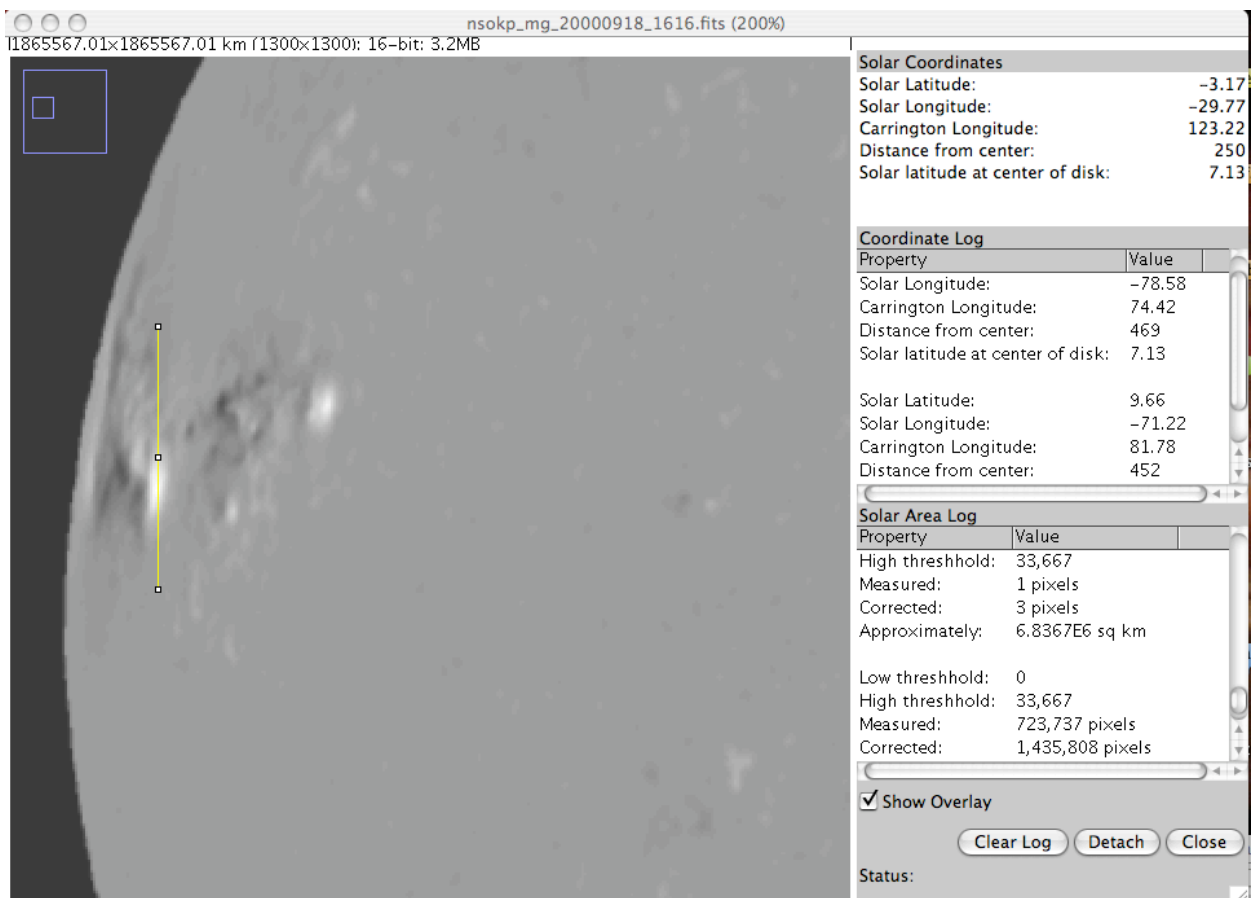


Week 13, with Connie Walker Assignment 3

Assignment 3 - Estimating Magnetic Field Strength Of A Sunspot Region Over Time (due date: Saturday, April 19)

