The background image shows an aerial view of a desert landscape with a large, flat valley floor. In the center-left, there is a cluster of buildings, some with green roofs and others with white or light-colored roofs, surrounded by a small area of green vegetation. To the right of the buildings, there is a tall, thin vertical structure, possibly a antenna or a chimney. In the far distance, several mountain peaks are visible under a clear blue sky.

A heating facility for Jicamarca

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motivation

- queried at various times by AFOSR, ONR, NRL, AFRL, NSF, others
- why here, why now?

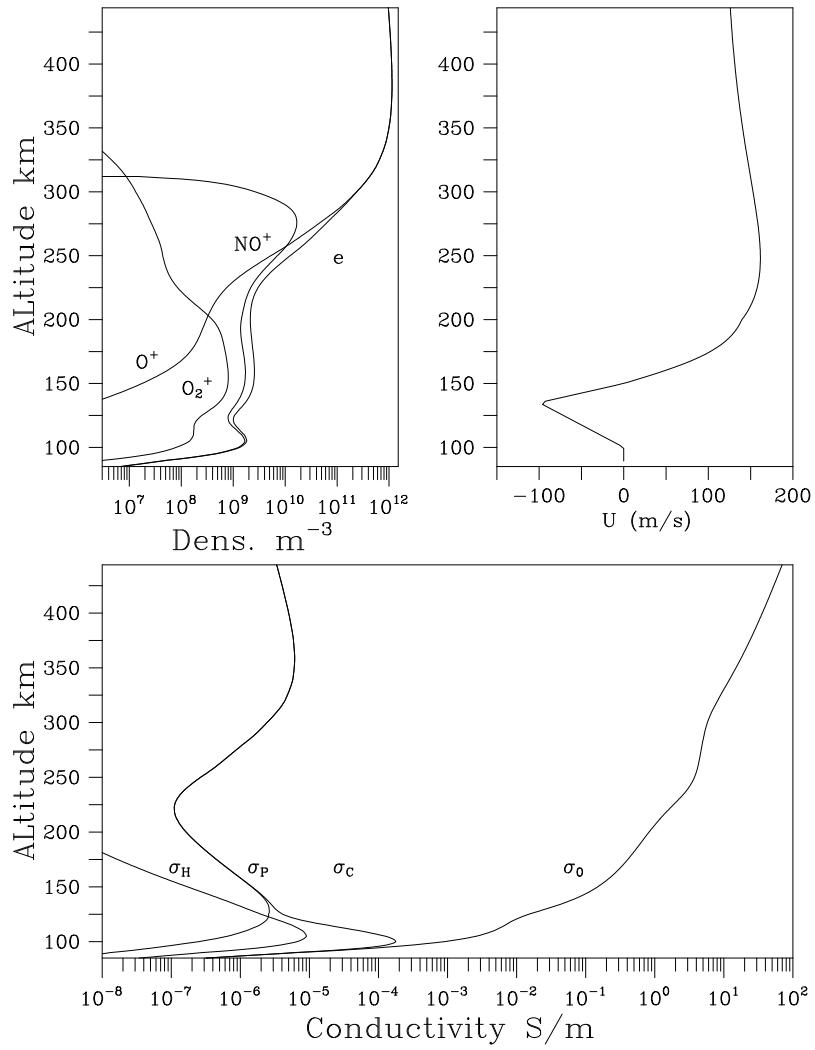
General advantages of magnetic equator:

- relatively stable background conditions
- less absorption, more ionization
- equatorial electrojet more reliable than auroral electrojet

