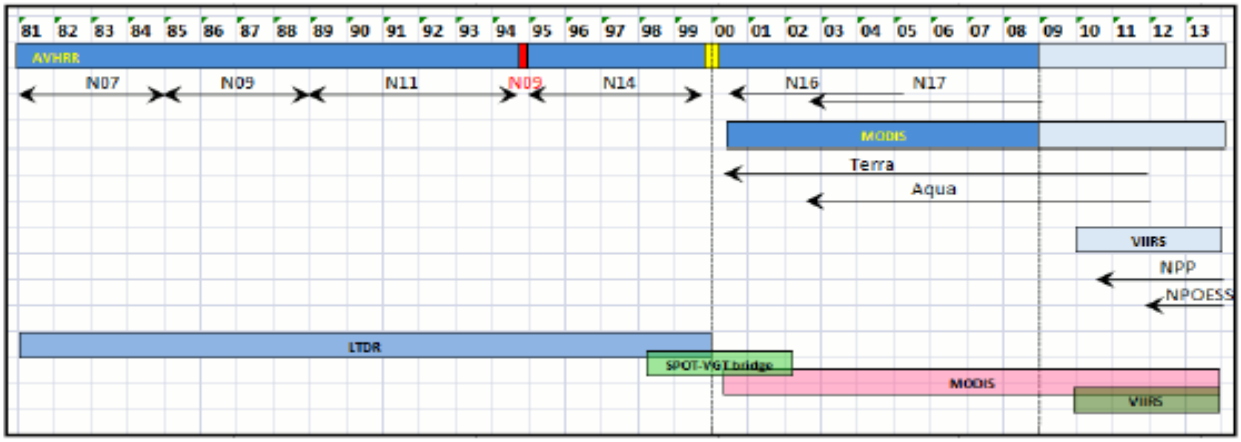
Preprocessed Input Data

A 30+ years global CMG daily dataset is downloaded, composed of the following sensors: AVHRR (1981-1999), SPOT4 (1998-2002) and MODIS (2000-2010). The daily global data from MODIS and LTDR both have 3600x7200 pixels.



Description

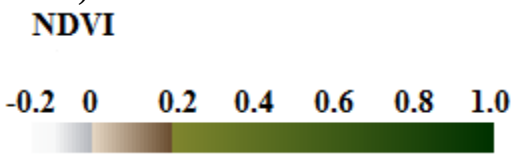
AVHRR

The Advance Very High Resolution Radiometer (AVHRR) is a polar orbital satellite founded by NASA. AVHRR provides two surface reflectance spectral band products and they are centered around the read and NIR regions. There are different types of satellite that were used for surface reflectance, the following table are shown the launch and service dates:

Satellite	Service start	Service end
NOAA-7	24-Aug-81	7-Jun-86
NOAA-9	25-Feb-85	11-May-94
NOAA-11	8-Nov-88	13-Sep-94
NOAA-14	30-Dec-94	23-May-07

Process

The product has been downloaded directly from ftp://ltdr.nascom.nasa.gov/pub/f301/AVHRR/. This data do not have processing. The following legend have been used for the images (see below)



