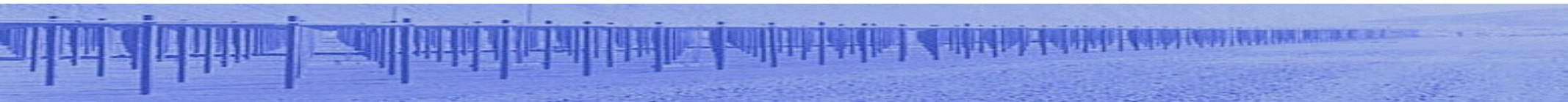


Introduction to the Jicamarca Radio Observatory

Marco Milla

Radio Observatorio de Jicamarca, Instituto Geofísico del Perú

September 20, 2014

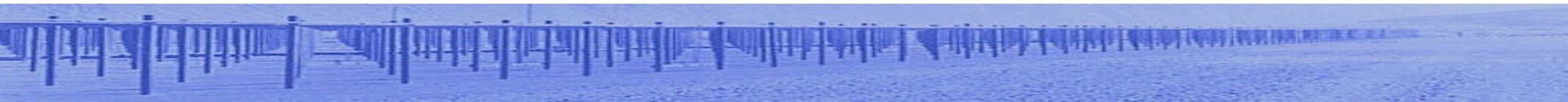


Jicamarca Radio Observatory



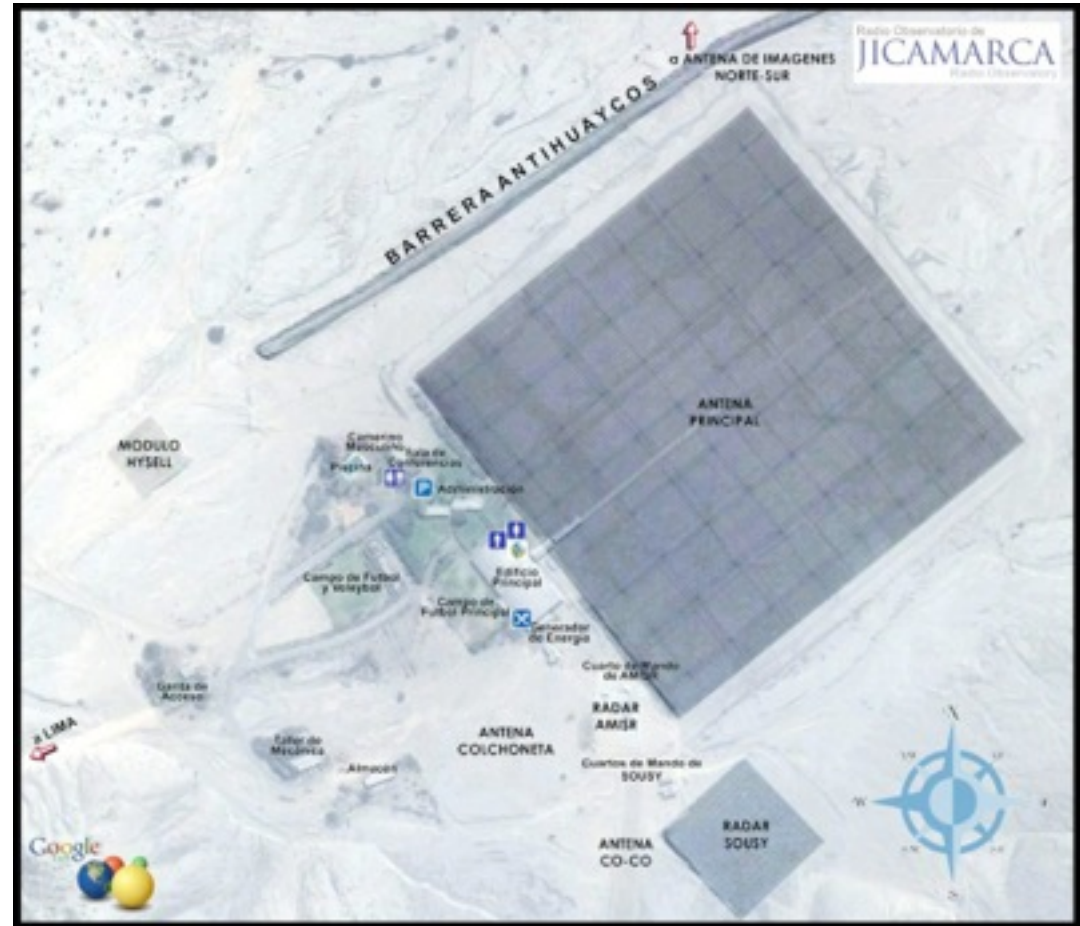
Our main instrument is one of the largest incoherent scatter radars in the World.

