



Approaches for retrieving abundances of methane isotopologues in the frame of the AGACC project from ground-based FTIR observations performed at the Jungfraujoch

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This work has been performed within the frame of AGACC (<http://www.oma.be/AGACC/Home.html>), a contribution to the Belgian Scientific Support for a Sustainable Development. The project intends to make an advanced exploitation of existing ground-based remote-sensing measurements for a selection of atmospheric species that play an important role in the chemistry of the atmosphere and that have a direct or indirect impact on climate. Target species include -among others- lower tropospheric aerosols, H₂O, HDO, CH₄, HCN and CO. The instrumentation includes 3 types of spectrometers (FTIR, MAXDOAS and Brewer) and one CIMEL sun photometer. These instruments are operated at 3 different sites (Jungfraujoch, Ile de la Réunion and Uccle) and most of them are affiliated with the Network for the Detection of Atmospheric Composition Change (NDACC, formerly NDSC - <http://www.ndacc.org>), a group dedicated to performing high-quality long-term observations.

This contribution will deal with the detection of the isotopologues of methane, a species released to the atmosphere by natural processes (e.g. wetlands, termites) as well as by anthropogenic activities (e.g. fossil fuel exploitation, rice agriculture, biomass burning, etc). Due to its high warming potential and its relatively long chemi-

cal lifetime, atmospheric methane is a major greenhouse gas. Methane also affects climate by influencing tropospheric ozone and stratospheric water. The cycle of methane is complex and a thoroughly study of the sources and sinks of its main isotopologue, as well as the other isotopic species, is necessary to characterize it. Isotopic ratios are also useful to differentiate between various sources of atmospheric methane.

To study the vertical distribution of methane isotopologues from the high resolution FTIR spectra recorded by the University of Liège instrument at the International Scientific Station of the Jungfrauoch (ISSJ; 46.5°N, 8.0°E, 3580m a.s.l., Swiss Alps), we have selected several $^{13}\text{CH}_4$ lines distributed in the so-called InSb (1-5 μm) and MCT (2-16 μm) spectral ranges. A set of four microwindows has also been selected for the study of CH_3D . Using the SFIT-2 v3.91 algorithm, vertical column abundances as well as low-resolution vertical distributions have been retrieved, adjusted from an *a priori* profile defined on a 41 layers scheme and derived from ACE-FTS space observations. The information content and first preliminary retrieval results will be presented.