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X-Ray Emission Associated with Terrestrial and Planetary Magnetosheath and Cusp Plasma

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In situ data from a large number of spacecraft missions, including the recent MMS mission at Earth and the Juno mission at Jupiter, have greatly increased our understanding of processes such as magnetic reconnection at the terrestrial and at planetary magnetopauses. However, still missing from work on these topics are global images of magnetosheath and cusp plasma. Efforts are underway to remedy this deficiency, including the approved ESA-Chinese SMILE mission, which will image magnetosheath and cusp plasma using x-ray emission. The x-rays are produced by charge exchange reactions of high charge state solar wind ions with exospheric neutral gas. Auroral imaging provides another way of obtaining global information relevant to magnetopauses and cusps. For example, the x-ray aurora at Jupiter, observed by the Chandra X-Ray Observatory and XMM-Newton, provide information on magnetosphere-ionosphere coupling at this planet. A general discussion of x-ray emission from planetary magnetospheres will be given in this talk.