

Survey of the Images

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1 Opportunity (MER1)

There are a total of 18,219 images from MER1. These images are of different dimensions (width x height), which Table 1 lists along with their frequencies. Some of these images do not include the Pancam calibration target in the field of view. Their dimensions are a good way to determine if this is the case or not. All dimensions which contain the Pancam calibration target in the field of view are in boldface type in Table 1. Since a vast majority of the images containing the Pancam calibration target have the dimensions 320x272, the remaining image dimensions could be ignored to simplify any further image processing.

Of the total 18,219 images, 9,866 are from the left Pancam CCD and the other 8,353 are from the right Pancam CCD. These images were also taken using different filters. Figure 1 shows the frequencies of the various filters along with which filters belong to which CCD. The 535nm filter on the left CCD is the most frequent with 11.29% of the share.

These images were taken from sol 2 to 2,839, and the number of images every sol varies throughout. Figure 2 shows a histogram of the sols the images were taken (with a bin of 10 sols; i.e. each blue bar represents 10 sols). There is no obvious periodic pattern visible, however the number of images taken ever sol decreases, more or less, as sols increase. This is probably due to the ever reducing operational efficiency of the rover caused by the wear and tear of the machinery (solar panels, gears, wheels, etc.)

To see if there is any correlation with the number of images taken and the Martian revolution of the sun, a histogram of the solar longitudes at which the images were taken, is shown in Figure 3. This is a radial histogram with a bin of 2 degrees for the solar longitude. From this histogram, it appears that the most active time on Mars for this rover is from about 0 degrees to 45 degrees solar longitude.

These images were also taken at different local true solar times (LTST). Figure 4 shows a histogram of the LTSTs at which the images were taken (bin of 15 minutes). Figure 4 shows a somewhat normal distribution centered about 12:00:00 LTST.

Another interesting set of variables to compare are the coordinates of Pancam in each image. These were derived and recorded in two different reference frames. The first were in the rover frame, which are plotted in Figure 5, and the second were in the site frame, which are plotted in Figure 6. As expected, the coordinates do not change much in the rover frame, and in the site frame they vary quite a bit because of the movement of the rover.

Finally, solar coordinates are another interesting set of variables to compare between the images. These coordinates were derived in the site frame and are plotted in Figure 7.

2 Spirit (MER2)

There are a total of 16,959 images from MER2. Like MER1 images, these images are also of different dimensions, which are listed in Table 2, along with their frequencies. The dimensions in Table 2 in boldface type contain the Pancam calibration target. And again, images with dimensions 320x272 outnumber, by far, all the others.

Of these 16,959 images, 8,915 are from the left Pancam CCD and 8,044 are from the right Pancam CCD. These images were also taken in different filters, which are shown in Figure 8 along with their frequencies. The 535nm filter on the left CCD is the most frequent with 10.84% of the share.

Because MER2 lost contact, the images range only from sol 2 to 2,191, which is 648 sols less than MER1. However, the number of images taken every sol varied similarly to MER1. Figure 9 shows a histogram of the sols the images were taken. Again, there is no obvious periodic pattern visible but, the number of images every sol decreases as the sols increase.

Again, to see if there is any correlation with the number of images and the Martian revolution of the sun, a histogram of the solar longitudes at which the images were taken is shown in Figure 3. From this histogram, it appears that the most active time on Mars for this rover is from about -23 degrees to 23 degrees solar longitude.

These images were also taken at different local true solar times (LTST). Figure 11 shows a histogram of the LTST at which the images were taken.

The coordinates of Pancam in the rover frame and in the site frame are plotted in Figure 12 and Figure 13, respectively. And finally, the solar coordinates in the site frame are plotted in Figure 14.

Width	Height	Count
1	1	2
72	56	508
80	60	2
90	60	169
296	296	4
310	272	2
320	272	16963
320	660	49
320	1024	85
361	272	220
400	272	215

Table 1: Number of images ordered by their dimensions.

Number Images by Filter (MER1)