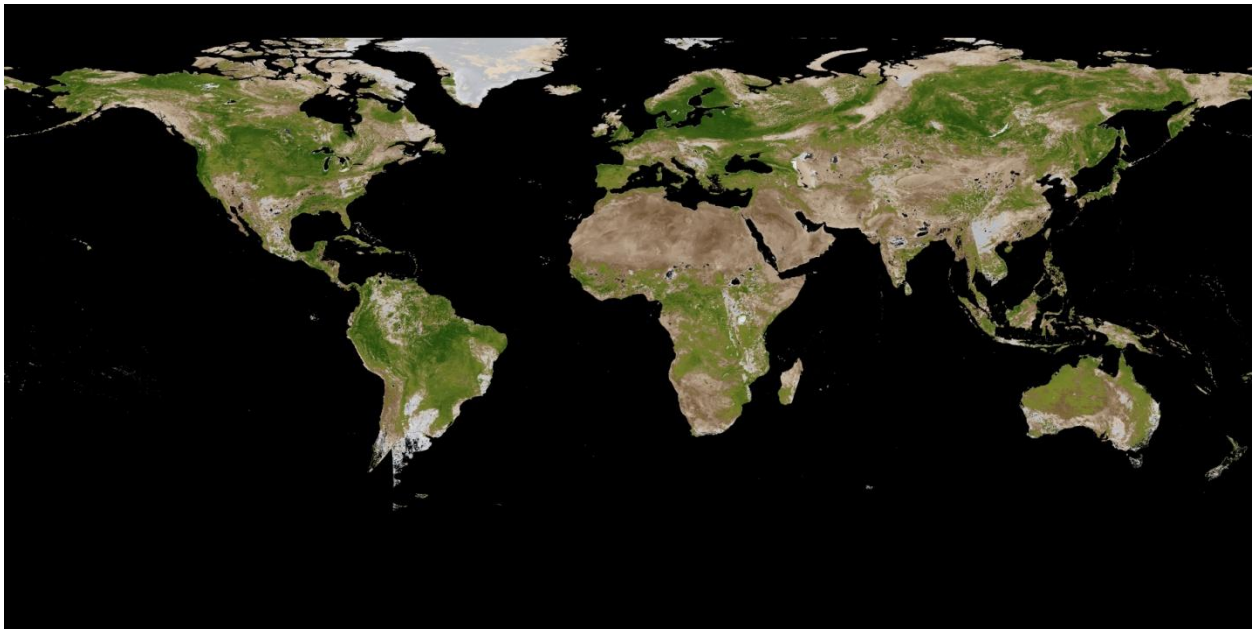


Figure 1 Input Data (AVHRR)

The following table shows the days of the year without data.

Year	Missing Days (DOY)
1981	177, 178, 182-201
1982	22, 88, 104-107, 114, 119-121, 187, 202, 237, 268, 269
1983	218
1984	14, 15, 51, 53, 62, 82, 101, 107, 205, 341, 342
1985	1, 2, 18, 19, 39, 40, 41, 42, 70, 310
1986	38, 73, 74, 247-365
1987	
1988	4, 72, 73, 81, 90, 135, 136, 170, 197-199, 206-208, 235, 262, 281, 313-315, 335
1989	80, 81, 96
1990	1, 3, 59, 201-205, 210-213, 307, 321
1991	1-4, 10-14, 41-43, 262-365
1992	50, 213-365
1993	90, 213-365
1994	11, 257-365
1995	
1996	121-128
1997	285-365
1998	
1999	1, 287, 288

Data Set Characteristics

Temporal Coverage	1981 - 1999
Area	Global
File Size	~160 MB
Projection	Latitude/Longitude
Data Format	HDF-EOS
Dimensions	3600 x 7200 rows/columns
Resolution	0.05 degrees (5600 meters)
Science Data Sets (SDS HDF Layers)	10
Location	/DATA/MEASURES/LTDR/

Layer Specifications and QA/QC Descriptions

Science Data Sets for AVHRR 09 Surface Reflectance Daily Global 0.05Deg CMG V2:

Science Data Sets (HDF Layers) (10)	UNITS	BIT TYPE	FILL	VALID RANGE	MULTIPLY BY SCALE FACTOR
Surface Reflectance 640 nm	Reflectance	16-bit signed integer	-9999	-1000–1000	0.0001
Surface Reflectance 860 nm	Reflectance	16-bit signed integer	-9999	-1000–1000	0.0001
Coarse Resolution Surface Reflectance Band 3 (459–479 nm)	Reflectance	16-bit signed integer	-28672	-100–16000	0.0001
Brightness Temperature 3.75 microns	Kelvins	16-bit signed integer	-9999	0 - 1000	0.1
Brightness Temperature 11.0 microns	Kelvins	16-bit signed integer	-9999	0–1000	0.1
Brightness Temperature 12.0 microns	Kelvins	16-bit signed integer	-9999	0–1000	0.1
Surface Reflectance 3.75 microns	Reflectance	16-bit signed integer	-9999	-1000–1000	0.0001
Solar Zenith Angle	Degree	16-bit signed integer	-9999	-9000–9000	0.01
View Zenith Angle	Degree	16-bit signed integer	-9999	-7000–7000	0.01
Relative Azimuth	Degree	16-bit signed integer	-9999	-18000–180000	0.01
Quality Assurance	Bit Field	16-bit signed integer	0	0–15	na

The QA information below is excerpted from an HDF-EOS file of the AVHRR 09 Surface Reflectance product.
The V2 AVHRR09 product includes one QA layer, presenting the surface reflectance state.

AVHRR09 0.05 Deg CMG Surface Reflectance Data State QA Descriptions (16-bit)

Bits are listed from the MSB (bit 15) to the LSB (bit 0)

Bit No.	Parameter Name	Bit Comb.	Coarse Resolution State QA
15	Polar flag (latitude over 60 degrees (land) or 50 degrees (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	Channel 1 -5 are valid	1	yes
		0	no
6	Pixel is at night (high solar zenith)	1	yes
		0	no
5	Pixel is over dense dark vegetation	1	yes
		0	no
4	Pixel is over sunlight	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

Reference:

AVHRR webpage, http://noaasis.noaa.gov/NOAASIS/ml/avhrr.html