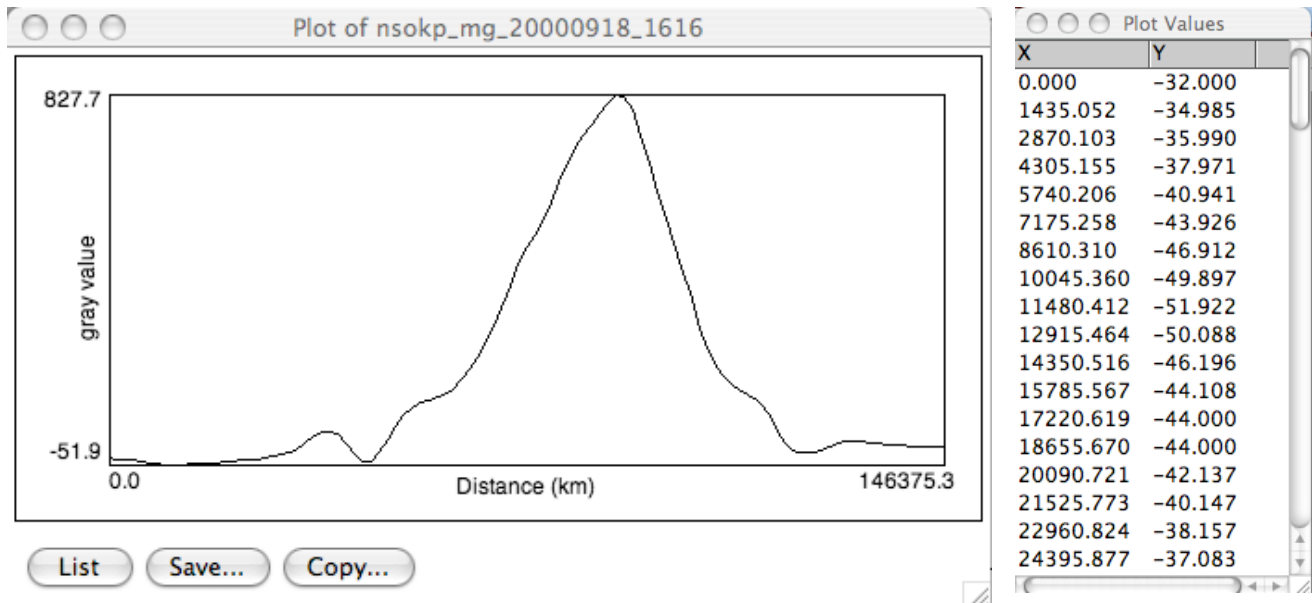
If you are starting a new ImageJ session, use a similar procedure as in Assignment 2 to start the solar plugin, to detach the information panel, to set the scale and to zoom in. We will not be using the threshold feature in this assignment. Start your analysis with image nsokp_mg_20000918_1616.fits in the Magnetograms directory. An example of the analysis is shown below. Repeat for the other 9 images (through nsokp_mg_20000929.fits) over the two weeks of data.



Making a Plot Profile of the Magnetic Field Strength

Draw a vertical line with the line selection tool so that it is at least twice as big as the brightest white area corresponding to the sunspot region. (See above.) The white area corresponds to one polarity of the magnetic field strength. Select Analyze-> Plot Profile. A dialog box will open that looks like the plot of relative gray value versus distance (km) below. Select "list" to get a list of x and y values. Select the "copy" button in the dialog box to copy the list of x and y data (relative gray scale or magnetic field strength vs.

distance in km). (See below.) Paste it into Graphical Analysis to make a plot (or into excel) to play with the data.



Run the cursor over the ImageJ plot profile for nsokp_mg_20000918 that you just made. Find the maximum (relative) gray value. The x- and y-values are shown to the right of the List/Save/Copy buttons. For nsokp_mg_20000918, the y-value for the maximum (relative) gray value is around 827. Record this value.

Recording Solar Coordinates:

Move the mouse pointer (e.g., the cursor) to the center of the brightest white area on the image for nsokp_mg_20000918. This should correspond to a point along the line you just drew for the plot profile. Press the space bar. The current solar coordinates will be recorded in the Coordinate Log. Record the solar coordinates for this polarity.

Again for the other polarity... and the remaining 9 magnetogram images

Repeat making a plot profile of the magnetic field strength, but this time draw a vertical line with the line selection tool on the image of nsokp_mg_20000918 so that it is at least twice as big as the darkest black area corresponding to the sunspot region. Find the maximum (relative) gray value (as above). Record the solar coordinates for this polarity (as above).

Repeat for the other 9 magnetogram images (through nsokp_mg_20000929.fits) over the next two weeks (e.g., through September 29, 2000).

On the Discussion Board, post as a table the solar coordinates and maximum magnetic field strength (which is the relative gray scale) for the sunspot region for each of the 10 days. Do this for both polarities. For each polarity, plot the maximum magnetic field strength over two weeks.

Compare these two plots from Assignment 3 with the three plots from Assignment 2. Discuss whether there are any correlations or not between the plots. Do you see any relationship in the behavior between the area of the sunspot, the (vertical) size of the sunspot, the maximum relative intensity and the maximum magnetic field strength over the two weeks?