Seasonal study of E-region electric fields at the dip equator estimated from 50 MHz radar observations

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Electric fields have been estimate at E region heights based on coherent backscatter echoes from the equatorial electrojet obtained with the RESCO radar in 2002. The technique of estimating electric fields used by [Balsley, 1969] based in determining Doppler velocity from radar echoes type 2 at low elevation angles was adapted for use at the 50 MHz radar installed at São Luís (2.3 S, 44.2 W, dip: ˜ -0.5), Brazil. RESCO radar uses a 7 degree beam width at an elevation angle of 60 degree for equatorial electrojet sounding. This relatively narrow beam allows us to deduce the altitude of the scatter directly from the range. Therefore, we measure the drift profile of the electrojet, which is used as basis for zonal electric fields estimates. Curve fitting techniques was used to estimate type 2 Doppler shifts from echoes power spectra. This method was chosen due to the presence of the superimposed type 1 Doppler shift around local midday. A magnetic field aligned integrated conductivity model was used to calculate Pedersen and Hall conductivities at E region heights [Denardini, 2005]. Electron density used in this conductivity model is based in the IRI model corrected by electron densities obtained from digisonde measured of the daytime equatorial E-layer (foE) over three locations that constituted a conjugated points station pair: Campo Grande in south (20.45 S, 54.65 W, dip: -22.5) and Boa Vista in north (2.8 N, 60.66 W, dip: 22.5), and an equatorial station, Cachimbo (9.47 S, 54.83 W, dip: -3.9). Our results are presented and discussed in terms of the South hemisphere seasons and are comparable to previous ones obtained for different longitudinal sector, such as by [Reddy et al., 1987], who have used the same approach for estimating electric field despite the different method for estimating the Doppler velocities from the radar echoes.

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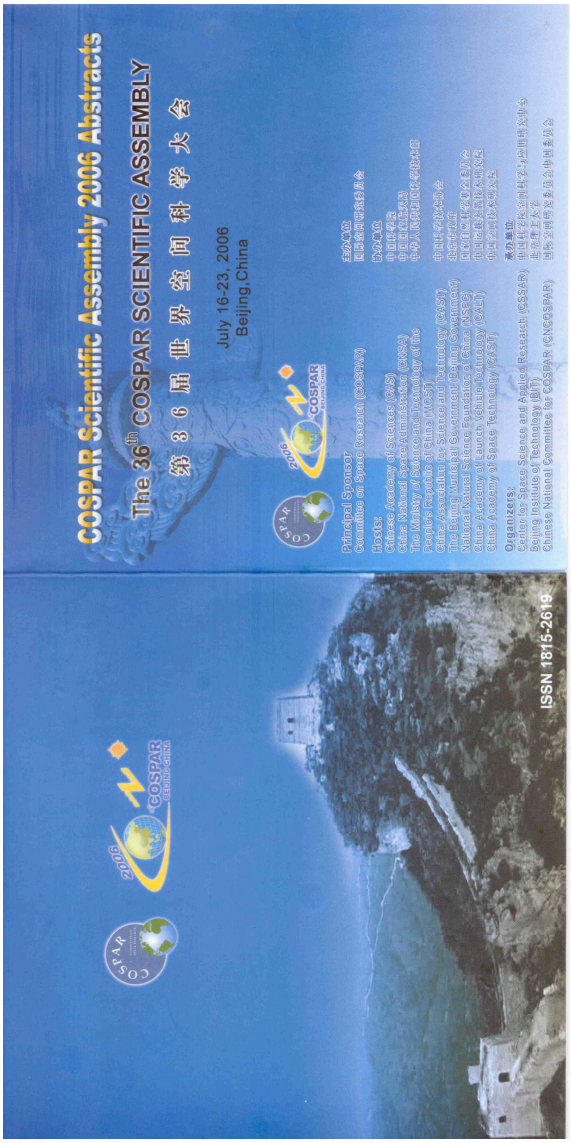

