Table 1: Per cent change in PAL NDVI between 1982 and 1999 for six geographic regions and the world[1]

Figures are % except for land area.

Regions[2]	Decreasing NDVI		Neutral	Increasing NDVI		Land Area[3]	Percent[4]
	<-8%	-8 to <-4%	-4 to 4%	>4 to 8%	>8%		
World	0.43%	1.18%	68.27%	25.76%	4.36%	132,599.2	100.00%
Africa	0.16%	0.49%	75.77%	19.60%	3.98%	30,083.8	22.69%
Asia	0.43%	0.84%	72.39%	22.12%	4.22%	43,256.2	32.62%
Austral	1.08%	3.91%	65.88%	21.30%	7.83%	9,272.6	6.99%
Europe	0.49%	0.72%	49.75%	43.71%	5.33%	10,023.0	7.56%
North America	0.47%	1.07%	54.75%	39.25%	4.46%	21,926.2	16.54%
South America	0.41%	2.14%	73.85%	20.72%	2.88%	18,037.4	13.60%

Notes

1. Per cent change is based on the simple differencing image (annual average image 1982-83 subtracted from 1998-99) divided by the 1982-83 image.

2. The regions are based on the following areas.

a. African realm includes Madagascar and the coastal islands.

b. Asian realm includes East, Southeast, South and West Asia with the Ural mountains separating Russia into European Russia and Asian Russia.

c. Austral realm includes Australia, New Zealand, New Guinea and Pacific islands.

d. European realm uses the Urals and the Greece and Turkey border as the separator between Europe and Asia.

e. South America is divided from North America at the border of Panama and Colombia.

f. North America includes the Caribbean islands and Central America.

3. Land area in thousands of square kilometers, based on portions of the annual average image and is based on the per cent change image (70^0 N to 60^0 S; 360^0 of longitude).

4. Per cent is based on 132,599,168 square kilometres from the per cent change image (70^0 N to 60^0 S; 360^0 of longitude)

Table 2: Per cent Change in Persistent NDVI between 1982 and 1999 for six Regions and the World.

Per cent change is based on the simple differencing image (annual average image 1982-83 subtracted from 1998-99) divided by the 1982-83 image, and then filtered for persistent change (see text for filter methodology).

A. PAL Data

Regions	Decreasing NDVI		Neutral	Increasing NDVI		Land Area	Percent
	<-8%	-8 to <-4%	-4 to 4%	>4 to 8%	>8%		
World	0.22%	0.40%	82.93%	12.95%	3.50%	132,599.2	100.00%
Africa	0.07%	0.19%	86.07%	10.52%	3.15%	30,083.8	22.69%
Asia	0.23%	0.19%	84.17%	11.80%	3.61%	43,256.2	32.62%
Austral	0.66%	2.01%	89.63%	3.41%	4.28%	9,272.6	6.99%
Europe	0.18%	0.10%	68.76%	26.19%	4.77%	10,023.0	7.56%
North America	0.23%	0.25%	76.87%	19.12%	3.82%	21,926.2	16.54%
South America	0.23%	0.76%	86.88%	9.88%	2.26%	18,037.4	13.60%

Notes
See notes for Table 1.

B. GIMMS Data

Regions	Decreasing NDVI		Neutral	Increasing NDVI		Land Area	Percent
	<-8%	-8 to <-4%	-4 to 4%	>4 to 8%	>8%		
World	2.02%	1.52%	75.70%	6.35%	14.41%	132,599.2	100.00%
Africa	1.78%	2.02%	83.20%	3.49%	9.51%	30,083.8	22.69%
Asia	1.87%	1.36%	74.67%	6.54%	15.56%	43,256.2	32.62%
Austral	8.16%	2.40%	67.62%	3.32%	18.50%	9,272.6	6.99%
Europe	0.58%	0.89%	75.42%	11.49%	11.62%	10,023.0	7.56%
North America	1.56%	1.06%	73.10%	8.28%	16.00%	21,926.2	16.54%
South America	1.66%	2.14%	75.49%	4.70%	16.01%	18,037.4	13.60%

Notes
See notes for Table 1.

Table 3. Non-persistent PAL NDVI between 1982 and 1999 for six Regions and the World.

Non-persistent refers to the pixels increasing or decreasing which do not qualify as persistently changing (Simple Differencing image minus Persistent Change image = Non-persistent image).

Regions	Decreasing NDVI		Increasing NDVI		Land Area	Percent
	<-8%	-8 to <-4%	>4 to 8%	>8%		
World	0.21%	0.91%	17.72%	1.20%	132,599.2	100.00%
Africa	0.09%	0.37%	13.11%	1.11%	30,083.8	22.69%
Asia	0.20%	0.71%	14.67%	0.91%	43,256.2	32.62%
Austral	0.43%	2.44%	19.49%	4.47%	9,272.6	6.99%
Europe	0.32%	0.64%	27.02%	0.94%	10,023.0	7.56%
North America	0.24%	0.87%	27.04%	0.89%	21,926.2	16.54%
South America	0.20%	1.67%	14.88%	0.86%	18,037.4	13.60%

Notes:
See Notes from Table 1.