- It is a research center to study the ionosphere and upper atmosphere.
- Located at ~20 km east of Lima, Peru. (11.95°S , 76.87°W).
- It is part of a chain of observatories extending from Greenland to Peru.
- Operates a variety of instruments: IS and CS radars, ionosondes, magnetometers, GPS receivers, Fabry Perot interferometers.



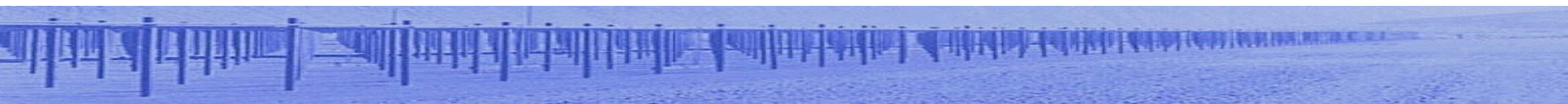
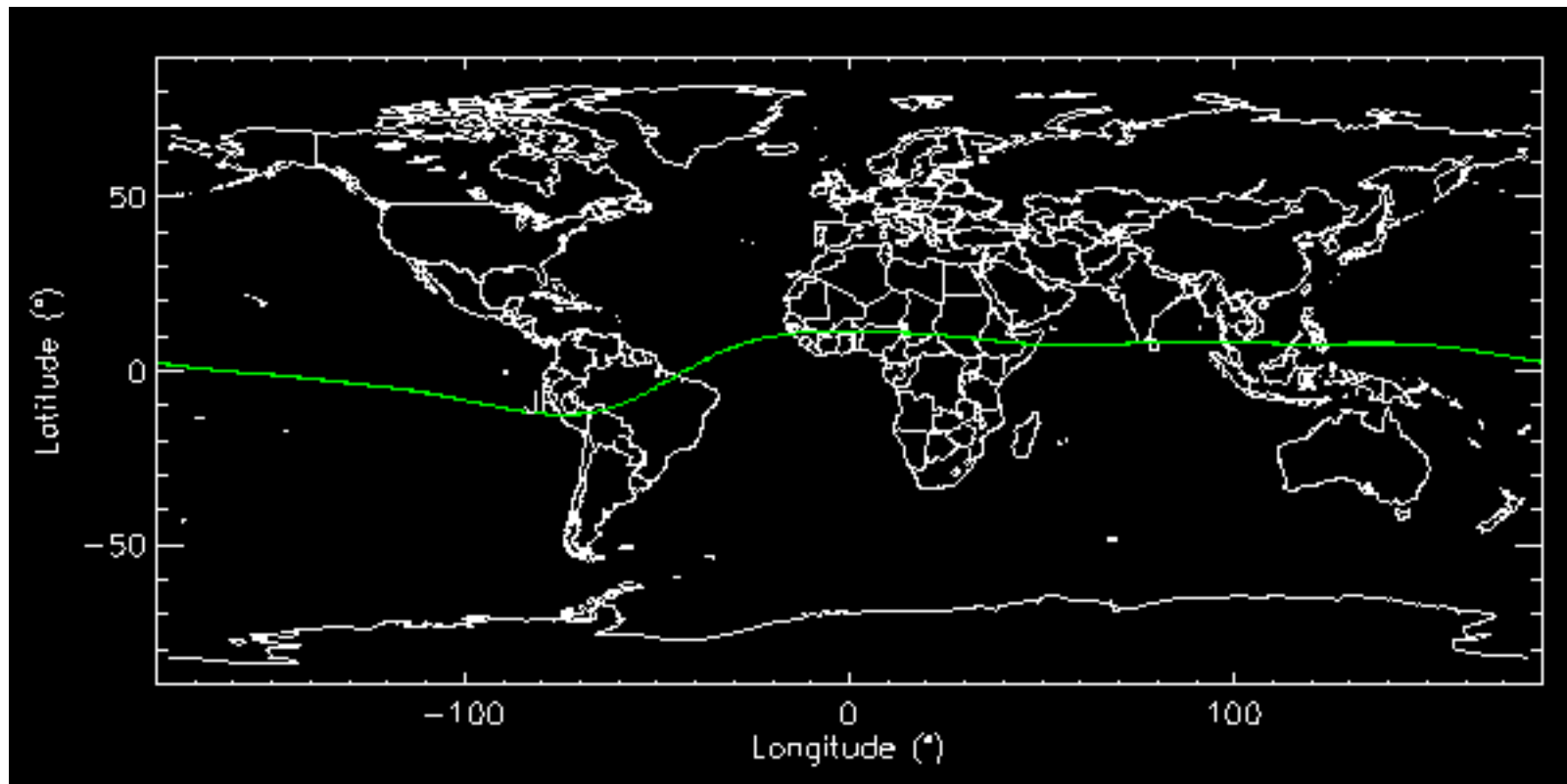
Characteristics of the Jicamarca Radar

