Supplementary material

Precipitation was included (along with the other meteorological variables discussed in Section 2) as an explanatory variable in the generalised additive models. Trends adjusted for the effect of the meteorology (including precipitation) are presented in the paper. In addition, the amount of precipitation the previous day is included in the modelling process (see Section 2).

Figures 1 and 2 of this supplement show the function of the $PM_{2.5}$ and PM_{coarse} factors vs. precipitation for each site (see Section 4.1 for the definition of PM factors). The fitted curves represent a reasonable relationship between PM and daily total precipitation for precipitation values up to approximately 10mm. For larger values of precipitation at some sites the PM factors have very large uncertainties and unrealistic best estimates. This is due to scarcity of data for extreme values of precipitation: days with total daily precipitation above 10mm represent 1.7% of the data on average over all stations. Inadequate model predictions for extreme precipitation events are not considered to be an issue in terms of trend identification because of the rarity of such events.

Days without precipitation correspond to zero millimetres of precipitation in Figures 1 and 2. It can be seen that the $PM_{2.5}$ and PM_{coarse} factors for zero precipitation are considerably larger than for positive values of precipitation.

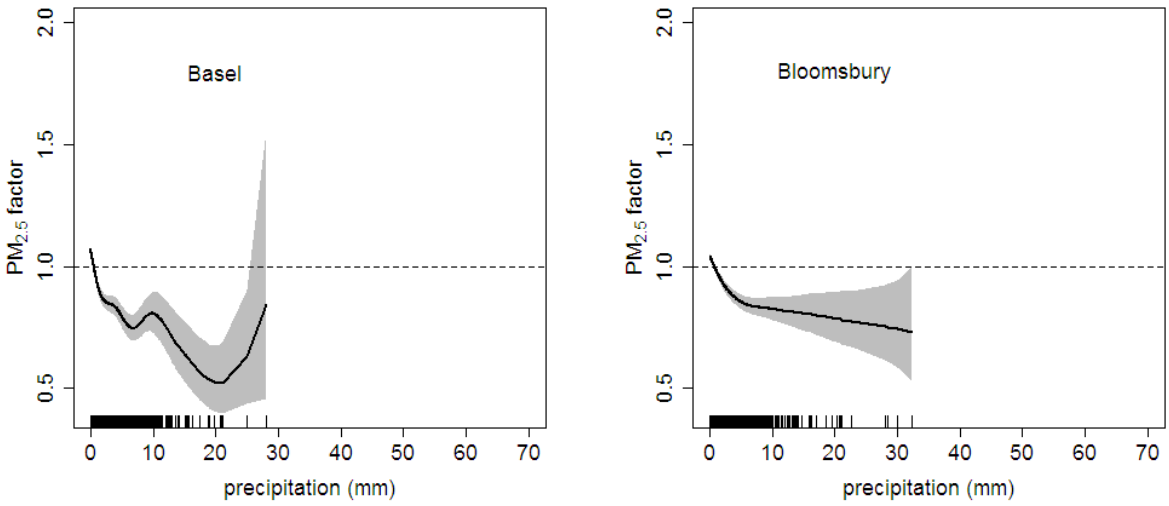

Figure 1. Plots of "$PM_{2.5}$ factors" (see Chapter 4.1 for a definition) vs. daily total precipitation for all considered sites. The best estimate is represented by the solid curve. The grey area represents 2 standard deviations around the best estimate. A rough idea of the distribution of the precipitation data is provided by the "rug" on the x-axis.

