

# Geomagnetic Disturbance Report – Reeve Observatory

Event Type: Coronal mass ejection and associated shock

Background: This background section defines the events covered.

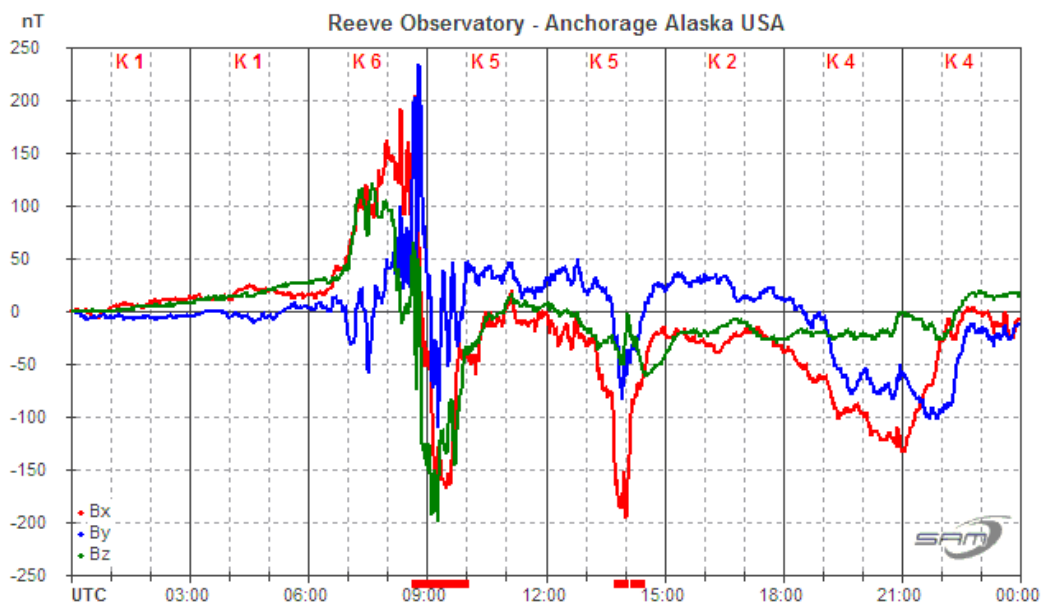
A coronal mass ejection (CME) is a strong surge in the emission of charged particles with a resulting increase in the velocity and density of the solar wind. Generally, a CME must be directed at Earth for it to disturb the geomagnetic field; however, it has been found that some CME may initially be directed “over” or “under” Earth but the Sun’s magnetic field (IMF) may deflect them in such a way that they intercept Earth. When the surge hits the Earth’s magnetosphere, usually 3 – 5 days after the solar event, the magnetic field is disturbed and oscillates. This in turn generates electric currents in the Earth’s ionosphere and near-Earth space environment. The electric currents in turn generate additional magnetic-field variations.

Activity: On 10 March 2011, a CME intercepted the Earth’s magnetosphere at about 0645 UTC. The CME likely originated about 3 d earlier on 7 March. The disturbance continued through the rest of the day and was most severe at high latitudes.

SAM Data: The SAM\_VIEW image is for the 24 h periods 10 March 2011. The caption describes the events as they were reported by Space Weather Prediction Center (SWPC) with additional information specific to Reeve Observatory.

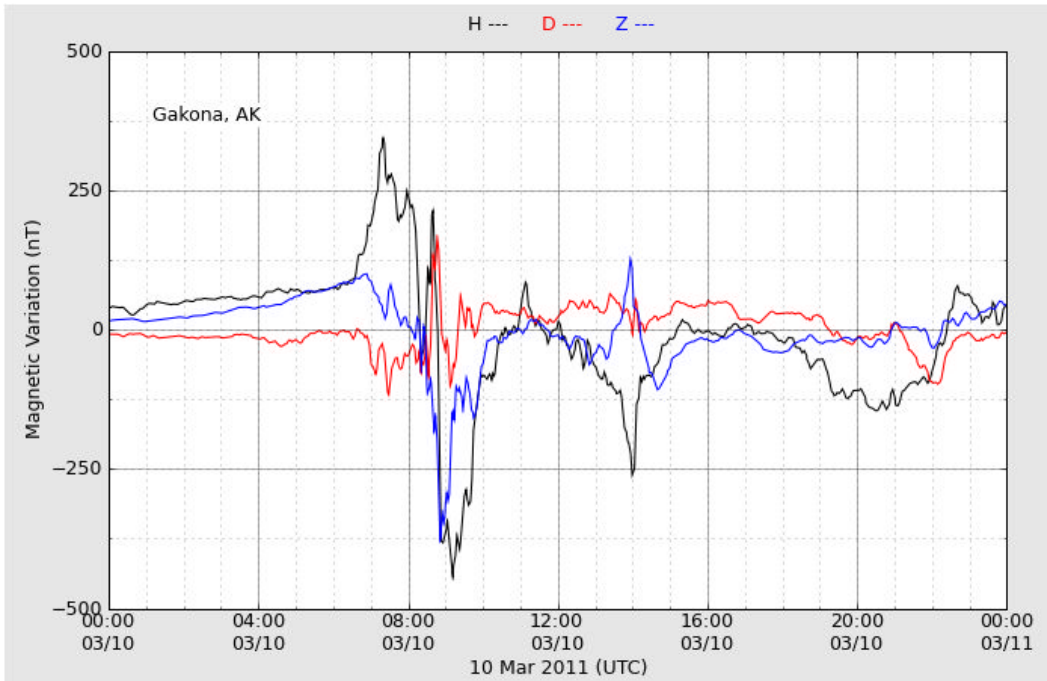
10 March 2011 (below)

