Reconstruction of a helical prominence in 3D from IRIS spectra and images

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Abstrakt:
Movies of prominences obtained by space instruments e.g. the Solar Optical Telescope (SOT) aboard the Hinode satellite and the Interface Region Imaging Spectrograph (IRIS) with high temporal and spatial resolution revealed the tremendous dynamical nature of prominences. Knots of plasma belonging to prominences appear to travel along both vertical and horizontal thread-like loops, with highly dynamical nature. We reconstructed the 3D shape of a helical prominence observed over two and a half hours by IRIS satellite. From the IRIS Mg II k spectra we computed Doppler shifts of the plasma inside the prominence and from the slit-jaw images (SJI) we derived the transverse field in the plane of the sky. Finally we obtained the velocity vector field of the knots in 3D. We reconstructed the real trajectories of nine knots travelling along ellipses. The spiral-like structure of the prominence observed in the plane of the sky is mainly due to the projection effect of long arches of threads (up to 8×10^4 km). Knots run along more or less horizontal threads with velocities reaching 65 km s^{-1}. There is no evidence to treat so called tornado prominences as rotating structures.

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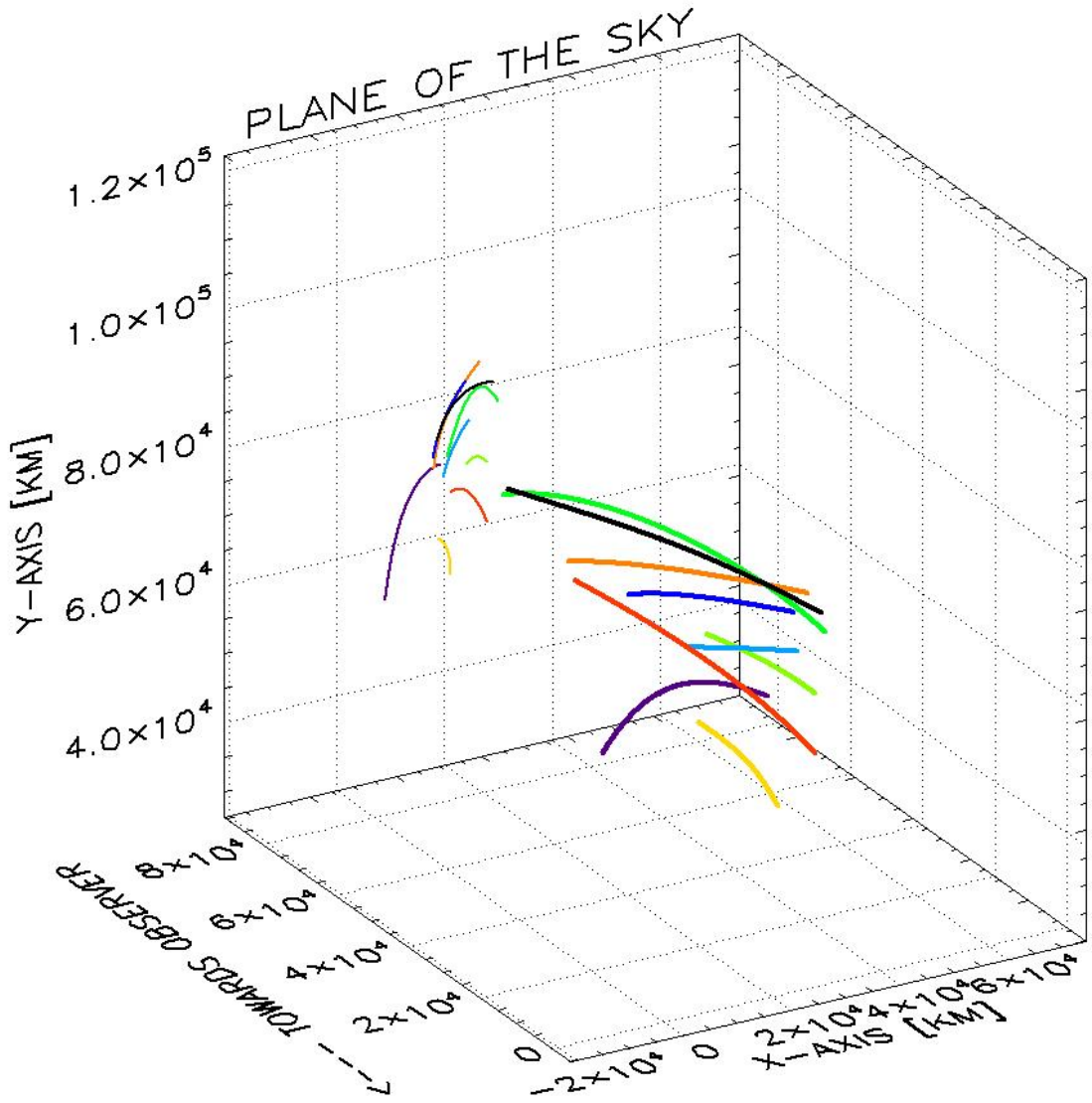

Figure 1: Reconstructed 3D knot trajectories. x, y is in the plane of the sky, z is oriented along the