Lab-9: Level-2 Processing (SST and Water-Leaving Radiance)

May-7, 2010

Previously we have used the SeaDas c-shell scripts like modis_L1A_to_L1B.csh to convert level-1A to level-1B files. These files are in a standard, Hierarchical Data Format (HDF) which was originally designed at the National Center for Supercomputing Applications in Urbana-Champaign at the University of Illinois. The SeaDas c-shell scripts provide wrappers to execute c-codes that read, process, and write binary .hdf files such as the *.L1B_LAC (1km), etc. which contain calibrated signals in engineering units for all 36 MODIS bands.

Today we will expand our processing capabilities to level-2 files which contain estimated properties such as SST, water-leaving radiances, chlorophyll, etc., that are NOT directly measured, but are results from algorithm using multiple bands as input and many models and regressions that may or may not be appropriate for all applications in all regions. It also contains extensive data quality flags (clouds, ice, etc.) Relevant information at

http://oceancolor.gsfc.nasa.gov/seadas/doc/l2gen/l2gen.html

explains both run-time (GUI) and command-line (Unix) processing. The latter is preferred as it gives you fuller access to all data fields.

1. Lets start with the minimum command to obtain the product sst [**bold are commands**]

l2gen ifile=$name.L1B_LAC geofile=$name.GEO ofile1=$name.L2 l2prod1='sst'

where $name is the file name of a Modis scene you have already processed, but we have no idea what the new file $name.L2 contains except that it is an .hdf file.

2. Explore the header information of the file $name.L2 by extracting header information via an hdf-tool similar to one we have used before (to generate HeaderInfo.ascii):

hdp dumpsds –h –o HeaderInfo.L2 $name.L2

3. Have a look the output HeaderInfo.L2, e.g., **more HeaderInfo.L2** and perhaps issue a nawk command like **nawk '$1 ~ "Variable" {print}' HeaderInfo.L2** to see what you got.

4. Based on the information gathered in #3, you can extract the relevant variables from the $name.L2 file and write them to a flat binary file via the same hdf-tool used in #2:

hdp dumpsds –n sst –o sst.L2 –b $name.L2

which extracts the variable sst from the input file $name.L2 and writes it to file sst.L2. This flat binary file contains sst values as 16-bit signed integers (INTEGER*2 in fortan parlance) on a 1960x1354 grid as documented in the HeaderInfo.L2 file. You can check the file size of sst.L2 which should be 1960*1354*2 bytes = 5,307,680 bytes or about 5MB. If you omit the –o sst.L2 (output written to sst.L2) option, the sea surface temperatures are written in ascii to your screen. You can extract latitude and longitude the same way; however, these are stored as 32-bit floating-point numbers (REAL*4 in fortran parlance).

5. Extract longitude and latitudes the same way as you extracted SST in #4.

6. Copy your functional getbin.f fortran code and modify this copy to read the flat binary level-2 files to produce a flat ascii file with longitude, latitude, SST for GMT plotting.