

# Electrodynamic coupling processes in the solar–terrestrial environment

Lou-Chuang Lee

Director & Academician, Institute of Earth Sciences, Academia Sinica

E-mail: louclee@earth.sinica.edu.tw

## Abstract

The solar–terrestrial system consists of many neighboring physical regions, which include the photosphere, solar corona, solar wind, magnetosphere, ionosphere, atmosphere and lithosphere. The electrodynamic coupling among neighboring regions leads to the generation of many observed natural phenomena. The following important electrodynamic coupling processes will be presented in this talk. (a) The plasma shear flows in the solar photosphere lead to the formation and eruption of solar prominences. (b) The coupling between solar wind and magnetosphere lead to the transport of particles and energy from the solar wind to magnetosphere. (c) The solar wind-magnetosphere-ionosphere coupling leads to magnetospheric substorms, auroras and auroral kilometric radiation. (d) The charges and currents associated with a thunderstorm may interact with the middle atmosphere and the ionosphere, leading to the transient luminous events, which include elves, halos, blue jets, sprites, and gigantic jets. (e) The coupling among lithosphere, atmosphere and ionosphere may lead to total electron content (TEC) variations and formation of nighttime plasma bubbles in the ionosphere. Observations of daytime and nighttime TEC variations and nighttime plasma bubbles can be used as precursors for earthquake prediction.