# Multi-instrumented observations of June solstice *F*-region irregularities at Jicamarca

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It is well-known that ionospheric F-region irregularities are frequently observed at equatorial and low latitudes between sunset and midnight hours during equinoctial months. This is true for most longitudes, including the Peruvian sector. Recent radar studies, however, indicated a higher-than-expected occurrence of unusual F-region irregularities during June solstice, low solar flux conditions.

In order to obtain more information about June solstice irregularity events and the conditions leading to their development, we conducted a multi-instrumented campaign of F-region observations between July 11 and August 4, 2016 at the Jicamarca Radio Observatory. In addition to measurements with the low-power, coherent scatter mode of the Jicamarca radar (JULIA), ionospheric measurements made with a GPS-based TEC monitor, an airglow imager, and a digisonde were available to this investigation. Finally, we also made observations with a 14-panel version of the advanced modular incoherent scatter (AMISR) that has been deployed at Jicamarca. While AMISR-14 cannot provide incoherent scatter measurements, its digital steering capability allowed for zonal scans of the F-region and detection of irregularities causing coherent scatter echoes.

We were able to collect 20 full nights of AMISR-14 observations during the campaign. In several of these nights, measurements by the other sensors were also available. AMISR was able to detect relatively strong F-region echoes on 6 nights. The echoes occurred during pre- and post-midnight hours and, in most cases, were not associated with geomagnetic disturbances. Two-dimensional images of the scattering structures were produced with the AMISR measurements and used to investigate the genesis, evolution, and decay of June solstice events.

During this talk we will describe our setup for AMISR-14 observations of F-region irregularities. We will then present results of our efforts to create a two-dimensional (zonal distance versus height) description of the temporal evolution of the F-region scattering structures using AMISR measurements. Presentation of the results are followed by a discussion of the signatures of these events in other types of sensors, and the underlying ionospheric conditions prior to irregularity detection.