Revision Date: February 09, 2007

LBA-ECO LC-23 ASTER and MODIS Fire Data Comparison for Brazil: 2003-2004

Summary:

This data set contains data associated with MODIS fire maps generated using two different algorithms and compared against fire maps produced by ASTER. These data relate to a paper (Morisette et al., 2005) that describes the use of high spatial resolution ASTER data to evaluate the characteristics of two fire detection algorithms, both applied to MODIS-Terra data and both operationally producing publicly available fire locations. The two algorithms are NASA's operational Earth Observing System MODIS fire detection product and Brazil's National Institute for Space Research (INPE) algorithm. These data are the ASCII files used in the logistic regression and error matrices presented in the paper.

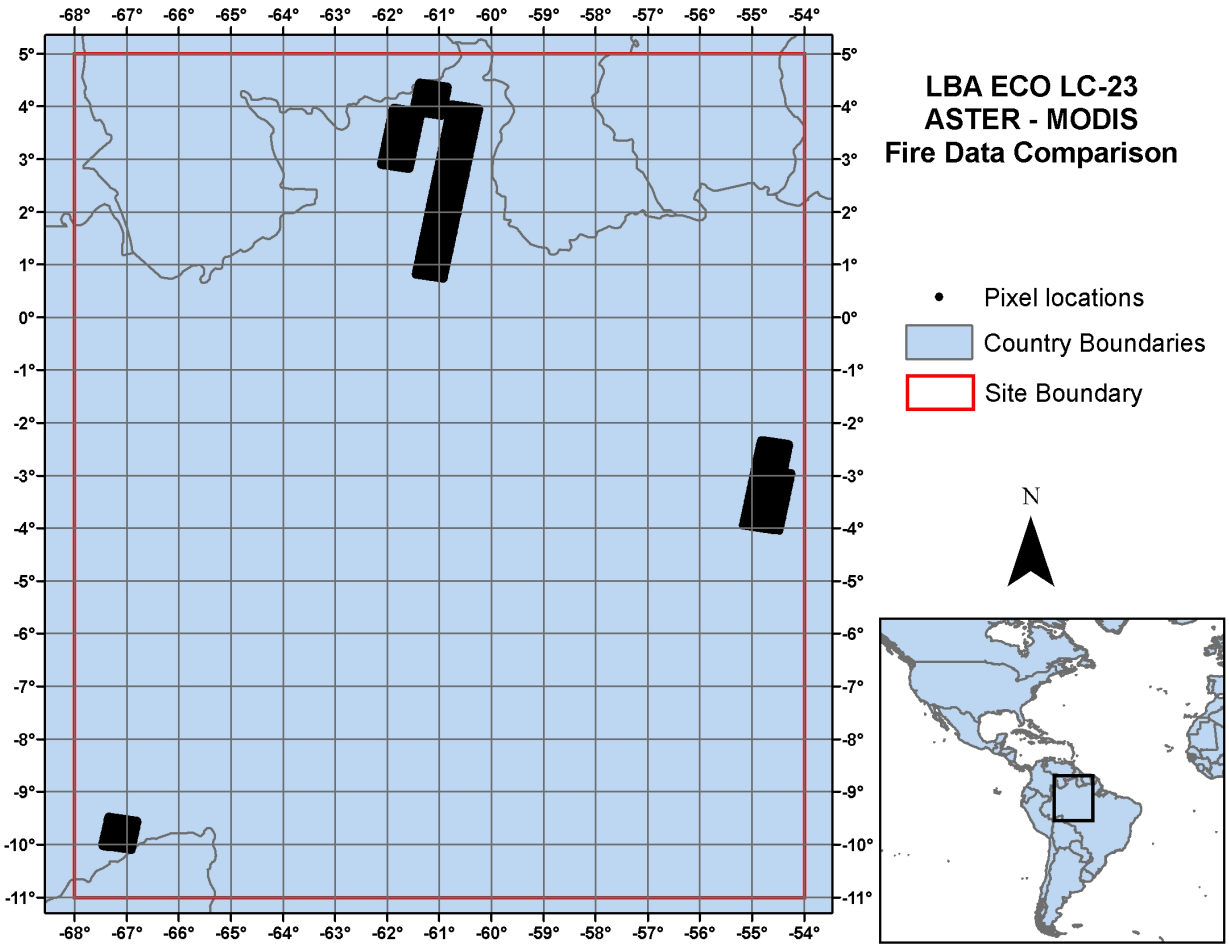

Figure 1. Distribution of the Terra MODIS Thermal Anomalies/Fire 5-min Level 2 1-km swath (MOD14) pixels coincident with the ASTER Level 1B scenes.

