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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Technical Note: VUV photodesorption rates from water ice in the 120–150 K temperature range – significance for Noctilucent Clouds" *by* M. Yu. Kulikov et al.

Anonymous Referee #1

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This is a very well-written paper concerning the photochemical processes in ice particles of Noctilucent Clouds (NLC). The authors observe the "matrix-isolation" of the photoproducts H and OH in the solid ice phase and the recombination of these products inside the "matrix cage" of the ice. Thus, no photoproducts will enter the gas phase, which is in contradiction to former studies. This study is very conclusive and formulae and figures are well-presented and are well-argued.

The set-up and the experimental performance remind me to a typical matrix isolation experiment in rare gas matrices, only here the matrix is the ice. The authors indeed

are well-known specialists in matrix isolation and thus should be able to compare the presented results with those in rare gas matrices and particularly compare the recombination rates of OH and H, respectively.

Up to my point of view, the isolation and recombination and also the possible emission of the photolysis products inherently depend on the dipole-dipole interaction, on the ice structure and on the morphology of the ice grains. Therefore, I have the following questions: âĂć What is the phase composition of your ice sample, i.e. hexagonal vs. cubic vs. amorphous ice? Since you have chosen a fast water vapor deposition for sample preparation, an amorphous ice sample seems very feasible. âĂć What happens during a phase change from amorphous to cubic ice and further into hexagonal ice? Could photoproducts and secondary products be released during these structural changes? âĂć What are the crystal sizes of the ice? What impacts have grain boundaries? âĂć Could photolysis produce defects in the ice matrix and thus initiate phase transformations?

I also wonder that so little information is presented concerning the history of NLC discovery and about the ideas of Alfred Wegener who is the patron of the host institution where the experiments were carried out.

This paper should be published as it is after some minor corrections answering the questions above.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 22653, 2010.