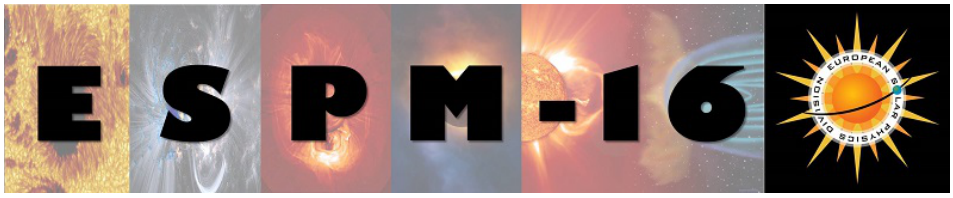

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Solar surges related to UV bursts: Characterization through k-means, inversions and density diagnostics.

Monday 6 September 2021 11:37 (13 minutes)

Surges are dynamic, cool and dense ejections typically observed in chromospheric lines and closely related to other solar phenomena like UV-bursts or coronal jets. Even though surges have been observed for decades now, fundamental questions regarding the temperature and density distribution, as well as their connection and impact on upper layers of the solar atmosphere remain open. Our aim is to characterize the chromospheric and transition region properties of these phenomena taking advantage of high-resolution observations combined with advanced techniques. We have analyzed four surges that appear related to UV-bursts observed with the *Interface Region Imaging Spectrograph* (*IRIS*) on 2016 April. We have studied the mid- and low-chromosphere of the surges by getting their representative Mg II h&k line profiles through the *k*-means algorithm and performing inversions on them using the STIC code. We have also studied the far-UV spectra, focusing on the O IV 1399.8 and 1401.2 Å lines, and carrying out density diagnostics. We obtain that the mid- and low-chromosphere of the surges are characterized by temperatures between 5.5 and 6.9 kK, electronic number densities from $\sim 1.5 \times 10^{11}$ to 2.5×10^{12} cm^{-3}, and line-of-sight velocities of a few km/s at optical depths ranging from $\log_{10}(\tau) = -6.0$ to -3.2. We find, for the first time, observational evidence of O IV emission within the surges, indicating that these phenomena have a transition region counterpart even in the weakest lines. The O IV emitting layers of the surges have an electron number density between 2.5×10^{10} and 10^{12} cm^{-3}.

Author: NÓBREGA-SIVERIO, Daniel (Instituto de Astrofísica de Canarias (IAC) | Rosseland Centre for Solar Physics (RoCS))

Co-authors: GUGLIELMINO, Salvatore Luigi (Istituto Nazionale di Astrofisica (INAF)); Dr SAINZ DALDA, Alberto (Lockheed Martin Solar & Astrophysics Laboratory)

Presenter: NÓBREGA-SIVERIO, Daniel (Instituto de Astrofísica de Canarias (IAC) | Rosseland Centre for Solar Physics (RoCS))

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