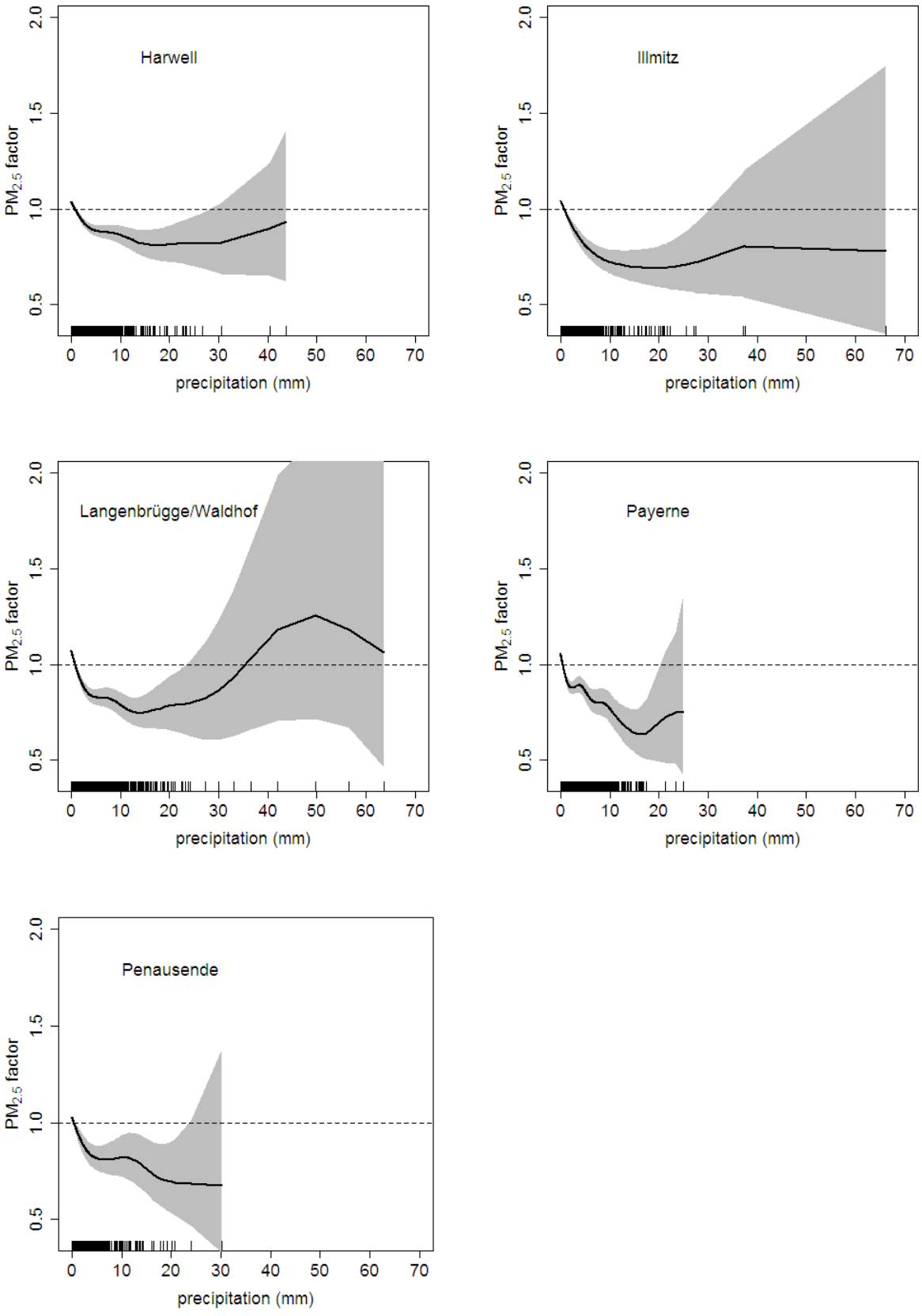

Figure 1 (continued).

