Target Products for Initial Evaluation

- Location and timing of change
- Time since change
- Magnitude of change
- Quality assurance
- Length of segment

Example Data

```
Time Segment: 1
Start Date: 1984-04-21
End Date:
           1988-04-16
Break Date: 1988-05-18
OA: 14
Magnitudes:
   Blue 0.0
   Green 0.0
   Red
         0.0
   SWIR1 0.0
   SWIR2 0.0
       0.0
   NIR
   Thermal 0.0
Time Segment: 2
Start Date: 1988-05-18
End Date:
           1993-05-16
Break Date: 1993-06-01
QA: 8
Magnitudes:
   Blue
           236.37420168533754
           365.267545246895
   Green
   Red
         458.5037034725649
   SWIR1 1734.8551380318677
   SWIR2 846.6785557514813
          1133.0144999672557
   NIR
   Thermal 243.72175992079428
Time Segment: 3
Start Date: 1994-04-17
End Date: 2003-06-13
Break Date: 2003-06-29
QA: 8
Magnitudes:
   Blue
           145.11422667484385
           389.38162399564703
   Green
        445.25285881579475
   Red
   SWIR1 823.4817684282182
   SWIR2 402.54586998031425
   NIR
        2000.5590253595492
   Thermal 389.2918652372755
```

Start Date:	2011-04-24
End Date:	2014-07-13
Break Date:	2014-07-13
QA: 8	
Magnitudes:	
Blue	62.49133863787938
Green	78.85710274297162
Red	82.38574465201964
SWIR1	63.2809387308298
SWIR2	41.78808611128261
NIR	302.39242827665294
Thermal	182.65347275219392

	Timing of	Time Since			Length of
Year	Change	Change	Magnitude	QA	Segment
1984	0	0	0	14	71
1985	0	0	0	14	436
1986	0	0	0	14	801
1987	0	0	0	14	1166
1988	139	44	0	8	44
1989	0	409	0	8	409
1990	0	774	0	8	774
1991	0	1139	0	8	1139
1992	0	1505	0	8	1505
1993	152	30	2313.86145	0	30
1994	0	395	0	8	75
1995	0	760	0	8	440
1996	0	1126	0	8	806
1997	0	1491	0	8	1171
1998	0	1856	0	8	1536
1999	0	2221	0	8	1901
2000	0	2587	0	8	2266
2001	0	2951	0	8	2631
2002	0	3316	0	8	2996
2003	180	2	2278.655299	0	2
2004	0	368	0	0	368
2005	0	733	0	0	733
2006	0	1098	0	0	1098
2007	0	1463	0	0	1463
2008	0	1828	0	0	1828
2009	0	2193	0	0	2193
2010	0	2558	0	0	2558
2011	0	2923	0	8	68
2012	0	3289	0	8	434
2013	0	3654	0	8	799
2014	194	4019	331.960473	8	1164

Location and Timing of Change

Purpose

Report the spatial coordinates and date when there is significant enough change in the spectral signature in the time series.

Methodology

Annual raster maps showing the day-of-year (DOY) when change was first detected. If no change occurred in a given year, the pixel value will be 0. DOY values are 16-bit integers ranging from 1 to 365 (366 in leap years).

Time segments reported from pyccd have a change break date value expressed in proleptic Gregorian ordinal, where January 1 of year 1 has ordinal 1. These values are then transformed, and the relevant year and DOY values are extracted.

The projected spatial coordinate values are reported with the results from the LCMAP API. These values are expressed as 'x' and 'y' attributes on the response, in CONUS Albers CRS.

Default value: 0

Special Cases Case 1: Multiple breaks are found in the year.....

Time Since Change

Purpose

Report the spatial coordinates and time, in days, that elapsed since the last recorded significant spectral shift.

Methodology

Annual raster maps showing the cumulative number of days since the last change was detected. This value is calculated off a July 1st date (DOY 182, 183 for leap years) for each year. Cumulative day values are 16-bit integers.

