# New developments on the field of atmospheric monitoring

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Atmospheric science is a wide field and Optics offers a powerful tool to understand the chemical and physical processes occurring in it. An overview of optical methods will be presented as well as new methods and the present challenges.

Some methods can be carried out by means of a laser but also natural sunlight delivers remarkable results. In particular we will focus on Multi-Axis-Differential Optical Absorption Spectroscopy (MAX-DOAS), which is a relative new development to achieve remote air pollution measurements on field. It combines the measurement principles of the zenith-scattered sunlight DOAS and the active long-path DOAS. The main part of the optical system is a compact spectrometer which receives the scattered solar radiation to retrieve the information from the atmosphere. A MAX-DOAS instrument usually works in the near UV and VIS spectral range where chemical substances, like $NO_2$, $SO_2$, $H_2O$, BrO, hydrocarbon tracers and others, show strong absorption features.

The application fields of these methods range from stratospheric ozone monitoring, air quality control and industrial emissions. However, different applications are frequently very similar irrespective of the particular context. In particular, the DOAS method shows great potential for applications in agriculture and spectroscopic imaging.