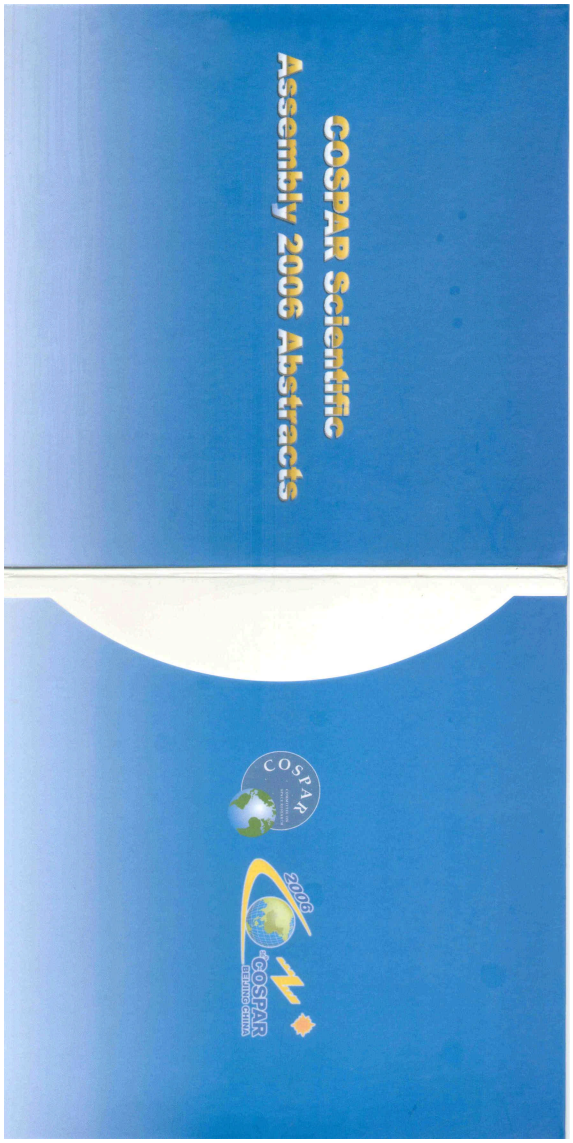

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Variations of the ionospheric peak electron density over Wuhan

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TEC, L-band scintillation and zonal plasma drifts measured by the Brazilian GPS receiver network

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Scintillation zonal drifts inferred at equatorial and low-latitude magnetic conjugate regions

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Muella, MTAH ; Fagundes, P.R.; Bittencourt, J.A.; Sahai, Y.; Lima, W.L.C; Becker-Guedes, F.; Pillat, V.G.
Nighttime thermospheric meridional winds inferred from ionospheric h´F and hpF2 data

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Fagundes, P.R.; **Muella, MTAH** ; Bittencourt , J.A.; Sahai , Y.; Lima, W.L.C; Becker-Guedes , F.; Pillat , V.G.
Nighttime thermospheric-ionospheric coupling during geomagnetic storms

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Aranha, S.L.; **Fagundes, P.R.**; Pillat, V.G.; Bolzan, M.J.A; Sahai, Y.; Becker-Guedes, F.
Observations of F-layer electron density profiles modulated by planetary wave type oscillations in the equatorial and low latitude regions

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Buresova, D.; **Lastovicka, J.**
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Statistical analysis of the F3 layer using the SEALION ionosonde network

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The occurrence of total solar eclipse on October 3, 2005 in TEC over Europe

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Verification of thermospheric-ionospheric coupling scenario using analysis of ionospheric storm effects in Irkutsk

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Denardini, C. M.; Abdu, M. A.; Sobral, J. H.; Wrasse, C. M.
Seasonal study of E-region electric fields at the Brazilian dip equator estimated from 50 MHz radar observations

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Morphology in the total electron content during the magnetic storms derived from global ionosphere maps

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Sen, S.
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Gyro line observations at Arecibo (**cancelled**)

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