Table 4. Per cent PAL Pixels filtered out for 6 Geographic Regions and the World

Pixels showing increasing NDVI and decreasing NDVI which were not persistently changing through the time period were filtered out. (Simple Differencing image minus Persistent Change image = Non-persistent image). See methodology section for details.

Regions	Decreasing NDVI		Increasing NDVI	
	<-8%	-8 to <-4%	>4 to 8%	>8%
World	49%	66%	50%	20%
Africa	56%	61%	46%	21%
Asia	47%	77%	47%	15%
Austral	39%	49%	84%	45%
Europe	63%	86%	40%	11%
North America	51%	77%	51%	14%
South America	44%	65%	52%	22%
Total	49%	66%	50%	20%

Notes:

See Notes in Table 1.

Table 5. Percent Change in NDVI between 1982 and 1999 for 13 Land Cover Classes[1]

A. PAL Data

Land Cover Classes[2]	Decreasing NDVI		Nutrual	Increasing NDVI		Land Area[3]	Percent[4]
	<-8%	-8 to <-4%	-4 to 4%	>4 to 8%	>8%		
Evergreen Needleleaf	0.16%	0.67%	53.31%	41.43%	4.43%	11,256.0	8.53%
Evergreen Broadleaf	0.54%	0.97%	67.01%	28.20%	3.28%	14,941.8	11.31%
Deciduous Needleleaf	0.11%	0.81%	84.38%	14.35%	0.35%	2,321.5	1.76%
Deciduous Broadleaf	0.22%	0.91%	67.22%	29.44%	2.21%	4,223.3	3.20%
Mixed Forest	0.06%	0.29%	55.47%	41.58%	2.60%	4,816.6	3.65%
Woodland	0.25%	1.49%	71.11%	23.41%	3.74%	16,150.6	12.23%
Wooded Grassland	0.23%	1.54%	54.97%	36.01%	7.25%	9,603.4	7.27%
Closed Shrubland	0.34%	4.29%	68.71%	18.87%	7.79%	4,955.3	3.75%
Open Shrubland	0.16%	1.06%	75.59%	17.81%	5.38%	11,850.2	8.97%
Grassland	0.46%	1.28%	65.98%	26.33%	5.95%	14,889.8	11.27%
Cropland	0.53%	0.97%	53.69%	38.38%	6.43%	14,143.3	10.71%
Bare Ground	0.04%	0.36%	94.27%	4.38%	0.95%	15,963.1	12.09%
Mosses and Lichens (Tundra)	0.57%	1.40%	76.63%	9.44%	1.96%	6,953.0	5.26%

B. GIMMS Data

Land Cover Classes[2]	Decreasing NDVI		Nutrual	Increasing NDVI		Land Area[3]	Percent[4]
	<-8%	-8 to <-4%	-4 to 4%	>4 to 8%	>8%		
Evergreen Needleleaf	5.38%	11.35%	48.00%	18.86%	16.41%	11,256.0	8.53%
Evergreen Broadleaf	4.83%	9.96%	46.16%	16.93%	22.12%	14,941.8	11.31%
Deciduous Needleleaf	12.89%	17.02%	44.23%	13.82%	12.04%	2,321.5	1.76%
Deciduous Broadleaf	4.04%	9.94%	54.79%	19.15%	12.08%	4,223.3	3.20%
Mixed Forest	3.08%	8.12%	57.71%	21.68%	9.41%	4,816.6	3.65%
Woodland	5.58%	10.45%	48.54%	17.04%	18.39%	16,150.6	12.23%
Wooded Grassland	7.23%	8.94%	35.54%	16.74%	31.55%	9,603.4	7.27%
Closed Shrubland	19.72%	8.85%	24.59%	13.23%	33.61%	4,955.3	3.75%
Open Shrubland	6.80%	6.19%	25.26%	14.79%	46.96%	11,850.2	8.97%
Grassland	8.32%	8.84%	31.69%	16.59%	34.56%	14,889.8	11.27%
Cropland	3.72%	7.94%	46.50%	21.19%	20.65%	14,143.3	10.71%
Bare Ground	1.79%	2.80%	56.91%	13.90%	24.60%	15,963.1	12.09%
Mosses and Lichens (Tundra)	5.56%	6.60%	25.68%	15.93%	46.22%	6,953.0	5.26%

Notes

1. Percent change is based on the simple differencing image (annual average image 1982/83 subtracted from 1998/99) divided by the 1982/83 image. Then the University of Maryland 8 km Global Land Cover Data Set (GLCD) image was used to extract the percent change for each land cover class.

