The solar corona and Solar-B observations

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The Solar-B satellite is a japanese spacecraft dedicated to the solar observations and now under final testing for the launch currently scheduled in August 2006. Solar-B carrys a coordinated set of visible-light, EUV and X-ray instruments, which, as a whole, enable us to explore the origins of the solar corona and the magnetic coupling between the dynamic process occurring in the corona and the dynamics of fine magnetic structures at the photosphere. The Solar Optical Telescope (SOT) is a medium-sized (50cm aperture) optical telescope with capability of measuring full vector magnetic fields in the phosophere and chromosphere with a spatial resolution of 0.2-0.3 arcsec (about 150km on the sun). The X-Ray Telescope (XRT) obtains soft X-ray images of the entire Sun with angular resolution of 1 arcsec and high time cadence in tens of seconds, giving the evolution of spatial distribution of high temperature coronal plasma in 0.5-10MK. The EUV Imaging

Spectometer (EIS) is a spectrograph for measuring physical conditions and velocity fields of hot plasma in the corona and transition region. The primary objectives of Solar-B are 1) to investigate the origin of hot plasma in the solar corona, 2) to understand the magnetic coupling between the dynamic processes occurring in the corona and the fine magnetic structures at the photosphere, and 3) to investigate the basic mechanisms involved in magnetic reconnection and other mechanisms for converting magnetic energy into thermal and kinetic energy.

The space weather research attemps to understand conditions on the sun and in the solar wind, magnetosphere, upper atomospheres of the earth that can influence space-borne and ground-based electrical systems and can endanger human health. It is extremely essential to understand solar drivers of magnetic disturbances observed in the space environment. The solar surface is filled with various kinds of magnetic activities; The magnetic fields are

emerged from below the photosphere. The magnetic fields are twisted and braided by convective motions at the photosphere. The magnetic fields disappear from the photosphere with magnetic activities including magnetic topological changes due to reconnection, dissipation, submergence, and emergence. These magnetic activities are widely belived to store energy in coronal magnetic fields and to trigger release of the energy. There is, however, a lack of observations for well understanding physical processes involved in the magnetic activities. Solar-B can enable us to investigate basic mechanisms of solar drivers by observing fine magnetic structures on the surface and in the corona. It is our hopes that Solar-B observations give significant progress in space weather research.