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Current sheets in comet 67P/Churyumov-Gerasimenko's coma

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Abstract

The Rosetta Plasma Consortium (RPC) data are used to investigate the presence of current sheets in the coma of comet 67P/Churyumov-Gerasimenko. The interaction of the interplanetary magnetic field (IMF) transported by the solar wind towards the outgassing comet consists amongst others of mass-loading and field line draping near the nucleus. The draped field lines lead to so-called nested draping because of the constantly changing direction of the IMF. It is shown that the draping pattern is strongly variable over the period of one month (Figure 1).

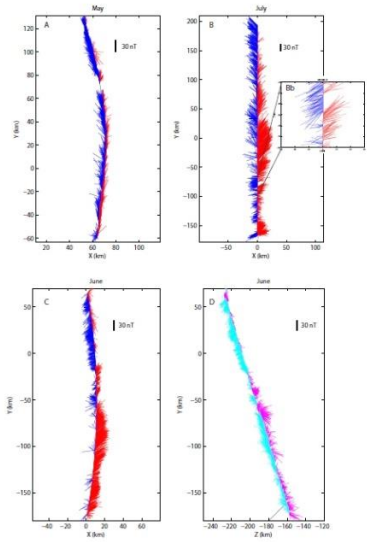

Figure 1: This is the example of an included figure.

Nested draping results in neighbouring regions with oppositely directed magnetic fields, which are separated by current sheets. Selected events on 5 and 6 June 2015 are studied, which show that there are strong rotations of the magnetic field with associated current sheets that have strengths from several 10s up to 100s of nA/m2.

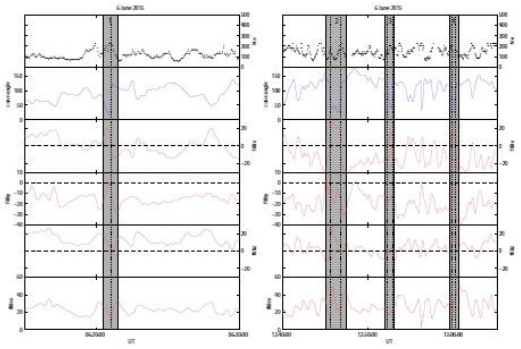

Figure 2: This is the example of an included figure.

Not all discussed current sheets show the characteristic peak in plasma density at the centre of the sheet, which might be related to the presence of a guide field (see Figure 2). There is no evidence for different kinds of plasmas on either side of a current sheet, and no strongly accelerated ions have been observed which could have been an indication of magnetic reconnection in the current sheets.

References

M. Volwerk et al., Current sheets in comet 67P/Churyumov-Gerasimenko's coma, J. Geophys. Res., in press, 2017, doi:10.1002/2017JA023861.