



The possible role of galactic cosmic rays in stratospheric heterogeneous chemistry

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A strong impact of solar variability on stratospheric heterogeneous chemistry is put forward in the Lu and Sanche (PRL, 2001) mechanism that implies that through dissociative electron attachment (DEA), halogen species (both chlorofluorocarbons (CFC) and chlorine reservoir species) are decomposed on the surface of polar stratospheric clouds, the electrons being produced by galactic cosmic ray activity. This mechanism is frequently put forward as a motivation for laboratory studies, for example Wang et al. (JCP, 2008) explicitly state that it “plays a crucial role in [...] ozone-depleting reactions in the stratosphere”. Here it is argued that no correlation is observed between polar chemical ozone loss and cosmic ray activity, in contrast to the arguments by Lu and Sanche. Further, the observed distribution of CFCs in the stratosphere is inconsistent with the Lu and Sanche mechanism. However, there is a possibility that the mechanism has a (hitherto unexplored) relevance for the details of chlorine activation through a DEA induced loss of HCl on polar stratospheric cloud surfaces.