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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Evidence of the water-cage effect on the photolysis of NO_3^- and $FeOH^{2+}$, and its implications for the photochemistry at the air-water interface of atmospheric droplets" *by* P. Nissenson et al.

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The authors present a study on the photolysis of various chemical species (NO3-, FeOH2+, H2O2) with clear evidences for the possible role played by the surface layer of the atmospheric water droplets on photochemical reactions.

This is a well documented, well written paper, with well performed analysis of the data. Overall the paper contains interesting tools for the assessment of the possible impact of various interface phenomena on the photochemical processes occurring at interface.

It implies also interesting findings for aerosol chemistry in the atmosphere.

Specific comment

The numerical model used to calculate various parameters as a function of normalised distance (r/a) from the droplet center is robust. The authors give some information which can justify their choice to investigate spherical droplets with 1 μm radius (P13134). However, to my opinion few more details are mandatory here in order to understand the criteria used by the authors to select droplets of 1, 2 and 3 μm radius in their investigation. If surface layer thickness is problematic in investigating the interface effect on smaller size droplets (droplets with radius of < 1 μm) than the authors should mention this in the paper. Moreover, this issue needs to be addressed as the authors have chosen benzene as a model aromatic substrate in order to assess its reaction rate with the OH radicals. There are interesting findings which prove that in small droplets (1 μm) reaction in the surface layer would account for a significant percentage of the overall reaction undertaken by short- or longer-lived photo-chemical species. The contribution of the reactions at interfaces would probably be even more important in droplets of smaller sizes. Such details would allow us better to understand the chemistry of deliquesced atmospheric particles, an issue of high importance nowadays.

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