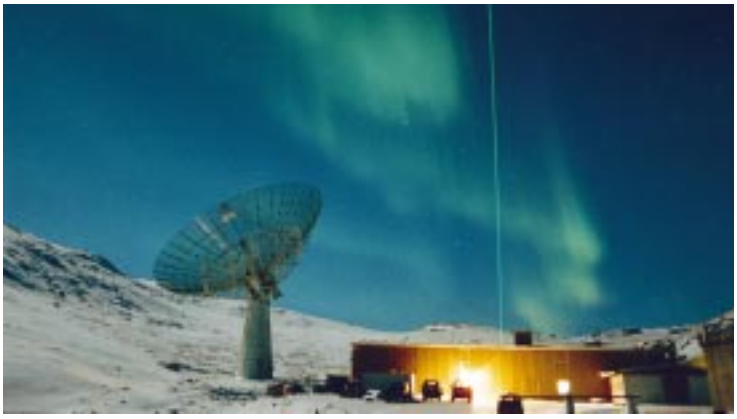
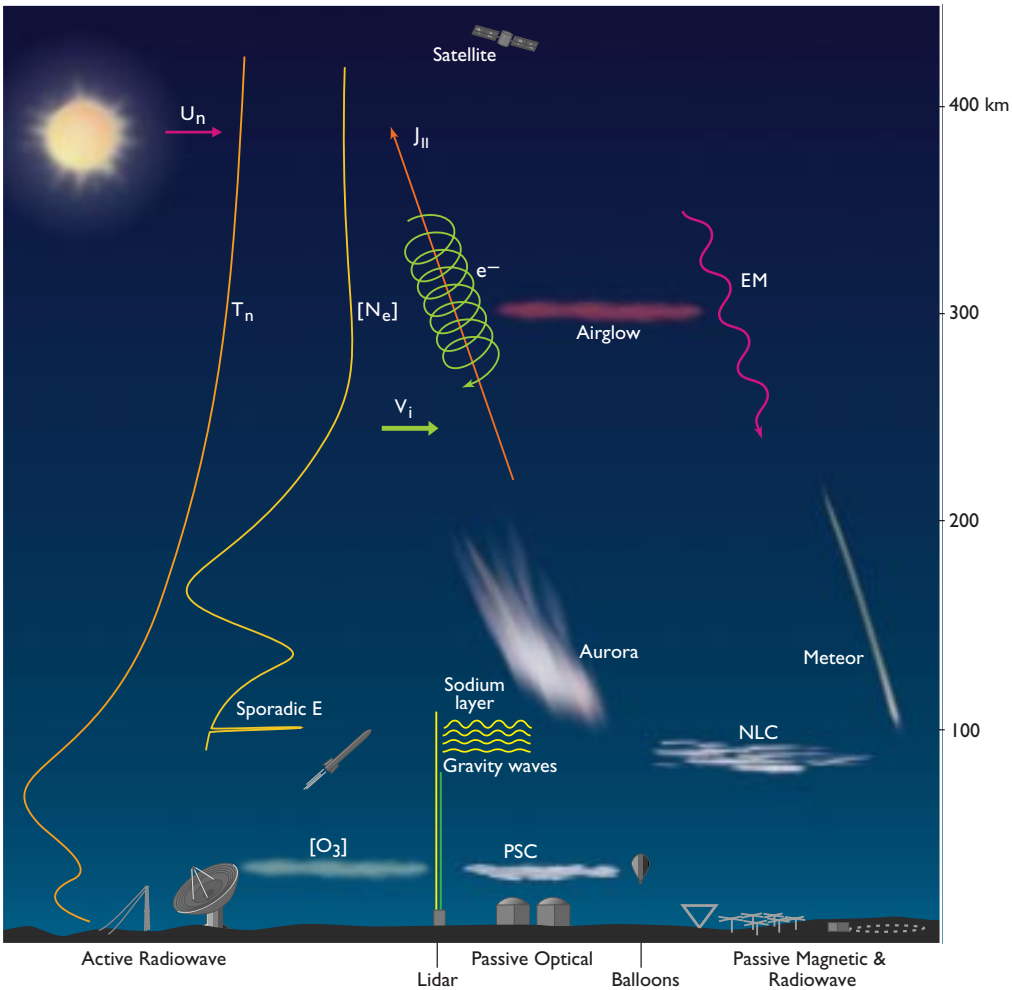
SRI International and the National Science Foundation