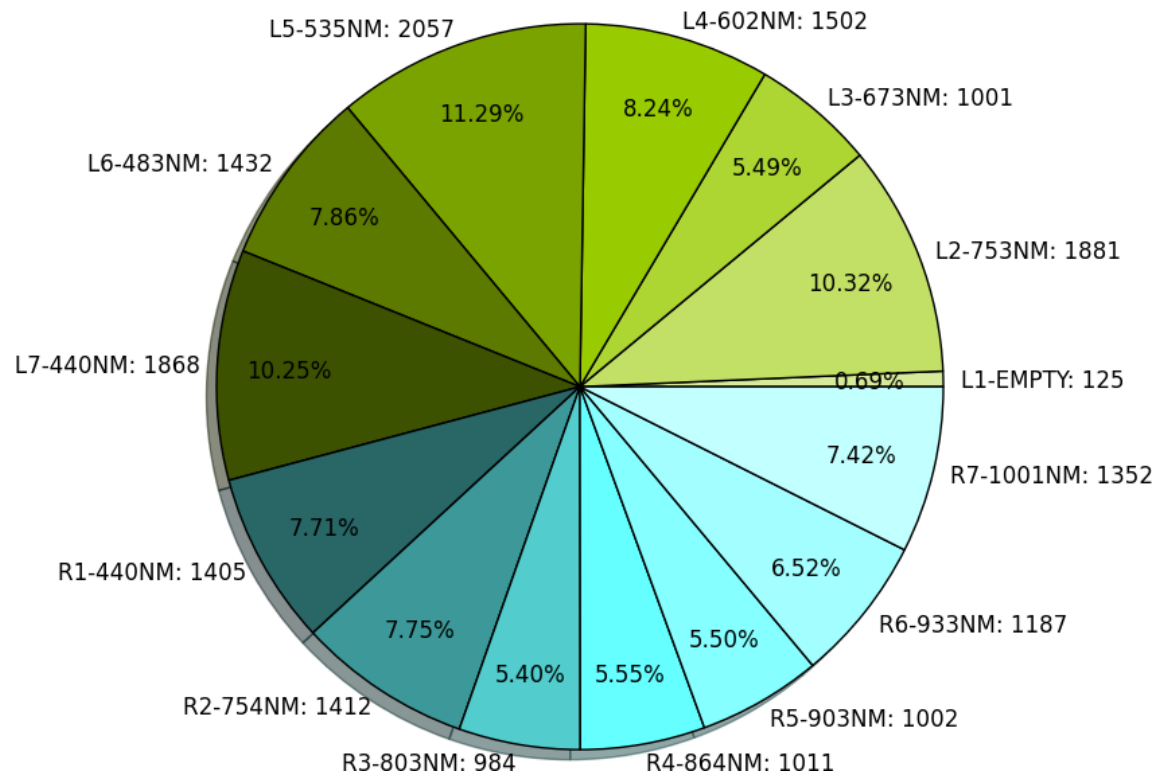


Figure 1

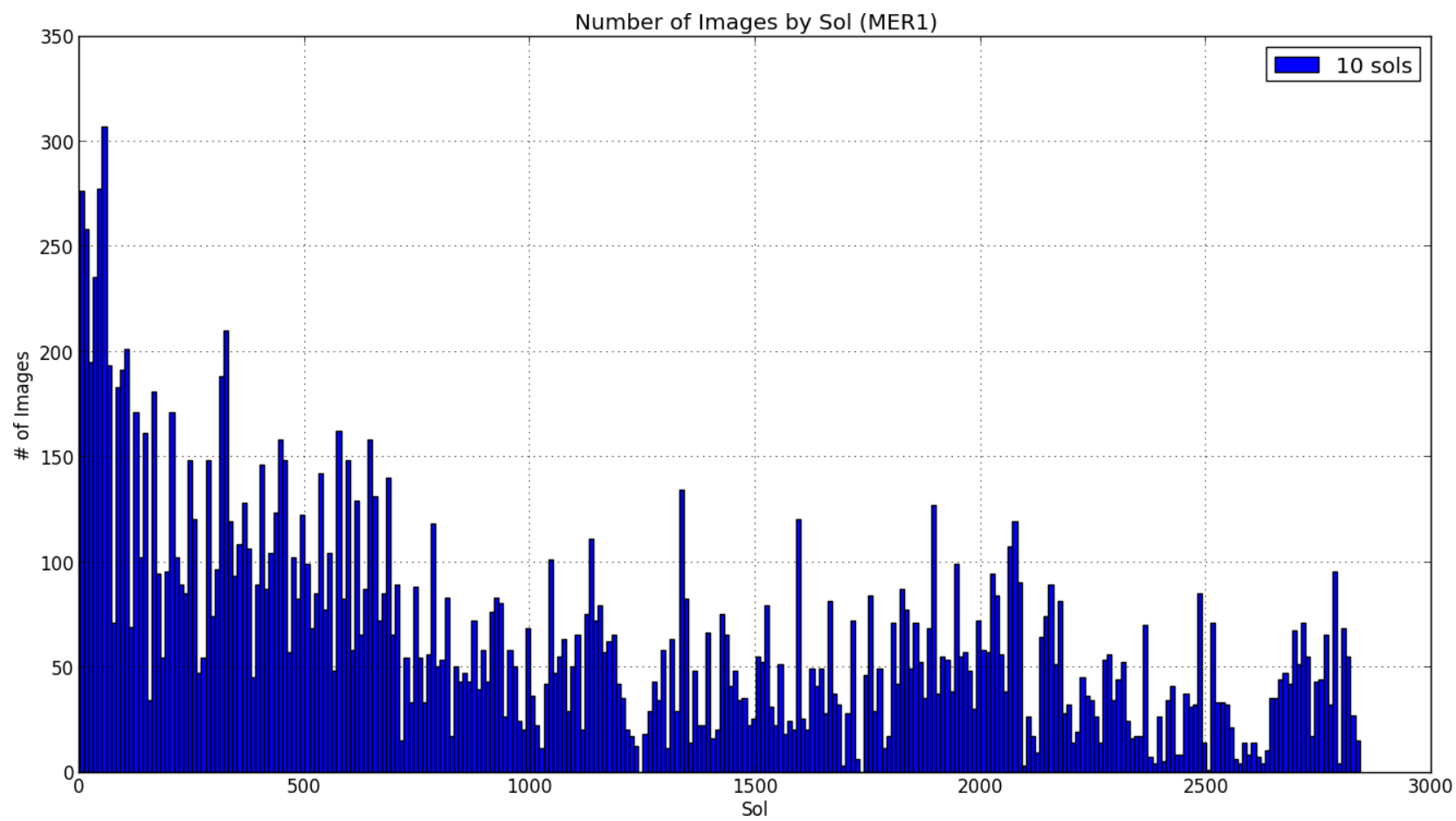


Figure 2

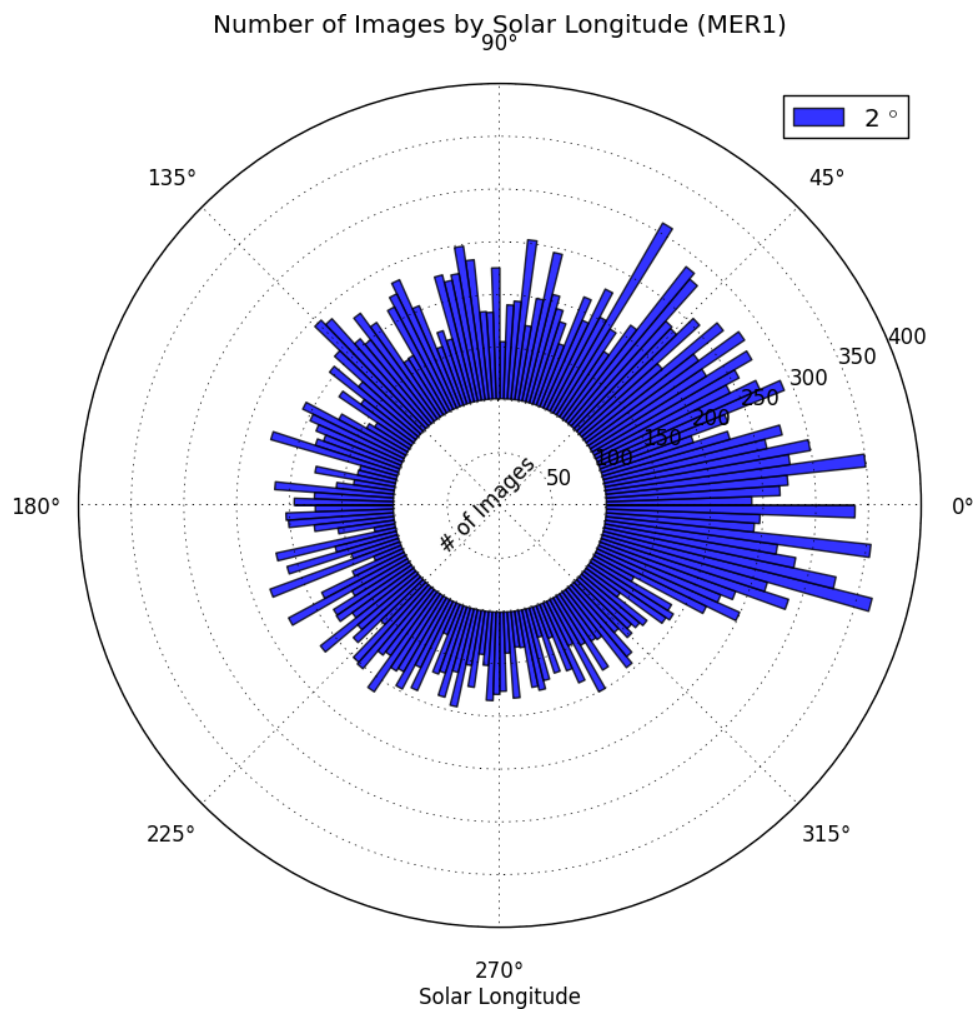


