



## Astronomical spectra as powerful source for airglow studies

Wolfgang Kausch (1,2), Stefan Noll (2), Stefanie Unterguggenberger (2), Bastian Proxauf (2), Stefan Kimeswenger (3,2)

(1) Universität Wien, Institut für Astrophysik, Wien, Austria (wolfgang.kausch@uibk.ac.at), (2) Universität Innsbruck, Institut für Astro- und Teilchenphysik, (3) Instituto de Astronomía, Universidad Católica del Norte, Antofagasta, Chile

Light from astronomical objects has to pass the Earth's atmosphere before it reaches ground-based telescopes. Thus, any observation taken with such facilities contains information on the chemical composition and the physical state of the atmosphere. In particular, optical and near-infrared spectra taken with such telescopes are well suited to study various airglow emissions arising in the upper atmosphere thanks to the small field-of-view of the telescopes, large mirror sizes, and the frequent usage of medium to high resolution spectrographs.

We study data taken by two frequently used echelle spectrographs from the Very Large Telescope (VLT) of the European Southern Observatory at Cerro Paranal (Chile):

UVES, operative since 1999, is a high-resolution ( $20000 \leq R \leq 110000$ ) instrument covering the wavelength range from 300 to 1100 nm. Hence, several O<sub>2</sub> band systems (Herzberg I+II, Chamberlain, atmospheric), the green and red OI lines ( $\sim 557$  nm;  $\sim 630$  nm), the recently discovered FeO bands ( $\sim 550$  to 720 nm), NaID ( $\sim 589$  nm), and all hydroxyl bands up to OH(3-0) can be investigated. The high temporal coverage allows investigations for more than one solar cycle.

The X-Shooter instrument is an echelle spectrograph which is able to take medium-resolution ( $3000 \leq R \leq 18000$ ) spectra from 300 to 2480 nm within one shot. Therefore, it is well suited for a comprehensive study of OH, as it covers all bands with a vibrational level difference  $\Delta v \geq 2$  (up to OH(9-7)) simultaneously, apart from the previously mentioned other lines and bands. X-Shooter was put into operation in 2009.

In this presentation, we will give a review on the available spectra, their quality and time coverage. Moreover, we will illustrate the potential of the data for airglow studies by showing results for level populations and temperatures for 25 OH bands and O<sub>2</sub>b(0-1), and FeO intensities in relation to NaID.