

Magnetic evolution of faculae observed with IMaX

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Abstract

The SUNRISE mission, consisting of a one metre diameter telescope on board a stratospheric balloon, was launched on June 2009 on route over the arctic circle. At approximately 36 km height, the balloon flight allowed to observe with almost no atmospheric influence yielding very good quality data as well as observations in ultraviolet spectral lines (by means of the SUFI instrument). The mission's arctic summer-circumpolar flight path provided continuous solar observations, without day-night cycles, during the almost 5 days of the mission.

IMaX/SUNRISE instrument –developed by a consortium of Spanish institutions– is a spectropolarimeter based in the use of a Fabry-Pérot etalon and liquid crystals for spectral and polarimetric analysis, respectively. It obtained full-Stokes vector maps at the selected wavelength of Fe I 5250.2 Å with a temporal cadence of around 30 seconds and a spatial resolution of approximately 0.15–0.18 arcsec.

In this poster, we present a temporal series of a group of limb faculae comprising approximately 21 minutes. Thanks to the data quality, as well as the full-Stokes maps and fast temporal cadence, small-scale magnetic cancellations and emergences can be observed around and at the faculae positions. We focused on a small area of the instrument field of view where the cancellation magnetogram shows high magnetic polarity changes.

What we observe are confronted patches of opposite polarities from the longitudinal magnetic field, being cancelled and reappearing, while the transversal field signal present changes also accordingly. This reflects as well in the continuum intensity images where facular brightenings are seen enhancing and decreasing in consonance with the transversal field evolution. Studies of this cancellation phenomena and evolution of the facular structures as magnetic tubes are being performed for more thorough analyses.