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Stability of Satellite and Ground-based Ozone Profile Records

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Positive trends are found in nearly all observation-based time series of extrapolar upper stratospheric ozone since the late 1990s, though magnitude and significance differ from one study to another. This prompts further investigations of the causes of these differences since more accurate trend estimates are needed to pin down the relative importance of geophysical processes affecting stratospheric ozone. Uncovering patterns in space and by season will be key in reaching this objective, not just in the extrapolar upper stratosphere but elsewhere as well. At the moment, however, it is unclear whether ozone profile observing systems are capable of providing this information. The latter question will be addressed in an overview of constraints and abilities of present data records in space (limb/occultation sounders) and on the ground (NDACC/GAW/SHADOZ-affiliated sonde, stratospheric lidar and microwave radiometer sites) to infer decadal trends and patterns in space and time. Long-term stability of the data record is a key prerequisite to detect trends. Updated results will be shown of an exhaustive analysis of satellite drift relative to the ground-based network data (Hubert et al., 2016). In a similar way, the satellite data were exploited to identify inhomogeneities in time and space in the ground-based time series. Some of these coincide with known instrument or measurement changes in the network, other features have -so far- no clear identified cause. Such changes add to the challenge to derive unbiased ozone trends from ground-based observations and they impede our ability to constrain satellite drift to the level required for current and future ozone trend assessments. This clearly shows the need to continue ongoing efforts to homogenise the ground-based data records.