

TWO-DIMENSIONAL UHF RADAR OBSERVATIONS OF EQUATORIAL SPREAD F EVENTS IN THE AMERICAN SECTOR

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Equatorial spread F (ESF) is the general name given to signatures of irregularities in the ionospheric electron density detected by different types of observational techniques at equatorial and low latitudes (e.g. ionosonde, radars, airglow imagers, etc.). It is understood that ESF irregularities are generated by plasma interchange instabilities with favorable growth rate conditions in the bottomside equatorial F-region around sunset hours. While much has been learned about ESF in the past few decades, we still seek a better understanding of the potential causes of ESF genesis and development into the topside ionosphere. A better characterization of the morphology and behavior of ESF structures can provide hints about the physical mechanisms controlling ESF.

The deployment of 14 panels of an Advanced Modular Incoherent Scatter Radar (AMISR) system at the Jicamarca Radio Observatory (JRO), located near the magnetic equator, provides a unique opportunity for investigations of the zonal variability of the scattering structures associated with ESF. The system operates at 430-450 MHz and has a peak power of 224 kW. The panels are distributed in a 7x2 rectangular pattern with the longest side in the meridional (North-South) direction.

In this presentation, we will provide a brief introduction to AMISR-14 and the description of an observing mode that takes advantage of its steering capability for measurements of the two-dimensional (2D) distribution of sub-meter ESF irregularities on the magnetic equatorial plane. We will also present examples of measurements made during a campaign of observations carried out during July-August 2016. During the campaign, we observed different types of ESF layers including events that occurred past local mid-night. The observations will be discussed in light of our current understanding of ESF.