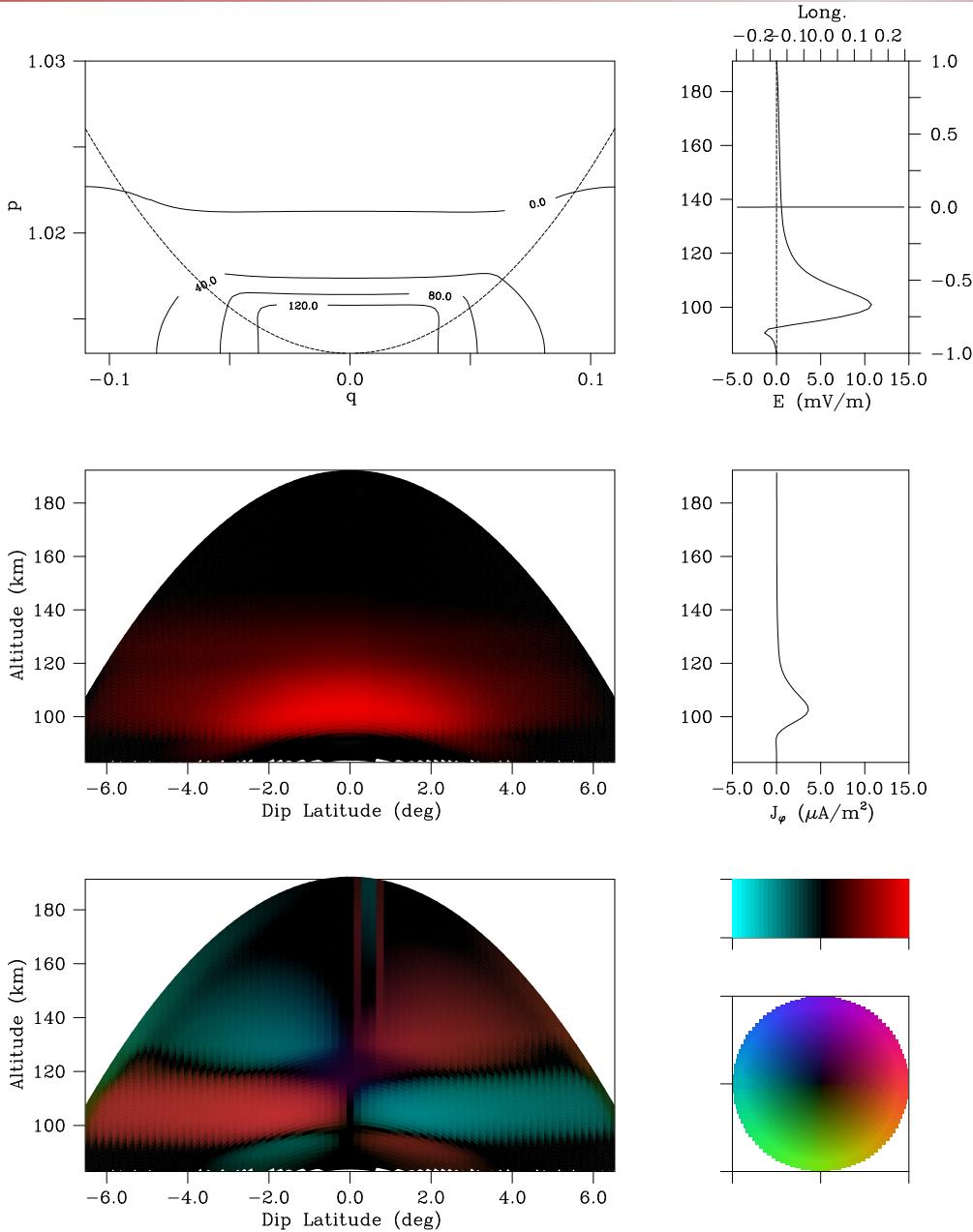
Specific features:

- VLF/ELF generation
- artificial periodic inhomogeneities and spread F
- electrojet thermal parametric instabilities
- Langmuir turbulence

VLF/ELF generation



VLF/ELF generation



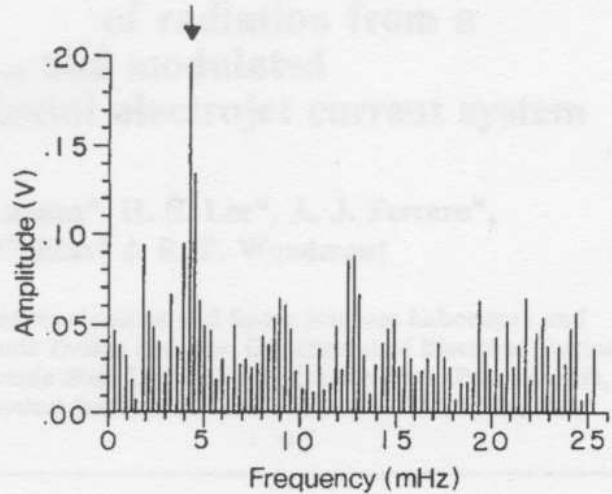


Fig. 1 Long-path amplitude spectrum, 2,500 Hz, Jicamarca, Peru to Salinas, Puerto Rico, 1600–1700 UT, September 1982.

