

# GEO-X: GEOSpace X-ray imager

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## ABSTRACT

GEO-X (GEOSpace X-ray imager) is a mission concept to image dayside boundaries of the Earth's magnetosphere for the first time in X-rays. Global imaging is crucial to understand dynamic structures and events such as reconnection, flux tubes and pressure changes occurring in the dayside boundaries of the magnetosphere, complimenting in-situ observations. Global imaging of near Earth regions such as aural oval has been established with past satellite observations and demonstrates its importance. However, the dayside boundaries have not been imaged with high spatial and timing resolutions required to follow their dynamic motions.

GEO-X aims at the first global imaging of dayside boundaries of the magnetosphere in X-rays. The X-ray emission from the Earth's magnetosphere has been discovered with recent X-ray astronomy satellites as a time variable foreground noise (e.g., Snowden et al. 1994, ApJ, Fujimoto et al. 2007 PASJ, Carter et al. 2011 A&A, Ezoe et al. 2011 ASR). GEO-X enables a wide field of view imaging of the dayside boundaries outside the magnetosphere using this emission as a signal. Its science payload will be based on ultra light-weight X-ray telescopes and radiation hard imaging detectors. The X-ray telescopes will cover a field of view of 8 degree  $\times$  8 degrees corresponding to  $6 R_E \times 6 R_E$  as a total with high image resolution of  $<9$  arcmin corresponding to  $<0.1 R_E$ . The large grasp per telescope  $>10 \text{ cm}^2 \text{ deg}^2$  at 0.6 keV together with spectroscopic capability will allow us to capture dynamic motions of the dayside boundaries with time resolution of  $<1$  hr.