Geomagnetic Disturbance Report – Reeve Observatory

Event type: Coronal hole high-speed stream (CHHSS) and coronal mass ejection (CME)

Activity: The Space Weather Prediction Center forecasted geomagnetic activity associated with a coronal hole and CME for several days. Here is the forecast for 10 October 2010:

"IIB. Geophysical Activity Forecast: The geomagnetic field is expected to be quiet to unsettled with isolated active levels at high latitudes on days one and two (11 - 12 October). This activity is due to a small, geoeffective coronal hole coupled with glancing blow effects from the 06 October full-halo CME. Day three (13 October) will see a return to mostly quiet conditions."

Finally, on 11 Oct 2010 a series of disturbances were measured at Reeve Observatory. The SAM showed an initial event at 0800 UTC with follow-on activity starting at 1030. The SWPC showed storm threshold (K5) was reached at 1351 while the Reeve Observatory system showed storm level was reached a couple hours before. The SWPC K-index is based on the horizontal component (vector X+Y) from a number of stations, while the K-index at Reeve Observatory is based on one station and one component, so differences are expected. Here is the SWPC Alert (two K-index of 4 alerts, not shown, were issued on 11 October, one at 1058 and another at 1317):

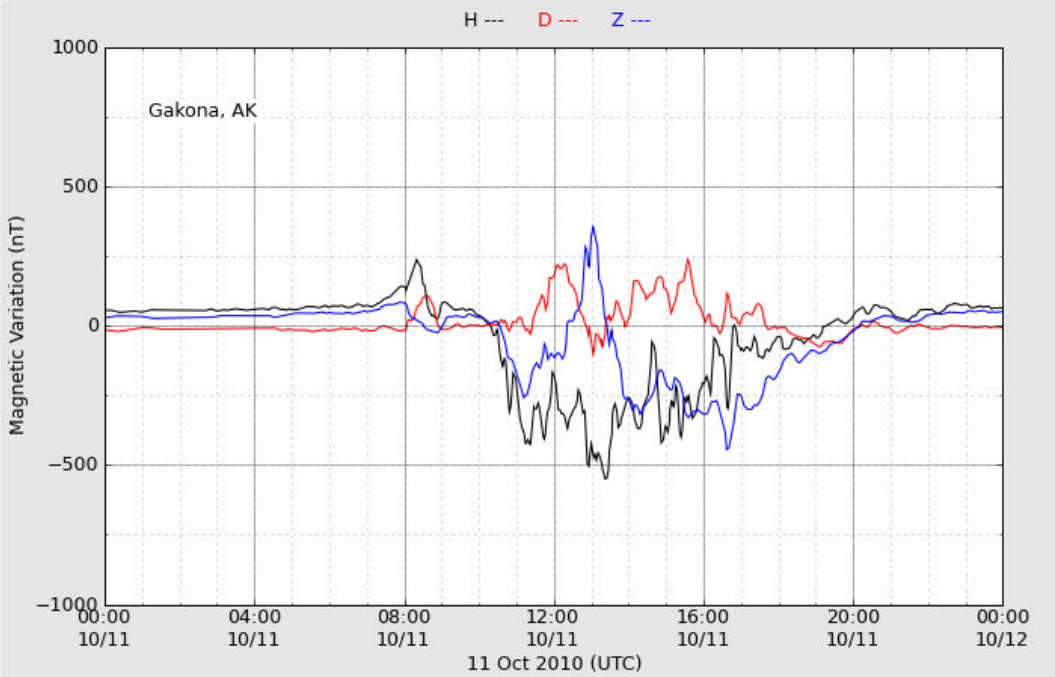
Space Weather Message Code: ALTK05
Serial Number: 647
Issue Time: 2010 Oct 11 1351 UTC
ALERT: Geomagnetic K-index of 5
Threshold Reached: 2010 Oct 11 1351 UTC
Synoptic Period: 1200-1500 UTC
Station: Boulder
Active Warning: Yes
NOAA Scale: G1 - Minor

SWPC issued the following summary on 11 October:

