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Seasonal trends in ozone concentrations in the planetary boundary layer and the free troposphere at Uccle

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Ozone sounding data are available at suburban station Uccle (50^o48'N, 4^o21'E) since 1969. A significant positive trend in ozone concentrations for the planetary boundary layer (PBL) and the free troposphere (FT) has been reported since the start of the time series until the beginning of the nineties. Seasonal trends in ozone concentrations for the PBL and the FT have been updated for the time period 1990 - 2006. It is shown that there are no significant trends in ozone concentrations present in the PBL and the FT. Indeed, since the beginning of the nineties, concentrations in NO_x and VOC's have significantly decreased. This resulted in a significant decrease of high ozone events, accompanied by a significant increase in background ozone. Also a significant decrease in the amplitude of the seasonal cycle for the PBL and the FT has been notified. Inspection of this seasonal cycle in the PBL and the FT shows that there is a shift in the ozone maximum; a broad spring - summer ozone maximum in the early years changed recently into a narrow spring maximum which is typical for a remote site. To understand the causes of these changes, a seasonal trend decomposition technique based on a locally weighted regression smoothing (Loess) approach will be presented to decompose these monthly ozone concentrations at Uccle into trend, seasonal and irregular components.