



In situ measurements of H₂O, CH₄ and CO₂ in the upper troposphere and the lower stratosphere (UT-LS) with the balloonborne picoSDLA and AMULSE tunable diode laser spectrometers during the 2014 and 2015 “Stratoscience” campaigns

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H₂O, CH₄ and CO₂ are major greenhouse gases with a strong impact on climate. The concentrations of CO₂ and CH₄ have dramatically increased since the beginning of the industrialization era due to anthropogenic activities, contributing thereby to the global warming. Anthropogenic activities as fossil fuels, ruminant, and biomass burning constitute the major sources of carbon dioxide and methane. The increase of H₂O concentration in the stratosphere could cause a cooling of this atmospheric region, impacting the recovery of the ozone layer. Therefore, having information and data about the vertical distribution of H₂O, CO₂ and CH₄ is very useful to improve our knowledge of the future of our climate.

We have developed, with the help of French space agency (CNES) and CNRS, two laser diode sensors PicoSDLA and AMULSE devoted to the in situ measurements of H₂O, CH₄ and CO₂ from balloon platforms. These instruments were operated from open stratospheric balloons in Timmins, CA, in August 2014 and 2015. We report and discuss the instrumental achievements of both sensors during these flights in the UT-LS.

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