Continuity

Description

The Advance Very High Resolution Radiometer (AVHRR) is a sensor which is located in a NOAA orbital satellite. One of the main advantages of the AVHRR instrument is that it provides a long term reflectance data sets (from 1981 through 1999) to monitor the land surface. After 1999, MODIS (2000) has been the sensor commonly used to the land surface characterization. In order to combine those data sets, it is necessary to standardize the AVHRR VIs at the same level as MODIS data. The data on the gap between AVHRR and MODIS were gathered with SPOT-4 Vegetation.

Process

Tomoaki Miura (one of the NASA's team) developed some equations, for both NDVI and EVI, to attend the continuity of those instruments. There are two approaches that have been applied to create the continuity science between AVHRR and MODIS instruments. The following tables (Spectral Transformation Equations to MODIS-equivalent (TOC, CMG)) show the equations:

Bottom-Up direct image comparison (for LTDR v.3)

NDVI (*x* variable)	**Equation**	**Uncertainty (95% PI)**
N-7 AVHRR, ROW, GAC	y = 0.0105080 + 1.1144501x	±0.033
N-9 AVHRR, ROW, GAC	y = 0.0127476 + 1.1215841x	±0.032
N-11 AVHRR, ROW, GAC	y = 0.0143102 + 1.1167148x	±0.032
N-14 AVHRR, ROW, GAC	y = 0.0143951 + 1.1336442x	±0.030
S-4 VEGETATION, TOC, CMGV	y = 0.0381324 + 1.0064999x	±0.013
EVI (*x* variable)	**Equation**	**Uncertainty (95% PI)**
N-7 AVHRR, ROW, GAC	y = -0.000084 + 1.2339542x	±0.023
N-9 AVHRR, ROW, GAC	y = 0.0023720 + 1.2298151x	±0.022
N-11 AVHRR, ROW, GAC	y = 0.0033594 + 1.2256970x	±0.022
N-14 AVHRR, ROW, GAC	y = 0.0044528 + 1.2244740x	±0.022
S-4 VEGETATION, TOC, CMGV	y = 0.0232545 + 1.0324644x	±0.006

Top-Down, Direct Image Comparison (for LTDR v.3)

NDVI (*x* variable)	Equation	Uncertainty (95% PI)
N-7 AVHRR, ROW, GAC	$y = -0.0646111 + 1.2409713x - 0.0304219x^2$	±0.138
N-9 AVHRR, ROW, GAC	$y = -0.0621082 + 1.2487272x - 0.0307315x^2$	±0.138
N-11 AVHRR, ROW, GAC	$y = -0.0606805 + 1.2456808x - 0.0335204x^2$	±0.138
N-14 AVHRR, ROW, GAC	$y = -0.0571829 + 1.2372178x$	±0.138
S-4 VEGETATION, TOC, CMGV	$y = 0.0156834 + 1.0610148x$	±0.061
EVI (*x* variable)	**Equation**	**Uncertainty (95% PI)**
N-7 AVHRR, ROW, GAC	$y = -0.0403338 + 1.2400319x$	±0.088
N-9 AVHRR, ROW, GAC	$y = -0.0403338 + 1.2400319x$	±0.088
N-11 AVHRR, ROW, GAC	$y = -0.0403338 + 1.2400319x$	±0.088
N-14 AVHRR, ROW, GAC	$y = -0.0403338 + 1.2400319x$	±0.088
S-4 VEGETATION, TOC, CMGV	$y = 0.0085842 + 1.1557716x$	±0.037

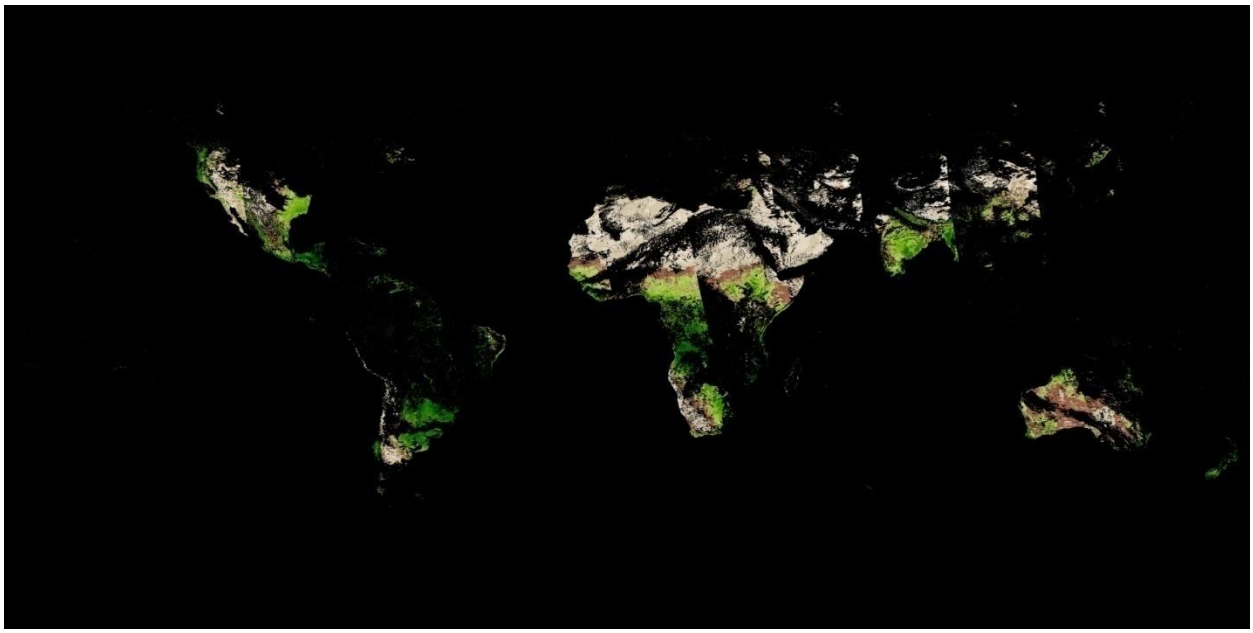

Figure 1: Continuity (NDVI)

Data set Characteristics

Temporal Coverage	1981 – 2010
Area	Global
File Size	~207 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)	4
Location	/VIP/DATA/MEASURES/CONTINUITY/

Science Data Sets (HDF Layers) (4)	UNITS	BIT TYPE	FILL	VALID RANGE	MULTIPLY BY SCALE FACTOR
NDVI	Vegetation Index	16-bit signed integer	-15000	-10000 - 10000	0.0001
EVI2	Vegetation Index	16-bit signed integer	-15000	-10000 - 10000	0.0001
Q&A	Bit Field	16-bit signed integer	0	0–65535	NA
Rank	Ordinal	8-bit signed integer	-2	>0	NA

Limitations

These data show gaps because they were filtered. The user can use the non-filtered data.