

Request for Third Run of HOP 237 - Spectroscopic Study of Magnetic Tornadoes

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HOP 0237 is the first observation campaign specially designed to study tornado-like prominences. The study of such structures has been an active topic around the world since the publications of first studies of solar tornadoes in 2012, including one Nature cover story and one of our papers, Su et al. 2012, which has been cited 36 times by now (NASA/ADS).

In order to understand the nature of these structures, especially the motion of plasma, we designed HOP 0237.

During its first run in 2013, we obtained a good dataset that allowed us to identify the rotational motion within, a key characteristic of tornado-like prominences. Two papers have been published from this dataset.

1. Su, Yang; Gömöry, Peter; Veronig, Astrid, et al. Solar Magnetized Tornadoes: Rotational Motion in a Tornado-like Prominence, *ApJL*, 785, L2, 2014
2. Levens, Peter; Labrosse, Nicolas; Fletcher, Lyndsay; Schmieder, Brigitte, A solar tornado observed by EIS: Plasma diagnostics, submitted to AA (In press)
<http://adsabs.harvard.edu/abs/2015arXiv150801377L>

During the second run in 2014, we made a small modification to the list of spectral lines to better understand plasma density inside tornado. However, due to the presence of coronal loops along the light of sight, we didn't get a clear structure of the tornado itself. However for the first time, we observed one close to disk centre, which allowed us to study the magnetic field and plasma motions at the feet of tornadoes. The work is still in progress.

Recently, Terry Kucera and Peter Young informed us of an issue with EIS, that the PSF function may have caused the signature of rotational motion. However, it is difficult to identify/remove its effect. A simple way is to observe more tornadoes. All we need to do is to find a structure above the limb that is rotating oppositely to the PSF effect. We also hope to study plasma density within tornadoes.

Therefore, we request the third run, using the same selection of spectral lines as from the second run. We will also inform the ground observation team and IRIS team. The best time windows for us are listed below,

Sep. 24 - Oct. 12 2015

Oct. 22 - Nov. 2015