THE SONDRESTROM RESEARCH FACILITY





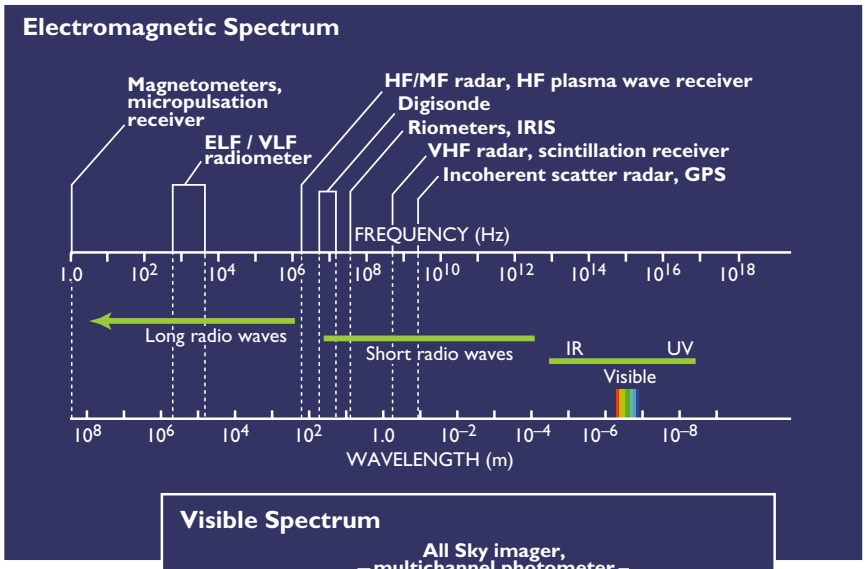
■ Just north of the Arctic Circle and 100 km inland from the west coast of Greenland lies a research facility dedicated to studying the polar upper atmosphere. For historical reasons, this research station is known around the world as the Sondrestrom Upper Atmospheric Research Facility in Kangerlussuaq, Greenland. The facility is operated by SRI International in Menlo Park, California, under the auspices of the U.S. National Science Foundation and in joint cooperation with Denmark's Meteorological Institute. The facility has been operating in Greenland since 1983 and continues to be in high demand by the international and national scientific communities.

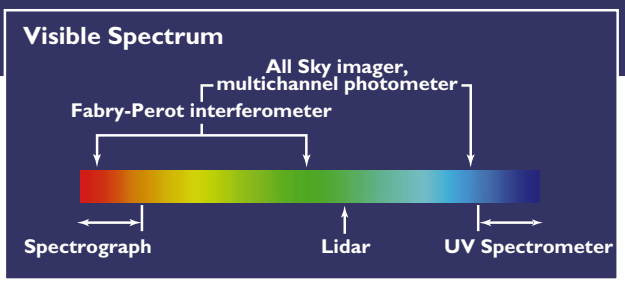
This unique facility is host to more than 20 instruments, the majority of which provide unique and complementary information about the arctic upper atmosphere. Together these instruments advance our knowledge of upper atmospheric physics and determine how the tenuous neutral gas interacts with the charged space plasma environment. The suite of instrumentation supports many disciplines of research – from plate tectonics to ozone depletion to auroral physics and space weather. As such, the facility instrumentation covers the electromagnetic spectrum while the data results span the spectrum of polar research.

The centerpiece instrument of the facility is an L-band incoherent scatter (IS) radar with a 32 m fully steerable antenna. The IS radar technique is a powerful tool capable of measuring range-resolved ionospheric and atmospheric parameters simultaneously from the ground to the outer reaches of our atmosphere. Use of a steerable antenna allows spatial coverage in both latitude and longitude.

