

F-REGION PARAMETERS OBSERVED IN THE EQUATORIAL AND LOW LATITUDE REGIONS IN THE BRAZILIAN SECTOR AND ITS COMPARISON WITH THE IRI-2007 MODEL RESULTS

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The ionospheric sounding observations using the Canadian Advanced Digital Ionosondes (CADIs) operational at Palmas (PAL; 10.2° S, 48.2° W; dip latitude 6.6° S; a near-equatorial station), and São José dos Campos (SJC, 23.2° S, 45.9° W; dip latitude 17.6° S; a low-latitude station located under the southern crest of the equatorial ionospheric anomaly), Brazil, are analyzed during the different seasons viz., winter (June and July 2003), spring (September and October 2003), summer (December 2003 and January 2004), and, fall (March and April 2004). The period used has medium solar activity. The seasonal mean (using only geomagnetically quiet days) variations of the parameters foF2 (critical frequency of the F-region), hpF2 (virtual height at 0.834 foF2; considered to be close to hmF2 (peak height of the F-region)), and h'F (minimum virtual height of the F-region) are calculated and compared between PAL and SJC. The prominent differences between PAL and SJC are as follows: h'F variations show strong post-sunset enhancement at PAL during the seasons of spring, summer, and fall; hpF2 variations show pre-sunrise uplifting of the F-layer at both stations during all the seasons and the hpF2 values during the daytime are lower at SJC compared with PAL during all the seasons; the foF2 variations show mid-day bite-out at PAL during all the seasons and SJC shows strong equatorial ionospheric anomaly during summer and fall seasons. Also, the seasonal variations of the ionospheric parameters foF2 and hpF2 (with ± 1 standard deviation) observed at PAL and SJC are compared with the IRI-2007 model results of foF2 and hmF2. It should be pointed out that the ionospheric parameter hpF2 is much easier to obtain compared with hmF2 (derived using POLAN). However, during the daytime due to underlying ionization hpF2 estimated is higher (approximately 50 km) than the true peak height hmF2. During the nighttime hpF2 \approx hmF2. The comparison between the foF2 variations observed at PAL and SJC with the IRI-2007 model results shows a fairly good agreement during all the seasons. However, the comparison between the hpF2 variations observed at PAL and SJC with the hmF2 variations from the IRI-2007 model results shows: 1) a fairly good agreement during the nighttime during all the seasons; 2) the model results do not show the pre-sunrise uplifting of the F-layer at PAL and SJC in any season; 3) the model results do not show the post-sunset uplifting of the F-layer at PAL; 4) considering that, in general, hpF2 is higher than hmF2 during the daytime by about 50 km, the model results are in good agreement at PAL and SJC during all the seasons except summer at SJC, when large discrepancies in the observed hpF2 and modeled hmF2 are observed.

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