



Investigation of the structure and stability of the lower atmosphere by microwave ground-based sensing over Nizhniy Novgorod, Russia during abnormally warm winter 2013 – 2014

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The monitoring of the lower atmosphere structure and stability is required for studying the processes of the convection in the atmosphere, determining the mutual influence of global climate change trends and the current state of regional climate systems, which have an impact on the appearance of dangerous meteorological events (heavy rains, thunderstorms, hail, floods, squalls, tornadoes, etc).

There are many methods of measuring structure of the atmosphere: contact (rocket and balloon), contactless - active (lidar) and passive (radiometric), with the placement of the instrumentation on the satellite, airplanes and the Earth's surface (ground-based). For the convection processes study in order to predict dangerous meteorological events the ground-based radiometric sensing of the structure of the lower atmosphere seems to be the most suitable due to higher time and spatial resolution.

This report discusses the peculiarities of the structure of the lower atmosphere over Nizhniy Novgorod, Russia during the abnormally warm winter 2013 – 2014 retrieved from measurements by radiometric complex HATPRO-G3 by Radiometer Physics GmbH. This complex gives vertical thermal and water vapor profiles of the lower atmosphere (0 - 10 km) with time resolution of a few minutes, horizontally resolution of about 10 kilometers and vertically resolution of about 100 meters. The analysis of the structure and stability of the lower atmosphere is based on the vertical distribution of virtual potential temperature derived from these measurements under the hydrostatic approximation. Also the comparison of the results for the abnormally winter 2013 – 2014 and the data computed from the Weather Research and Forecasting (WRF) Model (<http://www.wrf-model.org>) for winter 2011 – 2012 is discussed.