



Latitudinal and seasonal variations of the temperature response to solar activity inferred from rocket soundings of the middle atmosphere (30-75 km)

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At present there is a great interest to investigations of the solar-terrestrial relations in the middle atmosphere. In comparison with the thermosphere, in this atmospheric region the response to solar activity (F10.7) was expected to be small and was left out of account in the current reference atmospheric models. In the present work such a response is investigated for temperatures at the heights 30-75 km. The research database was obtained from rocket soundings at the Thumba (8.5N, 76.8E), Volgograd (48.7N, 44.3E), and Heiss Island (80.6N, 58E) stations, carried out from 1964 to 1994. On their base the responses of the average monthly temperatures and characteristics of the first three harmonics of the temperature seasonal variations to solar activity were inferred. An analysis of the latitudinal variations of these responses is presented. It shows that the response of the mean annual temperature has the largest positive values (6-7 K/100 sfu, where sfu is the solar flux unit) at the altitudes 60-75 km in the equatorial region and at the altitudes higher than 65 km in the polar region. The largest negative values of this response (about -3 K/100 sfu) are seen at altitudes of 30-45 km in all latitudinal regions. The comparison of the obtained responses with the published model expectations is discussed. This work is supported by Russian foundation for basic researches, grant 08-05-00504.