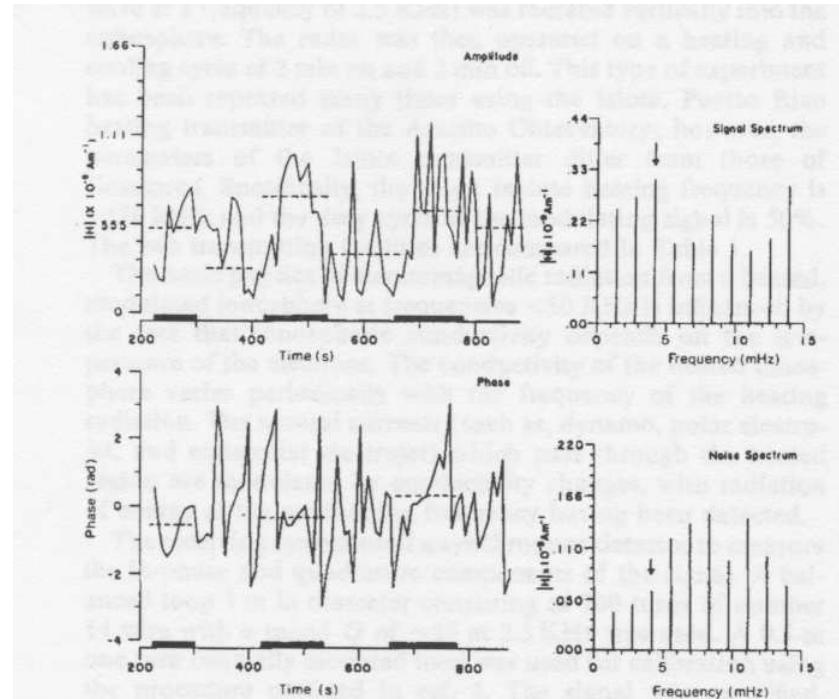
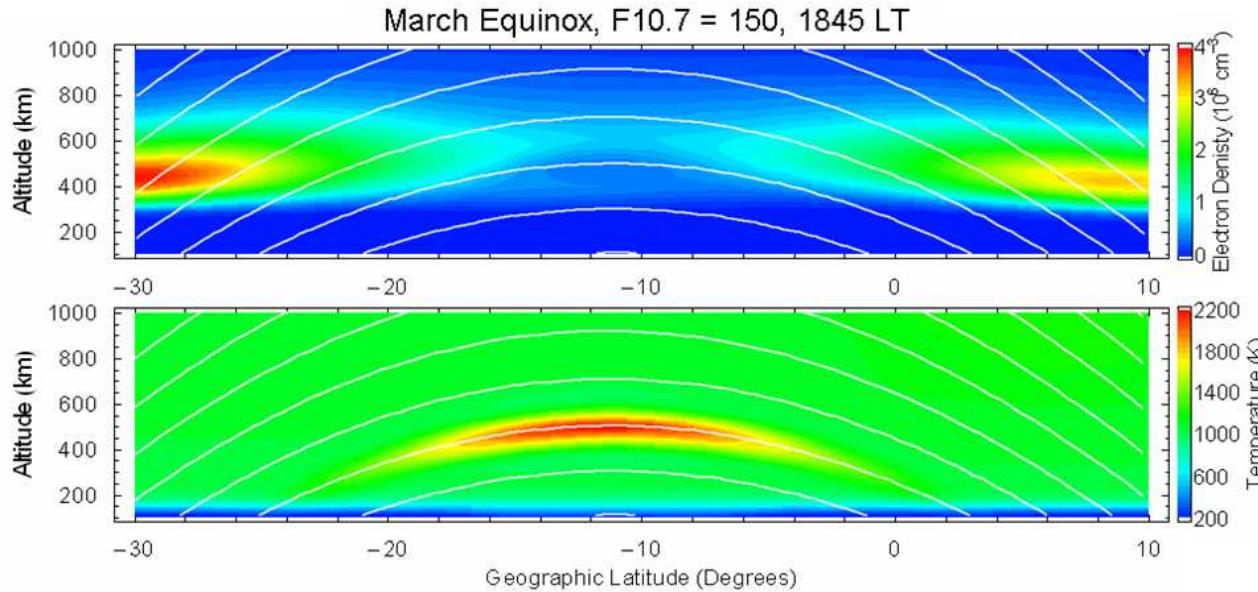