Figure 3

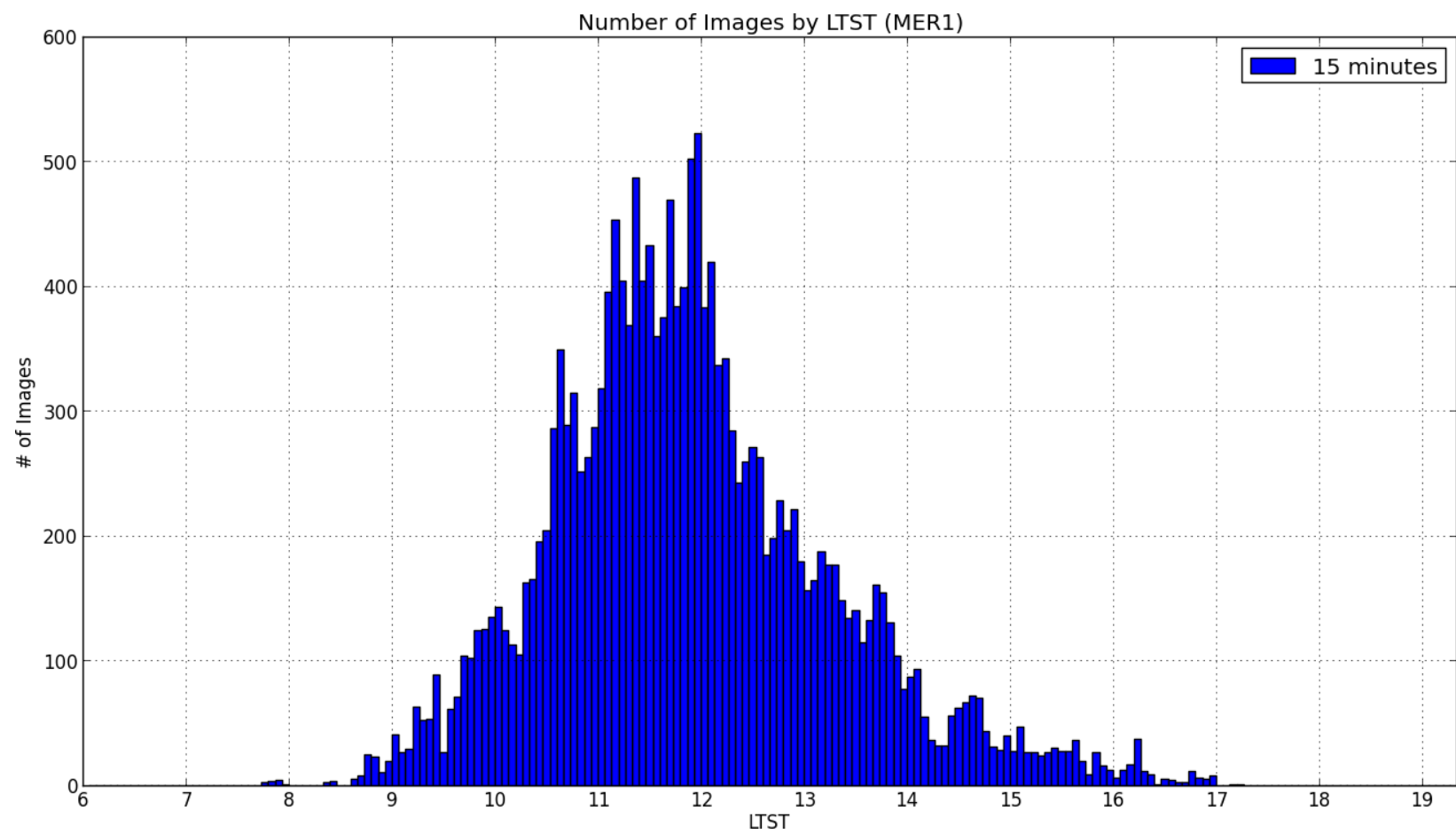


Figure 4

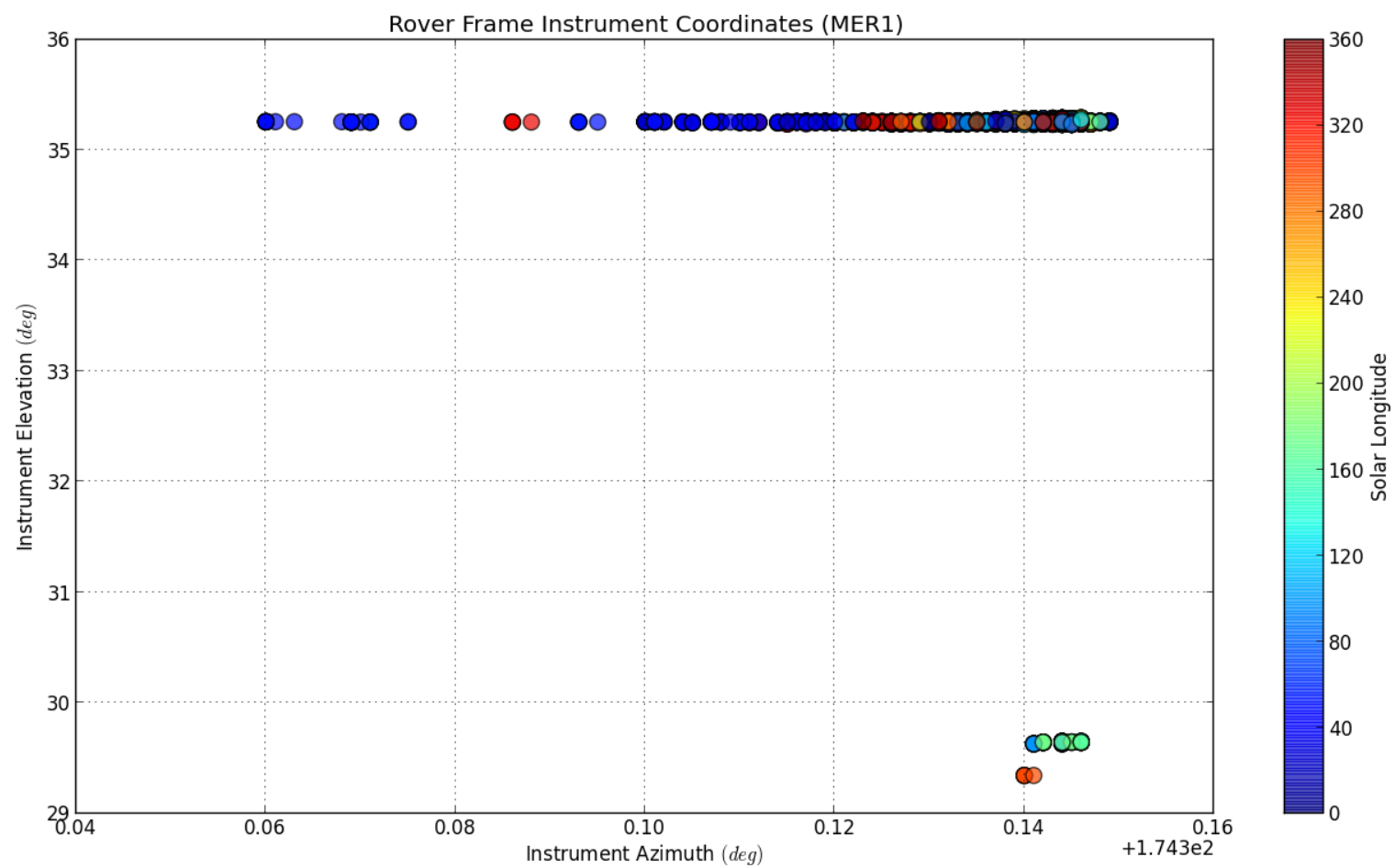


Figure 5