2. Classes based on the 8km GLCD image. (DeFries et al. 1998)

3. Based on the 8km GLCD image overlaid on the Percent Change image (footnote #1 above). Land area is in thousands of square kilometers.

4. Total land cover of 132,096,176 square kilometers from the 8km GLCD image overlaid on the Percent Change image (70^0 N to 60^0 S; 360^0 of longitude) (footnote #1 above).

Table 6. Percent Change in Persistent NDVI between 1982 and 1999 for 13 Land Cover Classes

Per cent change is based on the simple differencing image (annual average image 1982-83 subtracted from 1998-99) divided by the 1982-83 image, and then filtered for persistent change (see text for filter methodology).

A. PAL Data

Land Cover Classes	Decreasing NDVI		Nutrual	Increasing NDVI		Land Area	Percent
	<-8%	-8 to <-4%	-4 to 4%	>4 to 8%	>8%		
Evergreen Needleleaf	0.09%	0.14%	71.71%	24.17%	3.89%	11,256.0	8.53%
Evergreen Broadleaf	0.33%	0.25%	79.34%	17.11%	2.97%	14,941.8	11.31%
Deciduous Needleleaf	0.09%	0.12%	88.90%	10.56%	0.33%	2,321.5	1.76%
Deciduous Broadleaf	0.16%	0.29%	80.44%	17.10%	2.00%	4,223.3	3.20%
Mixed Forest	0.04%	0.05%	75.71%	21.96%	1.75%	4,816.6	3.65%
Woodland	0.15%	0.54%	83.04%	12.99%	3.29%	16,150.6	12.23%
Wooded Grassland	0.16%	0.75%	76.09%	17.26%	5.74%	9,603.4	7.27%
Closed Shrubland	0.23%	2.27%	86.99%	5.50%	5.00%	4,955.3	3.75%
Open Shrubland	0.10%	0.44%	91.85%	4.24%	3.37%	11,850.2	8.97%
Grassland	0.22%	0.25%	83.50%	11.36%	4.67%	14,889.8	11.27%
Cropland	0.25%	0.23%	74.05%	20.07%	5.40%	14,143.3	10.71%
Bare Ground	0.02%	0.16%	98.35%	0.85%	0.62%	15,963.1	12.09%
Mosses and Lichens (Tundra)	0.22%	0.30%	87.94%	9.76%	1.78%	6,953.0	5.26%

B. GIMMS Data

Land Cover Classes	Decreasing NDVI		Nutrual	Increasing NDVI		Land Area	Percent
	<-8%	-8 to <-4%	-4 to 4%	>4 to 8%	>8%		
Evergreen Needleleaf	1.30%	1.24%	75.95%	9.61%	11.90%	11,256.0	8.53%
Evergreen Broadleaf	2.12%	2.61%	77.92%	4.62%	12.73%	14,941.8	11.31%
Deciduous Needleleaf	5.58%	2.66%	77.44%	6.06%	8.26%	2,321.5	1.76%
Deciduous Broadleaf	1.27%	1.79%	78.17%	9.91%	8.86%	4,223.3	3.20%
Mixed Forest	1.01%	1.05%	77.54%	12.76%	7.64%	4,816.6	3.65%
Woodland	1.68%	2.06%	77.35%	6.61%	12.30%	16,150.6	12.23%
Wooded Grassland	2.54%	1.73%	70.49%	5.45%	19.79%	9,603.4	7.27%
Closed Shrubland	10.37%	1.87%	68.77%	2.81%	16.18%	4,955.3	3.75%
Open Shrubland	2.75%	1.65%	72.34%	2.61%	20.65%	11,850.2	8.97%
Grassland	1.50%	0.90%	71.48%	5.97%	20.15%	14,889.8	11.27%
Cropland	1.23%	1.49%	71.94%	10.15%	15.19%	14,143.3	10.71%
Bare Ground	0.75%	0.19%	91.83%	3.67%	3.56%	15,963.1	12.09%
Mosses and Lichens (Tundra)	1.10%	0.62%	74.32%	3.71%	20.25%	6,953.0	5.26%

Notes

See notes for Table 5.

