EMS Annual Meeting Abstracts
Vol. 11, EMS2014-299, 2014
14th EMS / 10th ECAC

Observation of aerosol transfer over russian lidar network after chelyabinsk meteorite falling in 2013

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The falling of Chelyabinsk meteorite took place on 15 February 2013 and drew attention of general public and researchers. The mass of the meteorite is estimated as 10 000 metric tons, which is comparable to the amount of the meteorite substance that enters the Earth's atmosphere during a year.
The explosion of such meteorite in the atmosphere left the trace that we registered by the method of lidar sounding. To analyze the spread of the meteorite trace we calculated the isotropic air masses trajectories by the method described in the work (Cheremisin et al., 2011). Trajectories started form the coordinates of meteorite trace. Then we used data from stratospheric lidar stations located near air masses trajectories (Moscow, Obninsk, Tomsk, Yakutsk, Kamchatka).
The aerosol layers were observed at altitudes of 34-42 km in Moscow, Obninsk, and Yakutsk. The first traces of meteorite origin were registered by Obninsk lidar station on 18 February at altitude of about 42 km. Later the layers were observed in Obninisk and Moscow at altitudes from 34 to 38, starting from 20 February. According to Obninsk measurements the thickness of layers at level 0.5 were a few hundreds of meters. Thin aerosol layer of meteorite origin was also observed in Yakutsk at altitude of 39,5 km on 20 February. A rather complex and changeable picture of aerosol content was observed at altitudes of 15-45 km in Tomsk and Kamchatka, but the aerosol layers of meteorite origin were definitely not registered at these altitudes.
This work was supported by the Russian Foundation for Basic Research (project no. 13-05-01036a).

Cheremisin A. A., Marichev V. N. and Novikov P. V. (2011). Lidar observations of volcanic aerosol content in the atmosphere over Tomsk. Russian Meteorology and Hydrology, Vol. 36, No. 9, P. 600-607.