RECENT RESEARCH ACTIVITIES

Equatorial MU Radar (EMU)
Equatorial fountain in the middle and upper atmosphere over Indonesia

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We are studying the coupling process in the solar-terrestrial system, focusing on the solar energy inputs into the Earth, and the response of the atmosphere to energy input. The solar energy can mainly be divided into two parts: the solar radiation involving infra-red, visible, ultra-violet and X-ray, and solar wind which is a high-speed flow of plasma particles. Electro-magnetic energy due to solar wind converges into the polar region, while, the solar radiation becomes maximum at the equator and atmospheric disturbances are actively generated near the Earth's surface. In particular, over Indonesia cumulonimbus convection is most active in the world. It further excites various atmospheric waves that propagate upward to transport energy and momentum into the upper atmosphere. Also, different kinds of materials (atmospheric minor constituents) originating at low- and mid-latitude regions converging into the equatorial region, are blown upward through the tropopause at about 15 km into the middle atmosphere (10-100 km), and spread to the whole globe. In the upper atmosphere, plasma disturbances and equatorial ionization anomaly are generated around the equator.

A number of international collaborative programs on the coupling processes in the solar-terrestrial system have been coordinated under SCOSTEP of ICSU. We have contributed much to these programs through observations especially using a state-of-the-art large atmospheric radar that enables us to study the behavior of the troposphere (altitude up to 10-15 km), middle atmosphere (10-100 km) and upper atmosphere (above 100 km). We have developed the middle and upper atmosphere radar (MU radar) in Shigaraki, Japan in 1984, the Equatorial Atmosphere Radar (EAR) right over the equator in West Sumatra, Indonesia in 2001. We are now promoting to construct the Equatorial MU Radar (EMU), which will be 10 times more sensitive than EAR. We will capture the energy and material flow that occur in all height ranges of the equatorial atmosphere as "Equatorial Fountain" using EMU.

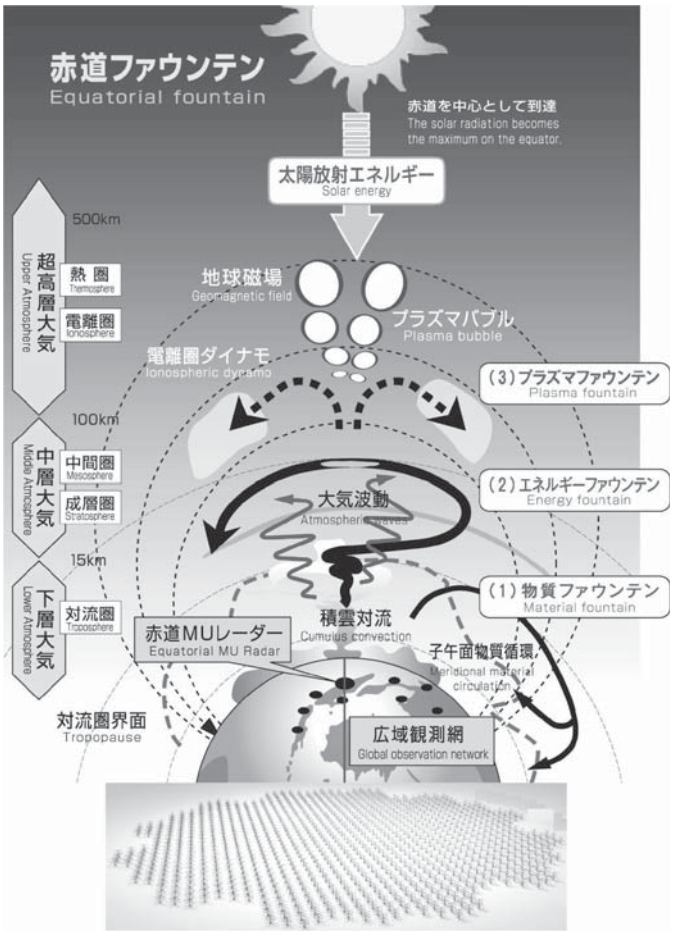

Figure 1. The energy and material flows that occur in all height regions of the equatorial atmosphere are named as “Equatorial Fountain”, which will be studied with the EMU.