Fig. 3 Amplitude, phase and spectrum of a local Jicamarca, Peru signal at 2,500 Hz, 1345–1400 UT, 9 May 1983, compared with noise spectrum.

- Lunnen et al., *Nature*, 311(13), 134, 1984
- N. Lehtinen, URSI GA, Chicago, Aug. 11–16, 2008
- 2006 BAE Systems patent

Heated Field Line at 7.9 MHz (7.8 10⁵ cm⁻³) 283° Longitude Equatorial Ionosphere



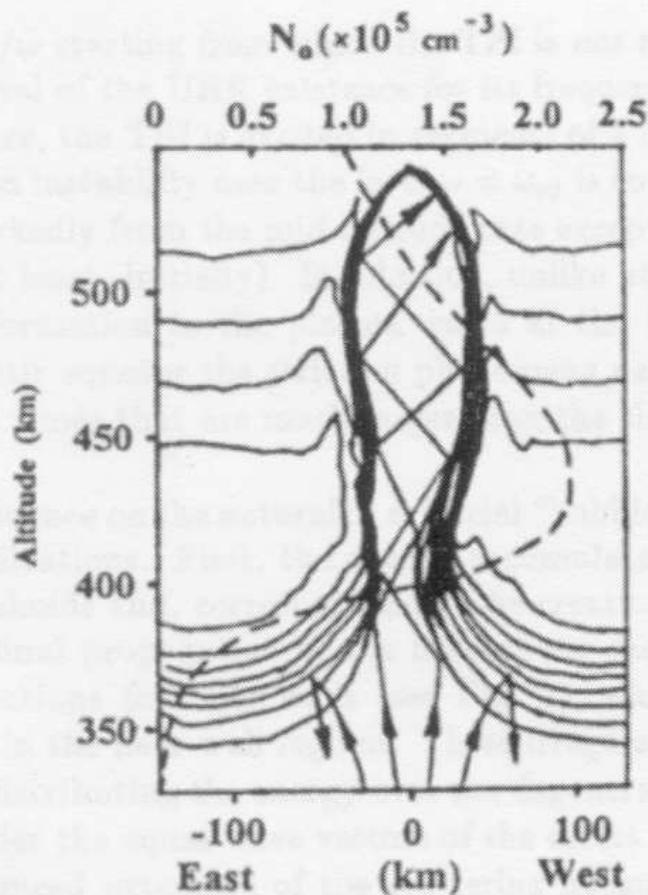


Fig. 2.