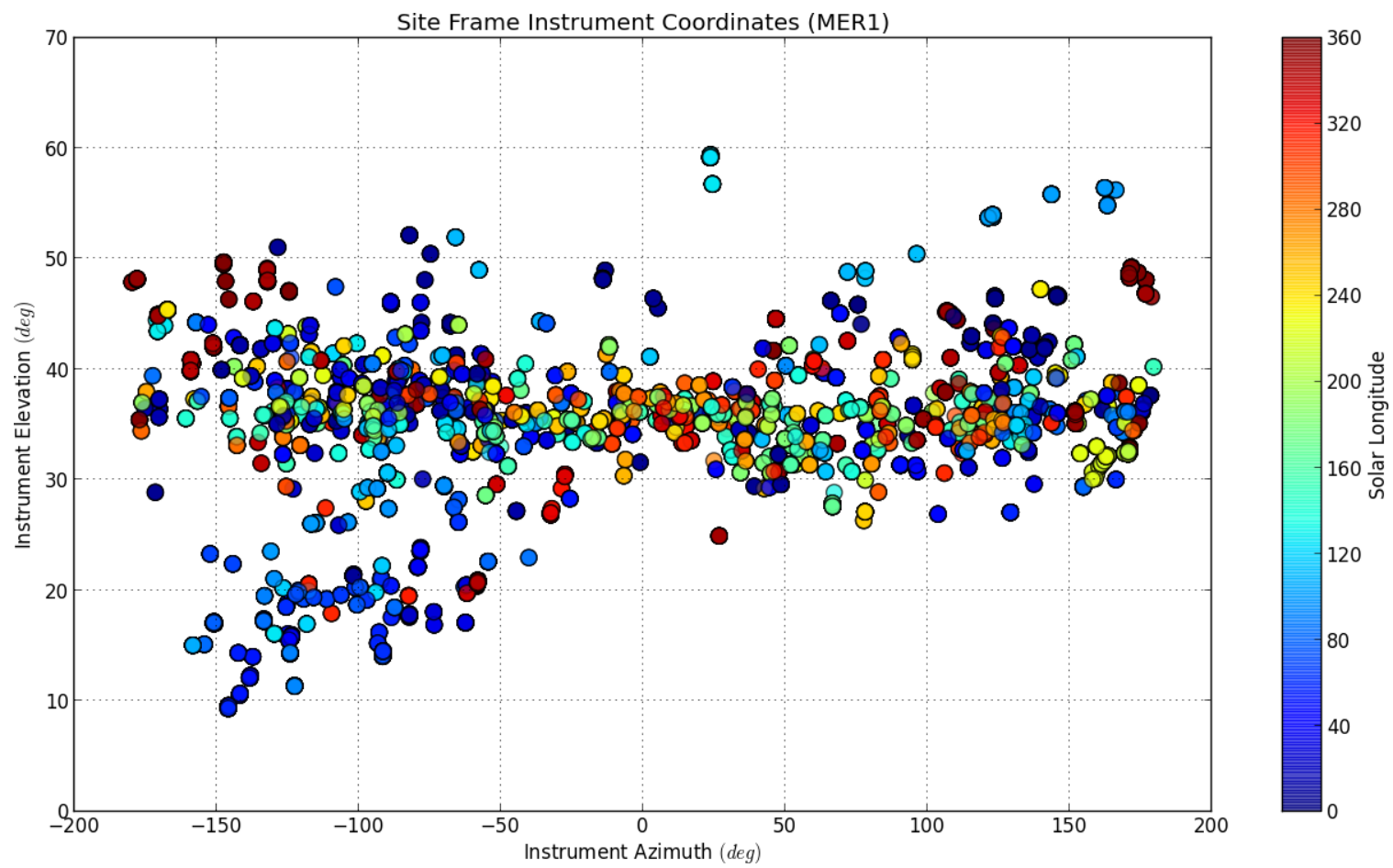


Figure 6

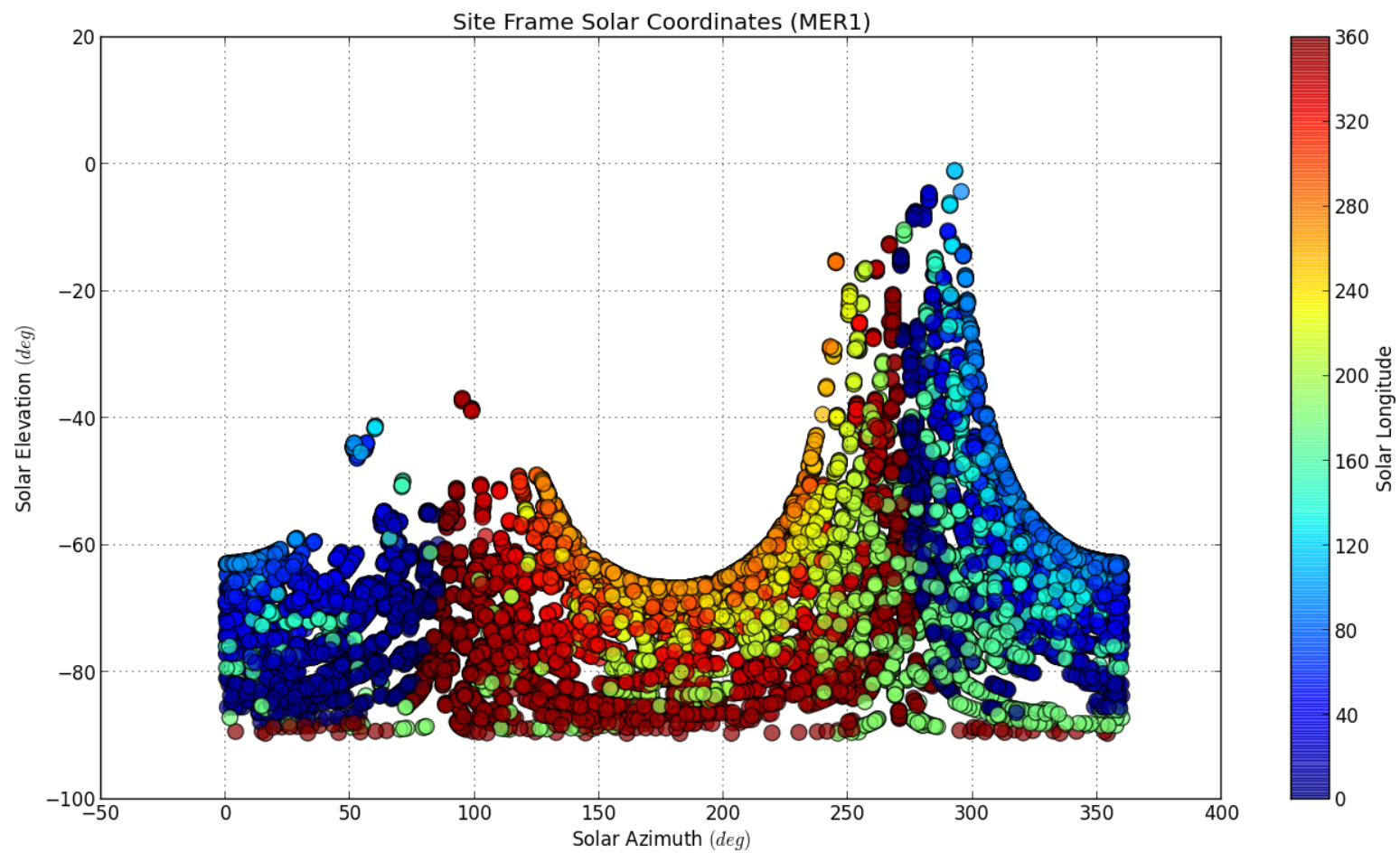


Figure 7

Width	Height	Count
80	60	485
296	296	2
320	272	16305
320	1024	135
361	272	14
400	272	14
1024	256	4

Table 2: Number of images ordered by their dimensions.

Number Images by Filter (MER2)

