

DAILY VARIATIONS OF ION AND ELECTRON TEMPERATURES BY SGM TiTe MODEL

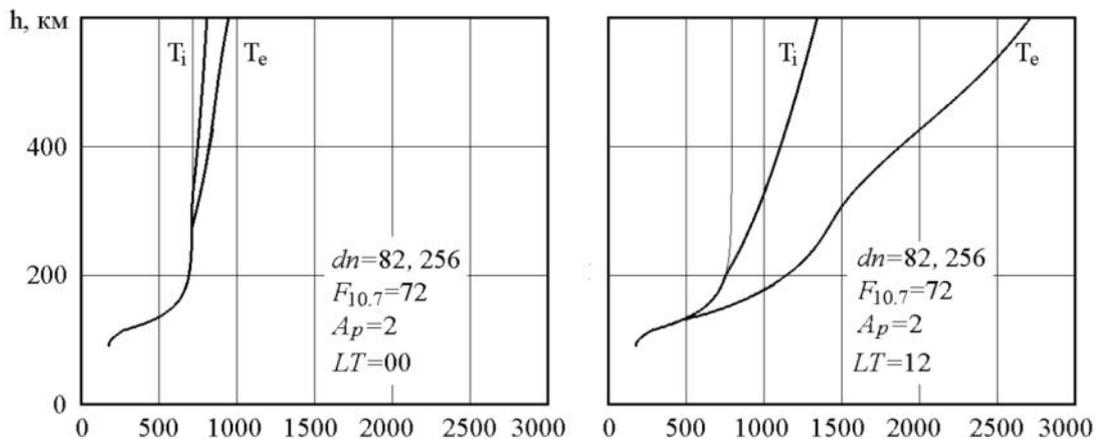
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The SGM TiTe model (Simple Global Model of Ion and Electron Temperatures) is being developed by the authors of this abstract [1].

A number of empirical models of ion and electron temperatures currently exist. However even a general overview of altitude temperature profiles, their daily and seasonal variations show the insufficient adequacy of these models.

The presented figure shows the altitude profiles of ion and electron temperatures at midnight and noon of the vernal and autumnal equinoxes.



Minimum daily values are observed at night. Maximum temperatures of ions and electrons are observed at midday. On winter solstice, with the solar activity index $F_{10.7} = 72$ and the magnetic activity index $A_p = 2$, the night values of the ion temperature at an altitude of 600 km are respectively 710 K and 781 K, and the daytime values are 1281 K and 2469 K. On the days of the vernal and autumnal equinoxes the night values of ion and electron temperatures are 810 K and 972 K, and the daytime temperatures of ions and electrons are 1345 K and 2730 K. On winter solstice the night values are 1268 K and 1598 K, and the daytime values are 1355 K and 2862 K.

The altitude profile of electron temperature is characterized by inversion at altitudes near the main maximum of electron density. On the days of the equinoxes the altitude of inversion of the depicted profile of electron temperature is equal to 343 km. At midday on winter solstice the inversion altitude is 341 km, at midday on summer solstice – 345 km.

References:

1. Sergii V Grinchenko, Valerii A Pulyayev. Comparison of ion and electron temperatures, calculated by CERIM and SGM TiTe models // Information Technology: Science, Engineering, Technology, Education, Health. XXIX International Scientific-practical Conference "MicroCAD-2023". Abstracts. Kharkiv, Ukraine, May 17-20, 2023. Kharkiv. 2023. 1406 p. P. 1250.