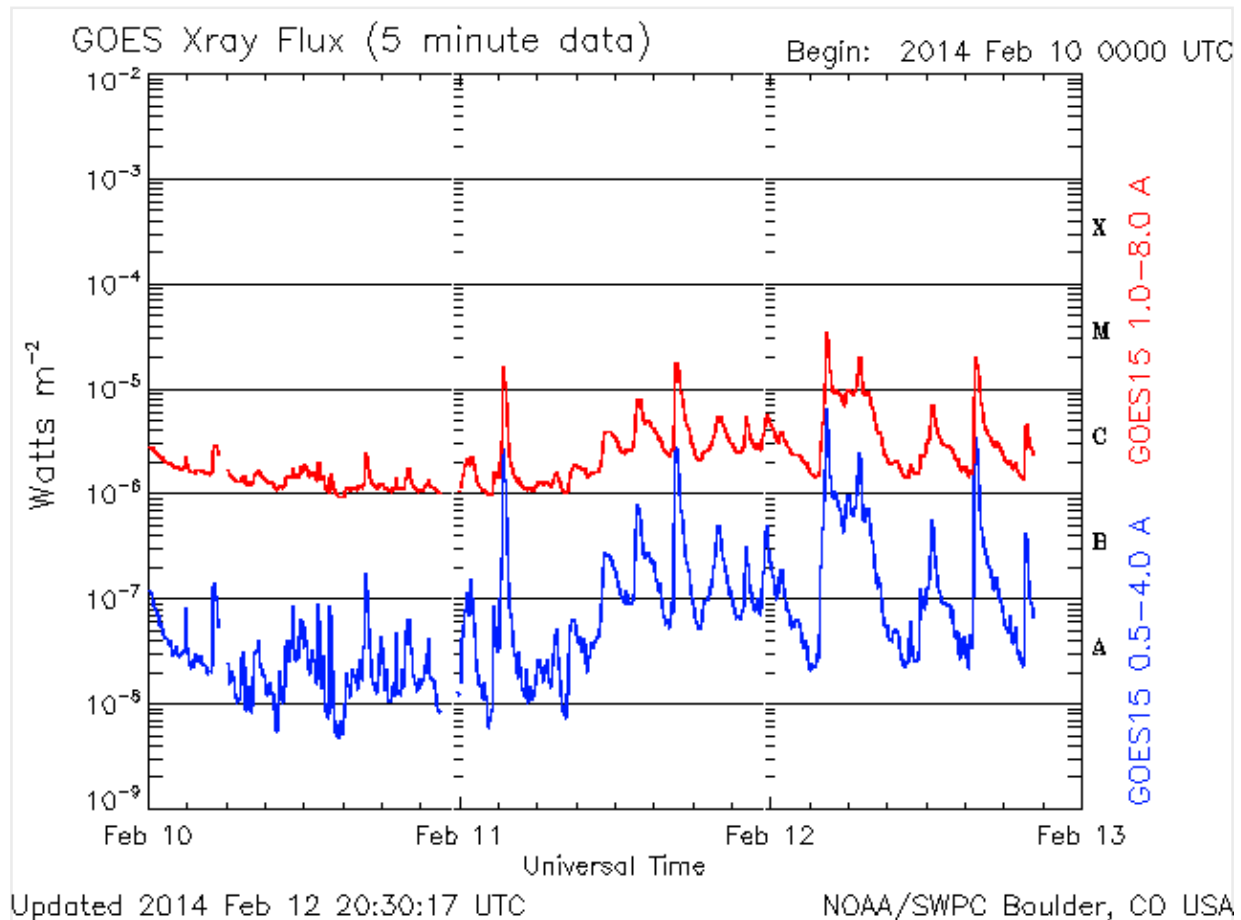


A Moderate Solar Flare - 12 February 2014

Let's look at the solar activity that occurred in February 2014. Here is the GOES X-ray flux from that period



1. ***When did the biggest flare in this period occur? What was the GOES flare class?***

Now go to <http://solarmonitor.org> and search for the date February 12, 2014 (upper left).

2. ***What active region produced this flare?***
3. ***Where on the disk was the region when the flare occurred?***

Now go to <https://www.helioviewer.org/#>

The peak of the flare was at about 2014/02/14 04:25 UT (we could find that

out from solar monitor.org)

Load the SDO-AIA-1700 Å image from that date and time. Zoom in to the active region near disk center (magnifier in upper left). Find the two extra bright "flare ribbons" - these show the chromospheric heating from particles propagating down from the reconnection of coronal magnetic fields.

Try also "adding a layer" selecting "SDO-HMI-continuum" (No difference image) and playing with the opacity to compare locations of ribbons and spots

4. *Are the ribbons right above the main sunspots?*

You can also compare the ribbons in SDO-AIA-1700 Å to the brightening seen in the simultaneous H-alpha image (the "classical" means of monitoring chromospheric flare responses).

<https://gong2.nso.edu/HA/hag/201402/20140212/20140212042554Uh.jpg>

Now change or add a layer to compare the SDO-HMI-magnetogram with the bright flare ribbons seen in SDO-AIA-1700 Å.

5. *Compare the magnetic polarities (positive and negative) for the two flare ribbons. What kind of magnetic field probably lies between the two ribbons (remember the SDO-HMI-magnetogram is just the line-of-sight magnetic field)?*

Now add the SDO-AIA-171 Å layer (in addition to the SDO-AIA-1700 Å layer). Compare the brightening seen in the "chromospheric" (1700 Å) and coronal (171 Å) channels.

6. *Are the extent and number of brightenings the same in both channels?*

Jump forward about 45 minutes (~2014/02/14 05:10 UT) and look at the bright post-flare loops seen in the SDO-AIA-171 Å images (or other wavelengths).

7. *What are the magnetic polarities of the two footprints (ends) of the bright coronal loops?*

Here is what the Helioviewer controls might look like:



▼ Observation Date



Date: UTC NEWEST

Jump:



Add Layer

Data Sources

▼ Images

▼ HMI Int 2014/02/12 04:25:56 UTC

Opacity:

Observatory:

Instrument:

Measurement:

Difference:

▼ AIA 1700 2014/02/12 04:25:43 UTC

Opacity:

Observatory:

Instrument:

Measurement:

Difference:

▼ AIA 171 2014/02/12 04:25:59 UTC

Opacity:

Observatory:

Instrument:

Measurement:

Difference:

Now zoom out and change the "Jump" setting at the top to 12 hours or 1 day and go back a few days, to about February 9. Did the magnetic complexity of the active region change as the region rotated across the disk?

8. ***What happened on around February 10-11th? Compare that to the GOES x-ray light curve shown at the beginning.***

9. ***Are there any noticeable changes in the magnetic field right at the time of the flare?***

For fun (or extra credit), you can make a movie of the HMI continuum or magnetogram to more clearly see the evolution of the active region. Or a movie of just the flare in some of the SDO-AIA coronal filters. You can either do the full disk or select a region (in the latter case, choose the "rotate field of view" in the advanced option so the movie tracks the solar rotation (albeit, imperfectly at times).

10. ***Share the URL of your (best) movie***

An example of the Helioviewer movie controls:

