

Title: Machine Learning for the Prediction of Solar Flares

Student: Caroline Mather (Carleton College)

Mentors: Laura Sandoval (LASP) and Stephane Beland (LASP)

Abstract:

Radiation from solar flares has the potential to disrupt telecommunications, power grids, navigation systems, and satellites. These eruptions often originate from active regions in the sun where concentrated areas of highly complex magnetic field configurations suddenly change. By studying and classifying these active regions, we are able to make predictions about when a solar flare might occur, and what class of solar flare is likely to occur in that region, which can allow us to be better prepared when these flares do occur. Currently, the active regions of the sun are manually identified and then characterized using the McIntosh classification system. Features of the sun are sketched out by hand every day by experts from the Space Weather Prediction Center. These sketches are then analyzed and assigned a McIntosh classification. There is quite a bit of subjectivity in every step of this process. By using image processing to identify features of an active region, and running these features through a variety of machine learning algorithms, we aim to eliminate some of the subjectivity of the classification process.