

Study of Coupling Processes in the Solar-Terrestrial System: Project Overview

TSUDA, Toshitaka^{1*}

¹Research Institute for Sustainable Humanosphere (RISH), Kyoto University

We promote a project named "Coupling Process in the Solar-Terrestrial System" under close collaboration among universities and research institutes. We aim to study the solar energy inputs to the Earth, and responses of the Geospace (magnetosphere, ionosphere and atmosphere) to them. The solar energy can mainly be divided into two parts; the solar radiation, involving infra-red, visible, ultra-violet and X-ray, and the solar wind, which is a high-speed flow of plasma particles.

The solar radiation becomes the maximum on the equator, then, atmospheric disturbances are actively generated near the Earth's surface. They further excite various atmospheric waves, which propagate upward carrying energy and momentum. On the other hand, electro-magnetic energy associated with the solar wind converges into the polar regions. Disturbances are also generated there, and a part of the energy is transported toward lower latitudes and lower atmospheric regions. We propose to establish large atmospheric radars with active phased array antenna on the equator and the Arctic region. Among the equatorial regions, we focus on Indonesia where the atmospheric disturbances are most intense in the world, and we will establish a comprehensive observatory in Indonesia with the Equatorial MU radar as its main facility. While, we will also construct the state-of-the-art radar, called EISCAT-3D, in Scandinavia under international collaboration. An observation network of portable equipment for will be expanded in Asia and Africa to clarify the global flow of energy and materials.

Keywords: Equatorial fountain, Equatorial MU Radar, EISCAT_3D, Global observation network