

Near traffic source apportionment in the City of Dresden, Saxony (PART II: Exceedences of the EU-PM₁₀ limit value)

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In 2003 daily PM₁₀ concentrations in Dresden were 53 days higher than > 50 µg/m³. Only 35 times are allowed in the EU. Episode analysis is a method to evaluate contributions of sources and source types to the PM₁₀ concentrations (Kuhlbusch *et al.* 2002).

184 PM₁₀ respectively PM_{2.5} samples (quartz fibre filter, 720 m³ in 24 h) were collected from 11/8/2003 until 8/8/2004 every second week for 7 days at a traffic site in Dresden (55,000 vehicles per day). Samples were analysed for main components, trace elements and PAH (Gerwig, 2004).

Average concentrations were: 29.1±12.4 µg/m³ PM₁₀ and 18.7±9.9 µg/m³ PM_{2.5}.

The maximum PM₁₀ concentration (in case of making chemical analyses) was 99.9 µg/m³ on 26/1/04. On this day a high proportion of fine particles (PM_{2.5}/PM₁₀ = 84%) and the highest arsenic und sulphate concentration (29,2 ng/m³ respectively 14,47 µg/m³) was observed. 96h-backward trajectories (Draxler & Rolph, 2003) show the origin of air masses from the Czech basins through the Elbe Valley.

Obviously the high concentrations can be attributed mainly to emissions from industrial brown coal burning in the Czech basins (Steinhoff, 2003).

On 9 of 184 days (27/01/04 d, 29/2/04 f, 26/1/04 c, 9/3/04 h, 28/1/04 e, 8/3/04 g, 18/12/03 b, 13/8/03 i, 21/10/03 a; Group H) the daily average was > 50 µg/m³. 96h backward trajectories indicated at least one of following source regions: Czech basins (b-d), the Ruhr area (b-e, i) or southwest Poland (a, f-h) and never solely from North Atlantic or Scandinavia.

For Group L 39 days were averaged with concentrations < 20 µg/m³ PM₁₀.

When comparing the contents of group H with L in %, H consists of less earth crust, less elemental carbon / organic matter and less sea salt but more secondary aerosol. The wind speed was half. All measured components showed less concentration in group G compared to H with exception of Mg.

Group H can be subdivided in 2 classes: Days 21/10/03, 18/12/03 and 13/8/03 were averaged to class H_crust. 3 times more Earth crust (Si, Al, Fe, Ti calculated as oxides) (30-38%) was observed at these days compared to the other 6 days of H (<10%), but only 17-29% secondary aerosol (ammonium, sulphate, nitrate).

In contrast days attributed to H_second consisted mainly of secondary aerosols (32-55%) and a small amount of Earth crust (4-14%).

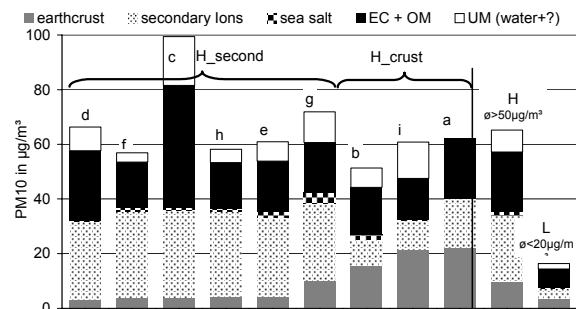


Figure 1. Chemical composition of daily averages > 50 µg/m³ and average of these days compared to days < 20 µg/m³.

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