Geomagnetic Disturbance Report – Reeve Observatory

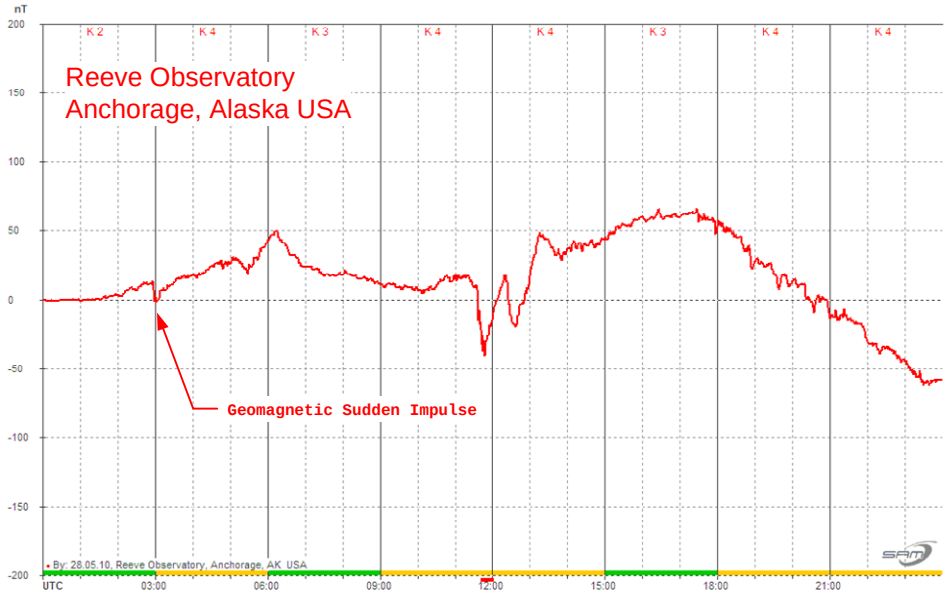
Activity: On 28 May 2010 the Space Weather Prediction Center measured an inter-planetary shock passage at 0203 (all dates and times in UTC) and issued the following warning:

> WARNING: Geomagnetic Sudden Impulse expected
> Valid From: 2010 May 28 0245 UTC
> Valid To: 2010 May 28 0345 UTC
> IP Shock Passage Observed: 2010 May 28 0203 UTC

It was felt as a geomagnetic sudden impulse (see definition at end of this report) on Earth almost exactly one hour later and reported in a SWPC announcement:

> Space Weather Message Code: SUMSUD
> Serial Number: 108
> Issue Time: 2010 May 28 0308 UTC
> SUMMARY: Geomagnetic Sudden Impulse
> Observed: 2010 May 28 0259 UTC
> Deviation: 33 nT
> Station: Boulder

The sudden impulse most likely was associated with a coronal mass ejection (CME) on 23 May. The impulse amplitude at the Boulder Colorado station was 33 nT. The Reeve Observatory geomagnetometer (SAM) recorded it as a very obvious sharp drop of around 15 nT. The magnetogram image below clearly shows the event at 0300.



The SWPC also issued a Warning of K-index 4 at about the same time, but it did not materialize, at least at Anchorage, Alaska:

> Space Weather Message Code: WARK04
> Serial Number: 1627
> Issue Time: 2010 May 28 0305 UTC
> WARNING: Geomagnetic K-index of 4 expected
> Valid From: 2010 May 28 0310 UTC
> Valid To: 2010 May 28 1600 UTC