The geomagnetic field was unsettled to active at middle latitudes and briefly reached severe storm levels at high latitudes. The geomagnetic disturbance was likely caused by the arrival of the 07 March CME. The CME shock was observed at the ACE spacecraft at approximately 06Z accompanied by a slight increase in wind speed to 360 km/s. The Bz component of the interplanetary magnetic field turned southward and averaged  $-9\text{nT}$  from 10/06Z to 10/09Z. The 10 MeV proton greater than 10 pfu event that began 08/0105Z ended at 10/1210Z with a maximum flux of 50 pfu at 08/0800Z. Note: pfu = proton flux units

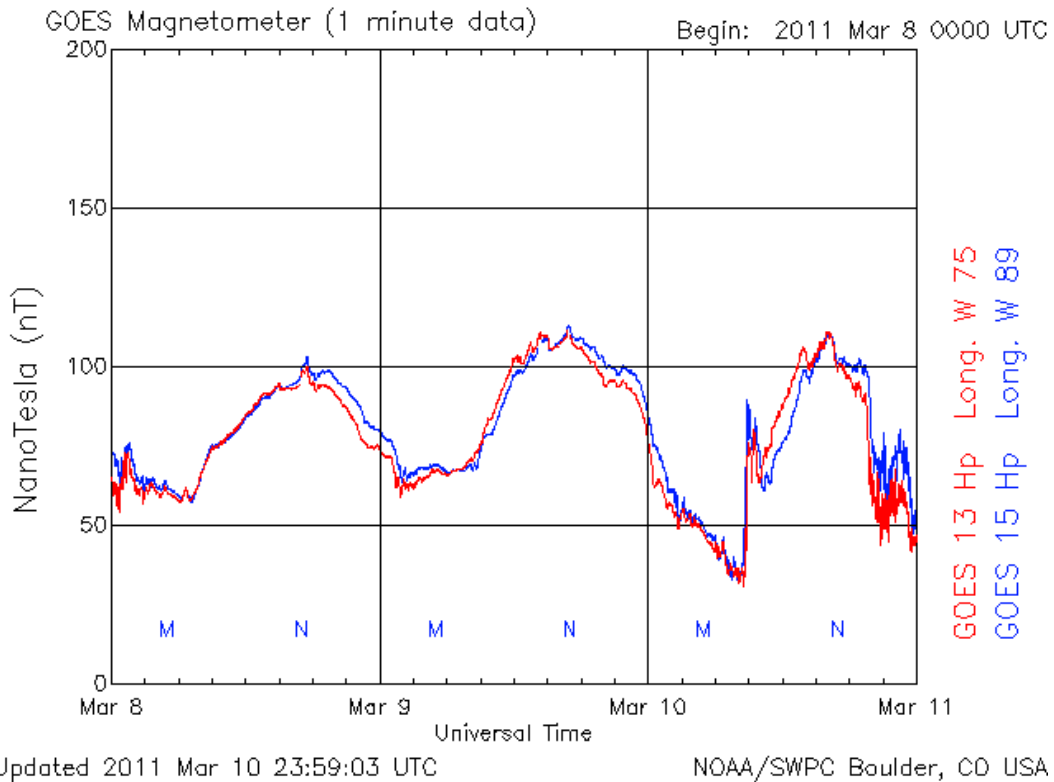


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Alaska Magnetometer Chain: Gakona station (approximately 290 km ENE of Reeve Observatory):

