LTDR Data Format Descriptions (Version 4 Release)

1.1 AVH02 TOA Surface Reflectance Product

Naming Convention

The LTDR TOA surface reflectance products in Version 4 release use the following naming convention:

AVH02C1.A1981175.N07.004.2010056111758.hdf

AVH02	identifies the AVHRR TOA land surface reflectance product
C1	indicates compositing interval
	C1 = daily product
A1981175	is the year (4-digits) of the observation followed by the day within the year
N07	identifies the satellite, NOAA-7, 9, 11, 14, or 16
004	identifies the data product version
2010056	is the year the data were processed followed by the day within the year
111758	is the hour, minute, and second the data were processed
.hdf	indicates the output file is in HDF

Scientific Data Sets

The processed AVHRR observations are packaged into separate Scientific Data Sets (SDS) within a single HDF file. All SDS arrays are dimensioned [7200, 3600] to cover the globe at 0.05º spatial resolution in a latitude/longitude Climate Modeling Grid (CMG). The SDS arrays in the surface reflectance product are:

Array Name	Description	Units	Data Type[1]	Valid Range [low,high]	Scale Factor[2]	Fill Value
TOA_REFL_CH1	TOA Reflectance for channel 1 (0.5–0.7 μm)	Unitless	Int16	[-0.1, 1]	1E-4	-9999
TOA_REFL_CH2	TOA Reflectance for channel 2 (0.7–1.0 μm)	Unitless	Int16	[-0.1, 1]	1E-4	-9999
BT_CH3	TOA brightness temperature for channel 3 (~ 3.55 – 3.93 μm)	Degrees Kelvin	Int16	[0-100]	0.1	-9999
BT_CH4	TOA brightness temperature for channel 4 (~ 10.3 – 11.3 μm)	Degrees Kelvin	Int16	[0-100]	0.1	-9999

Array Name	Description	Units	Data Type[1]	Valid Range [low,high]	Scale Factor[2]	Fill Value
BT_CH5	TOA brightness temperature for channel 5 (~ 11.5 – 12.5 μm)	Degrees Kelvin	Int16	[0-100]	0.1	-9999
SZEN	Solar zenith angle	Degrees	Int16	[-90° – 90°]	0.01	-9999
VZEN	View zenith angle	Degrees	Int16	[-70° – 70°]	0.01	-9999
RELAZ	Relative azimuth[3]	Degrees	Int16	[-180° -180°][3]	0.01	-9999
TIME	Time of acquisition	HH:MM	Int16	[0 – 23.99]	0.01	
QA	Quality Assessment Field (see section 1.3)	NA	Int16	NA	NA	NA

Notes:
1. The data type int16 is a 2-byte integer, containing 16 bits.
2. The scale factor is the number the physical value is multiplied by to convert to an integer value, thus to retrieve the physical units from the SDS values divide by the given scale factor.
3. The current version of V4 LTDR products contains values in the range (-360, 360) for the dataset relative azimuth. The routine to restrict the range to (-180, 180) was accidentally missed in the current reprocessing and will be corrected in the next reprocessing. Until then users are requested to derive the relative azimuth (GOOD_REL_AZ) from the current file value (RELAZ) using the following pseudocode.

```
    SIN_REL_AZ = sin(RELAZ)
    COS_REL_AZ = cos(RELAZ)
GOOD_REL_AZ = atan2(SIN_REL_AZ, COS_REL_AZ)
```

1.3 Quality Assessment Field Description

All LTDR products contain a Quality Assessment (QA) field or SDS. The definition of the QA bits is the same for each product. In the following table the bits are listed from the most significant bit (MSB = bit 15) to the least significant bit (LSB = bit 0):

Bit Number	Description	Meaning
15	Polar flag: latitude > 60° (land) or > 50° (ocean)	1 = yes, 0 = no
14	BRDF-correction issues	1 = yes, 0 = no
13	RHO3 value is invalid	1 = yes, 0 = no
12	Channel 5 value is invalid	1 = yes, 0 = no
11	Channel 4 value is invalid	1 = yes, 0 = no
10	Channel 3 value is invalid	1 = yes, 0 = no
9	Channel 2 value is invalid	1 = yes, 0 = no

Bit Number	Description	Meaning
8	Channel 1 value is invalid	1 = yes, 0 = no
7	Channel 1-5 are invalid	NA
6	Pixel is at night (high solar zenith angle)	1 = yes, 0 = no
5	Pixel is over dense dark vegetation	1 = yes, 0 = no
4	Pixel is over sun glint	1 = yes, 0 = no
3	Pixel is over water	1 = yes, 0 = no
2	Pixel contains cloud shadow	1 = yes, 0 = no
1	Pixel is cloudy	1 = yes, 0 = no
0	Unused	NA