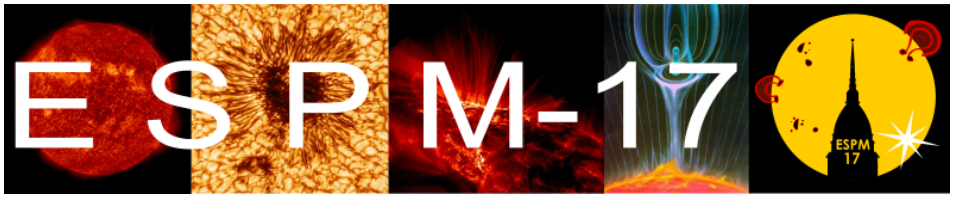

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Can we find distinct flare precursors observed with the IRIS spectrograph?

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Solar flare prediction has often been studied with data from the Solar Dynamics Observatory (SDO), which provides images of the full solar disk in different wavelength bands, probing different heights of the solar atmosphere, including the photospheric magnetic field. Recent studies have shown that spectroscopic data such as observations with the Interface Region Imaging Spectrograph (IRIS) may contribute to improving solar flare predictions in the future.
IRIS has a limited field of view and thus variable pointing, and additionally, the spectrograph slit only covers parts of an active region, which limits its potential for long-term forecasting. Therefore, we aim to study short-term spectral flare precursors observed with IRIS, occurring up to 1 hour before flare onset.
We use machine learning techniques to automatically mark where a flare occurs in an active region and extract the time-series of spectra of these pixels. We train classification models specifically to highlight such areas, solely from the shape of the spectra before the flare. Additionally, we investigate if there are distinct spectral shapes occurring before each flare, that can be categorized as strong flare precursors.
We find that the areas highlighted by the machine learning models match well with the later location of the flare, and that the Magnesium II h&k triplet emission is a strong precursor, which often occurs at the future onset location of a solar flare. We speculate that this is because of chromospheric heating before flares.

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