Ring current behavior inferred from ground magnetic and space observations.

F.Søraas(1), M. Sørbø(1), K.Aarsnes(1), and D.S. Evans(2)

1 Department of Physics and Technology, University of Bergen, Norway

2 NOAA Space Environment Center, Boulder, Colorado, USA.

1 finn.soraas@ift.uib.no, Fax: +47 55589440, Phone:+47 55582714

The existence of an electric current encircling the Earth at a distance of several Earth radii was first predicted from groundbased magnetic observations. These large variations in the Earth's magnetic field were called geomagnetic storms. The magnetic field at the Earth's surface exhibit an appreciable Magnetic Local Time (MLT) dependence in the initial and main phase of the storm. The field depression is very asymmetric, with the largest depression in the evening to midnight MLT sector. During such storms a well defined Storm Time Equatorial Belt (STEB) of Energetic Neutral Atoms (ENA) and ions is found to exist at low altitudes around geomagnetic equator. Most of the particles measured at the equator by the vertical viewing detector on the NOAA satellites at an altitude of 800 km will be ENA. Ring Current (RC) asymmetry and symmetry inferred from the STEB are in accordance with results from ground based magnetic observations. There is, however, also a difference. The magnetic observations show the storms to be worldwide, displaying essential the same signature all around the equator. The STEB is not worldwide it appears first in the midnight/evening sector and then it appears in the morning sector largely consistent with the drift of the RC ions. Possible the magnetic field depression in the morning sector during the initial and storm main phase can partly be due to the large partial RC in the evening sector. STEB observations show that large convection fields can prevent the RC ions from passing local noon in their drift motion.