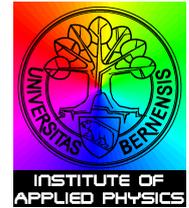


A METHOD OF VALIDATING AMSOS STRATOSPHERIC WATER VAPOR MEASUREMENTS USING POAM SATELLITE DATA.

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INTRODUCTION

Water vapour is the main topic of research of our institute (see also posters 4-07, 5-29 & 7-10). In the process of determining the isotopic composition of stratospheric water vapour from EMCOR $H_2^{18}O$ measurements, data from AMSOS are used to provide the complementary $H_2^{16}O$ profiles. Both of these

microwave radio-meters operate side by side at the International Scientific Station Jungfraujoch (ISSJ), offering ideal comparability. For both instruments a new retrieval software has been tried to calculate vertical distribution profiles from the measured spectral emission lines. For lack of representative $H_2^{18}O$ data we have done some investigations to check the quality of the retrieval algorithm by validating the $H_2^{16}O$ data, the results of which we will present in the following.

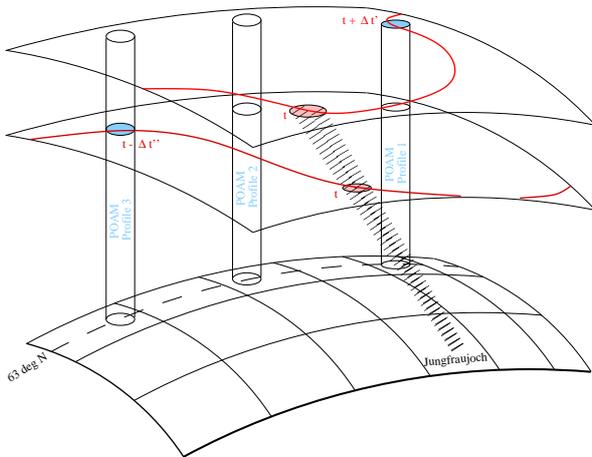


Figure 1: Schematization of the method used to find a validating profile. Values are picked from several POAM profiles at altitude layers which are correlated by air parcel trajectories to the air column that we have measured over Jungfraujoch.

METHODOLOGY

The air sample measured by a ground based radiometer is a column defined by the antenna's beam pattern. Let's look at this column as a stack of individual air parcels. An initial stack of air parcels is given by our measured $H_2^{16}O$ profile of Dec 21 1999. Subsequently we are looking for independent measurements of any of these air parcels forming our air column. For this we consider backtrajectory calculations, which tell us where each air parcel at a given altitude has been in the 10 days preceding and following the day of our measurement over Jungfraujoch.

Furthermore we make use of the POAM dataset. POAM is a satellite borne solar occultation photometer. It provides 7 high resolution (compared to a ground based microwave radiometer) profiles of water vapour a day for the northern hemisphere, all evenly distributed on a circle of $\sim 63^\circ$ latitude. Our idea has been to check whether any of the backtrajectories ever intersects with the $63^\circ N$ parallel, possibly close to a POAM measurement. A graphic representation of the method used is given in Figure 1. After a thorough selection matching POAM measurements have been found for 3 altitude layers. The values of these POAM profiles at their corresponding altitudes are then compared to our retrieved profile.

RESULTS

Figure 2 and Figure 3 show the result of the comparison once without and once with convolving (i.e smoothing) the individual high resolution POAM profiles to match the lower resolution microwave profiles. Without convolution a comparison of values at discrete altitudes is a delicate issue because certain

small scale patterns will not be resolved by the microwave radiometer. Using the convolution on the other hand leads to contributions from altitude layers for which we have no backtrajectory data, a delicate thing to do as well. Comparing both Figures nevertheless reveals that in any case the fundamental shape of the retrieved profile is confirmed, which leads us to assume that the retrieval algorithm performs fairly well.

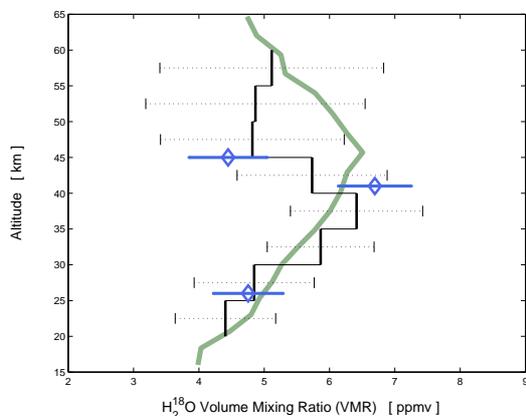


Figure 2: On the background of a HALOE mean water vapour profile for Dec 1999 (green) are shown the retrieved AMSOS VMR profile (black) and the values of corresponding POAM measurements (blue). Here the POAM profiles have not been convolved, consequently a smoothing error is added to the microwave profile.

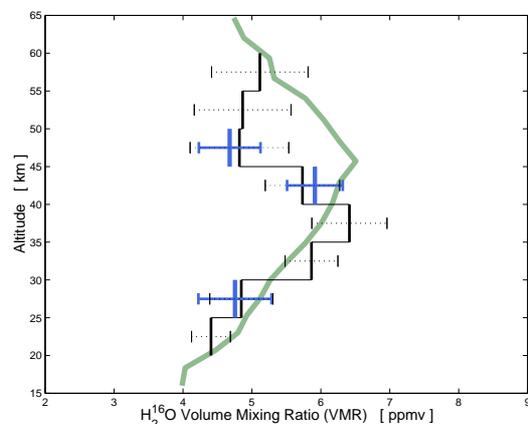


Figure 3: On the background of a HALOE mean water vapour profile for Dec 1999 (green) are shown the retrieved AMSOS VMR profile (black) and the values of corresponding POAM measurements (blue). Here the POAM profiles have been convolved to take into account the different vertical resolutions of the measurements.