Geophysical Research Abstracts, Vol. 9, 10210, 2007
SRef-ID:

Regional monitoring of tropospheric $NO_2$and CO using remote sensing from a HALE-UAV

A. Merlaud1, M. De Mazière1, M. Van Roozendael1, C. Hermans1, J. Everaerts2, A. Cornet3

1Belgian Institute for Space Aeronomy (BIRA-IASB), Brussels, Belgium (alexis.merlaud@aeronomie.be / Phone: +32-2-3730-382)2 Vlaamse Instelling voor Technologisch Onderzoek (VITO), Mol, Belgium3 Unité de physique atomique, moléculaire et optique (PAMO), Université Catholique de Louvain (UCL), Louvain-La-Neuve, Belgium

Monitoring air quality is nowadays a major scientific issue with applications to public health policies. Remote sensing measurements of pollutants are done from ground, from satellites and from traditional airplanes or balloons. Recent developments in High-Altitude Long Endurance Unmanned Aerial Vehicles (HALE-UAV) make this kind of platform promising for atmosphere monitoring. Sounding the troposphere from an altitude of about 18 km for a duration up to several months can improve the spatial and temporal resolution compared to satellite observations, a regional coverage can be assured and areas in the neighbourhood of emission sources can be focused. These benefits would be useful to improve the observational data set, for example, for constraining more efficiently regional models of atmospheric chemistry and transport.

In this work, we present studies concerning the design of spectroscopic systems to be installed on such an aircraft, fitting the requirements of the payload in terms of size and weight. The targeted species, CO and NO_2, can be measured respectively in the infrared and UV-visible range; therefore two different instruments are currently investigated. A nadir-looking imaging spectrometer with a holographic grating coupled to a wide field of view telescope is considered for the NO_2sensor, so as to achieve push-broom imaging. For CO monitoring, a higher spectral resolution and a detector cooling system are needed and compact devices based on Fabry-Pérot or Hadamard spectrometers are considered.