

LONG-TERM TRENDS IN THE UPPER ATMOSPHERE – RECENT PROGRESS

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Lastovicka et al. (2006, Science 314, 1253-1254) constructed for the first time a scenario of global pattern of observed global change in the upper atmosphere (mesosphere, thermosphere, ionosphere). It demonstrates that anthropogenic emissions of greenhouse gases influence the atmosphere at nearly all altitudes between ground and space. However, there were three areas, characterized by key words F2 region, MLT (mesosphere and lower thermosphere) dynamics, MLT water vapour, which did not fit yet the above scenario. Moreover, there are also other drivers which to some extent affect long-term trends in the upper atmosphere, namely stratospheric ozone depletion, water vapour concentration changes, long-term trend in geomagnetic activity, and secular changes of the Earth's magnetic field. Recent progress with emphasis to the above topics will be presented. According to recent model calculations and observational analyses, F2 region parameters foF2 and hmF2 could be at present dominantly controlled by geomagnetic activity and increasing greenhouse gases, respectively, which removes part of contradictions. Relatively little progress has been reached in mesospheric dynamics; new data on trends in planetary wave activity remain controversial but indications of positive trend in the MLT region turbulence, which is thought to be produced by gravity wave dissipation, have been reported. As for mesospheric water vapour, there are some indications that after considering different latitudes and period of satellite and ground-based NLC observations the difference between trends deduced from ground- and satellite-based data is reduced and remains within limits given by the accuracy of observations.

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