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Transport of low ozone air masses to South America middle latitudes: impact on solar UV irradiances

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The subpolar regions of the Southern Hemisphere are affected by short periods of low total ozone values directly linked to overpasses of the ozone hole. These events often happen during spring and early summer time and the polar flames of ozone poor air travel northward to low latitudes as much as Buenos Aires (34 S).
During these episodes, the subpolar regions experience a pronounced ozone reduction with generally an enhancement of UV-B radiation, depending on cloud cover conditions. But the level of surface UV radiation not only depends of total ozone column (TOC). Also play an important role the solar zenith angle (SZA), the cloud cover, the aerosols loading and the surface albedo.
The combination of low ozone content and high solar elevations at noon during the transports of polar ozone poor airmasses to lower latitudes can induce a relative change of surface irradiance respect to climatological conditions with greater UV indexes at lower than in the higher latitudes.
In this paper we evaluate the increase of UV index at surface during this kind of episodes using a parametric UV model that use as input parameters TOC from OMI/AURA and calculated noon solar zenith angle for three selected sites considered in this study: Rio Gallegos (51S), Comodoro Rivadavia (45S) and Buenos Aires (34S).
The study cases analyzed in this work were selected using potential vorticity maps at isentropic level of 550 K form NCEP reanalysis as tracer of the perturbation of polar vortex.
By means of ozone climatological database of Multi Sensor Reanalysis (MRS) (1978-2013) for the selected sites we modeled the climatological UV radiation level at noon time and calculate the relative impact that induces the transported ozone poor airmasses to subpolar regions on surface radiation levels.
The results show that the poor ozone airmass transported to middle latitudes increase the UV radiation level and the combination with higher solar elevation at solar noon at lower latitudes induce a high impact in the solar UV radiation.