CALIPSO SCIENCE DATA READERS
Release 2.3.1

Introduction

The Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation (CALIPSO) satellite will provide new insight into the role that clouds and atmospheric aerosols play in regulating Earth's weather, climate and air quality. In order to do this, a wide variety of scientific data products will be available to the science community. These products will be derived from the data acquired from three on-board instruments; the Cloud-Aerosol Lidar with Orthogonal Polarization (CALIOP), the Wide Field Camera (WFC) and the Imaging Infrared Radiometer (IIR). These data products are described in the CALIPSO Data Products Catalog (DPC) currently available on the CALIPSO public website at URL: http://www-calipso.larc.nasa.gov/resources/project_documentation.php. The LaRC Atmospheric Sciences Data Center (ASDC) processes, archives, and disseminates the CALIPSO data products. The website address for the ASDC is: http://eosweb.larc.nasa.gov/. These data products are output using the Hierarchical Data Format (HDF). More information concerning HDF formats can be found on the National Center for Supercomputing Applications website at: http://hdf.ncsa.uiuc.edu/.

Readers

A set of basic CALIPSO data product readers has been developed to aid users in their ability to read the HDF formatted files. This set of readers is written using the Interactive Data Language (IDL) available through ITT Visual Information Systems at URL: http://www.ittvis.com/ and go hand in hand with the CALIPSO DPC Release 2.3.   A list of the major data products, their associated readers, commons, check programs, and the corresponding DPC Table numbers are contained in the table below.

Due to the nature of the HDF formatting and the need to assign each parameter to the appropriately named variable, there must be an exact match between variable names stored in the file and the command parameter used to retrieve that variable. These readers are written to provide users with the greatest flexibility to select only those parameters that are necessary for their applications.   They were not written for efficiency as much as simplicity.   There is a one-line call for each parameter, that can be commented out by placing a ';' at the beginning of the line.   Already commented out in each program, but left available for the users, are print statements that will provide more detailed information about each parameter contained in the HDF file. Each reader takes as input two quoted string parameters, PATH and FILE NAME. The PATH name contains the directory path to the folder that contains the data, and the FILE NAME contains the full name of the file to be read.   The CALIPSO data product naming convention is currently being redefined. More information will be available soon.

The commons associated with each data product reader contain abbreviated names for each parameter. If the user chooses not to read every data product, these variables will not be filled, but will not present any problems if left in the common. Of course, the user may change these names to match the desired names for their application, but care should be taken to ensure that names are changed in the IDL code as well as the associated common.   In some cases, single dimension arrays are read as two dimensional with the initial dimension being set to 1. This does not affect the data in any way, but may need to be considered later when working with the arrays. In order to correct this issue, a simple call to the IDL REFORM function will adjust the array to a single dimension. For example, ArrayA is created with dimensions of (1,50). Issuing the command ArrayA = REFORM(ArrayA, /OVERWRITE) returns ArrayA with a single dimension of (50), and the actual data remains unchanged.

Simple check programs are also provided for each of the readers. These check programs are called at the end of each reader program, and are a double check to ensure that all variables are filled. The calls to the check programs can be commented out once the user is certain that all parameters of interest are read correctly. The check programs issue a 'HELP, Variable' for each of the common variables. The HELP command provides common, format, dimension and static value information for all variables. The output from the HELP command is sent to STDOUT, unless otherwise redirected. For a more detailed description of data formats, units, and ranges, please refer to the CALIPSO DPC.