- Operating frequency: 50 MHz
- Antenna: array of 18,432 half-wave dipoles covering an area of $300 \times 300 \text{ m}^2$.
The antenna is composed of 8×8 cross-polarized modules.
- Pointing directions: within 3 degrees from on-axis. Phase changes are done manually.
- Transmitters: 3 x 1.5 MW peak-power with 5% duty cycle.
Fourth TX under construction.



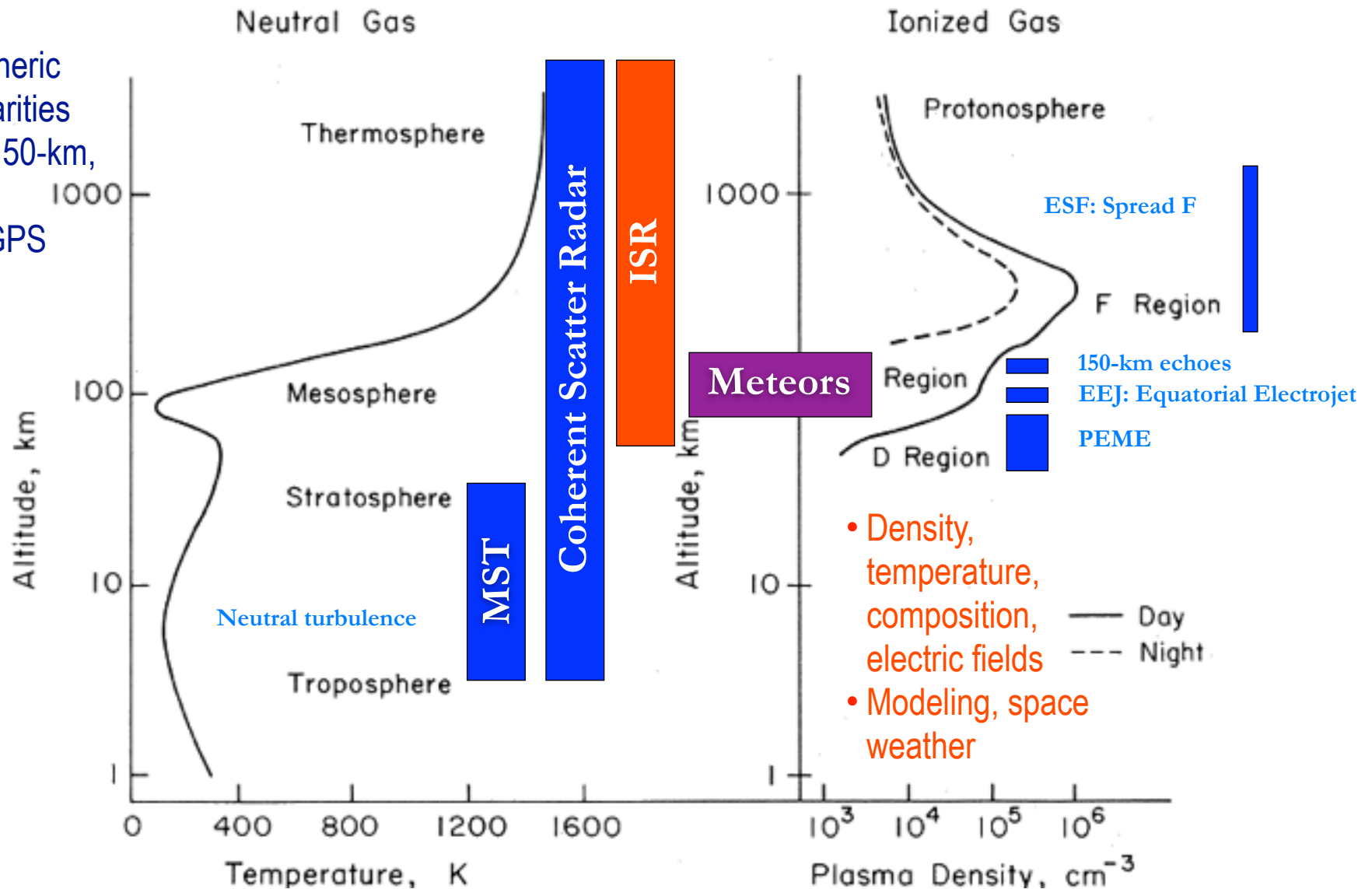
Why at Jicamarca?