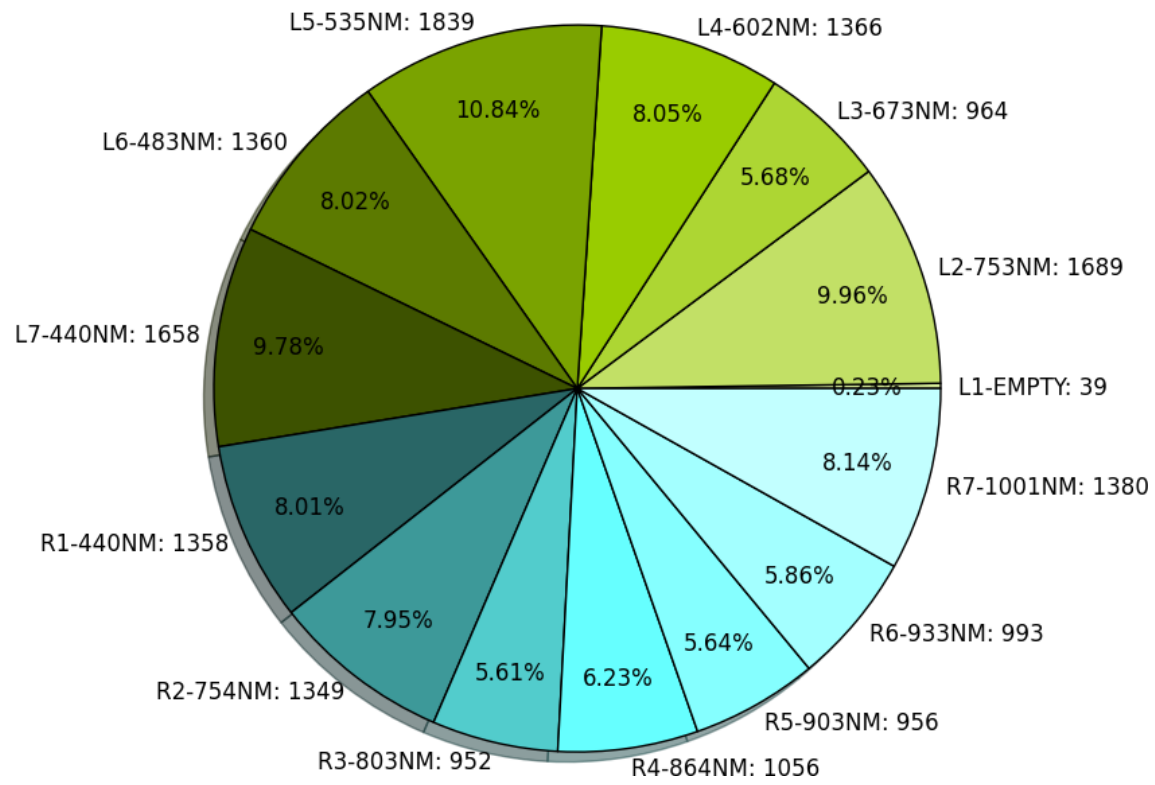


Figure 8

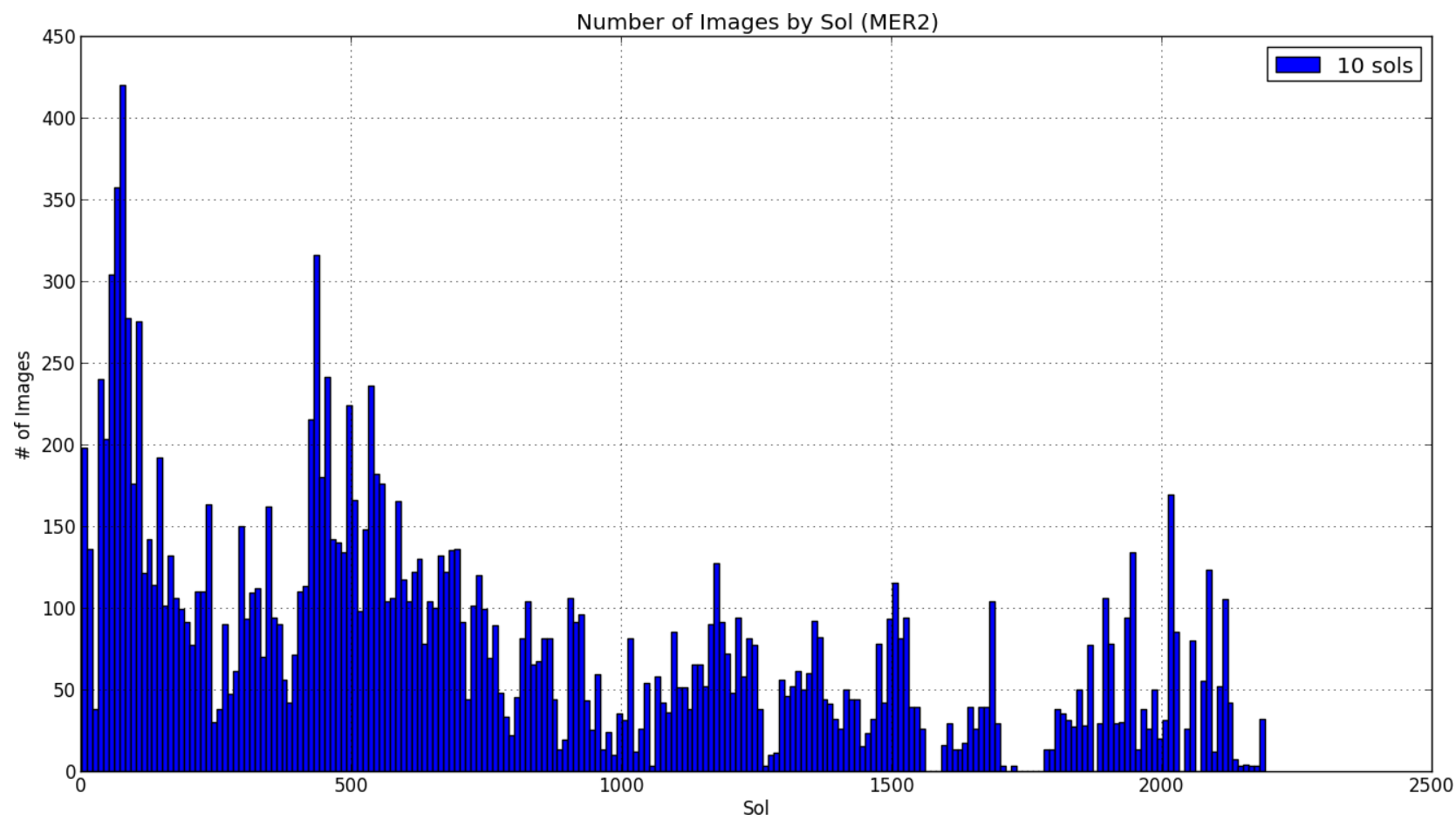


Figure 9

