Influence of precipitation on the background concentration of PM_{10}, $PM_{2.5}$ and PM_1 depending on air mass origin at German lowlands (Melpitz site)

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PM concentration measurements are available from a joint investigation (supported by the Umweltbundesamt, projects 351 01 031 and 351 01 038) and were done at the research station of the Leibniz-Institut für Troposphärenforschung (IfT) in Melpitz situated in the vicinity of the city of Torgau in the river Elbe valley (12°56' E, 51°32' N, 86 m asl.). This spot is integrated in the EMEP activities and a supersite in the EUSAAR network (Flossmann *et al.*, 2006). 24 hour samples for PM_{10}, $PM_{2.5}$ (every day) and PM_1 (at least every six days) were collected at quartz fibre filters (Munktell, S) using high volume samplers (DHA-80, DIGITEL Electronic AG, CH). The concentration of water-soluble ions was detected by ion chromatography (Metrohm, CH). Total carbon was quantified as sum of organic and elemental (TC=OC+EC) by a thermographic method applying a Ströhlein C-mat 5500 carbon analyzer (Spindler *et al.*, 2004). Under the dominating wind direction Southwest to Northwest (W) air masses from the Atlantic Ocean with integrated showers are transported, often during low pressure situations, to Melpitz. They pass large parts of Germany. The second main wind direction is East (E). Then dry air masses are transported with moderate wind velocity during high pressure situations over long distances to Melpitz. The main sources regions for these continental air masses are in Russia, Poland, Belarus, Ukraine, and the North of Czech Republic. The measurements of the mean particle mass concentrations and composition of particles PM_{10}, $PM_{2.5}$ and PM_1 for the two main air mass directions W and E are described in EMEP[1] 2007. For identifying air mass source regions 96 hours backward trajectories (www.arl.noa.gov) were used. Here we show the influence of the precipitation sum along of the 200 m backward trajectories at PM_{10}, $PM_{2.5}$ and PM_1. In Figure 1 the mean results for air mass transport from W and for these from E are shown. In principle the mean particle concentration and content of sulphate and TC is the highest during days with air mass transport from E without precipitation. During transport from W the particle mass concentration decreases significantly with the amount of precipitation for PM_{10} and $PM_{2.5}$. For air masses from East and for all PM_1 particles these decreases are not significant. The reasons can be found (i) in different turbulence conditions, different precipitation duration and intensity, but also (ii) in different physical and chemical properties of the particles and (iii) in different particle sizes and transport distances.

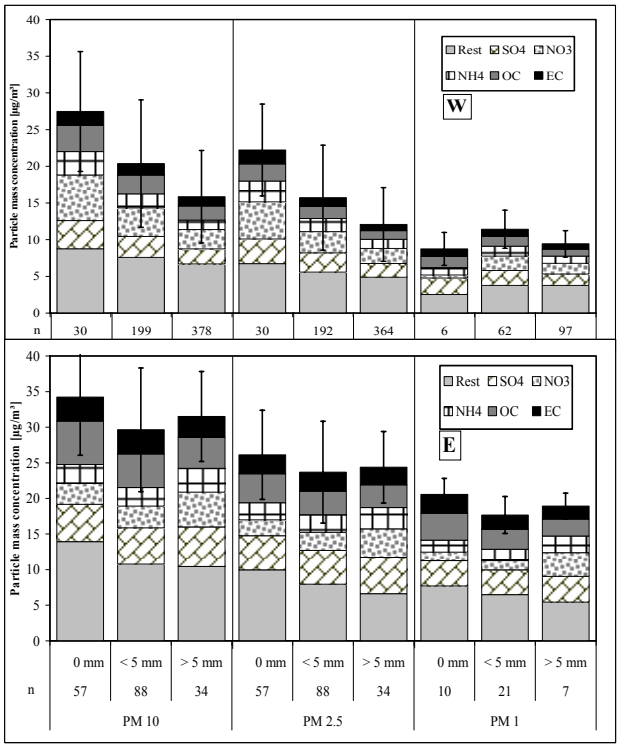

Figure 1. Influence of precipitation sum along the 200 m 96 h backward trajectory on daily particle mass concentration and composition, distinguished for air masses from W and E
(Mean values in three years observation, May 2004 till May 2007, n number of days for the mean)

[1] *EMEP is a scientifically based and policy driven program under the Convention on Long-Range Transboundary Air Pollution for international co-operation to solve transboundary air pollution problems.*

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