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# Influence of fog events on air quality at the background scale of the Czech Republic.

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The aim of presented study is to evaluate the influence of dense fogs on air quality at the background scale of the Czech Republic. The study is based on the data from the National Atmospheric Observatory Košetice (NAOK) operated by the Czech Hydrometeorological Institute (CHMI). The Observatory, established in 1988, is specialized in long-term air quality monitoring at the background scale. NAOK is located in free area outside of settlement (49[U+F0B0]35′ N, 15[U+F0B0]05′E, 534 m above sea level) and represents the Czech Republic in several international long-term monitoring networks (ACTRIS EMEP, GAW, ICOS, ICP-IM). The professional meteorological station (WMO indicative 11 286) is an integral part of NAOK. Air quality measurements are implemented within accredited National Air Quality Monitoring network since 1992. In the Czech Republic, fog is a year-round phenomenon but is most frequently observed during autumn and winter months. The average annual number of days with fog at NAOK is 47. The study covers the period with fully automated meteorological measurements (2002-2018). Special attention was devoted to the episodes of very dense (visibility less than 50m) and dense (50-200m) fogs. PM concentrations during the fog episodes were significantly higher than usual level. The average concentration of PM10 during the episodes with visibility less than 200 m was 43 $\mu$g.m-3 and the 27 $\mu$g.m-3 with visibility 50-200 m. The adequate values for PM2,5 were 27 $\mu$g.m-3 and 21 $\mu$g.m-3 The average concentrations for the whole period are 22 $\mu$g.m-3 for PM10 and 15 $\mu$g.m-3 for PM2,5. In the cold period, when the fog events occur most frequently, the concentrations are higher (25 $\mu$g.m-3 for PM10 and 17,7 $\mu$g.m-3 for PM2,5). The PM2,5/PM10 ratio was significantly lower during fog events (0,62%). The average ratio at NAOK is 0,76%. The regular monitoring of elemental/organic compounds started only in 2014, so that only limited number of events was taken into account, but the concentrations during dense fog events are significantly higher than the annual means. On contrary, the generation of tropospheric ozone was limited during the fog episodes. Mean concentration by the visibility below 200 m was 28 $\mu$g.m-3 and 50-200 m 32 $\mu$g.m-3. The mean annual concentration in 64 $\mu$g.m-3 and during the cold period 52 $\mu$g.m-3. Evaluating the $SO_2$ and $NO_x$ data we found only slightly higher concentrations during fog episodes.