

Effects of Sudden Stratosphere Warming on the ionosphere

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Effect of the large sudden stratospheric warming which occurred in January 2009 on the ionosphere is studied by using COSMIC ionosphere data. The SSW2009 is unique because stratosphere warming occurs in two longitude regions; 1. Longitude zone ranging from 30E to 30W(30EW), and 2. Longitude zone ranging from 150 E to 150W(150EW), and the highest increase of the temperature among the recent winters.

The temperature increased steeply from 215 K on the 19 January, 2009, peaked on 23 rd January, and then gradually reduced. While the temperature increase at 10 hpa shows the maximum in the longitude zone of 30EW during the period 19-30 January, very similar pattern of SSW feature is seen in 150EW which is opposite side of 30 EW. The effect of SSW on the NmF2 (maximum electron density) is recognized even before the temperature steep increase at 10 hpa. During SSW, reduction of temperature in low latitude appears, and , NmF2 reduces shows the minimum when temperature shows the minimum except midlatitude. Minimum of electron density shifts to late local time after 09-12 Local time. In midlatitude variation of temperature is not recognized, and reduction of NmF2 is not recognized or small. Similar latitudinal and local time feature of the ionosphere is recognized in all latitude zone, not only in 30 EW as well as 150E band.

The largest effect is found in low latitude in the afternoon. Variation of ionosphere (GIM TEC, COSMIC TEC, nmF2 by COSMIC) changes in phase in all latitude zone s well as in local time. GIM TEC is less sensitive to SSW, which suggests the more interaction in lower part of the ionosphere. A big jump of NmF2 in the local time zone 06-09 is found in 14 and 36 DOY both in 30 EW, and in 150 EW, but not in another longitude zones, which seem to be produced by SSW effect. The study is also extended to southern hemisphere.

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