Table 7. Percent of Pixels filtered out for 13 Land Cover Classes

A. PAL Data

Land Cover Classes[2]	Decreasing NDVI		Increasing NDVI	
	<-8%	-8 to <-4%	>4 to 8%	>8%
Evergreen Needleleaf	44%	79%	42%	12%
Evergreen Broadleaf	39%	74%	39%	10%
Deciduous Needleleaf	18%	85%	26%	6%
Deciduous Broadleaf	27%	68%	42%	10%
Mixed Forest	33%	83%	47%	6%
Woodland	40%	64%	45%	12%
Wooded Grassland	30%	51%	52%	21%
Closed Shrubland	32%	47%	71%	36%
Open Shrubland	38%	59%	76%	37%
Grassland	52%	81%	57%	22%
Cropland	53%	76%	47%	16%
Bare Ground	50%	56%	81%	33%
Mosses and Lichens (Tundra)	63%	78%	48%	9%
Average	40%	69%	52%	18%

A. GIMMS Data

Land Cover Classes[2]	Decreasing NDVI		Increasing NDVI	
	<-8%	-8 to <-4%	>4 to 8%	>8%
Evergreen Needleleaf	76%	89%	49%	27%
Evergreen Broadleaf	56%	74%	73%	42%
Deciduous Needleleaf	57%	84%	56%	31%
Deciduous Broadleaf	69%	82%	48%	27%
Mixed Forest	67%	87%	41%	19%
Woodland	70%	80%	61%	33%
Wooded Grassland	65%	81%	67%	37%
Closed Shrubland	47%	79%	79%	51%
Open Shrubland	60%	73%	82%	56%
Grassland	82%	90%	64%	42%
Cropland	67%	81%	52%	26%
Bare Ground	58%	93%	74%	86%
Mosses and Lichens (Tundra)	80%	91%	77%	56%
Average	66%	83%	63%	41%

Notes
See notes for Table 5.

Figure Captions

Figure 1 Changes in Global Scale PAL NDVI, 1982 – 1999.

This figure shows the spatial distribution of changes in annual average PAL NDVI (photosynthesis) between 1982 and 1999. Only areas of persistent increase and decrease are displayed.

Figure 2 Changes in Global Scale GIMMS NDVI, 1982 – 1999.

This figure shows the spatial distribution of changes in annual average GIMMS NDVI (photosynthesis) between 1982 and 1999. Only areas of persistent increase and decrease are displayed.

Figure 3 Profiles of Interannual Variation of NDVI

This figure profiles the change in NDVI over the 18-year period. The base data are annual average NDVI images. Different regions are profiled where pixels for those areas show the value of those pixels for each of the years between 1982 and 1999, displaying various patterns of change. The scale is the same for each of the profiles except for 2b, which shows detailed variations for desert PAL and GIMMS pixels.

2a. All pixels in the global AVHRR image (132,599,168 sq. km.) are profiled, along with 253,184 sq km of the Taklimakan desert in western China and 5,680,320 sq. km of the Sahara desert in northern Africa.

2b. This graph shows the inter-annual variations for the Taklimakan and Sahara deserts for the PAL and GIMMS data. Similar, but not exact areas, where extracted from the PAL and GIMMS data sets as these two data sets were in different projections.

2c. This graph shows examples of discrete changes.

2d. This graph shows examples of progressive increases.

2e. This graph shows examples of cyclical increases where inter-annual variation begins to be pronounced.

2f. This graph shows examples of high levels of inter-annual variation, so much so that depending on the year it might show an opposite trend of other years.

Figure 4 Additional Profiles of Inter-annual Variation of NDVI

See Figure 2 for broad explanation. The scale is the same for each of the profiles.

4a. Temporal profiles for coastal Peru. These pixels experienced an 8% increase over the time period, but were filtered out due to extensive fluctuations during the time period.

4b. Temporal profiles for eastern and western Australia for pixels increasing in NDVI, which were filtered out for extensive fluctuations.

4c. Temporal profiles for central Australia with decreasing NDVI, which was not filtered out.

4d. Temporal profiles for western Australia with increasing NDVI, which was not filtered out.

4e. Temporal profiles for pixels in Guangzhou China with decreasing NDVI, which was not filtered out.

4f. Temporal profiles for the Santa Cruz region of Bolivia with decreasing NDVI, which was not filtered out.

Figure 5 Comparing PAL and GIMMS Profiles of Inter-annual Variation of NDVI

See Figure 2 for broad explanation. The scale is not the same for each of the profiles. It varies between graphs in order to see detailed comparisons between the PAL and GIMMS data.

5a. Temporal profiles for the persistently declining area of central Australia.

5b. Temporal profiles for the persistently increasing PAL Philippians data and the non-persistent GIMMS data. For both profiles data were extracted from most of Mindanao.

5c. Temporal profiles for the persistently increasing GIMMS data in Oman and same region in the PAL data which was filtered out as non-persistent.

5d. Temporal profiles for the persistently increasing PAL data which was not persistently increasing in the GIMMS data.

5e. Temporal profiles for the persistently increasing Niger Delta in both the PAL and GIMMS data sets.

5f. Temporal profiles for the persistently increasing PAL data for a broad stretch of Coastal West Africa (Liberia and Ivory Coast) which is not persistently increasing in the GIMMS data set.