



Bottomside spread F and topside bubble in the equatorial ionosphere during solar maximum using digisonde and ROCSAT-1

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Data from the Jicamarca digisonde and the ROCSAT-1 satellite are employed to study the equatorial ionosphere on the west side of South America during April 1999-March 2000 for the concurrent bottomside spread F (BSSF) and plasma bubble events. This study concurrently using digisonde and ROCSAT-1 is the first attempt to investigate the equatorial spread F. Results show that BSSF and bubble appear frequently respectively in the summer (January, February, November, and December) and in the equinoctial (March, April, September, and October) months, but are both rarely observed in the winter (May-August) months. The upward drift velocity during the concurrent BSSF and bubble observations has been determined to study the driving mechanism. This analysis shows that large vertical drift velocities favor BSSF and bubble formations in the equinoctial and summer months. Conversely, the smaller upward velocities during the winter months cause fewer BSSF and bubble occurrences. For the geomagnetic effect, the BSSF/bubble occurrence decreases with increasing Kp value in the equinoctial months, but no such correlation is found for the summer and winter months. Moreover, the anti-correlations between Kp and $dh'F/dt$ are apparent in the equinoctial months, but not in the summer and winter months. These results indicate that in the equinoctial months the BSSF/bubble generations and the pre-reversal drift velocity can be suppressed by geomagnetic activity, because the disturbance dynamo effects could have decreased the eastward electric field near sunset. However, BSSF and bubble occurrences may not be suppressed by the geomagnetic activity in the

summer and winter months.