Data from the facility are used by hundreds of scientists annually. Dozens of scientists, engineers, and students visit the site each year to install hardware, implement enhancements to collocated instruments, and collect data in real time in multi-instrument campaigns. ■

Sondrestrom Research Facility

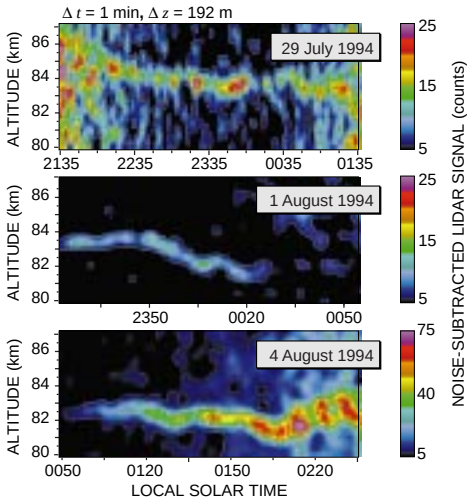




Lidar

Jeff Thayer, SRI International

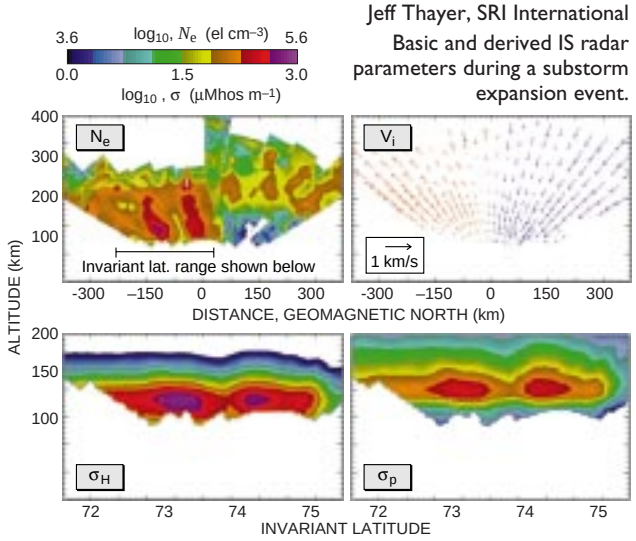
Noctilucent cloud observations using the Rayleigh lidar.



