

Title: Investigation of Active Region Properties for Solar Flare Forecasts

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Abstract: It has become increasingly more important to be able to correctly forecast large solar flares because these events can destroy or interrupt important technology and harm astronauts. We looked at the relationships between different measurements and classifications of sunspots for patterns in the type of sunspot that produced a large flare. We selected active regions with complete data sets containing each of the measurements we wanted to compare; if an active region was missing a measurement, we removed it from the analysis. We also measured the distance between each active region and the nearest other active region on the disk. Once we obtained this information, we generated plots and histograms to look at the tendencies and frequencies of X-class, M-class, and C-class flares as compared to Non-flaring active regions. The trends were weak, but we found a correlation between various measures of active region complexity and flaring tendencies. Comparing this to the NHGV value (a parameter that uses subsurface motions to predict flare occurrence) we found that NHGV values tend to be higher for more complex and more compact active regions, even when the active regions produce a similar size flare.