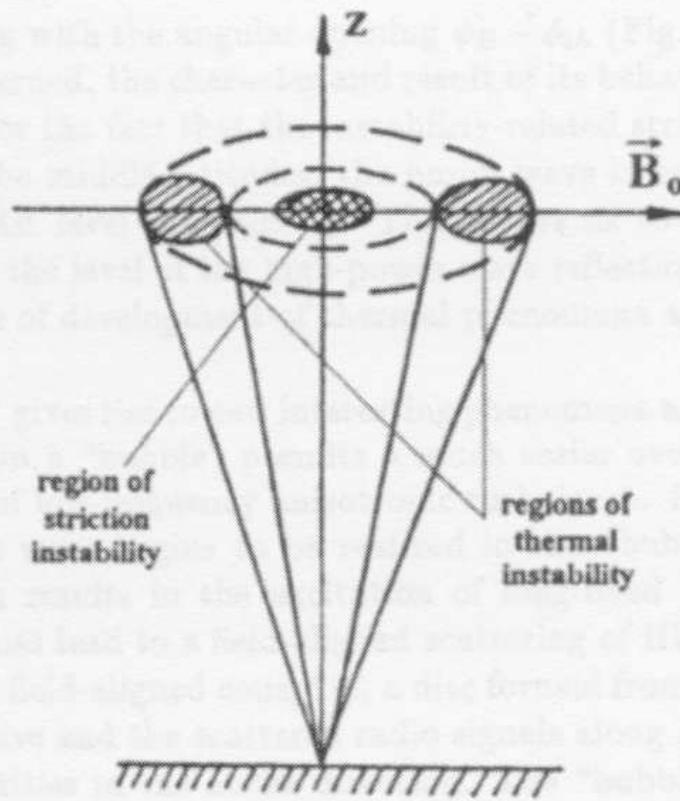
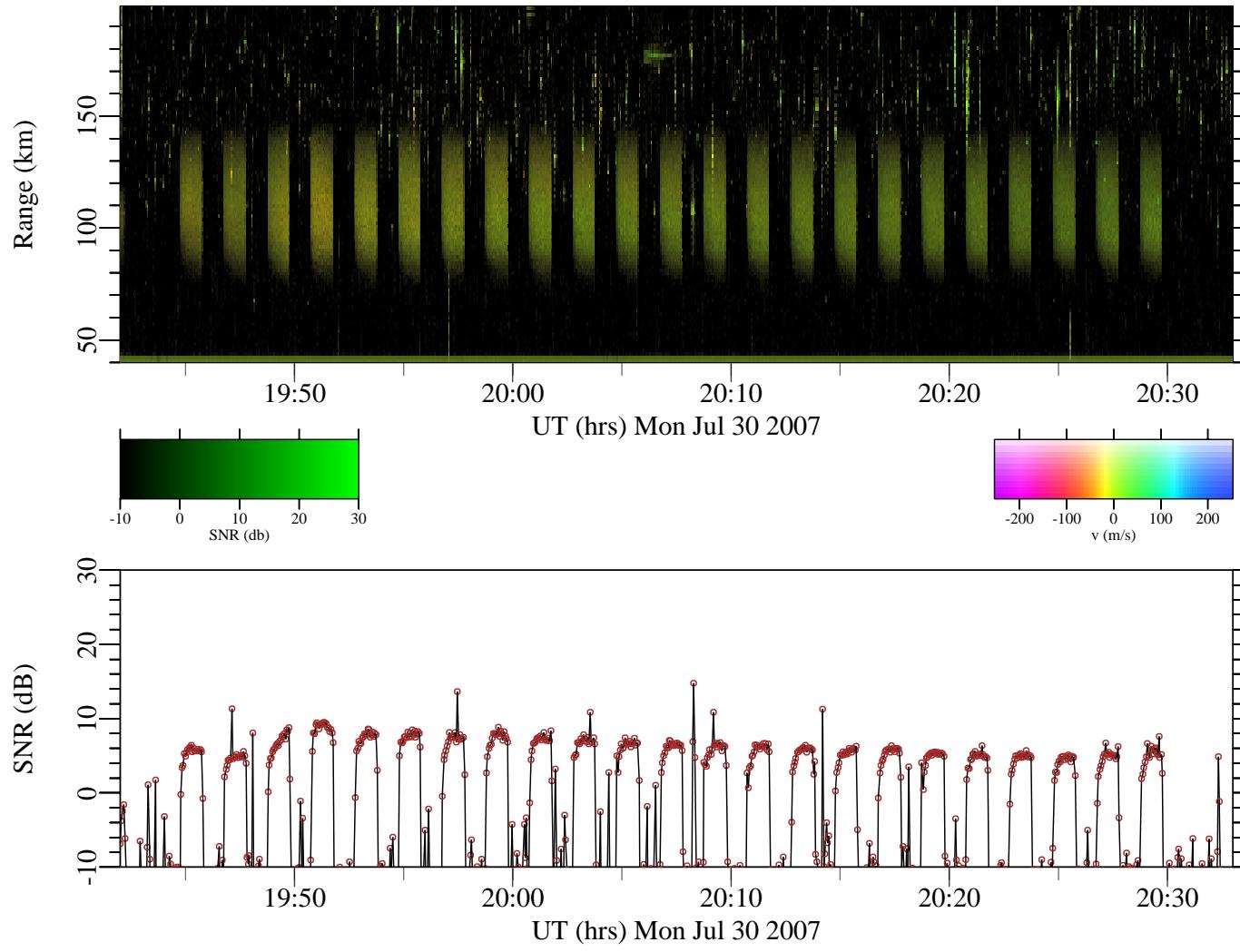