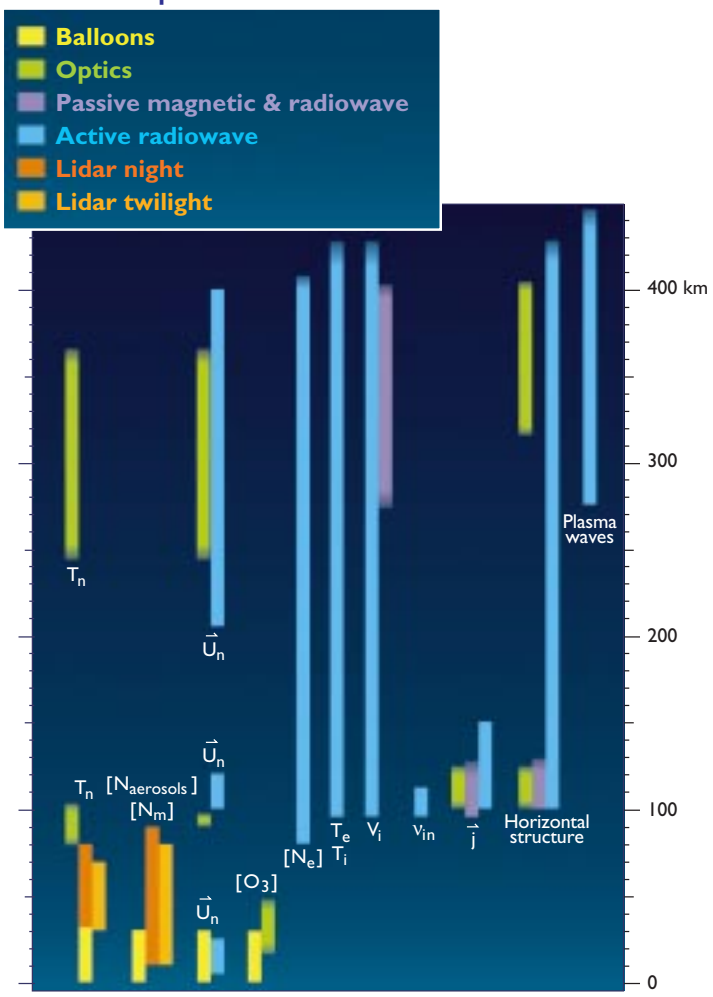
Incoherent Scatter Radar

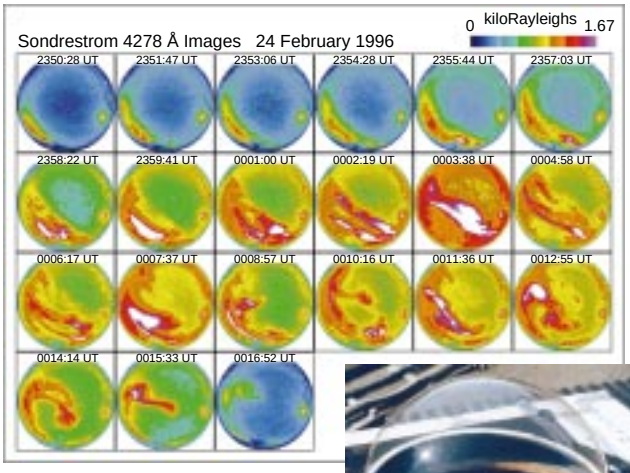
Jeff Thayer, SRI International

Basic and derived IS radar parameters during a substorm expansion event.



