Atmos. Chem. Phys. Discuss., 10, C13821–C13823, 2011
www.atmos-chem-phys-discuss.net/10/C13821/2011/

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.

M. Yu. Kulikov et al.

kulm@appl.sci-nnov.ru

Received and published: 18 February 2011

First of all, the authors are very grateful to the Referee for excellent evaluations of our work, its significance and quality, as well as the valuable comments.

Below we give our response to all the comments and recommendations of Referee 2 (***bold face italicized text***) and indicate the changes introduced in the revised manuscript.

1. Although performed under different conditions, there are some results in the

literature on the UV photolysis of ice, with quantitative estimates of the destruction of water molecules (Westley et al. Nature 373 (1995) 405, Watanabe et al. Astrophys. J. 541 (2000) 772). The authors should comment briefly on these results and on their compatibility with their work.

We agree with this Referee's comment and included five sentences in the revised manuscript. Please see the penultimate paragraph of Section 1 (Introduction, lines 88-102):

"Before these works, Westley et al. (1995a, 1995b) measured desorption of photoproducts during Lyman – α irradiation of thick (500nm) water ice samples at T=35–100 K by using a quartz crystal resonator microbalance and mass - spectroscopy. They found out that most of the desorbed species were water molecules and values of photodesorption yield Y_0 (number of H_2O molecules desorbed per incident photon) were essentially less than 1 molecule/photon. In particular, the maximal value of Y_0=8*10^{-3} molecule/photon obtained at T=100K corresponded approximately to the probability of desorption from the topside molecular layer of the ice. Watanabe et al. (2000) carried out mass - spectroscopy experiments on the formation of D_2 molecules from amorphous thin (thickness 4 and 12 nm) D_2O ice samples by VUV irradiation (126 and 172 nm) at 12 K. According to their results, only a small fraction of the total D_2 photoproducts was released into gas-phase at the low temperature. Also they determined the cross section for the photodestruction of D_2O which was found out to be close to the results gotten by Westley et al. (1995a, 1995b) for water ice."

Also we have included 3 new citations in References:

Watanabe, N., Horii, T., and Kouchi, A.: Measurements of D_2 yields from amorphous D_2O ice by ultraviolet irradiation at 12K, Astrophys. J., 541, 772–778, 2000.

Westley, M. S., Baragiola, R. A., Johnson, R. E., and Baratta, G. A.: Ultraviolet photodesorption from water ice, Planet. Space Sci., 43(10/11), 1311-1315,1995a.

Westley, M. S., Baragiola, R. A., Johnson, R. E., and Baratta, G. A.: Photodesorption from low-temperature water ice in interstellar and circumsolar grains, Nature, 373, 405–407, 1995b.

2. Also for the sake of completeness the authors should provide a reference for the value of the absorption cross section of Lyman- photons in ice (page. 22662, line 18).

The manuscript was corrected accordingly. We added reference to Westley et al, 1995a. Please see Section 4, page 9, line 283.

3. With these minor additions to the discussion and with slight improvements to the English, the article should be published.

The manuscript was checked carefully and the English was corrected accordingly.

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