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Disastrous hot in Moscow city in summer of 2010 by results of meteorological measurements

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In summer of 2010 anomalous hot weather took place at the Central part of European Russia – in Moscow city and in some other regions around the Russian capital. Since the second part of June till the mid of August extremely steady, high (up to 100 hPa isobaric level) and long-living blocking anticyclone existed above the East of European Russia. As a result, extremely hot Tropical air mass was invading from Africa and from Central Asia into Central Russia by steady Southern and South-Eastern winds during a long time.

On July 29th the maximal air temperature Tmax at the Moscow University consisted of 38.1 ºC whereas previous maximum-maximorum value for Moscow city was equal only to 36.8 ºC by the data of 1920. At the city centre Tmax was equal even to 39.0 ºC – probably due to the additional local effect of the urban 'heat island'. Thus, the air temperature in Moscow at the first time exceeds 100 ºF and a body temperature of healthy man.

The monthly-averaged air temperature for July of 2010 in Moscow consisted of 26.4 ºC that is the most value during last 230 years since 1780. This value is on 3 ºC more than previous maximal monthly-averaged value for July. The monthly-averaged air temperature for August 2010 (22.2 ºC) became the most value as well during whole the history of meteorological measurements in Moscow for August. The daily maximal air temperature 23 times (during 4 separate days on June, 10 days on July and 9 days on August) was more than maximal values for these days since 1879. The surface temperature in Moscow at the first time consisted of more than 60 ºC.

The minimal relative humidity on July 29th was equal to 16 % (whereas minimum-minimorum value for Moscow during last 45 years was observed in 1972: 15 %); the maximal humidity deficit at the first exceeds 50 hPa. As a result of extremely low precipitation amount (only 7.4 mm during July that is the smallest value for this month during all the history of measurements since XIX century) a lot of forest fires took place in Moscow region. The thermal wave connected with the disastrous hot has been detected in the soil layer during a long time later. E.g., the soil temperature in Moscow in 2010 was more than the highest one during last 45 years on 120 cm below a surface – till the end of August, on the 240 cm depth – till the middle of October, on the 320 cm depth – even till the middle of December, i.e. during four months later after destruction of the blocking anticyclone and ending of hot weather.

The monthly-averaged wind speed in July was extremely low in Moscow (only 1.5 m/s on the level of 15 m by the data of vane and 4.0 m/s in the air layer from 40 to 200 m by the sodar data) due to closeness of the city to the blocking anticyclone's centre.