

Phenology

Description

Vegetation phenology can be defined as the plants study of the biological cycle events throughout the year and the seasonal and interannual response by climate variations. Phenology products, produced daily or on 16-day compositing period, provide different parameters which describe the seasonal behavior of the vegetation.

Process

In general, the phenology is represented graphically it has a bell shape. The graphic below exhibits the following parameters: start of season (a), end of the season (b), length of the season (g), day of pick (e, time), rate of greening ($\Delta NDVI/\Delta t$, between a and c), rate of senescencing ($\Delta NDVI/\Delta t$, between d and b), cumulative green (h), pick green (e, NDVI), and average green. All of these parameters are shown below [Jonsson]. We are capturing these metrics for up to two seasons.

DAY OF THE YEAR

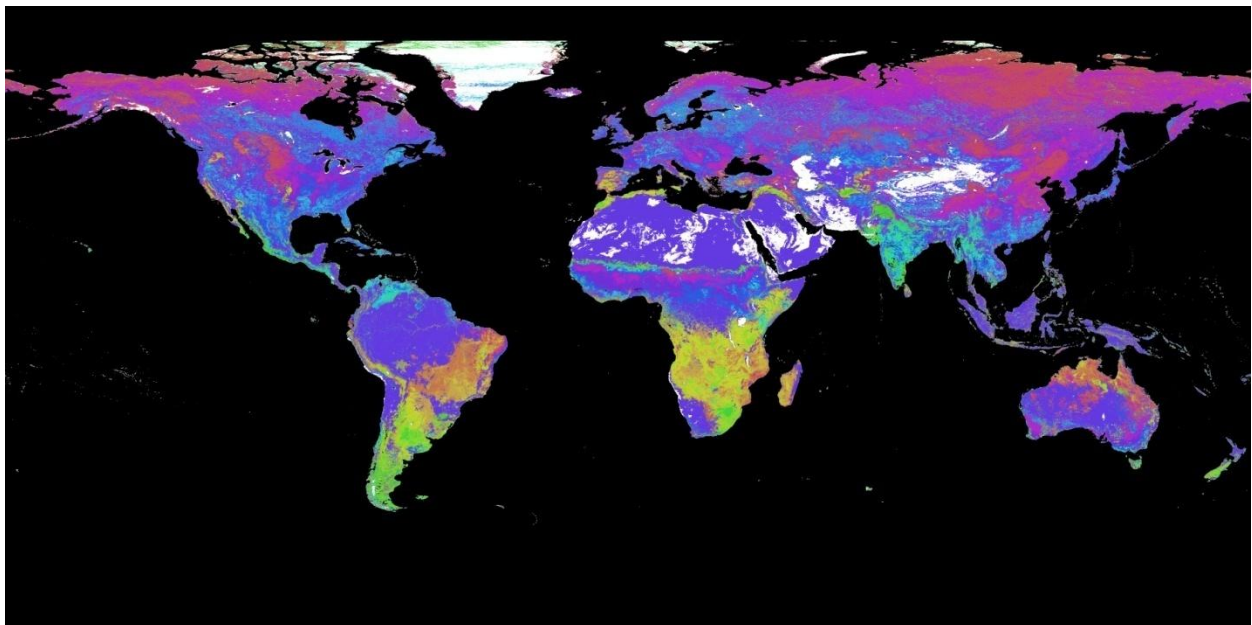
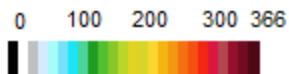
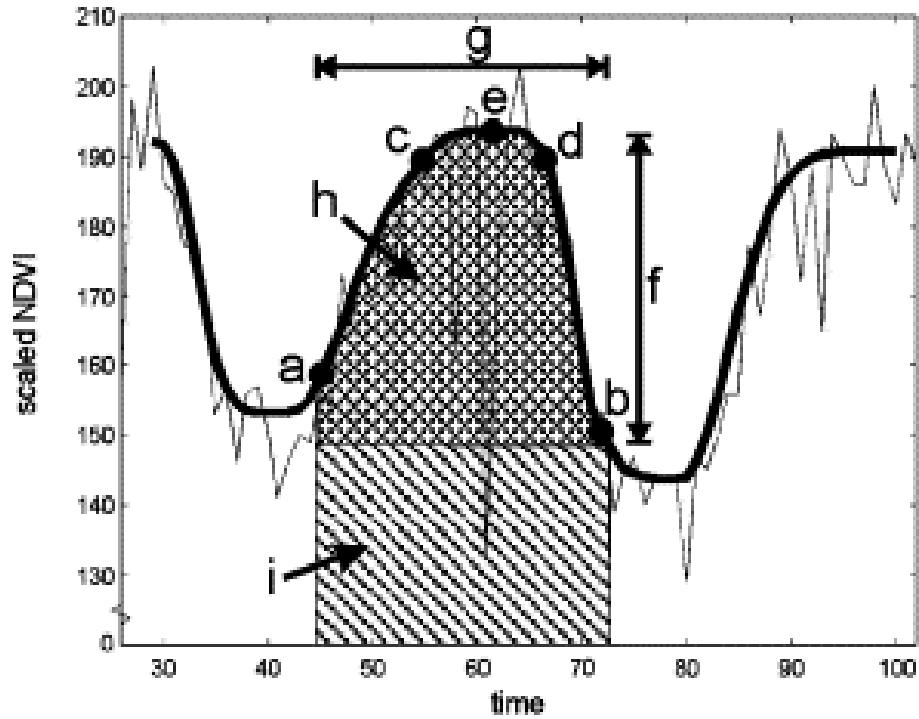


