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The source of unusual coronal upflows with photospheric abundance in a solar active region

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Upflows in the corona are of importance as they may contribute to the solar wind. Because of this, there has been interest
in the analysis of upflows at the edges of active regions (ARs). The coronal upflows that are seen at the edges of ARs have coronal
elemental composition and can contribute to the slow solar wind. The sources of the upflows have been challenging to determine
because they may be multiple.

In this talk, we will discuss the latest results of coronal upflows. This includes an example which is found unusually close to a sunspot umbra and unusually has photospheric abundance. We analyse in detail the cause of this upflow region using a combination of Solar Orbiter EUV images at high spatial and temporal resolution,
Hinode/EUV Imaging Spectrometer data, and observations from instruments on board the Solar Dynamics Observatory. This com-
bined dataset was acquired during the first Solar Orbiter perihelion of the science phase, which provided a spatial resolution of 356
km for 2 pixels. In the location of the, a small positive polarity connects to the umbra
via small-scale and very dynamic coronal loops. The Solar Orbiter EUV Imagers (EUI) high resolution data show the dynamics of these small loops, which last on timescales of only minutes. This is the location of the coronal upflow which has photospheric abundance. We attempt to determine if it is possible that they can feed into the slow solar wind. We discuss future observation potential using Solar Orbiter data along with data from other missions and ground-based observatories. This provides opportunities for multiple viewpoints, multi-wavelength measurements of these upflow regions.

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