- It is under the magnetic Equator (use of large horizontal antenna).
- It was built between 1960-1962. Dr. Ken Bowles, the founder of Jicamarca, worked in Peru (with IGP people) during the IGY 1958.
- It is free of electromagnetic interference (surrounded by mountains).



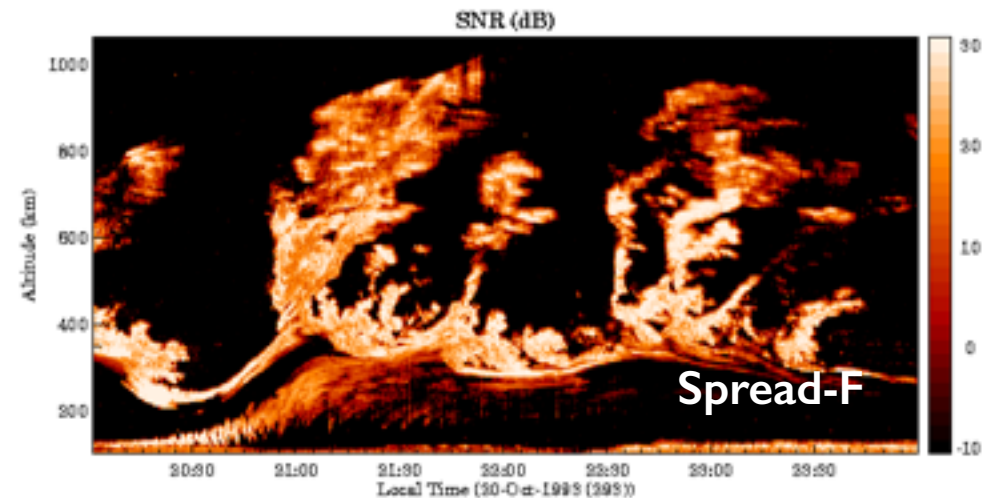
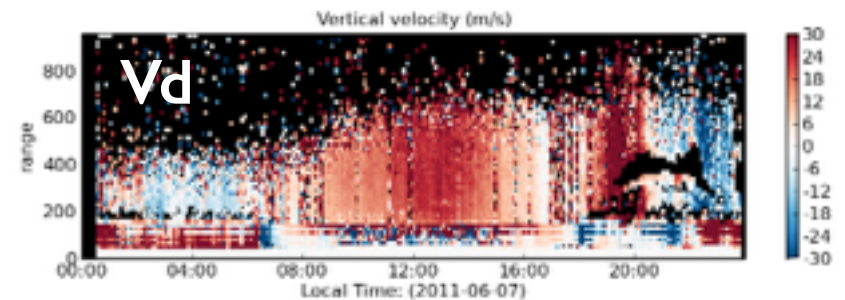
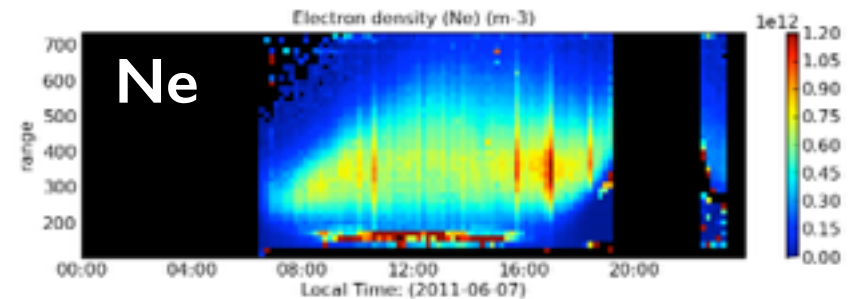
What do we study at Jicamarca?

