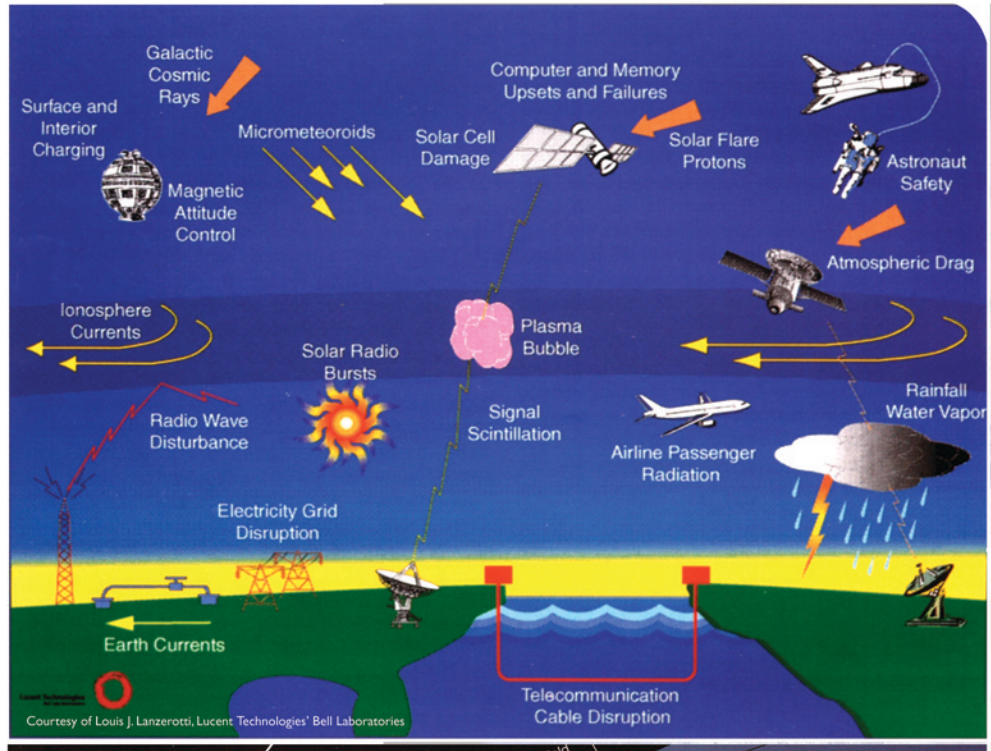
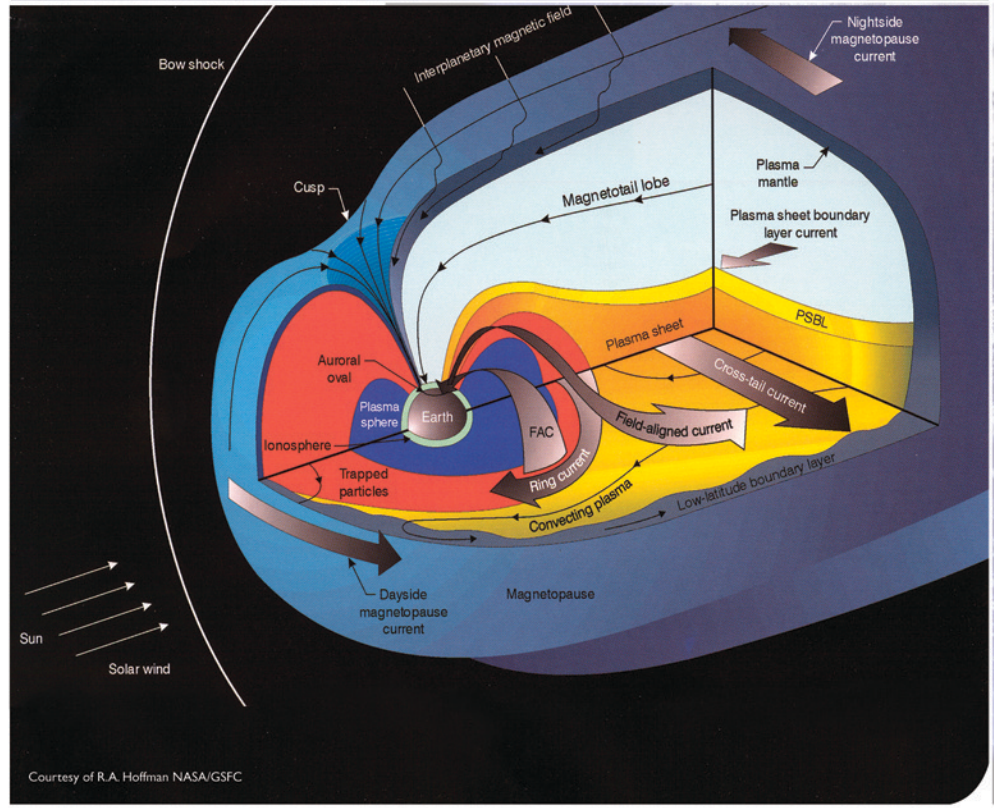
SCIENCE

The Center conducts scientific investigations in Space Weather, Magnetospheric Physics, Ionospheric Physics and Radio Sciences. Computer scientists at the Center develop advanced search and visualization programs, database applications, and networking systems.