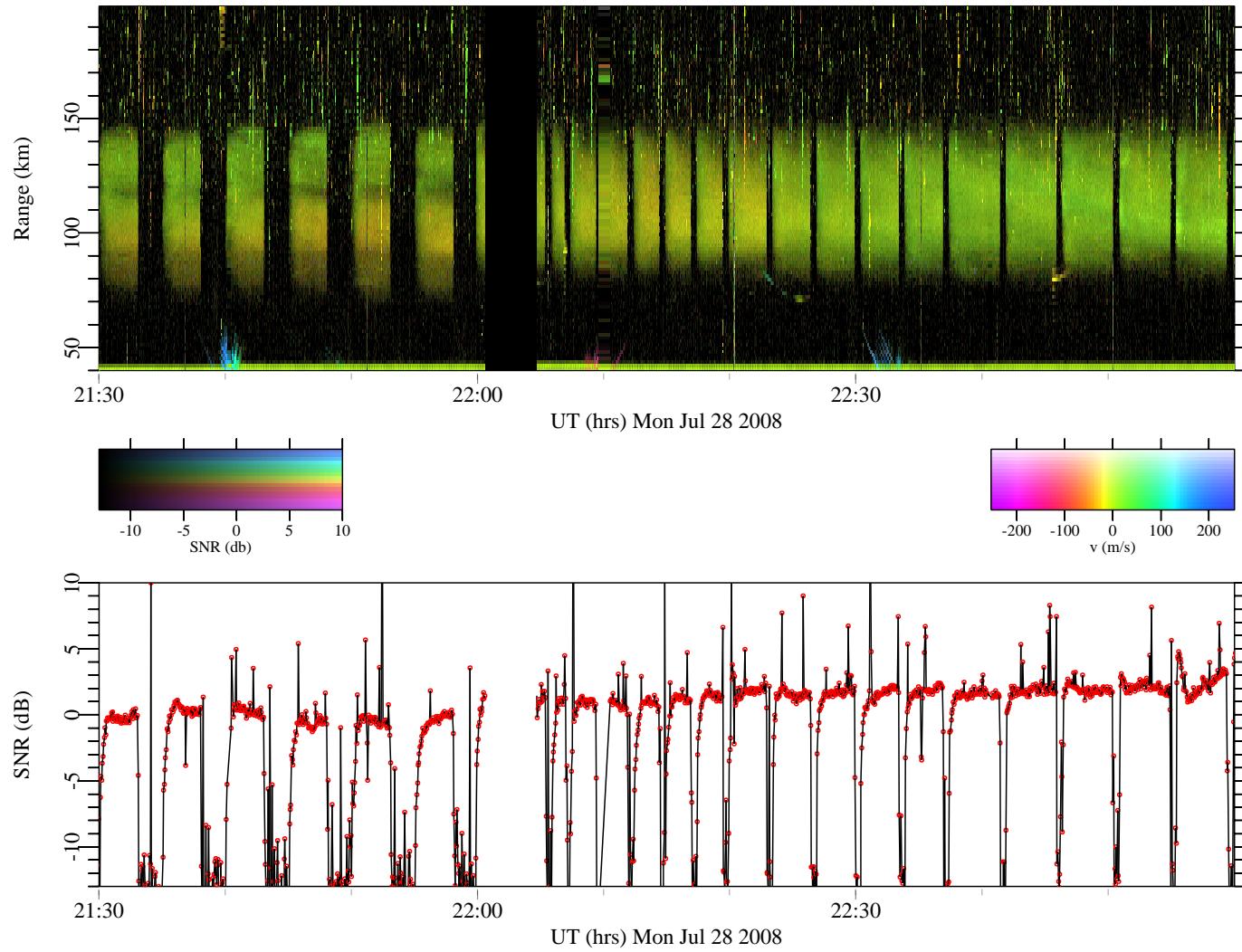


