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2 μm-HDIAL measurements of atmospheric CO2 density

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The Global Carbon Cycle has been significantly perturbed by human activities in the last two centuries. The current network seems insufficient to understand the fundamental processes and predict the future rate of increase of atmospheric CO2 density and its impact on climate. In this context, a 2-μm Heterodyne Differential Absorption Lidar (HDIAL) has been developed and operated at IPSL/LMD to monitor CO2 mixing ratio in the atmospheric boundary layer. One objective is to demonstrate the capability to monitor CO2 from air- and later space platform. First, the HDIAL performances are tested at 10 m above the ground and the absolute mixing ratio measurements compared to routine in situ measurements. The Doppler capability is fully used to understand the air masses advection and to analyse possible discrepancies between the HDIAL and in situ measurements in the broader context of the Paris area. Secondly, the HDIAL was used to make vertical measurements in the boundary layer. It is also demonstrating its capability to make CO2 measurements using clouds as hard targets. Thus, first atmospheric CO2 measurements are investigated in the free troposphere.