Active space research projects include solar wind - magnetosphere interaction modeling, magnetosphere-ionosphere-thermosphere coupling theory, plasmasphere sounding and modeling, plasmasphere depletion and refilling processes, ionosphere sounding and modeling, radiation belt wave-particle interactions, antenna-plasma interaction, antenna radiation theory and experiments, whistler mode wave propagation and ionospheric coupling.





UMass Lowell
Center for Atmospheric Research

SPACE TECHNOLOGY AND SCIENCES

The Center for Atmospheric Research at the University of Massachusetts Lowell was founded in 1975 with the goal of conducting experimental and analytical research in atmospheric and space sciences, to provide research opportunities for graduate and undergraduate students, and to demonstrate how research and development solve real world problems.

Environmental, Earth & Atmospheric Sciences Dept.
Center for Atmospheric Research
University of Massachusetts Lowell, USA

Prof. Bodo W. Reinisch, Director
Prof. Paul Song, Co-Director

600 Suffolk Street, 3rd floor
Lowell, MA 01854
Tel: 978-934-4900 Fax: 978-459-7915

http://umlcar.uml.edu

GROUND – BASED SOUNDING

Radio sounding provides a means to probe remotely and in situ space plasma conditions. In an effort to map the structure and dynamics of the global ionosphere, the Center for Atmospheric Research of UMass Lowell has built more than 70 ground-based ionospheric radio sounders for institutions worldwide. This global network provides real time information on the highly dynamic ionospheric conditions via the Internet to scientific users and communications services. The Center is now actively developing a new generation of ionospheric sounders using the most advanced technologies.

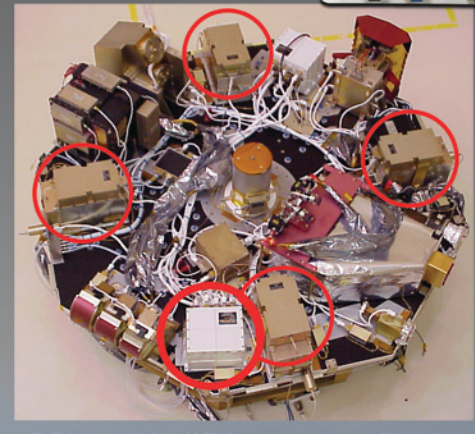
Digisonde DPS
(1993)

Digisonde 256
(1978)

Digisonde 128
(1970)

SPACE – BORNE SOUNDING

RPI
(2000)

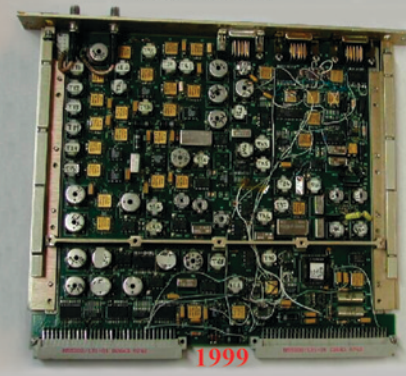


RPI on IMAGE Instrument Deck

A major breakthrough in space-borne radio sounding occurred when the NASA IMAGE satellite was launched in 2000. It carries for the first time a radio sounder into the magnetosphere, the Radio Plasma Imager or RPI, built by the Center to remotely measure Earth's space plasma up to distances of several Earth radii. The results from the RPI measurements have stimulated the space science community. Demands for space-borne sounders and transmitters have grown greatly.

CURRENT + FUTURE PROJECTS

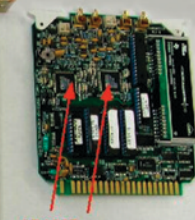
IMAGE/RPI Analog Transmitter
(Single Frequency)



1999

233 x 160 mm

PIDDP Digital Transmitter
(Dual Frequency)



2004

114 x 127 mm

Development of a prototype digital radio sounder for NASA's planetary missions is underway, and a high power VLF transmitter for an Air Force radiation belt satellite is being built for a launch in 2009.

The sounder instrumentation development, driven by space applications, demands advanced digital technologies in order to reduce size, weight and cost, and to increase functionality, reliability, precision and accuracy.