MELISSA studies of equatorial spread-F irregularities

Gebreab K. Zewdie[1]

Fabiano S. Rodrigues [1] and Eurico R. de Paula[2]

1. UT Dallas   2. INPE, Brazil
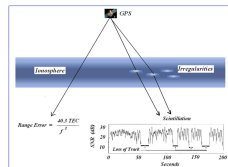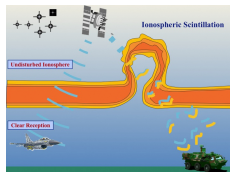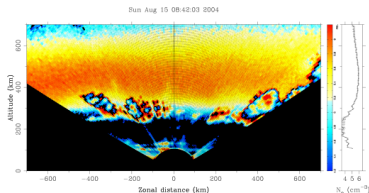
gkz130030@utdallas.edu

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- Develop software tools for spectral analyses
- Apply the software tools to new measurements made by MELISSA
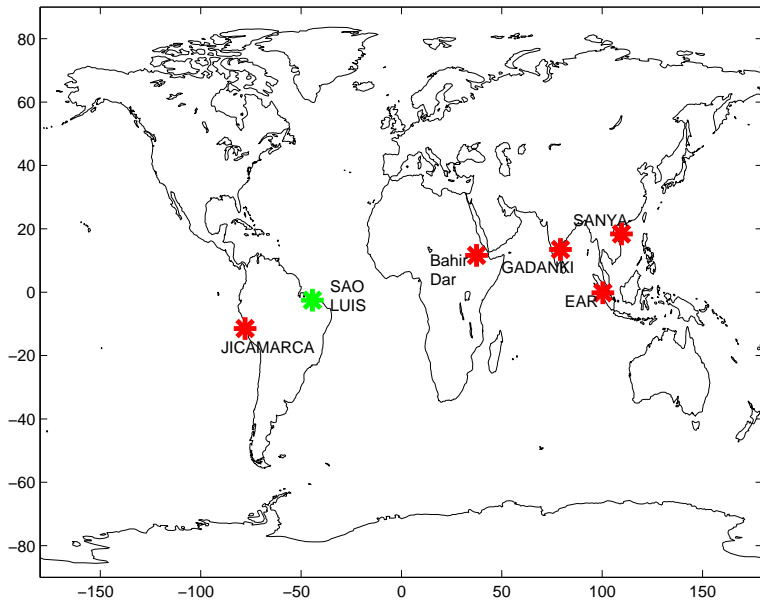
Outline

Equatorial Spread F

- Spread F irregularities are perturbations in the ionospheric electron density.
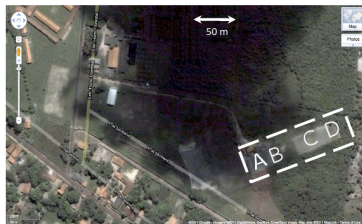- They adversely affect radio propagations.

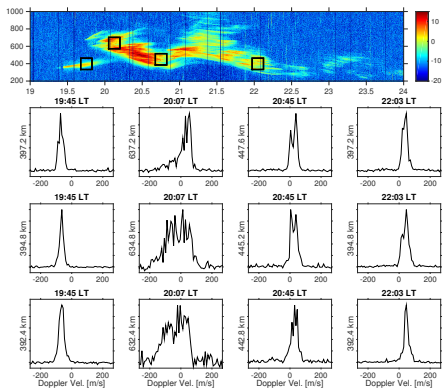Sources: Hysell et. al (2006), www.nasa.gov, www.cpi.com

Radar Observations

UTD / JRO /INPE

Radar Parameters

Summary of Radar parameters for the 2014 Observations

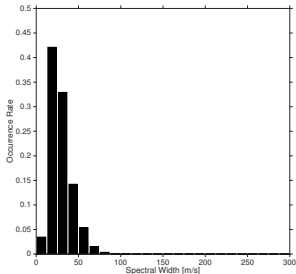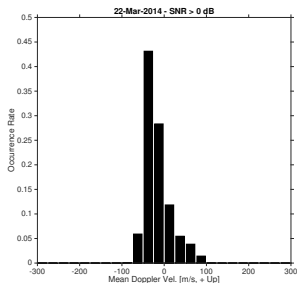| Parameter	Value
Radar Frequency	30MHz
Peak power	16kW
Lowest height sampled	90km
Highest height sampled	1222.8km
Baud length	2.4km
Number of FFT points	64
Number of FFT spectra averaged	25

Observations made by the MELISSA radar on March 22, 2014. The top panel shows the RTI map. The bottom panels show examples of spectra estimated.

Examples of Measurements
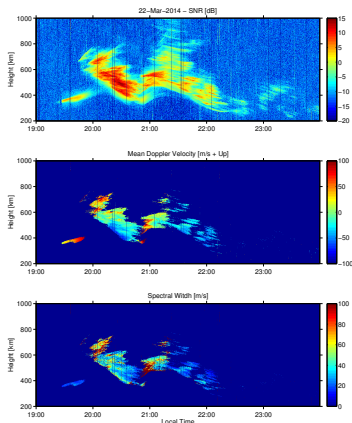
Examples of parameters derived using the MELISSA radar on March 22, 2014. SNR (top panel), vertical velocity (middle panel) and spectral width (bottom) panel.

Histograms of mean Doppler velocities (+ upward) and spectral widths estimated from the observations made by MELISSA on March 22, 2014.

Summary and Conclusion

- We implemented tools that calculate spectral parameters: Doppler velocity, spectral width, and power
- Doppler velocities fall within ±100m/s
- Spectral width values fall below 100m/s
- We have not yet observed supersonic velocities of Spread F irregularities commonly observed by Jicamarca [e.g. Hysell et al. (2004)].