# NEUTRAL WIND AND TEMPERATURE MEASUREMENTS IN THE UPPER ATMOSPHERE AND IONOSPHERE IN THE BRAZILIAN AMAZON REGION

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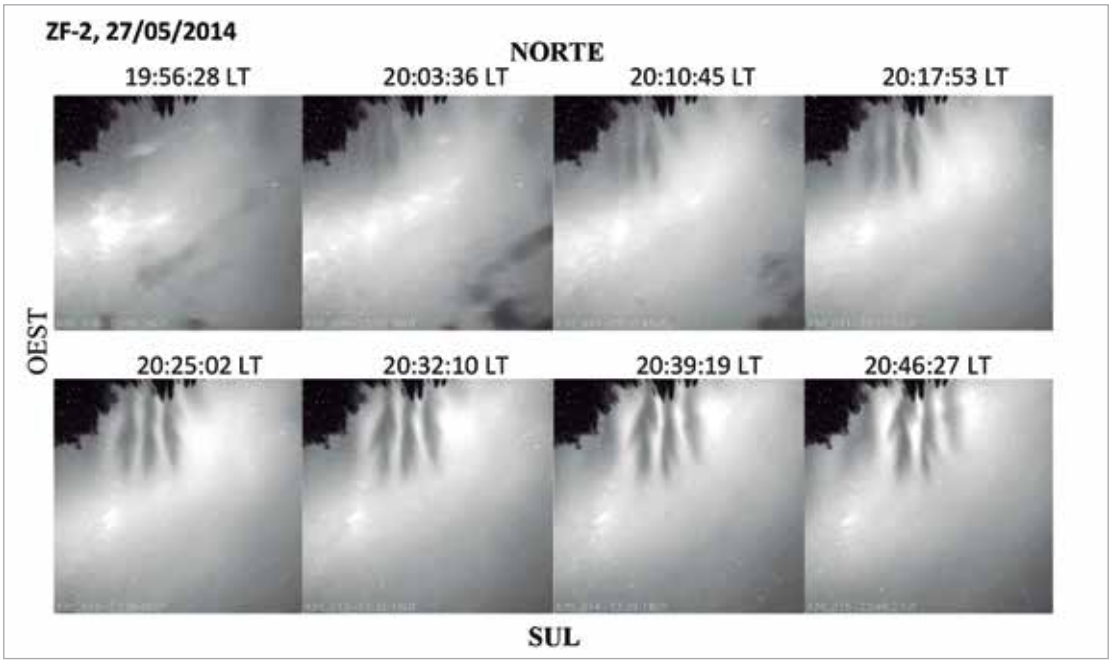
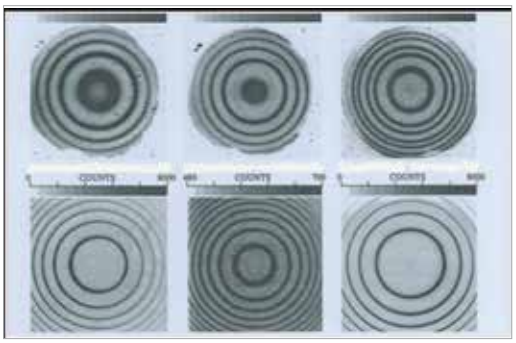


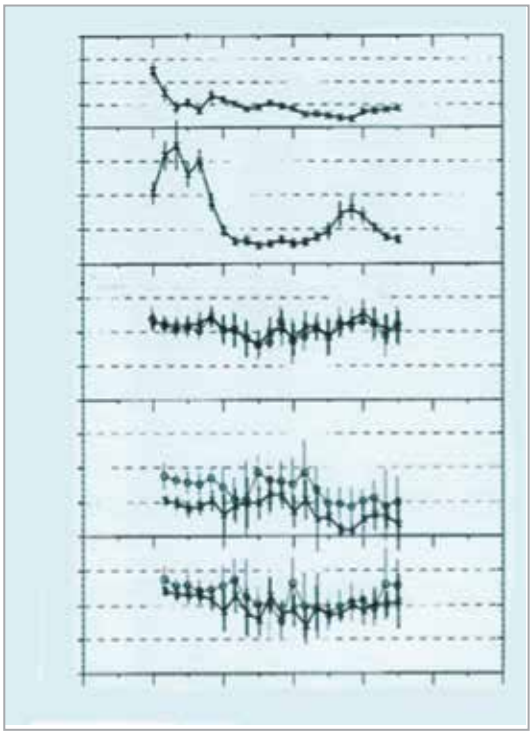

*Figure 1. Plasma bubble structure in the OI 630 nm airglow emission. Data were recorded from ZF-2 in the Amazon region, 27/05/2014*

The wind and temperature measurement in the upper atmosphere and ionosphere are important not only for a good understanding of the dynamics of the ionosphere, but also to their effects on the dynamics of neutral atmosphere. In addition, ionospheric wind and temperature are essential input parameters for modelling the tropical thermosphere and ionosphere. Observation of the OI 630 nm nightglow emission using the Fabry-Perot interferometer is an important tool to measure temperature and wind. We have developed a new three-channel Fabry-Perot (FPI) with three thermoelectric-cooled CCD detectors to measure neutral winds and temperature for wavelengths OI 630.0 nm (200-300km), 557.7 nm (96 km) and 839.9 nm (OH, 86 km) simultaneously with a time resolution of 20 min, using three cooled CCD detectors. The fringe drift that is due to changes in temperature of the etalon is monitored with a frequency-stabilized He-Ne laser. The system is fully automated and has been in operation since June 2014 at the ZF-2 Observatory in the Amazon region. It is fully automated and controlled by personal computers.

## SUMMARY OF RESULTS TO DATE AND PERSPECTIVES



Examples of the fringes on June 28, 2014. In the upward, from left to right, we have airglow emissions in the 630 nm, 557.7 nm and 839.9 nm respectively. The exposure times used to produce the airglow fringes were 16 min for all channels; those used for the laser fringes were 3 min for channels 1 and 2 and 5 for channels 3. For channels 1 (630.0 nm and 632.8 nm) and 2 (557.7 and 543.5 nm), upward is south and left is west; for channel 3 (839.9 and 840.0 nm), upward is south and right is west. In the bottom, we have the laser fringes.



Wind, temperature, and intensities of airglow and sky-background emissions by the Fabry-Perot interferometer for 630 nm airglow on June 28, 2014. Thick and thin curves correspond to the values obtained from the inner and the outer fringes, respectively. Error bars of the wind velocities indicate the average fitting error of the sinusoidal function; those of the temperature, intensity, and background indicate the standard deviations of the values for 16 azimuthal sectors.

## MAIN PUBLICATIONS


Pimenta AA, Amorim DC. An imaging Fabry-Perot interferometer for neutral wind and temperature measurements in the upper atmosphere. *Journal of Geophysical Research*. *Submitted*.

Amorim DCM, Pimenta AA, Almeida AA. 2012. Characterization of medium-scale traveling ionospheric disturbances in the Brazilian low latitude sector-statistical analysis of all-sky images of OI 630 nm airglow emission. *Revista Brasileira de Geofísica*. **30**: 129.

Fagundes PR, Bittencourt JA, de Abreu AJ, Moor LP, Muella MTAH, Sahai Y, Abalde JR, Pezzopane M, Sobral JHA, ABbdu MA, Pimenta AA, Amorim DCM. 2012. Atypical nighttime spread-F structure observed near the southern crest of the ionospheric equatorial ionization anomaly. *Journal of Geophysical Research*. **117**: 9-18.



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