the world. And, will help to fill the gaps in the other aurora catalogues of Europe and the Far East, and which throw light on the solar activity situations at that time

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الشفق القطبي على الجزيرة العربية

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المستخلص: يستعرض هذا البحث حالات النشاط الشمسي المتمثل في ظهور الشفق القطبي على خطوط عرض قريبة من خط الاستواء مثل الجزيرة العربية حيث نجد أن هذه الظاهرة قد سُوهدت في وسط المملكة العربية السعودية وغيرها. كما احتوى البحث على قائمة لأوقات الظهور، وبقية المعاملات الوصفية كاللون، والشكل، والتوزيع، ومدة الظهور. ومن أهم هذه المشاهدات خلال القرنين الماضيين، هو ظهور الشفق الذي أضاء منطقة المعابدة بمكة المكرمة في تاريخ ٢٤ ذي القعدة ١٢٨٨هـ الموافق ٤ فبراير ١٨٧٢م.