

Advanced 2- μm Ho :YLF transmitter and coherent DIAL for atmospheric CO₂ profiling in the boundary layer. Fabien Gibert, Dimitri Edouart, Claire Cénac, Florian Le Mounier and Pierre Flamant, LMD/CNRS (France).

ABSTRACT

In the framework of climate engineering, a unique approach for geochemical monitoring above a CO₂ sequestration site, called Sentinelle, is currently taking place in the south of France. Within this project, a new mobile CO₂ and Wind (COWI) lidar station has been intentionally developed at LMD-IPSL during the last three years. For an efficient monitoring, 3D scanning, good CO₂ mixing ratio accuracy (1 %) and high time (1 min) and space (100 m) resolutions are required. To fulfill these requirements, a new high power, high repetition rate, single mode 2 μm Ho :YLF laser transmitter has been designed and developed. A Pound-Drever-Hall (PDH) based novative method has been implemented to get single mode and multi-frequency operation of the transmitter with good energy and spectral stability. Then, the laser transmitter is used in a coherent DIAL system for preliminary CO₂ mixing ratio measurements. In this paper, we detail the project and analyze the potential of coherent DIAL system in the context of CO₂ sequestration site monitoring. Then the COWI lidar is technically described and preliminary measurements are presented.