



HAL
open science

SPECIES: a multi-channel infrared laser spectrometer with optical-feedback cavity-enhanced absorption for in-situ balloon-borne and airborne measurements

Patrick Jacquet, Valery Catoire, Michel Chartier, Claude Robert, Gisele Krysztofiak, Nathalie Huret, Daniele Romanini

► To cite this version:

Patrick Jacquet, Valery Catoire, Michel Chartier, Claude Robert, Gisele Krysztofiak, et al.. SPECIES: a multi-channel infrared laser spectrometer with optical-feedback cavity-enhanced absorption for in-situ balloon-borne and airborne measurements. 19th EGU General Assembly, Apr 2017, Vienne, Austria. pp.8293. insu-03568144

HAL Id: insu-03568144

<https://insu.hal.science/insu-03568144>

Submitted on 13 Feb 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License



SPECIES: a multi-channel infrared laser spectrometer with optical-feedback cavity-enhanced absorption for in-situ balloon-borne and airborne measurements

Patrick Jacquet (1), Valery Catoire (1), Michel Chartier (1), Claude Robert (1), Gisele Krysztofiak (1), Nathalie Huret (1), and Daniele Romanini (2)

(1) LPC2E, CNRS - Université Orléans, Orléans, France (valery.catoire@cnrs-orleans.fr), (2) LIPhy, CNRS - Université Grenoble Alpes, Grenoble, France

Over the last decades, thanks to significant technological advances in measurement techniques, our understanding of the chemistry and dynamics of the upper troposphere and stratosphere has progressed significantly. However some key questions remain unsolved and new ones arise in the climate change context. The full recovery of the ozone layer in a period of halogens decrease and N₂O increase (and the delay of this recovery), the impact of the climate change on the stratosphere and the role of this one as a feedback are very uncertain. To address these challenges, one needs instruments able to measure a wide variety of trace gases simultaneously with a wide vertical range, combined to chemical and dynamical modelling at different scales. LPC2E and LIPHY laboratories are developing a new balloon-borne and airborne instrument: SPECIES (SPECTromètre Infrarouge à lasERS in Situ). Based on the Optical Feedback Cavity Enhanced Spectroscopy (OF-CEAS) technique combined with mid-infrared quantum or interband cascade lasers (QCLs or ICLs), this instrument will offer unprecedented performances in terms of vertical extent of the measurements, from ground to the middle stratosphere, and number of molecular species simultaneously measured with sub-ppb detection limits (e.g. O₃, N₂O, HNO₃, NH₃, H₂O₂, HCl, HOCl, CF₂O, CH₄, CH₂O, CO, CO₂, OCS, SO₂). Due to high frequency measurement (>0.5 Hz) it shall offer very high spatial resolution (a few meters).