A Solar Flare on 10 September 2014 May be Related to F/A-18C Hornets Crashing in the Western Pacific Ocean

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ABSTRACT

Two F/A-18 Hornets from Carrier Air Wing 17 embarked on the aircraft carrier USS Carl Vinson crashed at 5:40 (UT) about 290 miles west of Wake Island on 12 September 2014. A large geomagnetic storm simultaneously occurred due to the X-Class solar flare at 17:46 (UT) on 10 September 2014. It can be doubted that this large geomagnetic storm may be a potential reason of the crashing.

Keywords: F/A-18 Hornets, USS Carl Vinson, Crashed, Wake Island, Geomagnetic storm, X-Class Solar Flare)

INTRODUCTION

A flare is defined as a sudden, rapid, and intense variation in brightness. A solar flare occurs when magnetic energy that has built up in the solar atmosphere is suddenly released. Radiation is emitted across virtually the entire electromagnetic spectrum, from radio waves at the long wavelength end, through optical emission to x-rays and gamma rays at the short wavelength end. The amount of energy released is the equivalent of millions of 100-megaton hydrogen bombs exploding at the same time! The first solar flare recorded in astronomical literature was on September 1, 1859. Two scientists, Richard C. Carrington and Richard Hodgson, were independently observing sunspots at the time, when they viewed a large flare in white light. In the study, the ionospheric electron content is examined. GPS users with single-frequency receivers need ionospheric electron content information in order to achieve positioning accuracy similar to dual-frequency receivers. The GDGPS System provides a global real-time map of ionospheric electron content. These maps are also of value in monitoring the effect of the ionosphere on radio signals, power grids, and on space weather. The maps are derived using data from the ~100 real-time GDGPS tracking sites. The integrated electron density data along each receiver-GPS satellite link is processed through a Kalman filter to produce the global maps of TEC. The maps are available from multiple GDGPS Operations Centers (GOCs) as images, as text files containing the gridded TEC values, or as a binary data stream containing the gridded TEC values (http://www.gdgps.net/products/tec-maps.html). TEC measured errors (biases), and their correction using the Kalman filter, are described in the following references; Wu and Bar-Sever (2005); Kechine et al (2004); Ouyang et al (2008). The estimated TEC data have been corrected for biases during measurements of dual-frequency delays of GPS signals e.g. carrier phase biases, satellite state (orbit) corrections, ionospheric delay and troposphere, which need to be removed using ground-based post-processing software (Raman and Garin., 2005; Wu and Bar-Sever, 2005). The GIMs contain vertical (VTEC), which has been converted from the slant (STEC) at the ionospheric pierce points as STEC=VTEC. ME + b + r, where ME = $1/\cos(\Theta)$ is the mapping function, Θ is the zenith angle of GPS satellite at the single layer height of the ionosphere, b and r are the instrument biases of the satellites and receivers, respectively. Then VTEC and the instrument biases b and r are obtained by combining

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interpolation and least-square fitting procedure. For details of the method used to derive the VTEC from GPS measurements, please refer to Mao (2007) and Mao et al. (2008).

DANGERS OF SOLAR FLARE

The electrical power grid is particularly vulnerable to these extra currents, which can infiltrate high-voltage transmission lines, causing transformers to overheat and possibly burn out. The danger is becoming more critical, as the sun is approaching what's known as solar maximum—the high point in our star's roughly 11-year cycle of activity. Scientists anticipate stronger storms around solar max, in 2013. Using the latest sun-watching satellites and computer models, scientists have been trying to improve solar storm predictions. At the same time, electricity operators are developing plans for how to respond to solar storm warnings and determine what the consequences for the grid might be in a worst-case scenario. Active sunspot AR2158 erupted at 17:46 (UT) on 10 September 2014 producing a strong X-class solar flare. Because the sunspot is directly facing Earth, this is a geo-effective event. HF radio blackouts and other communications disturbances have already been observed on the day-lit side of Earth (NOAA NWS Space Weather Prediction Center). (http://spaceweather.com/archive.php?view=1&day=10&month=09&year=2014). Figure 1 shows the global TEC map at 5:40 UT on 12 September 2014. Figure 2 shows the Dst indices in September 2014.

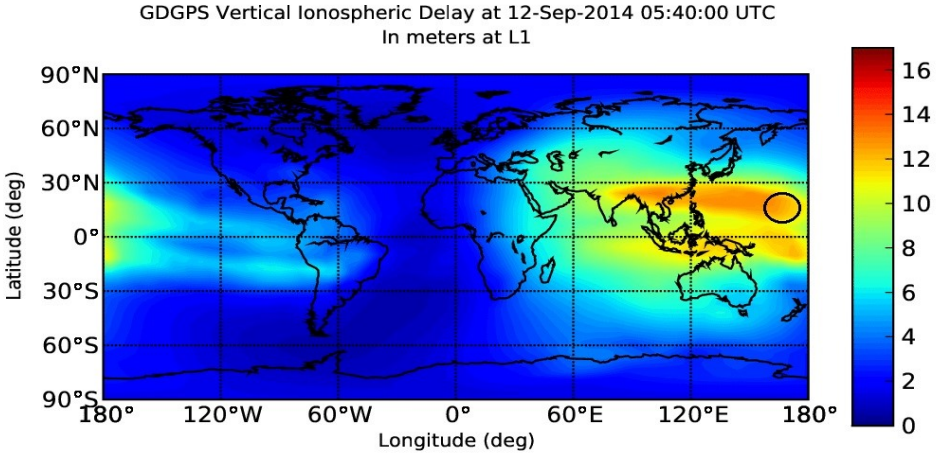

Figure 1. This figure is the global TEC map at the time of 05:40 (UT) on September 2014

Figure 2. This figure shows the Dst indices in September 2014
(World Data Center for Geomagnetism, Kyoto)

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RESEARCH CASE

Two US F/A-18 Hornets from Carrier Air Wing 17 embarked on the aircraft carrier USS Carl Vinson crashed at 5:40 (UT) about 290 miles west of Wake Island on 12 September 2014 (around the places marked with a circle in Figure 1). The potential crashed reason is examined in this study.

DISCUSSION

The DST (Disturbance Storm Time) equivalent equatorial magnetic disturbance indices are derived from hourly scaling of low-latitude horizontal magnetic variation. They show the effect of the globally symmetrical westward flowing high altitude equatorial ring current, which causes the "main phase" depression worldwide in the H-component field, and therefore the disturbance storm time (Dst, Kyoto Dst) index is a measure in the context of space weather. It gives information about the strength of the ring current around earth caused by solar protons and electrons and represented a large geomagnetic storm covering the time period of 12 September 2014 due to the strong X-class solar flare on 10 September 2014. The two aircraft are assigned to Strike Fighter Squadron 94 and Strike Fighter Squadron 113. The two F/A-18C Hornets have not been recovered. It is doubted that the potential reason of the incident may be due to the large geomagnetic storm.

CONCLUSION

Two US F/A-18 Hornets crashed at 5:40 (UT) about 290 miles west of Wake Island on 12 September 2014. Doubtfully, the caused reason may be related to a large geomagnetic storm covering the crashed time caused by a strong X-class solar flare.

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