

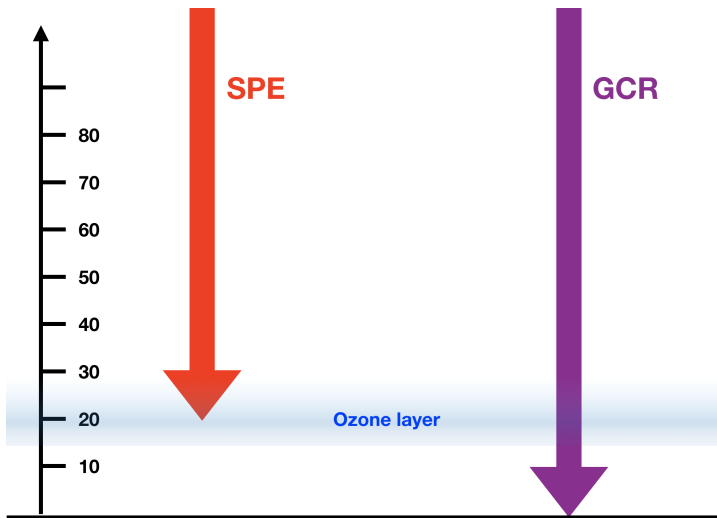
ISSI group: Space weather induced direct ionisation effects on the ozone layer

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Basic ideas



SPE impact on the Ozone layer

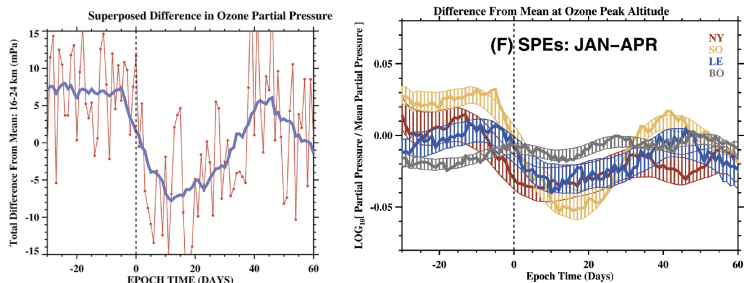


Fig. 1. Left: Superposed epoch analysis of Sodankylä Ozone sond partial pressure for a set of solar proton events that occurred during Jan-April (Denton+, JASTP, 2018). Right: Similar analysis carried out for several sounding stations: Ny Ålesund, Sodankylä, Lerwick and Boulder (Denton et al., GRL 2018).

GCR vs. Ozone layer

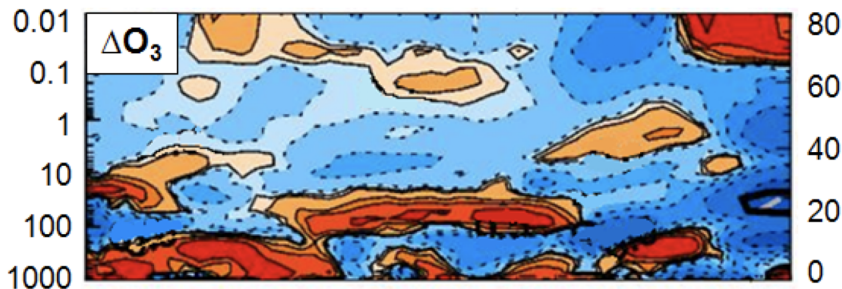
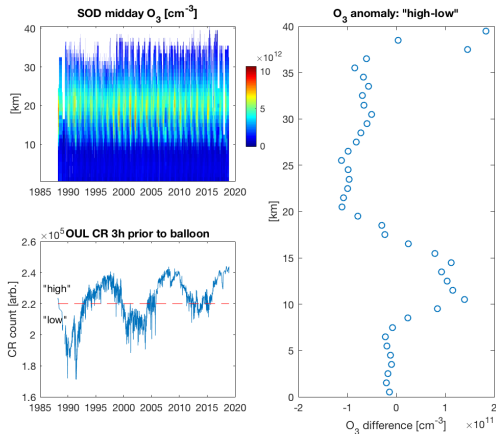


Fig. 2. Monthly mean zonal mean effects (in %) of GCRs on ozone (O_3) for the month of February, for different heights (right-hand Y-axis in km) or pressure (left-hand Y-axis in hPa). Red colors: increases; blue colors: decreases. Contour levels: -5, -2, -1, -0.5, -0.1, 0, 0.1, 0.5, 1, 2, 5%. Hatched areas (marked by thick black contours) show 95% statistical significance. From Callisto et al. (2011).

GCR vs. Ozone layer



The plan 9 from outer space ...

2.3 Summary

Our team will make an assessment on these effects based on satellite (MLS, GOMOS etc.), ground based datasets (ozonesonde), reanalysis dataset (ERA 5) and atmospheric models (SIC, WACCM-D, SOCOL), including the crucial role of the polar vortex. Our primary research objective is to find a mechanism by which the ozone layer is reduced by solar proton events. Moreover, we will assess experimentally the importance of the galactic cosmic ray fluxes variations to the stratospheric ozone.

6. Expected outputs

We expect to publish 2 major international refereed publications, one for the SPE effects and the other for the CGR impacts. In addition, we expect to have 2-4 splinter papers related to the topic. An acknowledgement to ISSI is added to all the publications and presentations showing the results of the team work.