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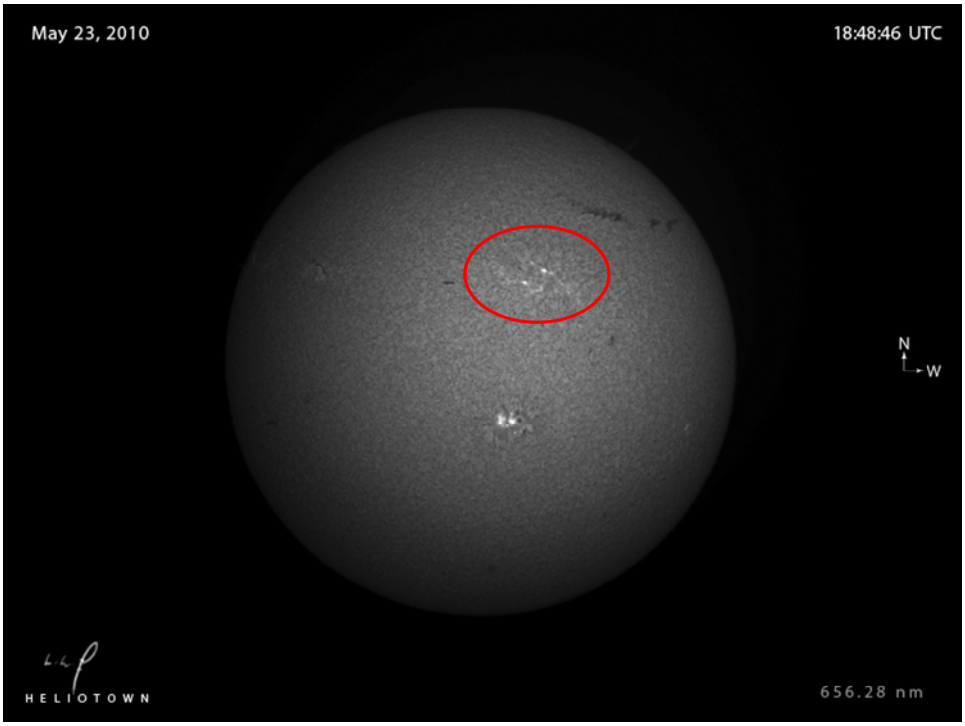
Warning Condition: Onset

Sun images (courtesy of Thomas Ashcraft): The CME associated with the geomagnetic events of 28 May originated on 23 May 2010 in the area indicated below (annotation added to original image)



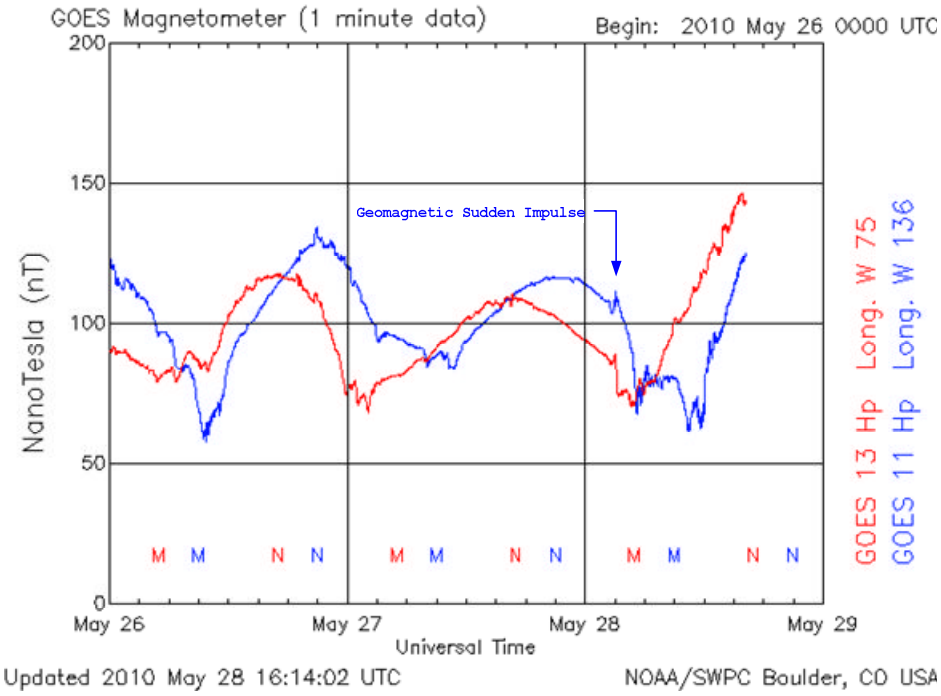
Other information: Usually, geomagnetic sudden impulses are stand-alone events that are not followed by a geomagnetic storm (defined by K-index ≥ 5). However, there is a possibility of further activity on 29 May due to a CME of 24 May. In addition to the CME, a recurrent coronal hole high-speed stream is directed at Earth and is forecast to be felt on 30 May. These events will 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 Sudden Impulse: 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 sudden impulse mostly is the effect of enhanced solar-wind pressure associated with a coronal-mass ejection (CME) and is identified by its characteristic signature in terrestrial magnetometer data. It is most clearly seen at low latitudes, where the field variations are generally less complex than at high latitudes. This means that a sudden impulse can be difficult to identify at high latitude observatories because it may be overshadowed by normal activity. However, almost all sudden impulses within the last year have occurred during otherwise quiet periods and are clearly shown at the Reeve Observatory at 61°N latitude.

Acknowledgement: Jeffrey J. Love, USGS Advisor for Geomagnetic Research, assisted with the sudden impulse definition above.