

Monitoring of the Earth's atmosphere at Jungfraujoch: the challenges and benefits of a long-term commitment

The Jungfraujoch atmospheric monitoring program started in the early fifties at the initiative of Prof. Marcel Migeotte from the university of Liège, Belgium. His primary aim was to record an atlas spanning the infrared region between 2.8 and 23.7 μm from this high-altitude dry unpolluted site (46.5°N, 3580 m a.s.l., Swiss Alps). The identification of the recorded lines was also part of this project, notably leading to the demonstration that carbon monoxide, methane, and nitrous oxide were ubiquitous constituents of the Earth's atmosphere. After a period devoted to the study of the solar photosphere, the surveillance of the atmosphere resumed in the mid-1970s, urged by concerns related to the possible catalytic destruction of the ozone layer by chlorine, following the photolysis of the chlorofluorocarbons (CFCs) in the stratosphere. This monitoring program has continued until now, leading to a multidecadal infrared observational database unique in terms of time coverage, measurement density and overall quality.

In this seminar, the aim will be to briefly describe the steps that led to the initiation of this program and to its development, in a historical perspective. In a second part, we will present recent results derived from the Jungfraujoch and other NDACC (Network for the Detection of Atmospheric Composition Change) stations, relevant for the monitoring of air quality or to support the Montreal Protocol on substances that deplete the stratospheric ozone layer. More specifically, the target gases of this talk will be ethane, peroxyacetyl nitrate (PAN), CFC-11 (CCl_3F), and the stratospheric reservoirs of chlorine and fluorine.