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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Weekly cycles in precipitation in a polluted region of Europe" *by* C. W. Stjern

D. Rosenfeld (Referee)

daniel.rosenfeld@huji.ac.il

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Here are some additional comments on the scientific interpretation of the results.

Fundamentally, a statistical analysis is aimed at testing an a-priori hypothesis, and the statistical significance is defined as quantifying the confidence in the validation of this hypothesis. The author has provided a partial brief review of publications that addressed such hypotheses, but stopped short of specifying what is to be expected based on these hypotheses for the study area. In such case of lack of a clear science question, inevitably, little can be learned from a statistical study with respect to the hypotheses.

More specifically, aerosols are expected to enhance rainfall in deep convective clouds

in very warm and moist air masses (Rosenfeld et al., 2008, which is already referenced by the author), as shown statistically to be the case in the weekly cycle over the southeastern USA during summer (Bell et al., 2008, which is already referenced by the author). Is the rain during summer in the study area precipitated mostly from such clouds? The answer is in the dew points (do they exceed ∼20 C?) and relative humidity in the summer. I suspect that the moisture is insufficient for the convective invigoration effect to be dominant in the study area during summer. The authors can provide us with such simple information of dew point and relative humidity during rainy days.

There are many references showing that added aerosols to convective clouds with cold base can decrease rainfall amounts. Are the convective cloud bases during summer sufficiently cool (∼ 10 C) for this effect to be significant in the study area?

If the clouds are in between those two regimes, why should we expect much of a weekly cycle during summer?

Furthermore, air pollution contributes both CCN (cloud condensation nuclei) and IN (ice nuclei) in unknown quantities for the study area. The IN might incur an effect that is opposite to that of CCN, especially for shallow clouds with supercooled tops. I suspect that this is a common situation in the study area during winter.

Therefore, while the statistical conclusion of the study remains the same, the authors should take the effort to explain why this negative statistical result does not mean necessarily that aerosols do not affect precipitation in the study area. A clear presentation of the scientific hypotheses also helps elucidating potential next steps in the research of this challenging question.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 1777, 2011.