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A full decade (2009-2019) of continuous nightglow observations from the NUV to the NIR

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The airglow emission of the mesopause region comprises molecular bands and atomic lines in the near-ultraviolet to the near-infrared wavelength range, e.g. the prominent roto-vibrational OH bands, a weak FeO/NiO continuum, the green OI line, the NaD doublet and some others. Since ground-based astronomical facilities observe through the Earth's atmosphere, the fingerprint of these emissions is visible in astronomical spectra taken with a telescope.

We have assembled a comprehensive data set of about 100,000 spectra in total taken between 1st of October 2009 and 30th of September 2019 with the X-shooter spectrograph, which is mounted at the Very Large Telescope in the Chilean Atacama desert (24.6°S, 70.4°W). This instrument provides medium-resolution spectra covering the entire wavelength range from 0.3 to 2.5µm simultaneously by incorporating three spectral subranges (UVB: 0.3-0.56µm; VIS: 0.56-1.02µm; NIR: 1.02-2.5µm).

The X-shooter instrument was continuously in operation during the covered period and frequently used by astronomers. Thus, the temporal coverage of the available observations is very dense for astronomical data allowing various airglow studies on time scales from minutes to a full decade. Due to the simultaneously observed wide wavelength range, individual airglow emitters as well as correlations between them can be investigated in detail (cf. Noll et al. 2021, this session, for more information).

In this presentation we describe the properties and the calibration of this unique data set.