Geomagnetic Disturbance Report – Reeve Observatory

Activity: On 29 May 2010 the Space Weather Prediction Center reported a K-index of 4 at 0747 (all dates and times in UTC) and issued the following alerts:

Space Weather Message Code: ALTK04
Serial Number: 1452
Issue Time: 2010 May 29 0748 UTC

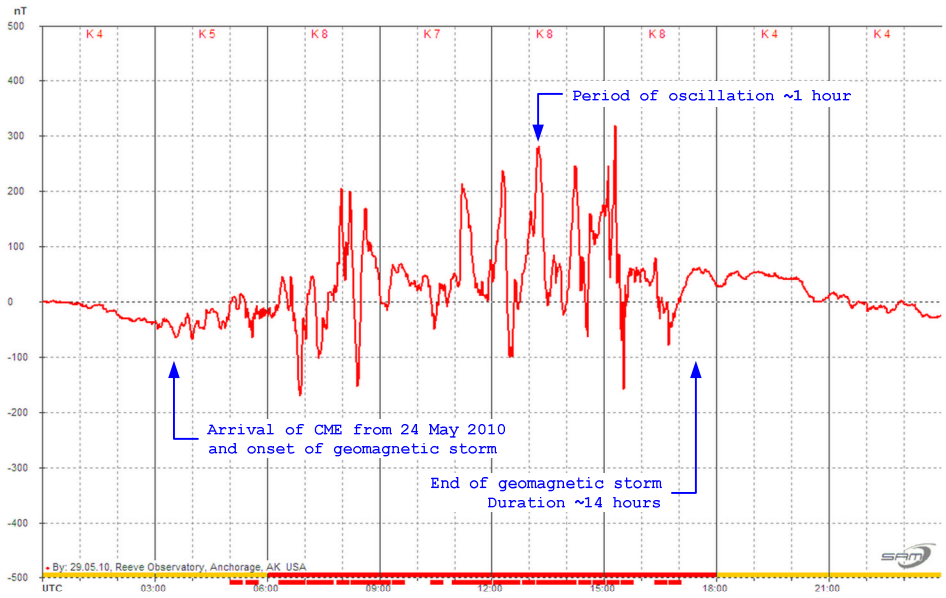
ALERT: Geomagnetic K-index of 4
Threshold Reached: 2010 May 29 0747 UTC
Synoptic Period: 0600-0900 UTC
Station: Boulder
Active Warning: Yes

SWPC issued a subsequent alert at 0754 for a K-index of 5, or storm level:

Space Weather Message Code: ALTK05
Serial Number: 640
Issue Time: 2010 May 29 0757 UTC

ALERT: Geomagnetic K-index of 5
Threshold Reached: 2010 May 29 0754 UTC
Synoptic Period: 0600-0900 UTC
Station: Boulder
Active Warning: Yes
NOAA Scale: G1 - Minor

The geomagnetic activity most likely was associated with a coronal mass ejection (CME) on 24 May. A rough calculation shows the average speed toward Earth of this CME was [151.7 x 10^6 km / (4.5 d x 24 h/d x 3,600 s/h) =] 390 km/s, or 0.0013c. The magnetogram image below from Reeve Observatory clearly shows the onset of the geomagnetic storm, which lasted approximately 14 hours. See end of this report for definition of geomagnetic storm.



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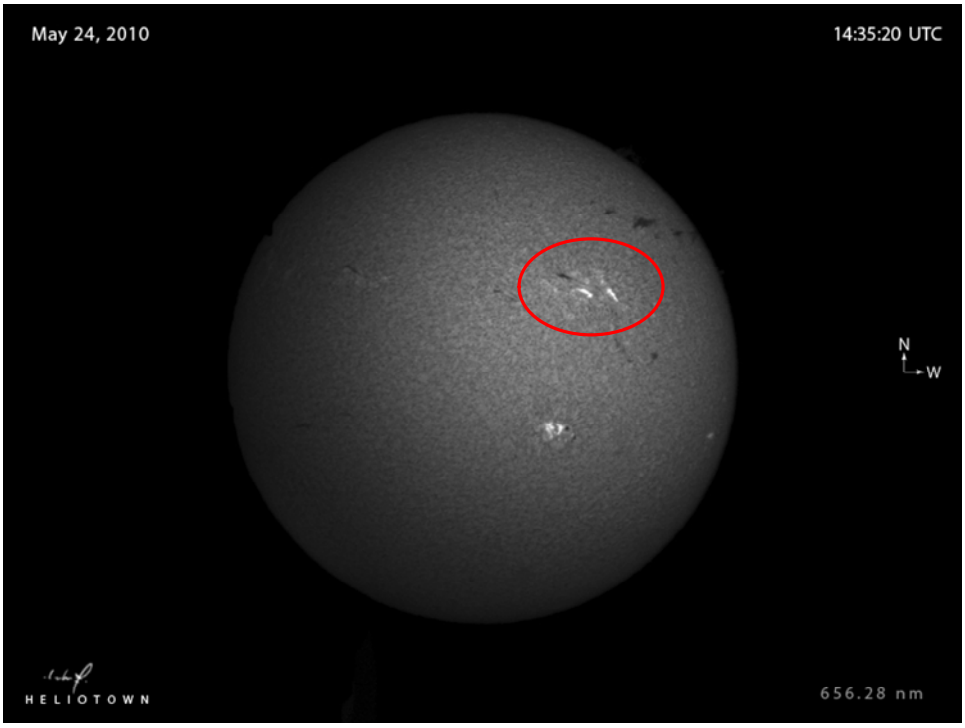
Sun image (courtesy of Thomas Ashcraft): The CMEs associated with the geomagnetic event of 29 May originated on 24 May 2010 in the area indicated by the red circle below (annotation added to original image).



