Regional optimization of IRI-2012 output (TEC, foF2) using derived GPS-TEC

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Accurate measurement and determination of the state of ionosphere has become a key point as ground-based communication systems become more space dependent. However, due to a limited infrastructure a number of global models have been developed with extensive interpolation techniques to comprehensively describe ionospheric dynamics. As a result, most global models don't perform adequately in regions with a paucity of ionospheric measurements. In this paper, the most recent International Reference Ionosphere (IRI-2012) model output, Total Electron Content (TEC) and F2 layer critical frequency (foF2), are optimized (over a range of 120° E - 150° E and 20° N - 50° N, in longitude and latitude respectively). To obtain the optimal solution two input parameters, 12-month running mean Sun Spot Number (R12) and ionospheric index (IG12), are adjusted in relation to derived Global Positioning System (GPS) vertical TEC (VTEC). The results are compared to measured TEC and foF2 from GPS receivers and ionosondes respectively. The analysis shows that the modified IRI-2012 model is more accurate at estimating both TEC and foF2 values than the original model during geomagnetic quiet and disturbed days.