

Interactive comment on “Sensitivity of a global model to the uptake of N₂O₅ by tropospheric aerosol” by H. L. Macintyre and M. J. Evans

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I would like to draw the authors' attention to a number of recent (post 2005) laboratory studies of N₂O₅ uptake onto different mineral dust types which they may wish to cite on revision of the discussion paper. Gamma values from these studies are summarised and can be downloaded from the website for the IUPAC Subcommittee for Gas Kinetic Data Evaluation at (<http://www.iupac-kinetic.ch.cam.ac.uk/>) – data sheet V.A 2.9. The 'preferred' value for uptake on Saharan dust is quoted as 0.013 which fits into the 'significant sensitivity' range stated in the conclusion section of this discussion paper. Even more recent studies have been made by Tang et al. (2010, Atmos. Phys. Chem., 10, 2965) on dust and soot aerosol, and Griffiths et al. (2009, J. Phys. Chem. A, 113, 5082) on mixed inorganic-organic aerosol.

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An additional factor which the authors' may wish to address is the reactive ageing of aerosol, with the likelihood of an initial gamma value which decreases with N₂O₅ exposure time to a 'steady-state' value as discussed in the comments section of the IUPAC document. A time-dependent gamma value for N₂O₅ uptake would be more realistic if initial 'bare' aerosol accumulates organics over time as inferred from the cited studies of Brown et al. and Bertram et al.

My final point is that the gas-phase species such as NO_x and O₃ which are tracked in the model will themselves be subject to uptake on the aerosol. Is this accounted for in the modelling and if so, what gamma values are assumed? Again, the IUPAC database provides a good summary for measured uptake values.

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