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Detectability of past changes in the vertical distribution of ozone with twelve limb sounders

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Recent international efforts like the SPARC/IO$_3$C/WMO-IGACO Initiative on Past Changes in the Vertical Distribution of Ozone (SI2N) and ESA's Climate Change Initiative (CCI), aim at a better exploitation of existing atmospheric data records for trend assessments and for studies of the interactions between atmospheric composition change and climate change. In particular, the vertical distribution of atmospheric ozone has been measured from space since the mid-1980s by various types of spectrometers measuring in different spectral ranges the solar and/or atmospheric radiation emitted, scattered and/or attenuated through the atmospheric limb. A prerequisite to the synergistic use of these nearly thirty years of observations is their mutual consistency and long-term stability lying within the limits required by trend and climate studies. In support of the aforementioned projects we present the systematic analysis of drifts and biases of ozone profile data records acquired by twelve major satellite missions: ERBS SAGE-II, UARS HALOE, SPOT-3 POAM-II, SPOT-4 POAM-III, Odin OSIRIS and SMR, Envisat GOMOS, MIPAS and SCIAMACHY, SCISAT-1 ACE-FTS and ACE-MAESTRO, and EOS-Aura MLS. The ground-based data acquired by ozonesonde and lidar networks affiliated with NDACC and WMO's GAW are used as a reference and as a standard transfer between not contiguous satellite missions. Besides conclusions on drifts and biases as a function of latitude and altitude, we also present the meridian structure of the threshold altitude for each satellite data record, i.e. the altitude below which the statistical data quality degrades rapidly. The suitability of current satellite data sets for the detection of past changes in the ozone profile is discussed.