Instrument Spectrum



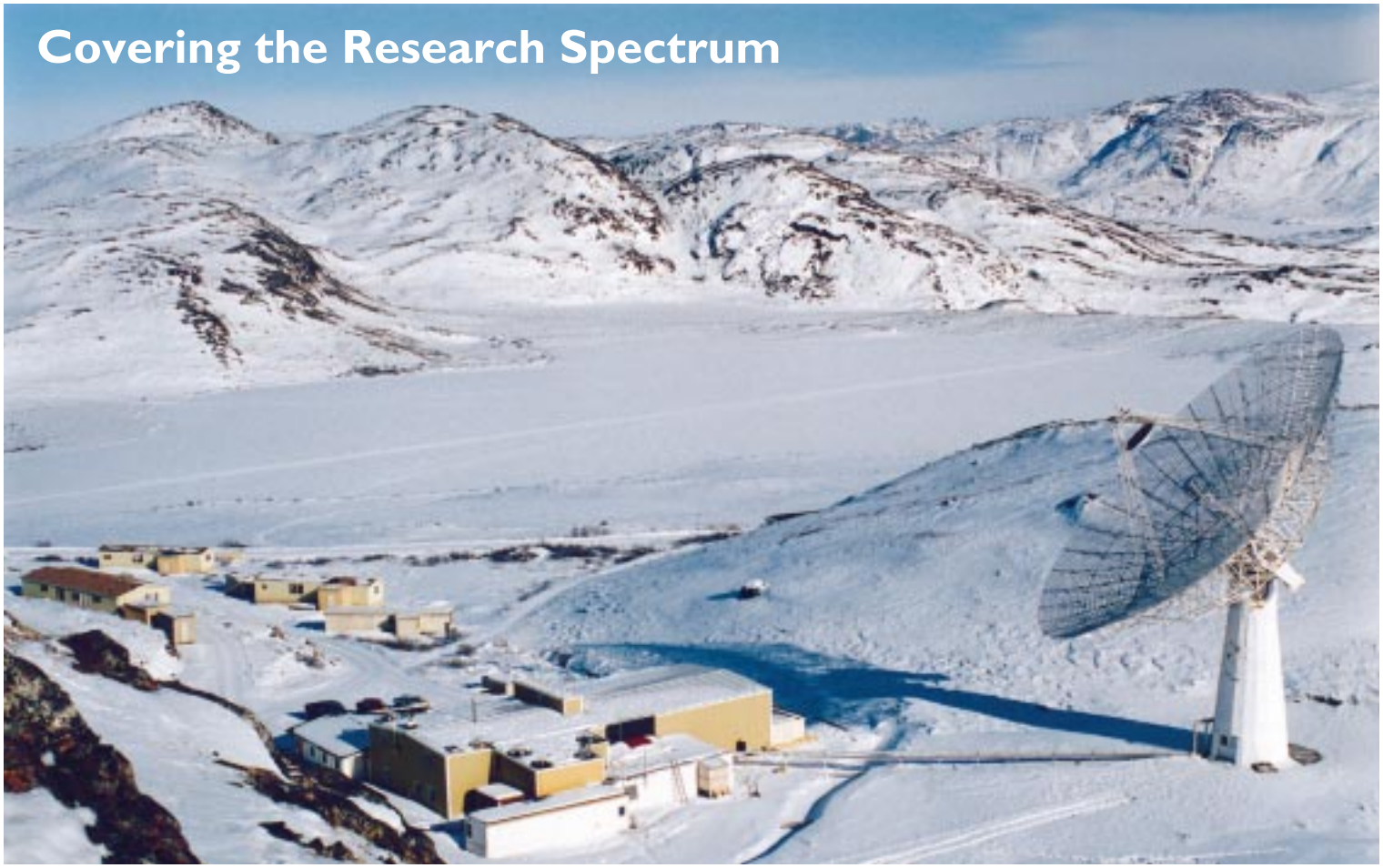


All Sky Imager

Rick Doe, SRI International

All Sky images of N_2^+ emission during a substorm expansion.

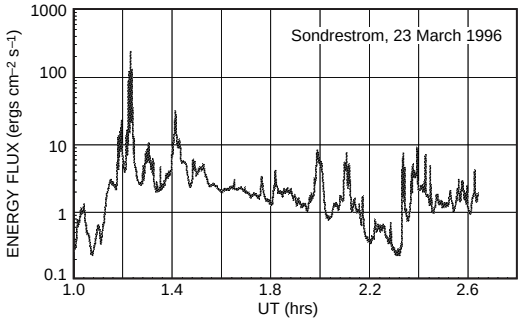
Covering the Research Spectrum



Multichannel Photometer

Gary Swenson, University of Illinois

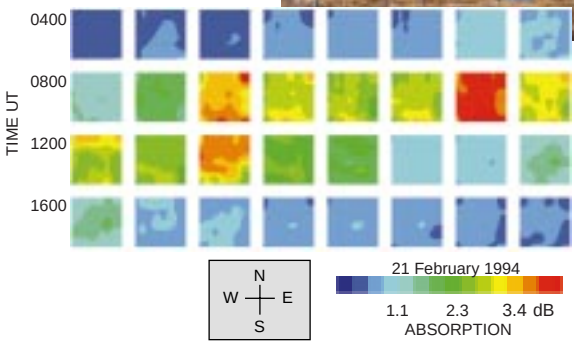
CGS energy flux for precipitating electrons derived from the ratio of 630.0 nm to 427.8 nm emission brightness.



Imaging Riometer (IRIS)

Ted Rosenberg and Peter Stauning, University of Maryland, Danish Meteorological Inst.

IRIS images sampled every 30 seconds record the structure of D-region absorption during a geomagnetic sudden commencement event.



