# LTDR Data Format Descriptions (Version 2 Release)

## 1.1 AVH09 Surface Reflectance Product

### *Naming Convention*

The LTDR surface reflectance products in the Version 2 release use the following naming convention:

AVH09C1.A1987123.N09.002.2007134130606.hdf

| | |
|---|---|
| AVH09 | identifies the AVHRR land surface reflectance product |
| C1 | indicates compositing interval<br>C1 = daily product |
| A1987123 | is the year (4-digits) of the observation followed by the day within the year |
| N09 | identifies the satellite, NOAA-7, 9, 11, 14, or 16 |
| 002 | identifies the data product version |
| 2007134 | is the year the data were processed followed by the day within the year |
| 130606 | 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 0.05° 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 |
|---|---|---|---|---|---|---|
| SREFL_CH1 | Surface reflectance for channel 1 (0.5–0.7 μm) | Unitless | int16 | [0, 1] | $10^4$ | -9999 |
| SREFL_CH2 | Surface reflectance for channel 2 (0.7–1.0 μm) | Unitless | int16 | [0, 1] | $10^4$ | -9999 |
| SREFL_CH3 | Surface reflectance for ch. 3 (~3.55 – 3.93 μm) | Unitless | int16 | [0, 1] | $10^4$ | -9999 |
| BT_CH3 | TOA brightness temperature for channel 3 (~3.55 – 3.93μm) | Degrees Kelvin | int16 | [varies] | 10 | -9999 |
| BT_CH4 | TOA brightness temperature for channel 4 (10.3 – 11.3 μm) | Degrees Kelvin | int16 | [varies] | 10 | -9999 |
| BT_CH5 | TOA brightness | Degrees | int16 | [varies] | 10 | -9999 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | temperature for channel 5 (11.5 –12.5 μm) | Kelvin | | | | |
| SZEN | Solar zenith angle | Degrees | int16 | [0°, 90°] | $10^2$ | -9999 |
| VZEN | View zenith angle | Degrees | int16 | [-90°, 90°] | $10^2$ | -9999 |
| RELAZ | Relative azimuth | Degrees | int16 | [varies] | $10^2$ | -9999 |
| QA | Quality Assessment Field (see section 1.4) | 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.

# 1.2 AVH13 NDVI Product

## *Naming Convention*

The LTDR NDVI products in the Version 2 release use the following naming convention:

AVH13C1.A1987123.N09.002.2007134130606.hdf

| | |
|---|---|
| AVH13 | identifies the AVHRR land surface reflectance product |
| C1 | indicates compositing interval<br>C1 = daily product |
| A1987123 | is the year (4-digits) of the observation followed by the day within the year |
| N09 | identifies the satellite, NOAA-7, 9, 11, 14, or 16 |
| 002 | identifies the data product version |
| 2007134 | is the year the data were processed followed by the day within the year |
| 130606 | 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 0.05° spatial resolution in a latitude/longitude Climate Modeling Grid (CMG).

| Array Name | Description | Units | Data Type[1] | Valid Range [low, high] | Scale Factor[2] | Fill Value |
|---|---|---|---|---|---|---|
| NDVI | Normalized Difference Vegetation Index | Unitless | int16 | [-1, 1] | $10^4$ | -9999 |
| QA | Quality Assessment Field (see section 1.4) | 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.

## 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 | Desert flag | 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 |
| 8 | Channel 1 value is invalid | 1 = yes, 0 = no |
| 7 | Channels 1 – 5 are valid | 1 = yes, 0 = no |
| 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 | Pixel is partly cloudy | 1 = yes, 0 = no |