Data Citation:

Cite this data set as follows:

Morisette, J. T., L. Giglio, I. Csiszar, A. Setzer, W. Schroeder, D. Morton and C. O. Justice. 2007. LBA-ECO LC-23 ASTER and MODIS Fire Data Comparison for Brazil: 2003-2004. Data set. Available on-line [http://www.daac.ornl.gov] from Oak Ridge National Laboratory Distributed Active Archive Center, Oak Ridge, Tennessee, U.S.A.

Implementation of the LBA Data and Publication Policy by Data Users:

The LBA Data and Publication Policy [http://daac.ornl.gov/LBA/lba_data_policy.html] is in effect for a period of five (5) years from the date of archiving and should be followed by data users who have obtained LBA data sets from the ORNL DAAC. Users who download LBA data in the five years after data have been archived must contact the investigators who collected the data, per provisions 6 and 7 in the Policy.

This data set was archived in January of 2007. Users who download the data between January 2007 and December 2012 must comply with the LBA Data and Publication Policy.

Data users should use the Investigator contact information in this document to communicate with the data provider. Alternatively, the LBA Web Site [http://lba.inpa.gov.br/lba/] in Brazil will have current contact information.

Data users should use the Data Set Citation and other applicable references provided in this document to acknowledge use of the data.

Table of Contents:

1. Data Set Overview:

Project: LBA (Large-Scale Biosphere-Atmosphere Experiment in the Amazon)

LBA Science Component: Land Use and Land Cover

Team ID: LC-23 (Morisette / Schroeder / Pereira)

Team Objective: Quantifying the accuracy of MODIS fire products and establishing their relationship with land cover dynamics

Team Investigators: Morisette, Jeffrey Thomas; Pereira, Joao Antonio Raposo; Schroeder, Wilfrid; Csiszar, Ivan Andras; Giglio, Louis and Morton, Douglas Christopher. You may contact Morisette, Dr. Jeffrey T. (jeff.morisette@nasa.gov)

Fire influences global change and tropical ecosystems through its connection to land cover dynamics, atmospheric composition, and the global carbon cycle. As such the climate change community, the Brazilian government, and the Large Scale Biosphere-Atmosphere study in Amazonia (LBA) are interested in the use of satellites to monitor and quantify fire occurrence throughout Brazil.

As multiple satellite and algorithms are being utilized, it is important to quantify the accuracy of the derived products. These data are from the paper where we evaluate the characteristics of two fire detection algorithms, both applied to MODIS-Terra data and both operationally producing publicly available fire locations (Morisette et al., 2005). The two algorithms are NASA's operational Earth Observing System MODIS fire detection product and Brazil's National Institute for Space Research (INPE) algorithm. We compare both to independent fire maps derived from 30m spatial resolution ASTER imagery. Quantitative comparison is accomplished through logistic regression and error matrices.

Results show that the likelihood of MODIS fire detection, for either algorithm, is a function of both the number of ASTER fire pixels within the MODIS pixel as well as the contiguity of those pixels. Both algorithms have similar omission errors and each has a fairly high likelihood of detecting relatively small fires, as observed in the ASTER data. However, INPE's commission error is roughly three times more than that of the EOS algorithm.

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For additional information, please see the following web sites:

Land Processes Distributed Active Archive Center (DAAC) via the EOS Data Gateway (Land Processes Distributed Active Archive Center (DAAC) via the EOS Data Gateway (http://edcimswww.cr.usgs.gov/pub/imswelcome/)

Related_Data_Sets:

LBA-ECO LC-23 Vegetation fire data - Roraima 2003 (The LBA-ECO LC-23 Vegetation fire data - Roraima 2003 data sets contain airborne imagery over a controlled burn in Roraima. It provides very detailed imagery for one of the many fires observed by ASTER and MODIS as seen in the files in the LBA_ASTER_MODIS_fire dataset from Jan 19 and 28.)

LBA-ECO LC-23 Characterizing Vegetation Fire Dynamics - Brazil 2001-2003 (The LBA-ECO LC-23 Characterizing Vegetation Fire Dynamics - Brazil 2001-2003 data set contains summary fire counts from multiple sensors - included MODIS fire counts that overlap with the fire counts described in this data set.)

Related Publication:

Jeffrey T. Morisette, Louis Giglio, Ivan Csiszar, Alberto Setzer, Wilfrid Schroeder, Douglas Morton and Christopher O. Justice. 2005: Validation of MODIS Active Fire Detection Products Derived from Two Algorithms. Earth Interactions: Vol. 9, No. 9, pp. 1–25.

2. Data Characteristics:

Data Set Contents: The output data are ASCII files where each row represents a MODIS fire pixel and the summarized information from the ASTER fire mask pixels within that MODIS pixel.