Major Data Products, Associated Readers, Commons, Check Programs, Corresponding DPC Table Numbers

DATA PRODUCT	READER NAME (.pro)	COMMON NAME (.pro)	CHECKIT NAME (.pro)	DPC TABLE NUMBERS
Lidar Level 1	Read_hdf_L1	L1_Common	Checkit_L1	7, 8, 9, 10
Lidar Level 2 5km Aerosol Column and Layer	Read_hdf_L2_AL05	L2_AL05_Common	Checkit_AL05	26, 33, 34
Lidar Level 2 1/3km Cloud Column and Layer	Read_hdf_L2_CL33	L2_CL33_Common	Checkit_CL33	26, 27, 28
Lidar Level 2 1km Cloud Column and Layer	Read_hdf_L2_CL01	L2_CL01_Common	Checkit_CL01	26, 29, 30
Lidar Level 2 5km Cloud Column and Layer	Read_hdf_L2_CL05	L2_CL05_Common	Checkit_CL05	26, 31, 32
Lidar Level 2 Aerosol Profile	Read_hdf_L2_AERPRF	L2_AERPRF_Common	Checkit_AERPRF	36, 37, 38
Lidar Level 2 Cloud Profile	Read_hdf_L2_CLDPRF	L2_CLDPRF_Common	Checkit_CLDPRF	40, 41
Lidar Level 2 Vertical Feature Mask	Read_hdf_L2_VFM	L2_VFM_Common	Checkit_VFM	43, 44
WFC 125m Native Science Record	Read_hdf_WFC_125	WFC_125_Common	Checkit_W125	18, 21
WFC 1km Native Science Record	Read_hdf_WFC_1NS	WFC_1NS_Common	Checkit_W1NS	18, 20
WFC 1km Registered Science Record	Read_hdf_WFC_1RS	WFC_1RS_Common	Checkit_W1RS	18, 19
IIR Level 1 Science Record	Read_hdf_IIR_L1	IIR_L1_Common	Checkit_IIR	12, 13, 14

These readers can be called from within a program, or embedded into the users program. Remember to include the associated common into the application software in order to have full access to the data. The user is also reminded to make certain that the IDL path parameters are set correctly under the IDL Preferences options.

To run these programs from the Windows IDL Development Environment (IDLDE) simply enter the command:

<Reader Name>, <Directory Path (quoted)>, <File Name (quoted)>

Examples:

READ_HDF_L1, 'C:\DATA\', 'CAL_LID_L1-Prov-V1-10.2006-00-00T00-00-00ZN.hdf'
READ_HDF_L2_AL05, 'C:\DATA\', 'CAL_LID_L2_05kmALay-Prov-V1-10.2006-00-00T00-00-00ZN.hdf'
READ_HDF_L2_CL33, 'C:\DATA\', 'CAL_LID_L2_333mCLay-Prov-V1-10.2006-00-00T00-00-00ZN.hdf'
READ_HDF_L2_CL01, 'C:\DATA\', 'CAL_LID_L2_01kmCLay-Prov-V1-10.2006-00-00T00-00-00ZN.hdf'
READ_HDF_L2_CL05, 'C:\DATA\', 'CAL_LID_L2_05kmCLay-Prov-V1-10.2006-00-00T00-00-00ZN.hdf'
READ_HDF_L2_AERPRF, 'C:\DATA\', 'CAL_LID_L2_40kmAPro-Alpha-V1-22.2006-00-00T00-00-00ZN.hdf'
READ_HDF_L2_CLDPRF, 'C:\DATA\', 'CAL_LID_L2_05kmCPro-Alpha-V1-22.2006-00-00T00-00-00ZN.hdf'
READ_HDF_L2_VFM, 'C:\DATA\', 'CAL_LID_L2_VFM-Prov-V1-10.2006-00-00T00-00-00ZN.hdf'

READ_HDF_WFC_125, 'C:\DATA\', 'CAL_WFC_L1_125m-Prov-V1-10.2006-00-00T00-00-00ZD.hdf'
READ_HDF_WFC_1NS, 'C:\DATA\', 'CAL_WFC_L1_1Km-Prov-V1-10.2006-00-00T00-00-00ZD.hdf'
READ_HDF_WFC_1RS, 'C:\DATA\', 'CAL_WFC_L1_IIR-Prov-V1-10.2006-00-00T00-00-00ZD.hdf'
READ_HDF_IIR_L1, 'C:\DATA\', 'CAL_IIR_L1-Prov-V1-10.2006-00-00T00-00-00ZD.hdf'