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Response of the middle atmosphere's chemical composition due to solar particle events

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The chemical composition of the middle atmosphere can be strongly influenced by Solar Particle Events e.g. Solar Proton Events. These events are well known sources of NO_x (N, NO, NO_2) and HO_x (H, OH, HO_2), which both contribute to ozone loss in the middle atmosphere. The processes of NO_x, HO_x production and the resulting O_3 loss is quite well investigated and appears to be well understood. However, recent measurements of the partitioning of NO_y and chlorine activation during the October 2003 event (e.g. by the MIPAS/ENVISAT instrument) show that also other constituents – NO_y and chlorine species – are affected by these events. These are not equally well investigated and understood. Our study investigates the impact of charged particles on the middle atmosphere using the long time series data from 1991 - 2005 of the HALOE instrument onboard the UARS spacecraft. First results show a significant decrease of the chlorine reservoir HCl, indicating an increase of reactive chlorine during the SPE in July 2000. This HCl decrease can only partly be explained by known chemical reactions. However, the observed chlorine activation must contribute to the ozone loss during the event.