The data files used for and resulting from this analysis are contained in 3 subdirectories.

- The directory input_inpe contains the input MODIS fire product derived from the INPE algorithm HDF files.
- The directory output_mod14 compares ASTER to the MODIS fire detection from the NASA/UMD algorithm.
- The directory output_INPE compares ASTER to the MODIS fire detection from the INPE algorithm.

Input Files: The MODIS fire product derived from the INPE algorithm is provided in the files contained in the input_inpe directory as HDF files.

Example input file name:

"INPE.A2003028.1435.001.hdf" derived from the MODIS at-sensor scaled radiance swath data collected in year 2003, day 028, at 1435 GMT.

Output Files: The output files reside in two directories; the first for the comparison of the ASTER fire mask with the standard NASA/Univeristy of Maryland fire product (output_mod14) and the second for the comparison of the ASTER fire mask with the INPE MODIS algorithm (output_inpe).

Please note that there are *.asc and *.txt versions of the output files that differ in file format. See details below.

Example output file names:

Output files of ASTER vs MODIS/EOS algorithm (within the output_mod14 directory):

"MOD14.A2004038.1440-ASTFIRE_00302072004144144_02272004182141.asc" and

"MOD14.A2004038.1440-ASTFIRE_00302072004144144_02272004182141.txt"

Output files of ASTER vs MODIS/INPE algorithm (within the output_inpe directory):

"INPE.A2004038.1440-ASTFIRE_00302072004144144_02272004182141.asc" and

"INPE.A2004038.1440-ASTFIRE_00302072004144144_02272004182141.txt"

Output file name syntax:

- Up to the first "." in the file name distinguishes between the MODIS/EOS and MODIS/INPE files.
- Between the first and second "." represents the day of the year for the MODIS data.
- Between the second "." and the "-" represents the time of the MODIS data collection
- Between the "-" and the third "." represents the unique component of the ASTER local granule ID from the ASTER scene used.

- The *.asc files are as received from the data provider.

- The *.txt files have been derived by the ORNL DAAC from the *.asc files.

A Note about the Standard Input Files:

The standard MODIS fire product and original ASTER files are available through the Land Processes Distributed Active Archive Center (LP DAAC, http://edcdaac.usgs.gov/) and searchable via the filenames listed in the companion filelist.csv file, therefore, no attempt was made to create a redundant archive at the ORNL DAAC.

Contents of the Output Files: The output data are ASCII files with header information (lines 1-4) and where each subsequent data row represents an individual 1km MODIS fire pixel and the summarized information from the ASTER fire mask pixels within that MODIS pixel.

Start of File	Description
line 1	ASTER file name
line 2	MODIS geolocation file name
line 3	File giving the location of either the MODIS or INPE algorithm fire locations
line 4	File for the binary ASTER fire mask
lines 5 through N+5	Where N = the number of MODIS pixels that have corresponding ASTER data. **There are 15 columns of data, these are:**
relX	"relX" and "relY" are the pixel coordinates of the MODIS swath data, relative to the subset of MODIS data overlapping the ASTER image such that (0,0) is the upper left MODIS pixel for the overlapping area.
relY	
X	"X" and "Y" are the pixel coordinates in MODIS swath image (listed on line 3), with upper left corner pixel (0, 0) X = along scan direction Y = along track direction
Y	
lat	"lat" and "lon" are latitude and longitude in decimal degrees (Southern latitude is negative, Eastern longitude is positive)
lon	
MODIS	"MODIS" is the MODIS fire classification (more information is at http://edcdaac.usgs.gov/modis/mod14a1v4.asp) 0: not processed (missing input data) 2: not processed (other reason) 3: water mask (no fire algorithm applied) 4: cloudy (significantly obscured by clouds so that no attempt is made to extract fire information) 5: no fire 6: unknown (information from adjacent pixel is unknown and contextual classifier can not be applied and single pixel information is not conclusive) 7: low-confidence fire 8: nominal-confidence fire 9: high-confidence fire
count	"count" is the number of ASTER fire pixels within corresponding MODIS pixel
Moran	"Moran" is the Moran's I calculation for the ASTER fire data within the corresponding MODIS pixel. In *.asc files, formatted in scientific notation (e.g., `0.00E+00` and `-9.10E-04`). In *.txt files, decimal formatting (e.g., `0.0000000 and -0.0009100`).