Fig. 3.

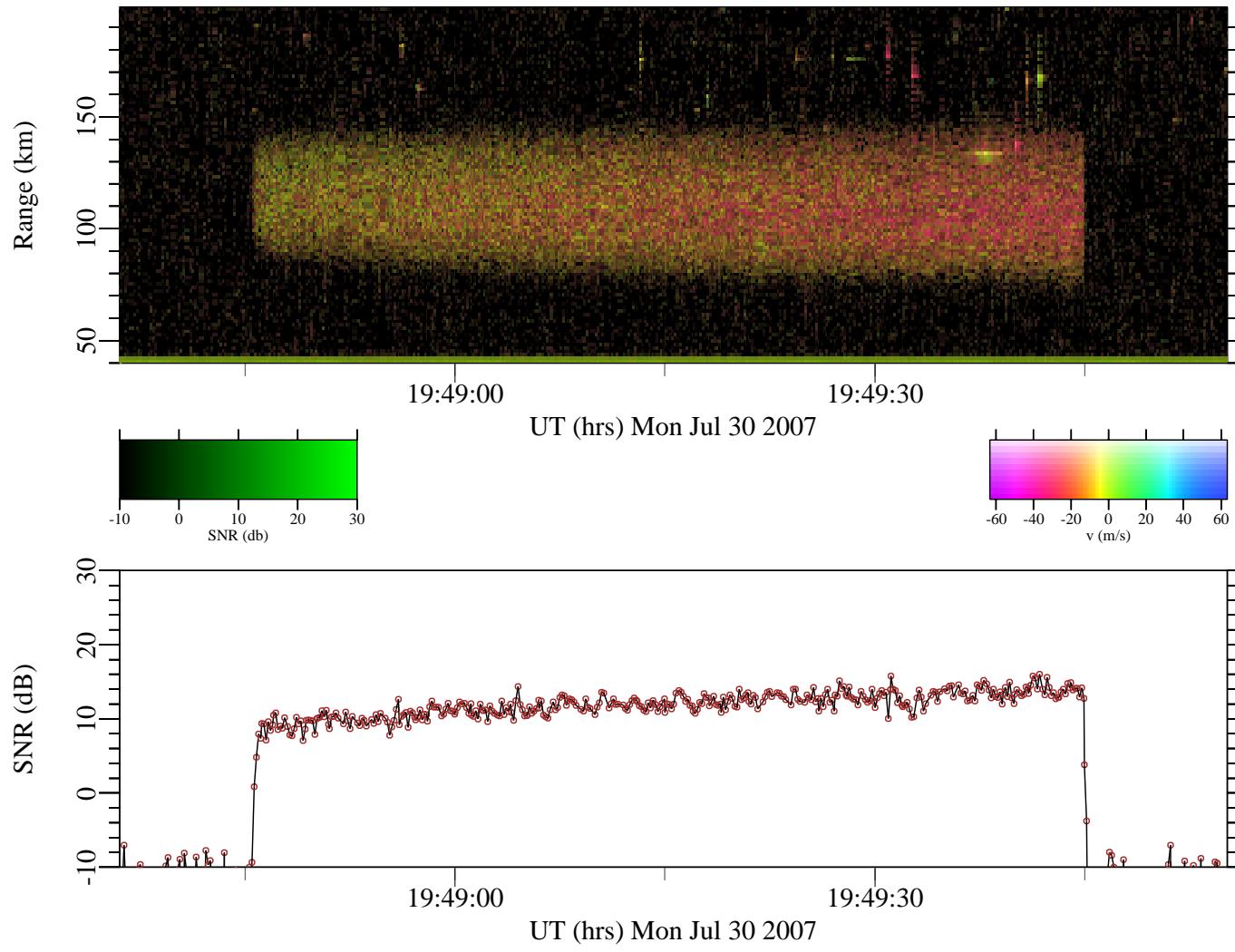
– L. Erukhimov et al., *Radiophys. Quant. Elect.*, 40 (1-2), 1997



