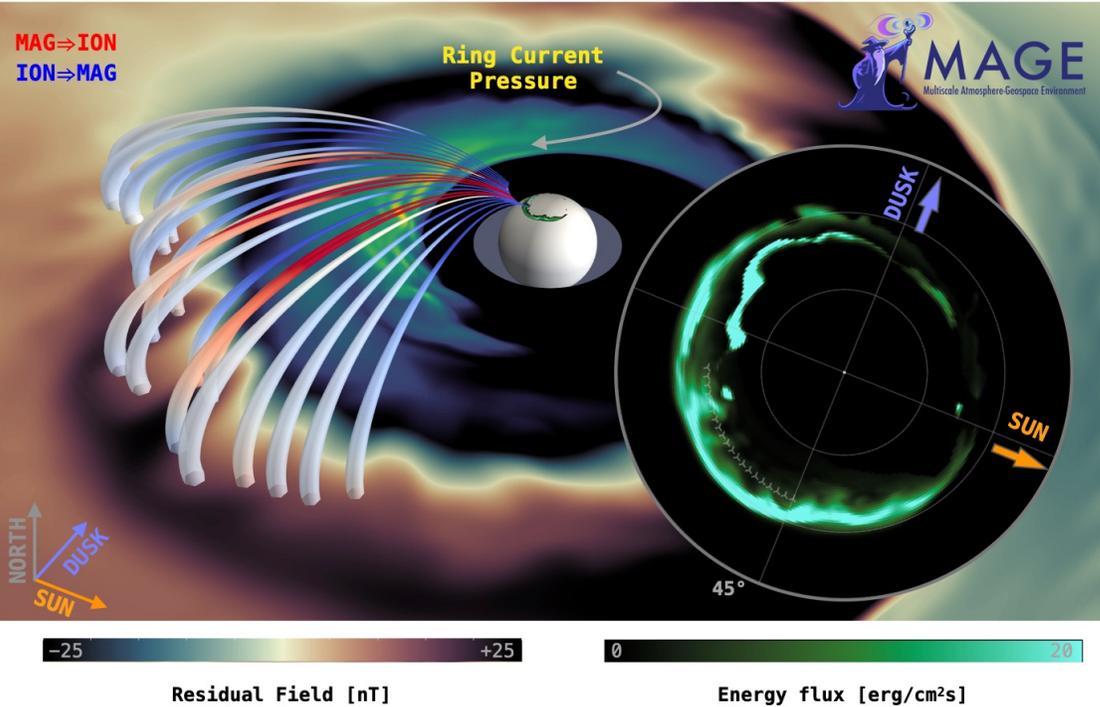


Magnetosphere-Ionosphere Coupling During Stormtime

10:30UT on 17-3-2013



Using sophisticated supercomputer simulations of geospace, we reveal the physical mechanisms underlying a critical aspect of stormtime magnetosphere-ionosphere coupling with important space weather implications.

- During geomagnetic storms, currents in space alter the ground magnetic field, with a lop-sided asymmetry: dusk-biased near the equator and dawn-biased at high latitudes.
- Our sophisticated geospace model reproduced this phenomena and found it occurred during a period of intense, localized, dawnside flow bursts, akin to bubbles.
- We found the causal agent of these bubbles is magnetic reconnection, typically symmetric but skewed dawnward due to a dusk-biased ring current.
- Strong disturbances to the ground magnetic field can damage and disrupt the power grid. This research enhances our understanding of phenomena that lead to hazardous space weather conditions, and builds towards using modeling to mitigate space weather hazards.

Visualization of geospace simulation depicts turbulent flows and magnetic fields around the Earth and their auroral manifestations (inset). Magnetic field lines (depicted as blue-red tubes) show how phenomena in space connect to the atmosphere, creating horseshoe-shaped structures in the aurora, known as omega bands.