might be involved with onsets of plasma bubbles. Although the observed equinoctial asymmetry of the bubble occurrence is not very prominent compared with other morphological features, it would be a key to testing possible connections between the plasma bubble and the lower atmosphere, because direct solar influence to the ionosphere-thermosphere system is expected to be identical in both the equinoxes.

Dynamical simulation of electromagnetic Spread F

M. Mascarenhas, E. Alam Kherani, J. H. A. Sobral, and E. R. de Paula

1: National Space Research Institute, São José dos Campos, Brazil (matheus@dae.inpe.br)

We present a three-dimensional simulation of electromagnetic bubble generation and evolution in the equatorial-low-latitude F region of the ionosphere. The bubble is generated by the Rayleigh-Taylor instability mechanism. The unstable Rayleigh-Taylor plasma modes are believed to be electrostatic modes due to the large conductivity parallel to the magnetic field. However, the recent CHAMP observations indicate the presence of magnetic field fluctuations associated with bubble currents. These fluctuations are caused by the currents inside and around the bubble. In order to understand the current system associated with the bubble in the equatorial-low-latitude ionosphere, we carry out the simulation in the framework of hydromagnetic theory. In this framework, the plasma fluid equations along with the complete Maxwell equations are solved. We have found that the electric field parallel to the terrestrial magnetic field diffuses away rapidly and so it does also the toroidal component of magnetic field fluctuation also. The large Pederson current inside the bubble, however, drives the large poloidal magnetic field fluctuation in and around the equator.

Can equatorial spread-F (ESF) occur on other planets?

Michael Mendillo[1], Jon Niehof[1], Katherine Garcia[1], Christina Prested[1], Sarah McGregor[1], Nicholeen Viall[1], Luke Moore[1], Paul Withers[1], Carlos Martinis[1], and Andrew Stephan[2]

1: Boston University, Boston, MA 02215, USA (mendillo@bu.edu)
2: Naval Research Laboratory, Washington, DC, USA

Observations of ionospheres on other planets started in the 1960s. In nearly 50 years of research on the topic, theoretical and modeling studies have concentrated on understanding the vertical structure of planetary electron density profiles, together with their diurnal, seasonal, latitudinal and solar cycle behavior. The data available from Venus and Mars are more abundant than from Jupiter and Saturn, and there are only a few observations from Uranus and Neptune. In the past several years, the more abundant data sets from Mars and Saturn have revealed two interesting trends: (1) at Mars, $N_e(h)$ profiles above the planet's crustal magnetic fields are far more structured than those above regions that are non-magnetized, and (2) virtually all $N_e(h)$ profiles at low latitudes at Saturn are highly structured. In this paper, we assess the impact that the gravitationally-driven Rayleigh-Taylor plasma instability may have as one possible source of plasma irregularities found above nearly-horizontal magnetic fields on Mars and Saturn.