- Ionospheric Irregularities (EEJ, 150-km, ESF).
- SAR, GPS
- Neutral atmosphere dynamics (winds, turbulence, vertical velocities)
- Meteorology, aviation.

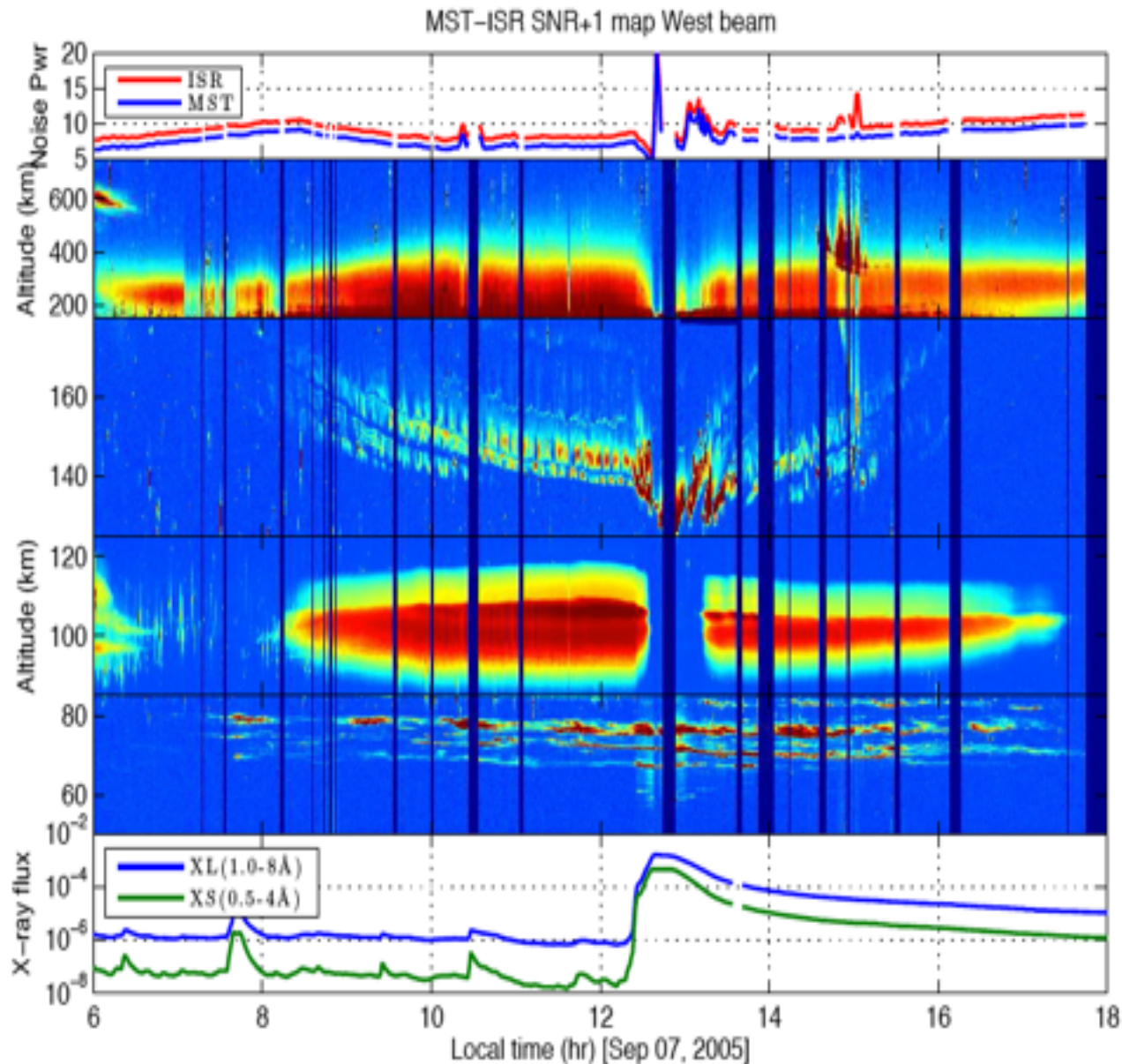


More about what we study at Jicamarca

- Dynamics of the equatorial ionosphere
 - Physical parameters (N_e , T_e , T_i , V_d , Z_d , $\%O^+$, $\%H^+$, $\%He^+$).
 - Spectral characteristics of plasma irregularities (Electrojet, Spread-F, 150km echoes).
- Dynamics of the neutral atmosphere - MST (Mesosphere, Stratosphere, and Troposphere).
- Meteor detection and characterization.
- Radio astronomy, others.