Example:

Change recorded for DOY 360 for year 1992 and the next recorded change is DOY 90 for year 1996.

Year 1993 would have value 188 Year 1994 would have value 553 Year 1995 would have value 826 Year 1996 would have value 93*

* Change was recorded before the July 1st date of the year.

Time segments reported from PyCCD have a change break date value expressed in proleptic Gregorian ordinal, where January 1 of year 1 has ordinal 1. These values are then transformed, and the relevant year and DOY values are extracted.

The projected spatial coordinate values are reported with the results from the LCMAP API. These values are expressed as 'x' and 'y' attributes on the response, in CONUS Albers CRS.

Default value: 0

Magnitude of Change

Purpose

Report the spatial coordinates and the magnitude of the spectral shift that occurred.

Methodology

Annual maps from 1985–2014 showing the change vector magnitude across all bands, calculated by calculating a euclidean norm of the median spectral residuals where change was detected.

Dates								
	731395	731411	731419	731435	731443	731451		
Observations								
blue	222	312	368	536	904	1088		
green	423	471	624	801	1194	1455		
red	342	381	553	781	1454	1615		
nir	1204	1378	2033	2718	3368	3152		
swir1	384	447	633	1287	2855	2727		
swir2	305	240	356	643	1959	1737		
thermal	2285	2415	2475	2375	2835	2625		
Residuals								Median
blue	52.03713412	34.52585985	77.67197605	212.5564773	567.0797334	743.2966661		145.1142267
green	101.7381619	158.9518671	308.084583	470.678665	858.1074056	1117.392585		389.381624
red	123.9313408	175.0060504	341.5583276	548.94739	1212.898896	1368.967443		445.2528588
nir	846.6599578	1003.253332	1652.754794	2348.363256	3017.521262	2829.492486		2000.559025
swir1	199.4308801	304.7494504	498.9439887	1148.019548	2707.442414	2570.393961		823.4817684
swir2	167.7719044	138.3237957	260.786647	544.305093	1854.92047	1628.354669		402.54587
thermal	216.1491375	329.3062155	404.5415652	374.0421653	888.3980371	747.5987694		389.2918652
							Change Magnitude	2278.655299

Date are floating point (32-bit real number) values with a potential range of $0 - \infty$.

The projected spatial coordinate values are reported with the results from the LCMAP API. These values are expressed as 'x' and 'y' attributes on the response, in CONUS Albers CRS.

Default value: 0

Quality Assurance

Purpose

Report the spatial coordinates and date when there is significant enough change in the spectral signature in the time series.

Methodology

Annual maps from 1984–2014 with two-digit categorical code (8-bit integer data) relating to how the time-series model was estimated. This value is derived by whatever time segment is contains July 1st for a given year, with 0 being between segments. The tens place value refers to what procedure was used for the model and the ones place indicates how many coefficients were used.

First Digit:	Second Digit:
5x: persistent snow	x4: simple model
4x: Fmask fails	x6: advanced model
2x: end fit	x8: full model
1x: start fit	

Persistent snow will always be marked as 54 and Fmask fails will always be marked as 44. A value of 0 is used for dates without an associated stable time segment.

The projected spatial coordinate values are reported with the results from the LCMAP API. These values are expressed as 'x' and 'y' attributes on the response, in CONUS Albers CRS.

Default value: 0

Length of Segment

Purpose

Report the spatial coordinates and date when there is significant enough change in the spectral signature in the time series.

Methodology

Annual raster maps showing the cumulative number of days since the start of the current time segment. This value is calculated off a July 1st date (DOY 182, 183 for leap years) for each year. Cumulative day values are 16-bit integers.

Time segments reported from PyCCD have a change break date value expressed in proleptic Gregorian ordinal, where January 1 of year 1 has ordinal 1. These values are then transformed, and the relevant year and DOY values are extracted.

The projected spatial coordinate values are reported with the results from the LCMAP API. These values are expressed as 'x' and 'y' attributes on the response, in CONUS Albers CRS.

Default value: 0