Minimum Information That Every HIRDLS Data User Needs to Know

M.1 Acquiring & Reading HIRDLS Level 2 Data

HIRDLS Level 2 data is available from several worldwide data repositories. In the United States, HIRDLS data can be downloaded from the Goddard Earth Sciences Data and Information Services Center (GES DISC). (http://disc.sci.gsfc.nasa.gov/data-holdings). HIRDLS data is also available in the United Kingdom and Europe from the British Atmospheric Data Centre (BADC) (http://badc.nerc.ac.uk/browse/badc/hirdls). In both institutions, several versions of HIRDLS data are available and care should be taken to make sure that V5 data is requested.

HIRDLS Level 2 (L2) 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 who wish to use IDL to access the HIRDLS data.
[1]http://www.eos.ucar.edu/hirdls/HDFEOS_Aura_File_Format_Guidelines.pdf

Warning for IDL users: Due to internal changes within the HDF5 library used to create V5 data, IDL must be upgraded to 7.1 in order to read the HIRDLS V5 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 for all products that HIRDLS measures. The HIRDLS data are a set of values of temperature or mixing ratio on a set of 24 pressure levels per decade of pressure, uniformly distributed in log pressure. The pressure range for V5 extends from 1000 to .01 hPa. 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 the exact names). The estimated precision of each data point is a corresponding field named *Species*Precision (for instance, Temperature and TemperaturePrecision). Two additional fields for each species, *Species*NormChiSq and *Species*Quality, are both filled with missing for V5. CloudTopPressure does not have Precision, NormChiSq or Quality fields. For V5 data, the fields for products other than those listed in Table 1 are filled with missing values (-999.0) since the radiance correction algorithms for these products are not mature yet.

There are two time fields in the HIRDLS data file, Time and SecondsInDay. Time is stored in TAI time (seconds since the epoch of 00.00 UTC 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.

M.2 Data That Should Be Used With Caution

Data points for which the majority of the information comes from the a priori have their precision fields set negative and the user should decide whether data are suitable for scientific studies. (See http://www.agu.org/journals/jd/jd0920/2009JD011937/ for details on quantitative a priori contributions to the errors. In addition, one may consult the web page http://www.eos.ucar.edu/hirdls/data for details on negative precision.)

M.3 Known Problems

A few cloud tops are not detected, resulting in retrievals at low altitudes of cloud-contaminated radiances. This can result in retrieved temperatures being 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.

Table 1 below 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, or the web page http://www.eos.ucar.edu/hirdls/, should be consulted before any use of the data. Additional products may be available in future versions.

Table 1: Information concerning V5 HIRDLS standard products.

Product	Field Name	Useful Range	Estimated Accuracy	Contact Name	Contact Email
Temperature	Temperature	400 - .04 hPa	± 2 K	John Gille	gille@ucar.edu
O_3	O3	260 – 0.5 hPa	† 3-10% 10-100% UTLS	Bruno Nardi	nardi@ucar.edu
HNO_3	HNO3	161 - 10hPa	† 10 to > 30%	Douglas Kinnison	dkin@ucar.edu
Cloud top pressure	CloudTopPressure	422 - 10 hPa	± 20%	Steven Massie	massie@ucar.edu
12.1 Micron Extinction	12.1 Micron Extinction	215 – 20 hPa		Steven Massie	massie@ucar.edu
CFC11	CFC11	287.3 - 26.1 hPa		Michael Coffey	coffey@ucar.edu
CFC 12	CFC12	287.3 - 10.0 hPa		Michael Coffey	coffey@ucar.edu
GPH	GPH	400 - .04 hPa	2%	Lesley Smith	LSmith@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

† Varies with latitude and altitude. See Nardi et al. (2008), Kinnison et al. (2008)

Note that the following references refer to the V3 data, but the descriptions of the data and the methods of evaluation are still applicable. In addition, one may consult the web page http://www.eos.ucar.edu/hirdls/

Gille et al., (2008), The High Resolution Dynamics Limb Sounder (HIRDLS): Experiment Overview, Results and Validation of Initial Temperature Data, *Journal of Geophysical Research*; doi:10.1029/2007JD008824, 2008.

Kinnison et al., (2008), Global Observations of HNO3 from the High Resolution Dynamics Limb Sounder (HIRDLS) – First Results, *Journal of Geophysical Research*; doi:10.1029/2007JD008814, 2008.

Massie et al., (2007), Validation of HIRDLS Observations PSC's and Subvisible Cirrus, *Journal of Geophysical Research*; doi:10.1029/2007JD008788, 2007.

Nardi et al., (2008), Validation of HIRDLS Ozone Measurements, *Journal of Geophysical Research*; doi:10.1029/2007JD008837, 2008.

End of Minimum Information Section