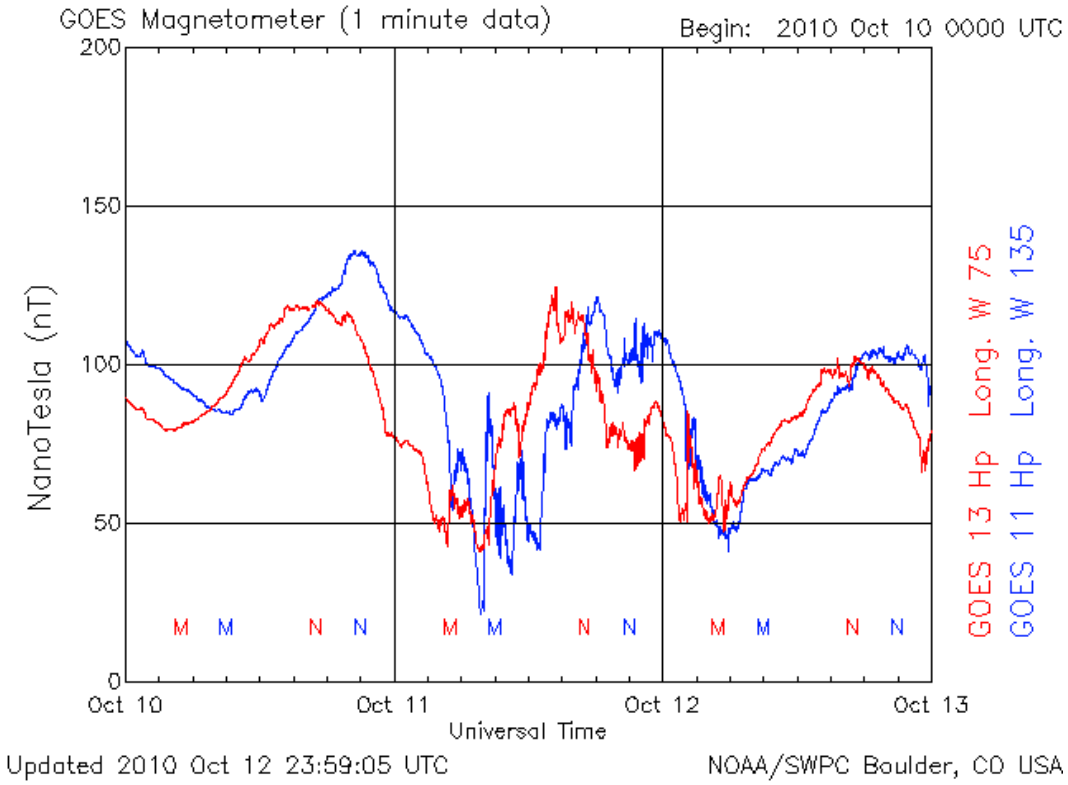
“IIA. Geophysical Activity Summary 10/2100Z to 11/2100Z:
The geomagnetic field ranged from quiet to minor storm levels. Activity levels were quiet through 11/0600Z. By 11/0900Z, geomagnetic activity increased at all latitudes to predominately unsettled to active levels with an isolated minor storm period observed between 11/1200 - 1500Z. At approximately 11/0300Z, measurements at the ACE spacecraft observed flucuations in the B component of the interplanetary magnetic field (IMF) along with a sharp increase in density and a slight increase in wind velocity. The IMF Bz reached a maximum of -13 nT at 11/0915Z, and remained southward through 11/1805Z. The IMF Bt hit a maximum of 14 nT at 11/0936Z while density reached a peak of 47 p/cc at 11/0509Z. Wind velocities increased slightly from a low of 325 km/s at the beginning of the summary period and peaked near 375 km/s at 11/1826Z. The increase in activity is most likely a result of a glancing blow from the 06 October full-halo CME.”

SAM Data: The magnetogram below shows 10 October (dark blue) and 11 October (red). Note the contrast between quiet and active days.

Alaska Magnetometer Chain:



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



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:
Reeve Observatory SAM-III real-time data: www.reeve.com/SAM/SAM_simple.html
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/
SOHO – http://sohodata.nascom.nasa.gov/cgi-bin/data_query
SDO – http://sdo.gsfc.nasa.gov/

Geomagnetism Tutorial:
www.reeve.com/Documents/SAM/GeomagnetismTutorial.pdf

Image sources:
GOES: NASA
Alaska Magnetometer Chain: University of Alaska Fairbanks, Geophysical Institute