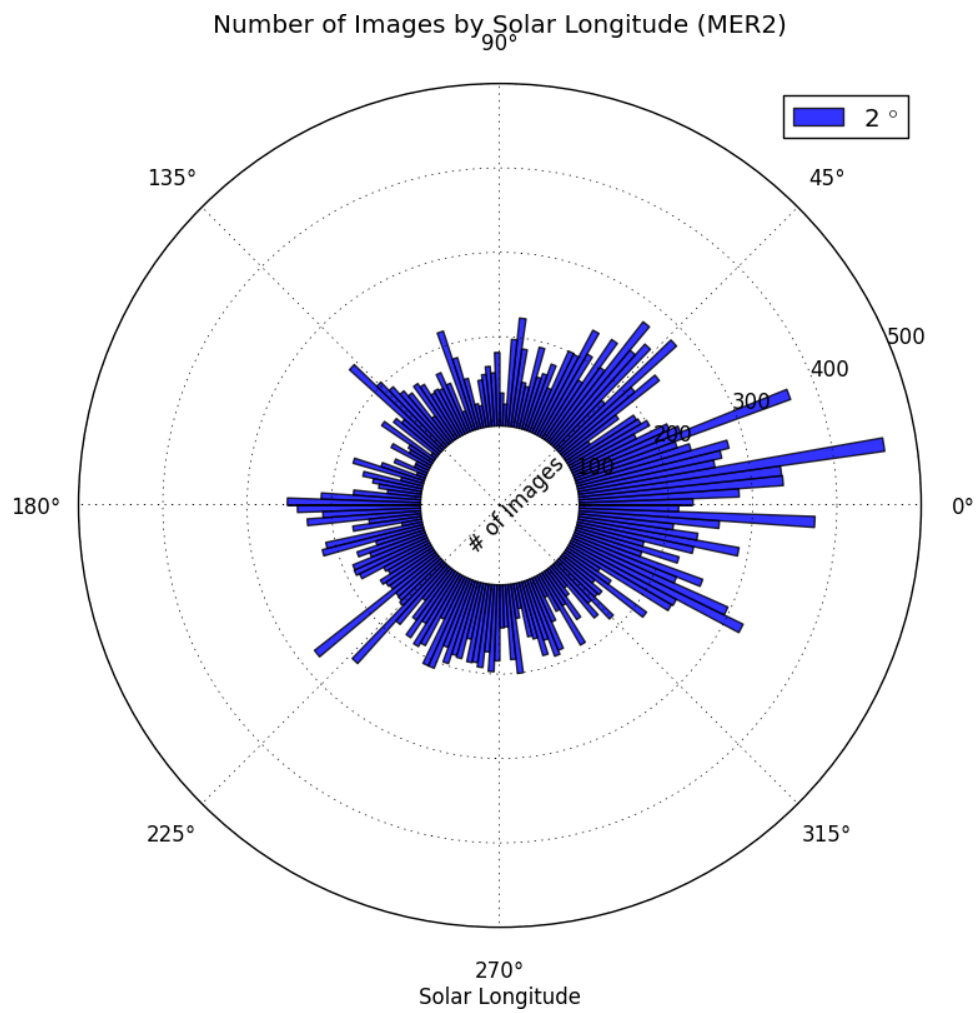


Figure 10

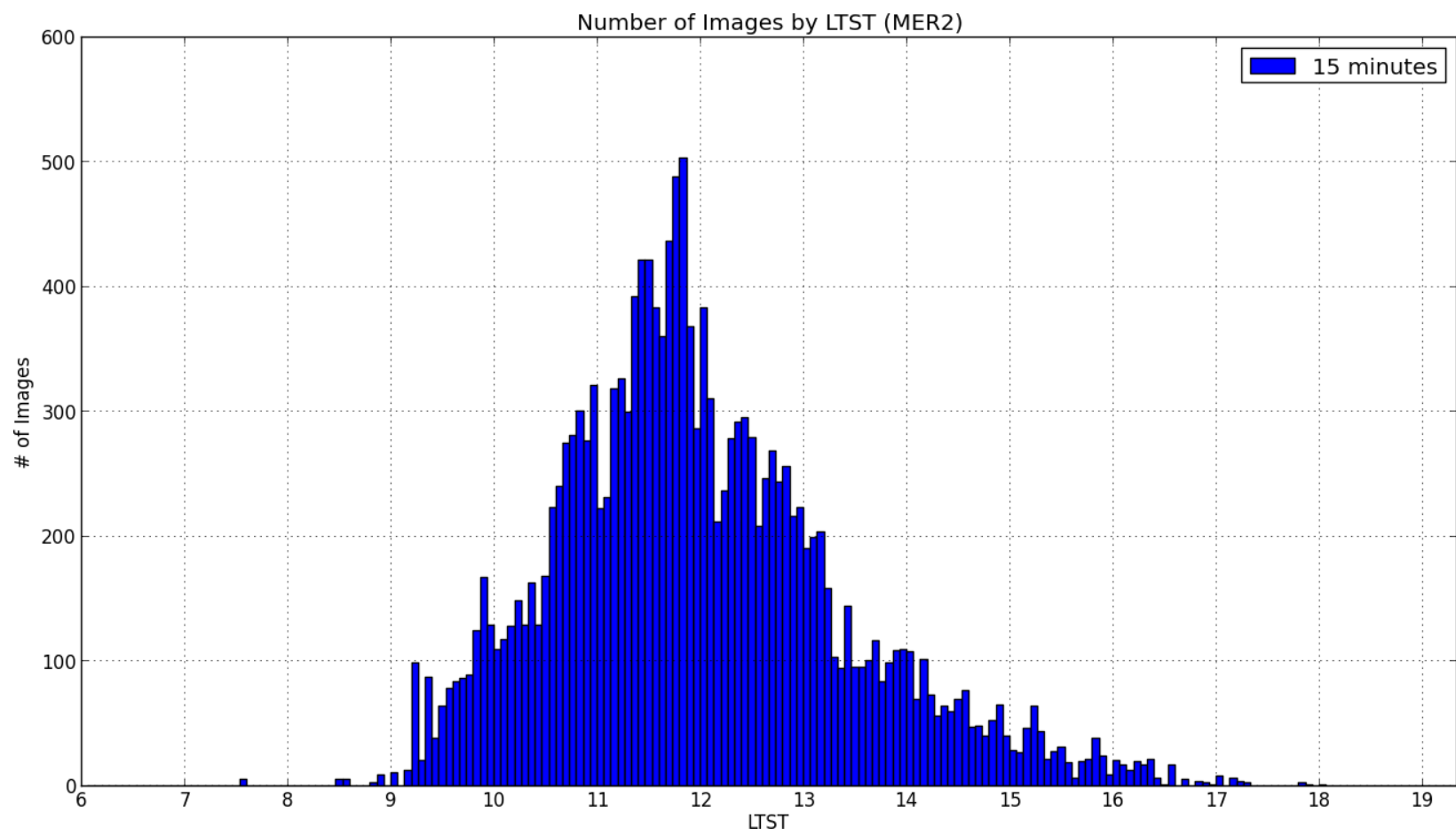


Figure 11

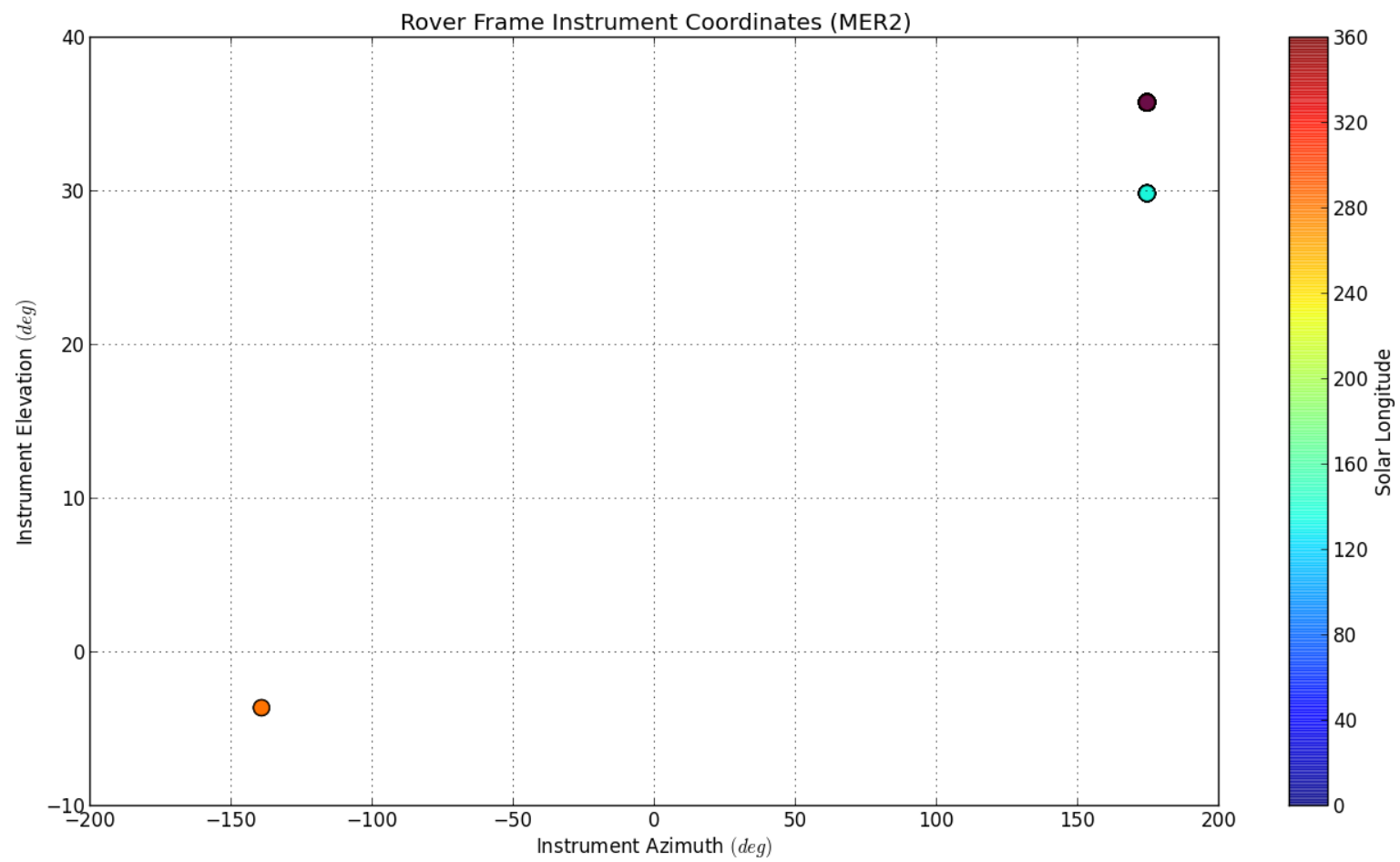