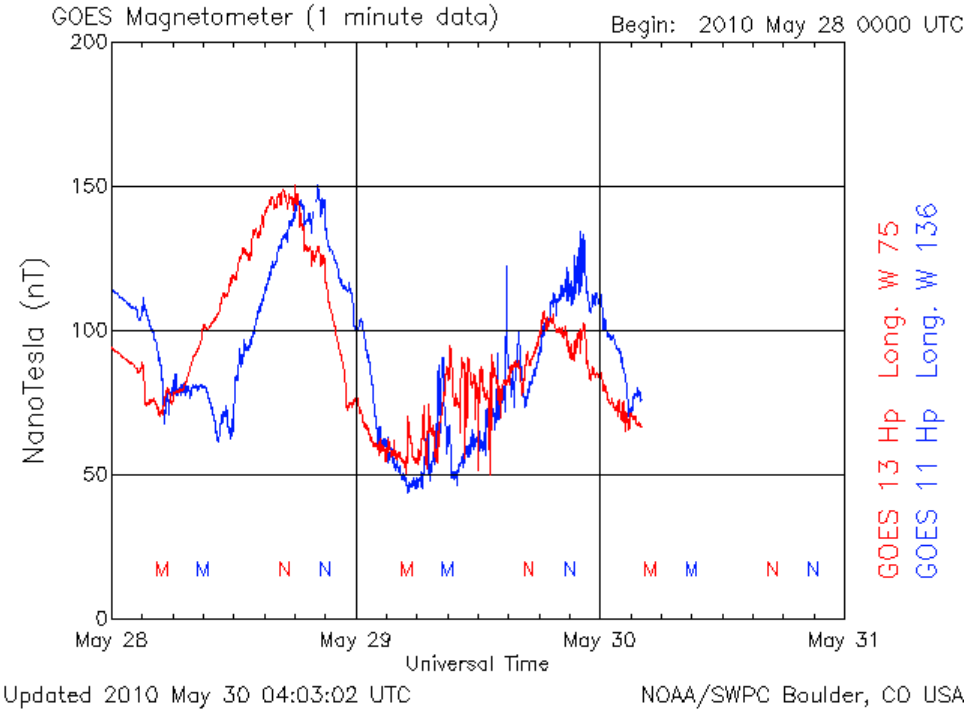
Other information: There is a possibility of further activity. In addition to the CME, a recurrent coronal hole high-speed stream is directed at Earth and is forecast to be felt on 30 and 31 May. These events may be described in subsequent reports as they develop.

During geomagnetic disturbances, amateur radio operators should look for VHF propagation opportunities on polar paths and aurora watchers should be on the lookout for aurora.

Equipment: Simple Aurora Monitor (SAM) located at geomagnetic coordinates: 61.63 °N : 262.89 °E
For equipment description and real-time magnetogram – www.reeve.com/MagnetometerM2.htm

Resources:
Alaska Magnetometer Chain – 137.229.36.30/cgi-bin/magnetometer/magchain.cgi
Geostationary Operational Environmental Satellites – www.swpc.noaa.gov/rt_plots/mag_3d.html
Space Weather Prediction Center – www.swpc.noaa.gov/

GOES data (GOES 11 is most relevant to Reeve Observatory):



Geomagnetic Storm: Geomagnetic storms are extraordinary variations in the Earth's magnetic field, which can last up to several days. The main feature of a storm is an unmistakable decrease of the field's horizontal intensity and its subsequent recovery. Such events are related to the way the magnetosphere interacts with the solar wind. Some geomagnetic storms, particularly larger ones, begin with the arrival of an interplanetary shock structure, called a *sudden commencement*. If the Interplanetary Magnetic Field (IMF) associated with the arrival of a solar-terrestrial disturbance remains northward behind the shock then there usually is no subsequent storm, and the shock stands alone as a *sudden impulse*. If the IMF is directed southward (–Bz) behind the shock then a geomagnetic storm usually follows the sudden commencement. The storm event usually is the effect of enhanced solar-wind pressure associated with a coronal-mass ejection (CME) or coronal hole high-speed stream. For purposes of measurement, a geomagnetic storm occurs when the K-index reaches a threshold of 5 or greater. For further information on K-index, see http://www.reeve.com/Documents/SAM/GeomagAmRadioAstron.pdf