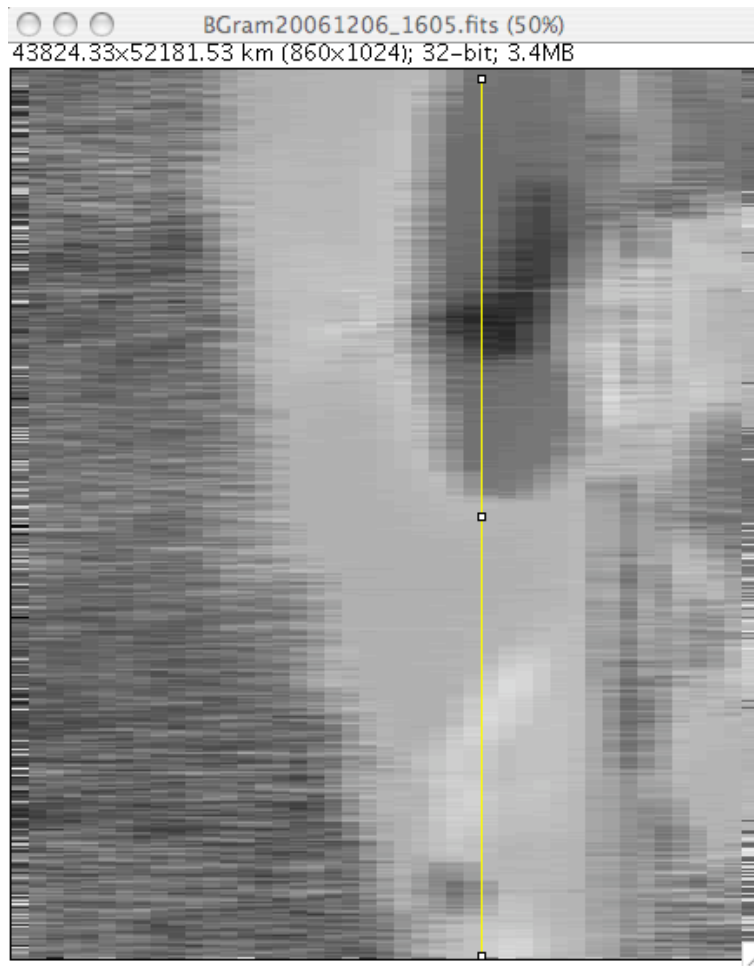


Week 14, with Connie Walker Assignment 5

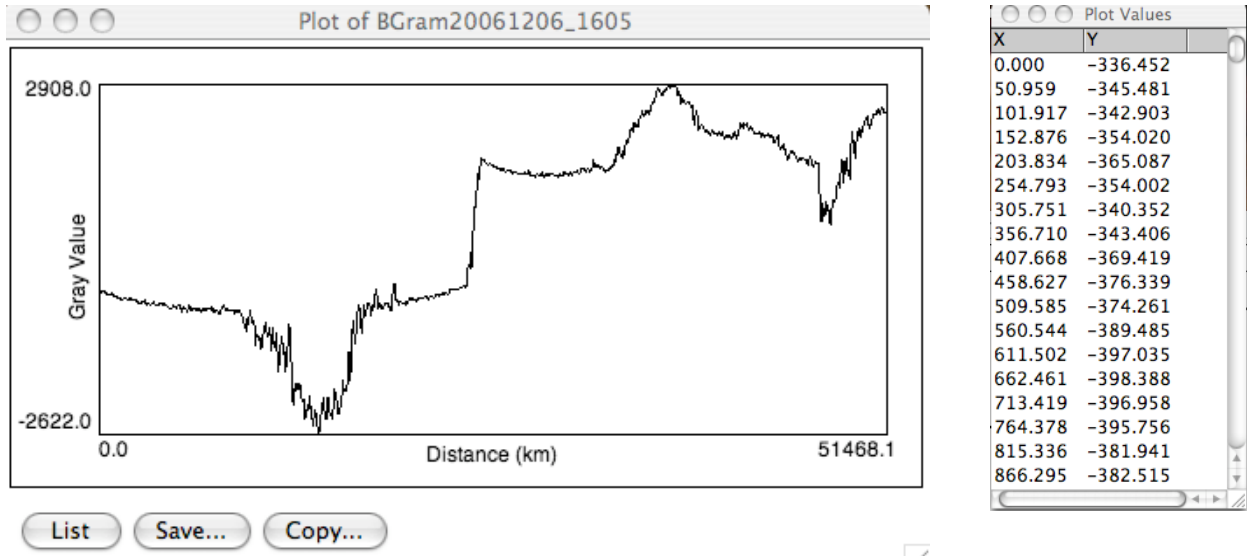
Assignment 5 - Estimating Magnetic Field Strength Of A Sunspot Region Over Time (due date: Saturday, April 16)

Start your analysis with image BGram20061206_1605.fits in the Magnetograms directory for Assignment 4. An example of the analysis is shown below. Repeat for the other 11 images (through BGram20061208_2006.fits) over the 3 days of data.



Making a Plot Profile of the Magnetic Field Strength

Draw a vertical line with the line selection tool so at least one of the polarities (white or black) is sampled by the vertical line. (See above.) Do this for both polarities separately if you cannot get them together. (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). Paste it into Graphical Analysis to make a plot (or into excel) to play with the data.



Note that both polarities are represented in the plot above. Run the cursor over the ImageJ plot profile BGram20061206_1605.fits 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 BGram20061206_1605.fits, the y-value for the maximum (relative) gray value is around 2900 Gauss. And for the minimum gray value, it is -2600 Gauss. Record these values.

Recording Solar Coordinates:

Move the mouse pointer (e.g., the cursor) to the center of the brightest white area on the image for BGram20061206_1605.fits. This might correspond to a point along the line you just drew for the plot profile. The current solar coordinates will be displayed in the ImageJ toolbar. Record the x and y solar coordinates (in km) for this polarity. Move the mouse pointer to the center of the darkest black area on the image. Record the x and y solar coordinates (in km) for this polarity as well.

On the Discussion Board, post as a table the solar coordinates and maximum magnetic field strength (which is the gray scale) for the sunspot region for each of the 12 magnetograms. Do this for both polarities. For each polarity, plot the maximum magnetic field strength over the three days.

Compare these two plots from Assignment 5 with the three plots from Assignment 4. 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 three days?