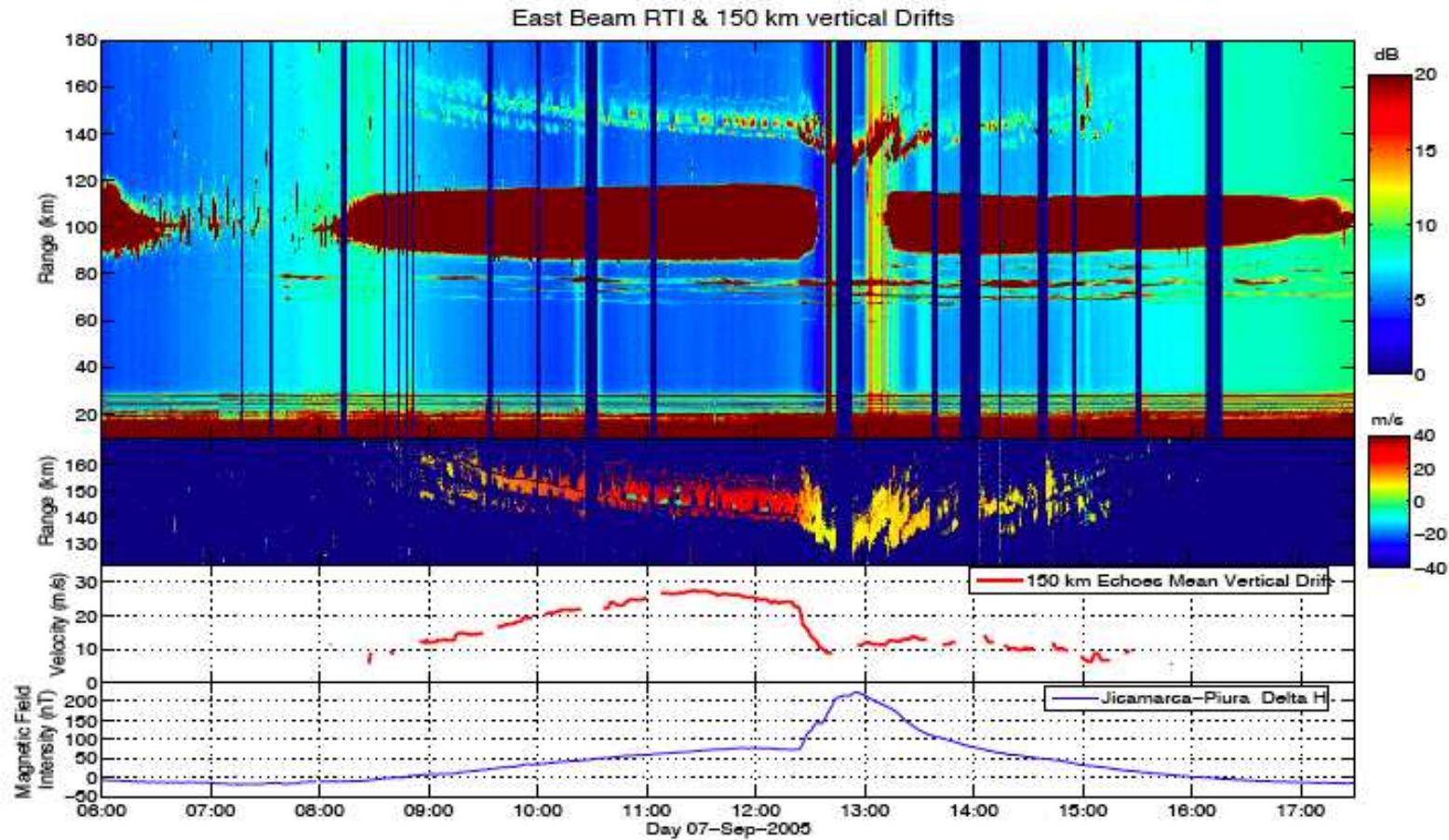
electrojet tpi



Homer radar



Langmuir turbulence



implementation

- use surplus OTH transmitters (10), feed lines
- duplicate HIPAS crossed dipole antennas (9) $2\Omega_e$, $3\Omega_e$
- construct exciter/ control hardware locally (FPGA/DDS units)
- likewise HF receivers (Echotek)
- power improvement and conditioning
- upgrade diagnostics (AMISR-7, SEE receivers, VLF receivers, optics, magnetometer, ionosonde, ...)

