Simulations of SMILE X-ray images from global MHD modelling

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The upcoming SMILE mission will carry a novel wide field-of-view soft X-ray imager capable of observing the photons emitted when heavy solar wind ions exchange electrons with exospheric neutrals. The imager will target the two regions expected to produce the strongest emissions: the subsolar magnetosheath and the cusps. We use a global magnetohydrodynamic (MHD) model to simulate the solar wind ion densities and velocities in the magnetosheath and cusps, employ a standard model for exospheric neutral densities, and calculate the corresponding line-of-sight X-ray emissions. Then we compose X-ray images which may be observed by SMILE near its apogee. We discuss how the positions of the subsolar magnetopause, bow shock, and cusps can be found and estimate the angular resolution needed for the mission science.