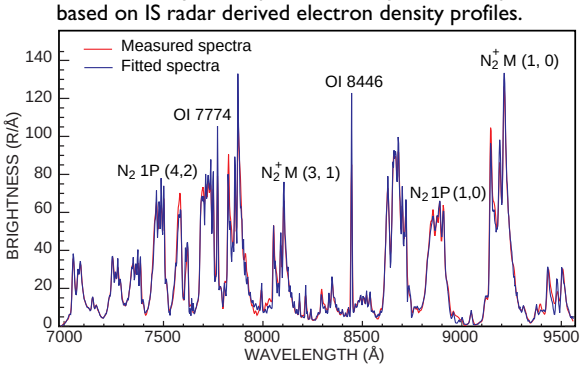
UV Spectrometer

Rick Niciejewski, University of Michigan

Michelsen Interferometer

Gulamabas Sivjee, Embry-Riddle Aeronautical University

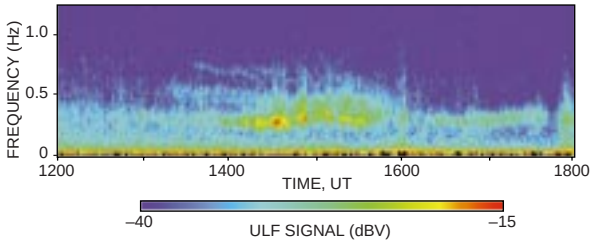
Near visible specta obtained during a period of significant auroral activity is compared with a synthesized spectra based on IS radar derived electron density profiles.

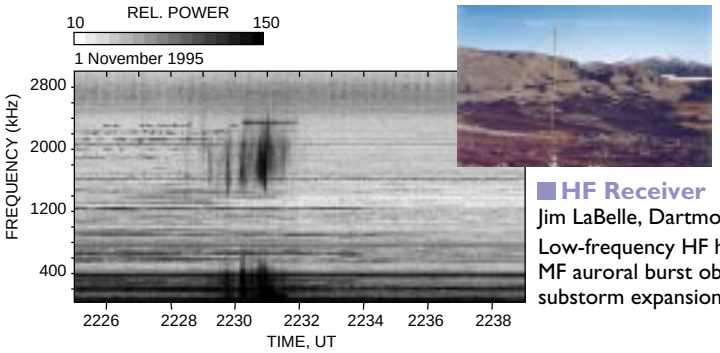


Micro-Pulsation Receiver

Roger Arnoldy, University of New Hampshire

Postnoon ULF spectrogram indicates a distinct group of PC-1 bursts from 14 to 16 UT (12 to 14 MLT) possibly associated with a dayside FTE.





HF Receiver

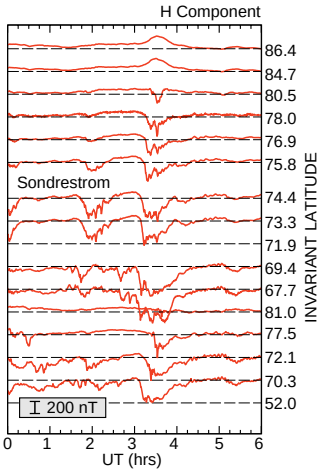
Jim LaBelle, Dartmouth College

Low-frequency HF hiss and correlated MF auroral burst observed during a substorm expansion event.

Magnetometer Chain

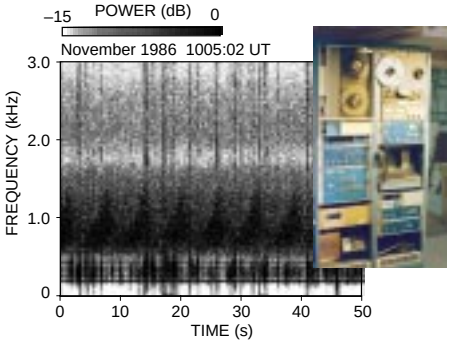
Ole Rasmussen,
Danish Meteorological Institute

Sondrestrom provides a crucial middle link in the DMI magnetometer chain.



Three-Frequency Riometer

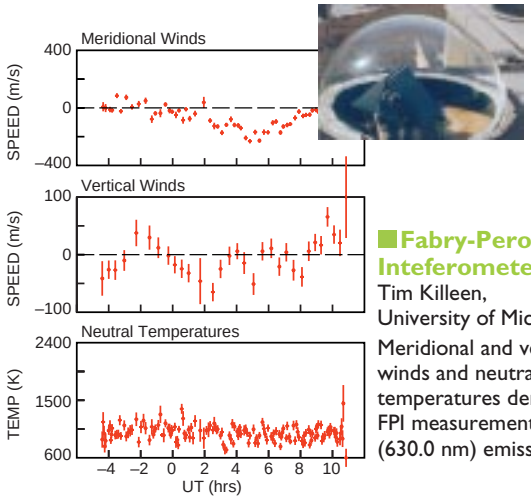
Peter Stauning,
Danish Meteorological Institute



ELF / VLF Receiver

Tony Fraser-Smith, Stanford University

ELF radio noise spectrogram shows both lightning sferics (vertical lines) and a quasi-periodic modulation of the 0.5 to 1.4 kHz background hiss.



