



High Resolution Dynamics Limb Sounder (HIRDLS)
A Short Guide to the use and interpretation of V003
(HIRDLS Version 2.04.09) Level 2 data.

Introduction

This document is a brief guide for those wishing to use Level 2 data (geophysical products along the measurement track) produced by the HIRDLS Version 2.04.09 data processing algorithms for the High Resolution Dynamics Limb Sounder (HIRDLS) on the Aura spacecraft. These are designated as V003 at the Goddard DISC and will have a designation of V2.04.09 in the filenames.

This data version contains temperature, ozone and nitric acid mixing ratios, and cloud top heights and characteristics. The validation of these data is described in the papers listed in the references. The data are evolving as algorithms are improved and extended, and it is anticipated that future data versions will contain additional species, as well as improved versions of the present retrieved quantities. Those wishing to use the data should contact one of the HIRDLS PI's concerning their intended use. Feedback to the HIRDLS team on features found in the data is strongly encouraged.

A preliminary Data Description and Quality Document for DISC Data Version 003 will be released shortly. This Short Guide, as well as the Data Description and Quality Document, will be updated as newer data versions and additional products are released.

Reading HIRDLS Level 2 Data

HIRDLS Level 2 data is stored in the HDF-EOS5 format in the [HDF-EOS Aura File Format Guidelines](#) document ¹. These data files can be read via C/C++ or Fortran using either the HDF-EOS5 or HDF5 library. A HIRDLS developed IDL routine "get_aura" is also available upon request for those users which wish to use IDL to access the HIRDLS data.

Users should obtain the pre-compiled HDF5 library for their operating system, if possible. Otherwise, source code is also available (see <http://hdf.ncsa.uiuc.edu>). These are prerequisite in order to compile the HDF-EOS5 library (see <http://www.hdfeos.org/>). Both libraries are needed to fully access the Aura HIRDLS data files. For additional help contact the GES DISC at help-disc@listserv.gsfc.nasa.gov or telephone 301-614-5224.

Each HIRDLS Level 2 file contains one day's worth of data and contains all species that HIRDLS measures. In the V003 data, a number of the fields will be filled completely

¹http://www.eos.ucar.edu/hirdls/HDFEOS_Aura_File_Format_Guidelines.pdf

with missing values until correction algorithms are refined for these species. For users who require only a subset of the HIRDLS species, the Goddard DISC has the ability to subset data before distributing it to users. Contact the DISC directly for more information on this service.

Individual HIRDLS data values for a product are stored in fields labeled with the species name (see Table 1 for exact names). The estimated precision of each data point is a corresponding field named *SpeciesPrecision* (for instance, Temperature and TemperaturePrecision). Two additional fields for each species, *SpeciesNormChiSq* and *SpeciesQuality*, are both filled with missing for V003. CloudTopPressure does not have Precision, NormChiSq or Quality fields.

There are two time fields in the HIRDLS data file, *Time* and *SecondsInDay*. *Time* is stored in TAI time (seconds since the epoch of UTC 12 AM 1-1-1993). This time includes leap seconds and can cause problems with simplistic conversions. For this reason, HIRDLS is also storing *SecondsInDay* which is seconds since midnight of the data day. Leap seconds do not pose a problem when using this field. Note that the first data point may be negative which indicates a time stamp before midnight. This is the case for scans which span a day boundary.

Data Points to Avoid

Data points for which more than half of the information comes from the a priori have the precision field set negative and should not be used for scientific studies.

Known Problems

A few cloud tops are not detected, resulting in retrievals at low altitudes of cloud-contaminated radiances. This can result in temperatures too warm, and positive or negative spikes in species retrievals.

While not expected, there may be some residual differences between up and down scans. Critical features should be checked to ensure they appear in scans in both directions.

These and other problems are discussed in more detail in the Data Description and Quality Document (SC-HIR-1511a).

Table 1 overleaf details the useful vertical range, estimated accuracy, and the HIRDLS team contact for each product in this version. The vertical range and accuracy entries generally summarize complex variations, and the listed references should be consulted before any use of the data. Additional products may be available in future versions.

How do I Interpret the Data?

The HIRDLS data give a set of values of temperature or mixing ratios on a set of pressure levels. This is described in more detail in the V003 Data Quality Document.

.

HIRDLS PI Contact Information:

John Gille
gille@ucar.edu

John Barnett
j.barnett@physics.ox.ac.uk

Table 1: Information concerning HIRDLS standard products.

Product	Field Name	Useful Range	Estimated Accuracy	Contact Name	Contact Email
Temperature	Temperature	316 -> 1 hPa	± 2 K	John Gille	gille@ucar.edu
O ₃	O3	100+ -> 1.0 hPa	100-600 ppbv, 5-10%	Bruno Nardi	nardi@ucar.edu
HNO ₃	HNO3	100 -> 10 hPa*	10 -> 30% †	Douglas Kinnison	dkin@ucar.edu
Cloud top pressure	CloudTopPressure	422 -> 10 hPa	$\pm 20\%$	Steven Massie	massie@ucar.edu
HDF5, HDF-EOS5	Library installation			GSFC DAAC	Help-disc@listserv.gsfc.nasa.gov
HDF-EOS5	Reading HIRDLS data			Cheryl Craig	cacraig@ucar.edu

* Depends on latitude

† Varies with latitude and altitude. See Kinnison et al.

References

Gille et al., (2008), The High Resolution Dynamics Limb Sounder (HIRDLS): Experiment Overview, Results and Validation of Initial Temperature Data, *Journal of Geophysical Research*; submitted.

Kinnison et al., (2008), Global Observations of HNO₃ from the High Resolution Dynamics Limb Sounder (HIRDLS) – First Results, *Journal of Geophysical Research*; submitted.

Massie et al., (2008), Validation of HIRDLS Observations PSC's and Subvisible Cirrus, *Journal of Geophysical Research*; in press.

Nardi et al., (2008), Validation of HIRDLS Ozone Measurements, *Journal of Geophysical Research*; in press.