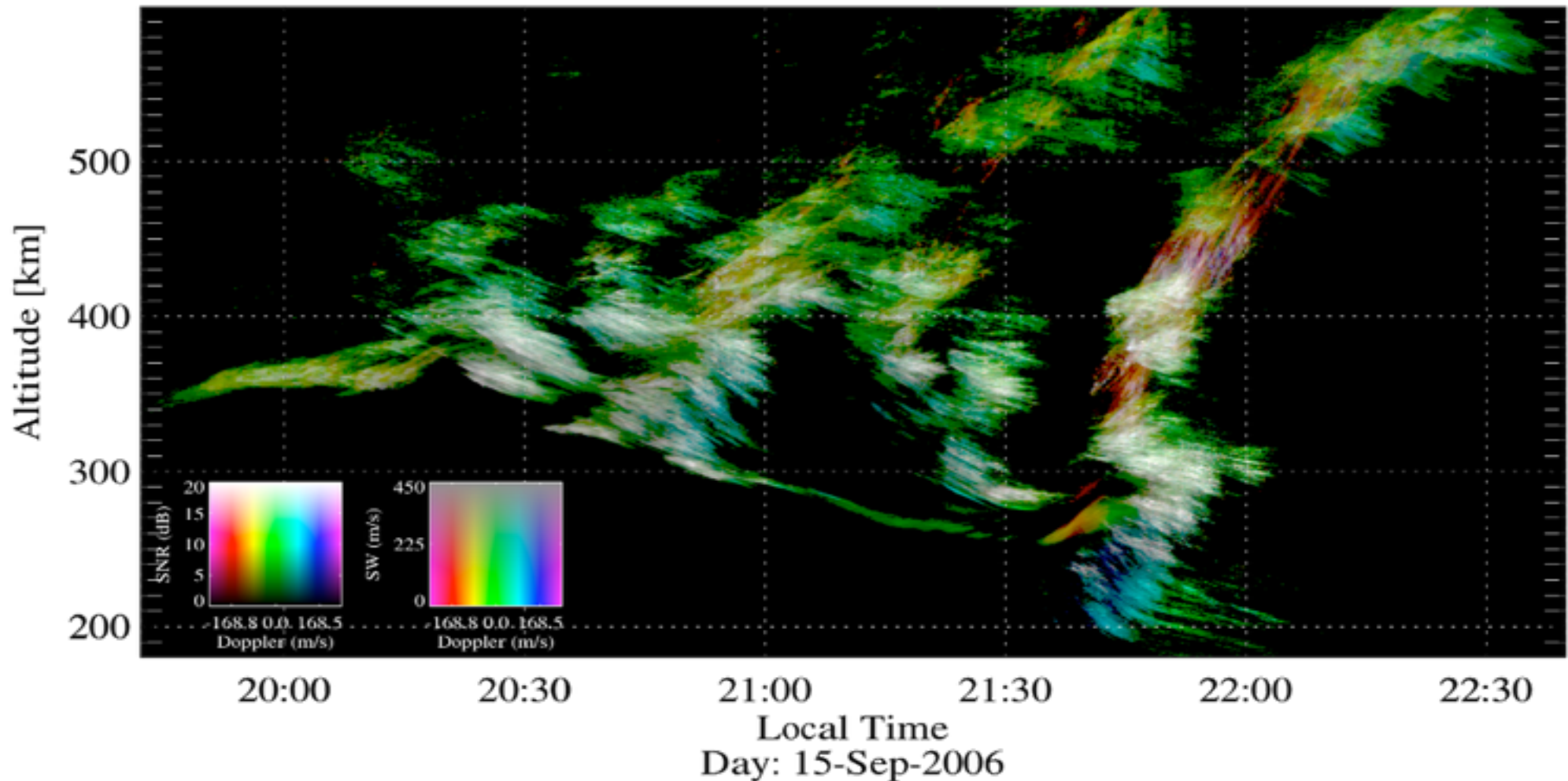
A typical day above Jicamarca



- ExB drifts from 150-km first moment.
- Plasma physics from EEJ spectra.
- Plasma physics and lower thermosphere winds from non-specular meteor trails.
- Mesospheric winds from mesospheric echoes.

A typical night above Jicamarca

RTDI over JRO



Effect of the F-region dynamics near sunset on the generation of Spread-F plumes.

JRO Tour

