



Studying distinct features of the Weddell Sea Anomaly using altimeter TEC data

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The Weddell Sea Anomaly (WSA) is a unique phenomenon in terms of intensity and geographic extent that occurs in December (Southern Hemisphere summer) over the region encompassing the southeast Pacific and southwest Atlantic. The classical definition of WSA refers to the situation where the Total Electron Content (TEC) at midnight is greater than the TEC at noon. However, several studies published in the last decades have shown that the WSA is a much more complex phenomenon, and that its definition might need to be revised [1, 2]. The present work analyzes the different features of the WSA as they appear in the ULIC Global Ionospheric Maps (GIMs) [3], which are obtained by processing TEC measurements from altimeter satellites using an innovative technique. Of particular interest are the results obtained with the Local Time-Latitude cross-sections, which show that the Equatorial Ionisation Anomaly (EIA) has unexpected expansion and contraction periods all over the Southern Hemisphere. Analysis of the daily median TEC patterns confirms these results and suggests that the WSA could be the result of a combination of three effects that characterize the spatial extent of the EIA along the day: a morning expansion, a noon contraction and a second expansion in the evening. Furthermore, examination of the regions away from the WSA leads us to suggest that the WSA may be only the most prominent among a series of anomalous features. Finally, we present results indicating the possible involvement of the Y component of the geomagnetic field in the formation mechanism of the WSA, and we elaborate a hypothesis to account for this finding.

References

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