



Statistical properties of three-dimensional ozone and temperature fields based on CRISTA data

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The analysis of the data obtained from ASTRO-SPAS satellite during CRISTA-1 and CRISTA-2 experiments was carried out. The purpose of the work was the study of dynamics of the atmosphere, especially the spatial-temporal characteristics of different scale processes in ozonosphere. By the use of software developed in Central aerological observatory the statistical properties of three-dimensional ozone and temperature fields were investigated. Special attention was devoted to dynamics of small and middle-scale structures. Fields of ozone mixing ratio maximum value and altitude as well as fields of temperature and altitude of stratopause were plotted. The presence of small scale structures was detected. The unzonality of temperature and ozone vertical distribution parameters during second mission was investigated. During CRISTA-2 mission the unzonality of ozone mixing ratio maximum value and altitude at extra tropical latitudes of Southern hemisphere was more than 10%, and in circumpolar area reached 27% for ozone mixing ratio maximum value and 60% for ozone mixing ratio maximum altitude. The comparison of unzonality in the fields of stratopause temperature and ozone mixing ratio maximum altitude with global distribution of potential vorticity at the height of 30 km during CRISTA-2 mission was performed. In Southern hemisphere the areas of “cold stratopause” were well corresponded with areas of low potential vorticity. The area of low values of ozone mixing ratio maximum altitude was almost coincided with area of maximum values of potential vorticity. The correlation coefficient between temperature and ozone mixing ratio maximum altitude standard deviations was studied. It was brought out that during CRISTA-2 period in Southern hemisphere the correlation coefficient was positive and reached 88%. The phenomenon of crevasse in ozone mixing ratio maximum profiles (two-modality) was investigated. The presence of two-modal profiles was detected (1.2%

during CRISTA-1 mission and 1.5% during CRISTA-2). By the use of balloon sounding of the atmosphere such profiles were found very seldom (8 from 19 567 of the world balloon sounding network archive). The geographical distribution of two-modal profiles was investigated. During second mission most of the profiles were located in extra-tropical latitudes of Southern hemisphere. During CRISTA-1 period the distribution of profiles was much more even with a crevasse in the South polar area and outlier in the North. The altitude distribution of two-modal profiles minimums was studied. For both missions it was two-modal. The geographical distribution of the altitude for the first mission was quazyoccasional, for the second mission it was strongly ordered in meridional direction. The possibility of the permeation of two-modal profiles in the area of polar night by means of inter latitude transfer was investigated. For this purpose special method based on pressure and temperature satellite data was proposed. It was found out that the explanation of crevasse-effect in the area of polar night based on inter latitude transfer seemed to be hardly probable. We'd like to make a special acknowledgement to prof. D. Offermann from the University of Wuppertal for the data and cooperation. The work was performed with a partly support of Grant RFBR No 03-05-64790.