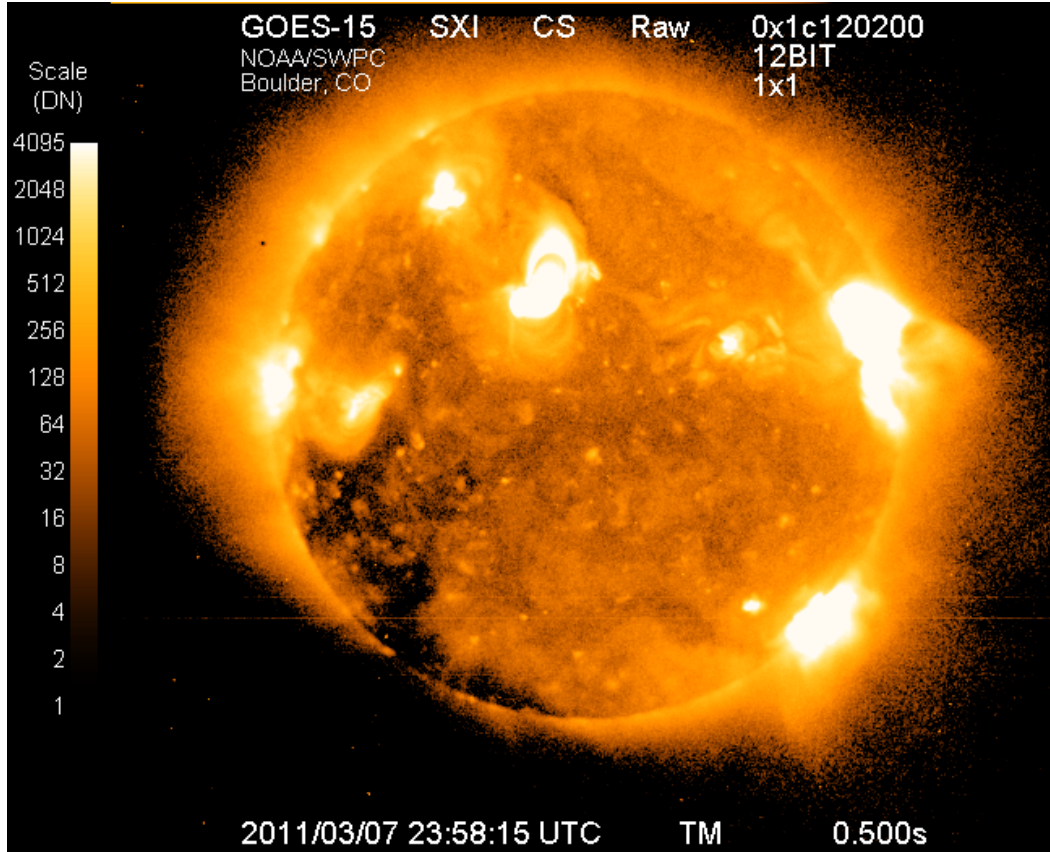


GOES data (GOES 15 is closest in longitude to Reeve Observatory):



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GOES 15 SXI (Solar X-ray Imager) for 7 March 2011):



## Equipment:

Simple Aurora Monitor (SAM-III) located at geomagnetic coordinates: 61.63 °N : 262.89 °E  
Equipment description: [www.reeve.com/SAMDescription.htm](http://www.reeve.com/SAMDescription.htm)

## Resources:

Reeve Observatory SAM-III real-time data: [www.reeve.com/SAM/SAM\\_simple.html](http://www.reeve.com/SAM/SAM_simple.html)  
Alaska Magnetometer Chain – [137.229.36.30/cgi-bin/magnetometer/magchain.cgi](http://137.229.36.30/cgi-bin/magnetometer/magchain.cgi)  
Geostationary Operational Environmental Satellites – [www.swpc.noaa.gov/rt\\_plots/mag\\_3d.html](http://www.swpc.noaa.gov/rt_plots/mag_3d.html)  
Space Weather Prediction Center – [www.swpc.noaa.gov/](http://www.swpc.noaa.gov/)  
SOHO – [http://sohodata.nascom.nasa.gov/cgi-bin/data\\_query](http://sohodata.nascom.nasa.gov/cgi-bin/data_query)  
SDO – <http://sdo.gsfc.nasa.gov/>

## Geomagnetism Tutorial:

[www.reeve.com/Documents/SAM/GeomagnetismTutorial.pdf](http://www.reeve.com/Documents/SAM/GeomagnetismTutorial.pdf)

## Image sources:

GOES: NASA

Alaska Magnetometer Chain: University of Alaska Fairbanks, Geophysical Institute