Fabry-Perot Inteferometer

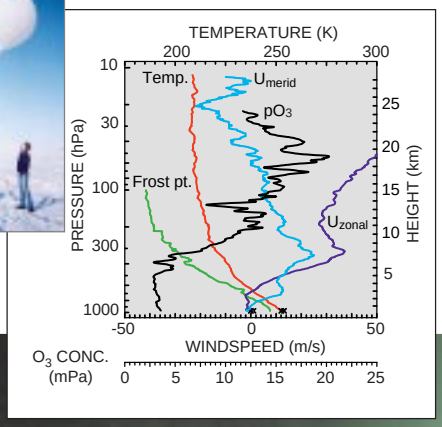
Tim Killeen,
University of Michigan

Meridional and vertical winds and neutral temperatures derived from FPI measurements of OI (630.0 nm) emission.

Balloon Launching Facility

Ib Steen Mikkelsen,
Danish Meteorological Institute

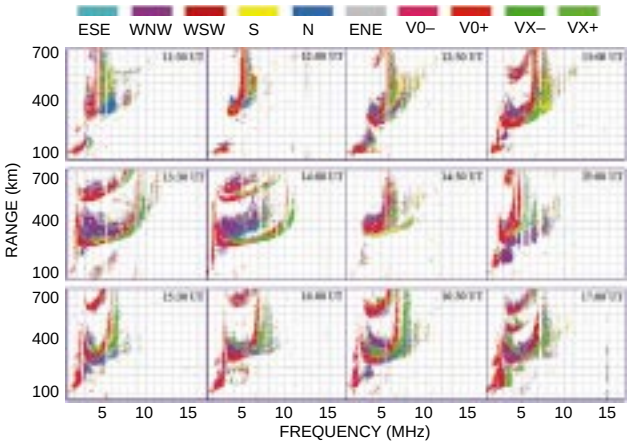
Wind, temperature and ozone concentration data are gathered on a seasonal basis by balloon borne radiosondes.



Digisonde

Terry Bullett, Air Force Phillips Lab

Color-coded sequential ionograms from the digisonde instrument allow users to determine the angle of arrival for the return signal and to discriminate ordinary from extraordinary returns.



Other Permanent Sondrestrom Instruments:

Meteor Scatter Radar
Susan Avery, University of Colorado

Ozone Spectrometers
Paul Eriksen, Danish Meteorological Institute

Imaging Spectrograph
Gary Swenson, University of Illinois/Lockheed Martin

Scintillation Data Receiving System
Santimay Basu, Air Force Phillips Lab

Sodium Resonance Lidar
Jeff Thayer, SRI International and
Brenton Watkins, University of Alaska

Campaign Instruments:

All Sky Imager & Imaging Spectrograph
Michael Mendillo, Boston University

Auroral Photometer
Jim Hecht, Aeorspace Corp.

Fabry-Perot Interferometer
Jim Hecht, Aeorspace Corp.

SRI International

- Founded in 1946 as the Stanford Research Institute in conjunction with Stanford University
- Independent, nonprofit scientific research institute with for-profit spin-offs and subsidiaries (Sarnoff Corporation and SRI Consulting)
- Creating and delivering science and technology solutions for government and business

National Science Foundation

The National Science Foundation supports research, education, and infrastructure to advance the state of knowledge about Earth, including its atmosphere, continents, oceans, interior, and the processes that modify them as well as link them. Most NSF programs in the geosciences are funded through the Directorate for Geosciences.

Sondrestrom Facility photos by Craig Heinselman

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