Initiation of equatorial Spread F

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We present experimental evidence and modeling results which suggest that eastward thermospheric wind may be the primary controlling factor of equatorial spread-Finitiation in the post-sunset ionosphere. Eastward wind driven Pedersen currents should be able to polarize F-region density perturbations with westward tilting wavefronts into rapidly growing modes to trigger the formation of spread-F bubbles. The described process, which depends on differential motion between the neutrals and bottomside F-region plasma, can be so rapid that seeding requirements of spread-F initiation by external factors such as gravity waves may not be essential.

Equatorial spread F irregularity development conditions as diagnosed from conjugate point observations by digisondes and all-sky imagers in Brazil.

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A Conjugate Point Equatorial Experiment (COPEX) campaign was conducted during the October - December 2002 period in Brazil, with the objective to investigate the equatorial spread F/plasma bubble irregularity (ESF) generation and development conditions in terms of the electrodynamical state of the ambient ionosphere along the magnetic flux tubes in which they occur. A network of instruments including Digisondes, optical imagers, and GPS receivers, were deployed at magnetic conjugate and dip equatorial locations, in a geometry that permitted field line mapping of the conjugate E layers to dip equatorial F layer bottom side. This paper address ESF/ plasma bubble initiation by large scale wave structures, and discusses the competing influences of the evening vertical plasma drift in favoring the ESF development versus that of the trans-equatorial winds in suppressing its growth. A perspective on the causes of the ESF day-to-day variability is also presented.

On the role of large-scale wave structure in the initiation of equatorial plasma bubbles

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