Figure 1: Phenology cluster from 1980 to 1985 (AVHRR)



The phenology process has been done by two approaches: by pixel and by cluster. Phenology cluster intends to determine the phenology metrics in homogeneous zones, with similar precipitation, temperature, and plant species and around similar elevation [Didan].

Data Set Characteristics

Temporal Coverage	1981 - 2010
Area	Global
File Size	~ 850 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)	18
Location	/DATA/MEASURES/PHENOLOGY/

Science Data Sets (HDF Layers) (18)	UNITS	BIT TYPE	FILL	VALID RANGE	MULTIPLY BY SCALE FACTOR
Start of Season	Day of the year	16-bit signed integer	-1	1-366	1
End of Season	Day of the year	16-bit signed integer	-1	1-366	1
Length of Season	Days	16-bit signed integer	-1	1-366	1
Day of Peak	Day of the year	16-bit signed integer	-1	1-366	1
Rate of Greening	VI/Day	16-bit signed integer	-1	> 0	0.0001
Rate Senescence	VI/Day	16-bit signed integer	-1	> 0	0.0001
Peak Green	Vegetation Index	16-bit signed integer	-1	> 0	0.0001
Start of Season 2	Day of the year	16-bit signed integer	-1	1-366	1
End of Season 2	Day of the year	16-bit signed integer	-1	1-366	1
Length of Season 2	Days	16-bit signed integer	-1	1-366	1
Day of Peak 2	Day of the year	16-bit signed integer	-1	1-366	1
Rate of Greening 2	VI/Day	16-bit signed integer	-1	> 0	0.0001
Rate Senescence 2	VI/Day	16-bit signed integer	-1	> 0	0.0001
Peak Green 2	Vegetation Index	16-bit signed integer	-1	> 0	0.0001
Cumulative Green	Vegetation Index	16-bit signed integer	-1	> 0	0.0001
Average Green	Vegetation Index	16-bit signed integer	-1	> 0	0.0001
Number of Seasons	Ordinal	8-bit signed integer	-1	> 0	1
Pixel Reliability	Rank	8-bit signed integer	-1	> 0	1

References

Jonsson, P., Eklundh, L. "TIMESAT-a program for analyzing time-series of satellite sensor data". *Computers Geosciences* (2004). 30, 833-845.

Didan, K. "Multi-Satellite Science Data Record for Studying Global Vegetation Trends and Changes.