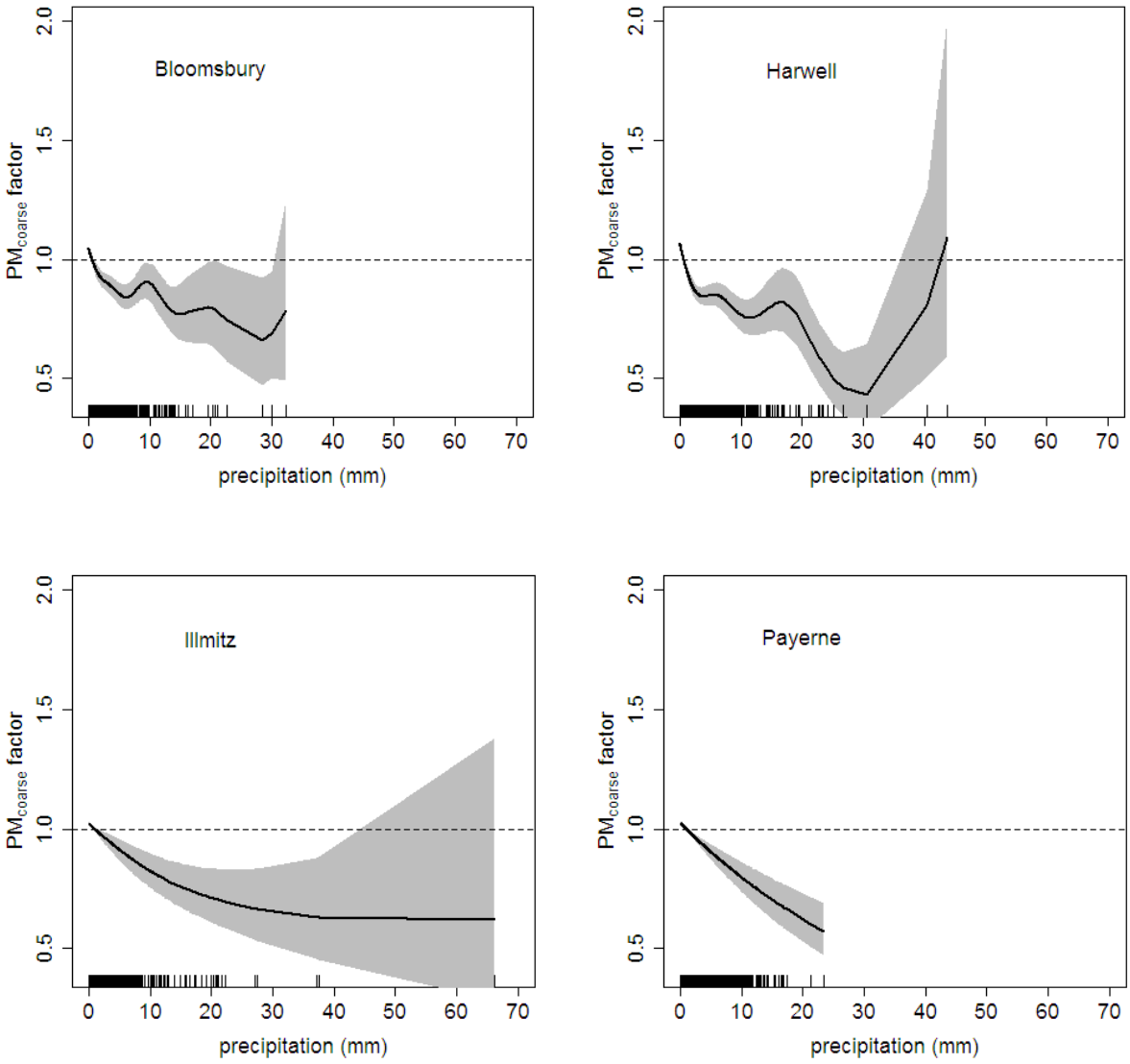

Figure 2. Same as Fig. 1 but for PM_{coarse}. Plots for Basel, Langenbruegge and Penausende sites are missing because precipitation was not selected by the variable selection algorithm for these sites ('yesterday precipitation' was however selected for Basel).

Table 1. Hess-Brezowsky European synoptic weather regime (GWL, Gerstengarbe et al., 1999) favouring high levels of PM for each site.

Site	GWL favouring high levels of PM
Basel	WW, SWA, NWA, HFZ, SEZ, TRW
Bloomsbury	WA, WW, SWA, HNZ, HB, TRM, HFA, HNFZ, TRW, U
Harwell	WW, HNZ, HB, TRM, NEZ, HNFZ, SEA, TRW, U
Illmitz	WW, NWA, NZ, HNZ, HB, HNFZ
Langenbruegge/Waldhof	WA, NWA, NWZ, HNZ, HB, HNFZ, SEA
Payerne	WS, WW, SWA, NWA, HNZ, HFZ, HNFZ, TRW
Penausende	HM, TM, NEZ, SEZ