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Squalls in Russian and Indian cities

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Specific features and parameters of squalls both in Moscow and in some Indian cities are discussed. A total statistics during recent decades represent that this dangerous weather phenomenon is observed in European part of Russia as a rule in summer or, sometimes, in spring (from April to August), whereas in India – usually at pre-monsoon time from March to June. The highest wind gust VMAX during squalls only in rare cases anywhere may reach 30 m/s or a bit larger (in Moscow suburbs the highest value 30 m/s in time of squall was detected in May, 2017; for Indian conditions it was equal to 33.3 m/s in Western India in Gujarat state in March, 2015). However, in more than 90% of all squall cases in recent years in India the highest wind speed was detected as less than 25 m/s (at least, at the closest weather station). In diurnal course squalls are observed usually both in Russia, and in India in the afternoon or at late evening time and almost never in the early morning when the surface temperature is low and thermal convection is absent or weak.

As a rule squalls are connected with thunderstorms but sometimes they may exist as separate phenomenon in absence of thunderstorm. One such example was a terrible squall in Moscow city which took place about 04 p.m. on May 29th, 2017 when 18 people were killed and about 170 were injured. Meteorological conditions of this case, including stationary, radar and sodar data are discussed in details. Surprisingly, neither high top of Cb clouds (this top was equal only from 5 to 9 km by radar data), nor thunderstorms were detected in Moscow, unlike in other squall cases before. Probably, the main reason of this squall was a quick passage of sharp cold front and its very narrow zone: the air temperature at Moscow University Meteorological observatory decreased by 10 ºC (from 25 to 15 ºC) during only 12 min, and at the same time wind gust has reached there 28 m/s. True, ten degrees is quite usual thermal contrast at cold fronts in mid-latitudes, but a cooling takes as a rule longer time. Evidently so quick cooling leads to additional growth of the instability energy. It should be noted as well that at night before squall, on 04.10 a.m., average in 10 min wind speed has reached already 33 m/s on the 480 m height above the ground by the data of MODOS sodar. Thus, an additional reason of so dramatic wind acceleration during squall was specific large-scale atmospheric circulation (Moscow was located at zone of intense gradient winds at the Southern periphery of deep cyclone).

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