Modeling the X-ray emissions from the geo-space environment

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The Earth’s magnetosheath is luminous in the soft X-ray band, due to the solar wind charge exchange (SWCX) process. SWCX occurs when a heavy solar wind ion with a high charge state encounters with a neutral component. The heavy ion obtains an electron and gets into an excited state. It then decays to the ground state and emits a photon in the soft X-ray band. Considering that the X-ray emission from the magnetosheath is higher compared to that from the magnetosphere, information about the boundary positions can be derived from an X-ray image of the magnetosheath.

The solar wind - magnetosphere - ionosphere link explorer (SMILE) is a mission jointly supported by ESA and CAS, which aims at exploring the dynamics in the whole system. Soft X-ray Imager (SXI) is expected to provide X-ray images of the magnetosphere. The Modeling Working Group (MWG) is one of the four working groups of SMILE. Studies about the modeling of X-ray emissions as well as the method to derive the boundary positions are two main topics of the MWG. The main progress of MWG will be summarized here.