

Aura MLS Radiance Average Retrievals (RAR) HOCl product guideline

Summary

Useful vertical range: 14 – 1 hPa
Latitude coverage: 85°S to 85°N
Vertical resolution: ~5 km

Significant averaging (one or more weeks) is required to obtain scientifically useful data.

Contact: Luis Millán

Jet Propulsion Laboratory, California Institute of Technology
luis.f.millan@jpl.nasa.gov

Introduction

The retrieval methodology is based on the work described by Millán et al. (2012) and Millán et al. (2015) for BrO and HO₂, respectively. In short, the retrieval algorithm produces a pair of zonal-mean abundance fields for each day, one for the ascending part of the orbit (mostly daytime) and the other for the descending part (mostly nighttime) on a grid with 6 surfaces per decade change in pressure (~3 km). These are obtained from a 10° latitude bin zonal mean of radiances interpolated onto a 6 surface per decade pressure grid using the limb tangent pressure from the standard production data.

Due to the small spectral signature of HOCl in the MLS radiances, significant averaging (one or more weeks) is required to obtain scientifically useful results.

Precision, Accuracy, and Vertical Resolution

In the usable pressure range, the vertical resolution is about 5 km. The daily precision for a 10° latitude bin (either ascending or descending) is around 110 pptv, dropping to ~20 pptv and ~5 pptv for monthly and yearly averages, respectively.

Data Format

All the MLS HOCl data described here can be found at the NASA Goddard Space Flight Center Earth Sciences (GES) Data and Information Services Center DISC [website](#).

All the data described here are stored in netCDF files.

The data are stored in files named according to the convention

MLS-Aura_L3ZMRAR-HOCl_v06-<VV>-c<CC>.<yyyy>d<ddd>.nc4

where L3ZMRAR stands for Level 3 Zonal Means Radiance Average Retrievals, v06-<VV>-c<CC> is the version and cycle number. The files are produced on a one-day granularity and named according to the observation date, where <yyyy> is the four-digit calendar year and <ddd> is the day number in that year (001 = 1 January).

Each file contains two swaths: Ascending and Descending. Each swath contains the following fields:

Average	retrieved HOCl data	[vmr]
Error	precision	[vmr]
lat	latitude	[-85°, -75°, -65°, ... , 85°]
lev	pressure levels	[hPa]
Solar_Zenith_Angle	solar zenith angle	[deg]
Local_Solar_Time	local solar time	[hours]

Data Screening

Bad data were set to -999.99 and should be avoided.

Due to the small signal-to-noise ratio many negative values are found throughout this dataset. These values need to be included in any scientific study to avoid high biases in averages derived from these data.

Bibliography

Millán, L., Livesey, N., Read, W., Froidevaux, L., Kinnison, D., Harwood, R., MacKenzie, I. A., and Chipperfield, M. P.: New Aura Microwave Limb Sounder observations of BrO and implications for Bry, Atmospheric Measurement Techniques, 5(7), 1741–1751, 2012. DOI: 10.5194/amt-5-1741-2012.

Millán, L., Wang, S., Livesey, N., Kinnison, D., Sagawa, H., and Kasai, Y.: Stratospheric and mesospheric HO₂ observations from the Aura Microwave Limb Sounder, Atmospheric Chemistry and Physics, 15(5), 2889–2902, 2015. DOI: 10.5194/acp-15-2889-2015.

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