Figure 12

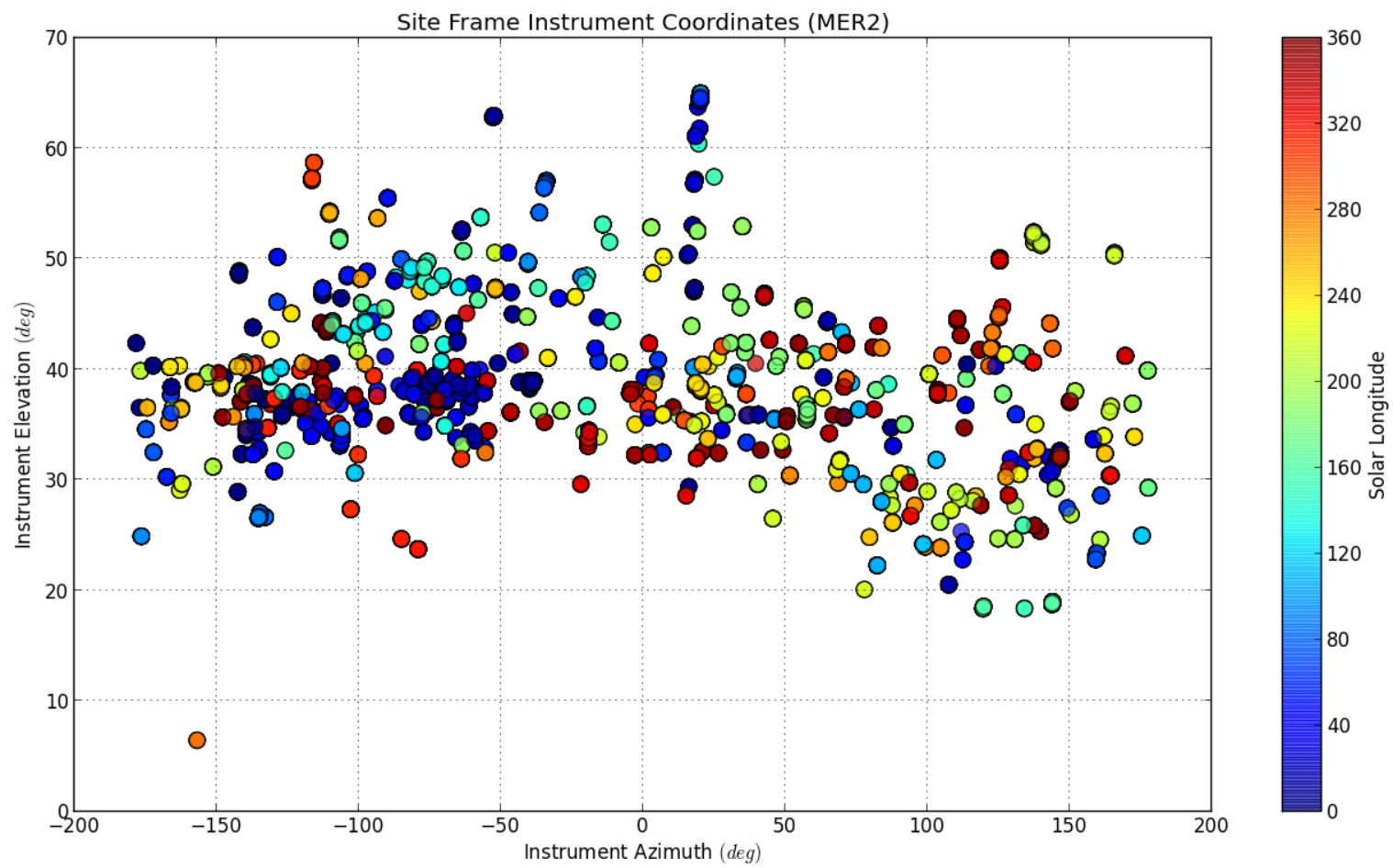


Figure 13

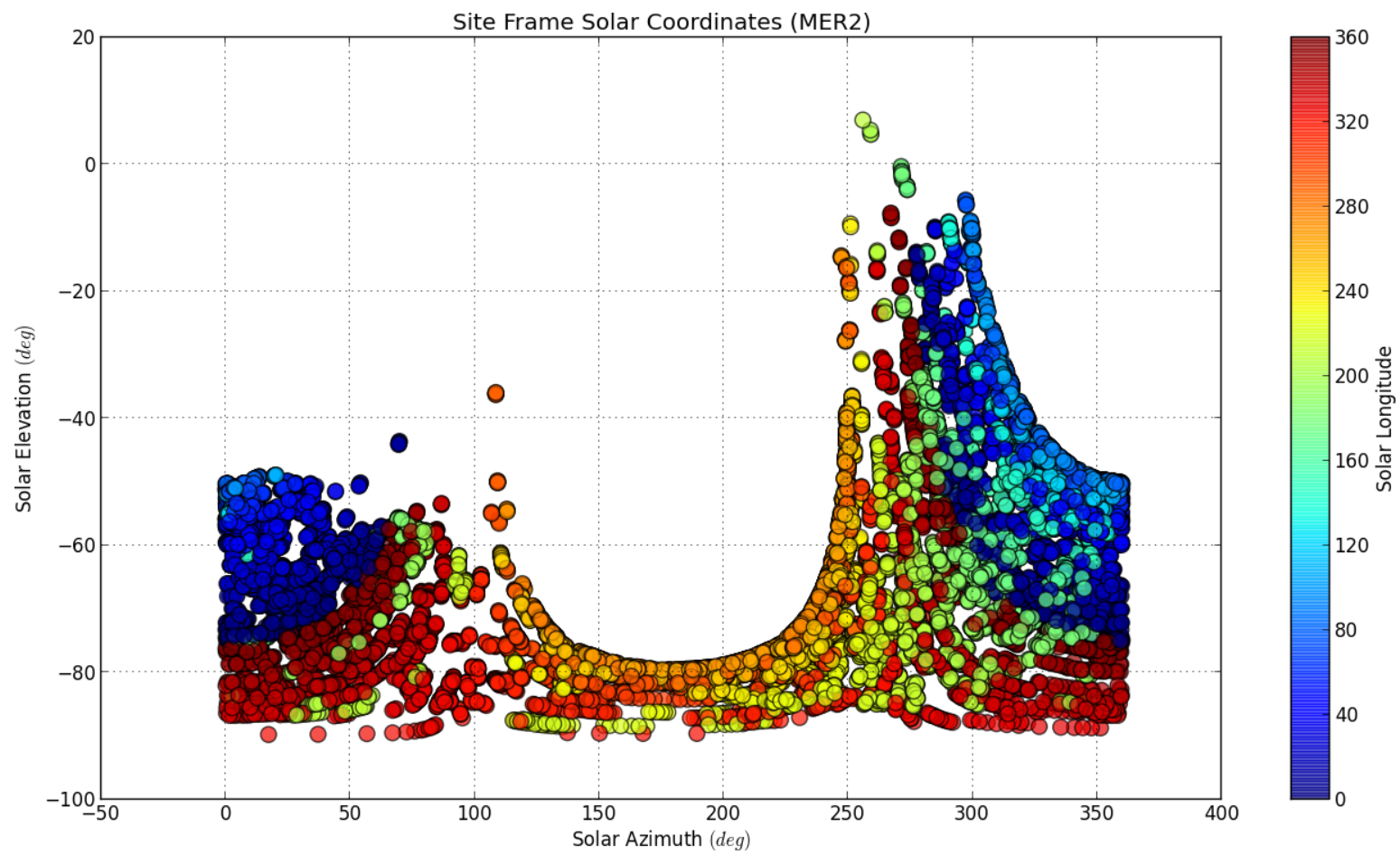


Figure 14