variance	"variance" is the variance of ASTER fire data within corresponding MODIS pixel. In *.asc files, formatted in scientific notation (e.g., `0.00E+00 and 8.28E-04`). In *.txt files, decimal formatting (e.g., `0.0000000 and 0.0008280).`
mean ASTER fire cluster size	"mean ASTER fire cluster size", is the number of individual ASTER fire pixels divided by the number of contiguous ASTER fire clusters, within a given MODIS pixel
MODIS band 21/22 brightness temperature	"MODIS band 21/22 brightness temperature" is the 3.96 micron channel brightness temperature of fire pixel. Comes from either band 21 or 22; 22 saturates first, at which point we switch to 21.
MODIS band 31 brightness temperature	"MODIS band 31 brightness temperature" is the Band 31 brightness temperature of fire pixel.
FRP	"FRP" is currently unused -- set to 0. In *.asc files, formatted in scientific notation (e.g., `0.00E+00`). In *.txt files, decimal formatting (e.g., `0.0000000).`
MODIS fire pixel confidence	"MODIS fire pixel confidence" is a Heuristic confidence estimate of detection confidence. Range 0 - 100, with 0 lowest and 100 highest. ***

*** For details, please see: Giglio, L., J. Descloitres, C. O. Justice, and Y. Kaufman, 2003: An enhanced contextual fire detection algorithm for MODIS. Remote Sens. Environ., 87, 273-282. [In this paper the confidence numbers range from 0 to 1.0, these have been linearly scaled to integers between 0 and 100 in the output files.]

Summary Statistics of Output Files:

The output data records, where each row represents a MODIS fire pixel and the summarized information from the ASTER fire mask pixels within that MODIS pixel, are very sparse. That is, there are not many MODIS pixels with corresponding ASTER fire data. The following table provides summary statistics for each output file to characterize the relatively few coincident MODIS/ASTER observations and to enable users to verify data file transformations.

Name of Output MODIS/EOS file	Morgan		Variance		MODIS/ASTER coincident observations	Total observations
	Min	Max	Min	Max		
MOD14.A2003019.1440-ASTFIRE_003_01192003144147_06052003101611.asc	-0.00091000	0.59400000	0.00041400	0.00888000	20	3689
MOD14.A2003019.1440-ASTFIRE_003_01192003144156_06052003101600.asc	0.00000599	0.50800000	0.00039100	0.01300000	10	3682
MOD14.A2003019.1440-ASTFIRE_003_01192003144204_03152003155855.asc	0.10600000	0.75100000	0.00077200	0.04430000	7	3725
MOD14.A2003019.1440-ASTFIRE_003_01192003144213_06052003104918.asc	-0.00042200	0.00038600	0.00386000	0.00038600	2	3742
MOD14.A2003019.1440-ASTFIRE_003_01192003144222_06052003104921.asc	0.16100000	0.87900000	0.00170000	0.08610000	12	3697
MOD14.A2003019.1440-ASTFIRE_003_01192003144231_03152003155909.asc	0.00000000	0.00000000	0.00000000	0.00000000	0	3742
MOD14.A2003019.1440-ASTFIRE_003_01192003144240_03152003160128.asc	0.00000000	0.00000000	0.00000000	0.00000000	0	3741
MOD14.A2003019.1440-ASTFIRE_003_01192003144249_03152003183937.asc	0.00000000	0.00000000	0.00000000	0.00000000	0	3741
MOD14.A2003028.1435-ASTFIRE_003_01282003143550_06052003112632.asc	-0.00047500	0.87400000	0.00039300	0.05010000	29	3725
MOD14.A2003028.1435-ASTFIRE_003_01282003143559_06052003113023.asc	-0.00049100	0.71500000	0.00043300	0.03470000	55	3707
MOD14.A2003028.1435-ASTFIRE_003_01282003143608_06052003164616.asc	-0.00049800	0.88000000	0.00044600	0.09470000	54	3672
MOD14.A2003028.1435-ASTFIRE_003_01282003143617_06052003165422.asc	-0.00049800	0.62000000	0.00044600	0.02430000	28	3662
MOD14.A2003028.1435-ASTFIRE_003_01282003143626_03152003180029.asc	0.00000000	0.00000000	0.00000000	0.00000000	0	3663
MOD14.A2003028.1435-ASTFIRE_003_01282003143634_06052003165756.asc	-0.00047500	0.91700000	0.00043300	0.19200000	35	3663
MOD14.A2003241.1455-ASTFIRE_003_08292003145615_09202003114156.asc	-0.00049100	0.87700000	0.00039100	0.10700000	213	3687
MOD14.A2003281.1405-ASTFIRE_003_10082003140529_10222003115440.asc	-0.00048300	0.73500000	0.00042600	0.01790000	18	3706
MOD14.A2003281.1405-ASTFIRE_003_10082003140537_10222003092614.asc	-0.00047500	0.47400000	0.00039700	0.01620000	16	3712
MOD14.A2003281.1405-ASTFIRE_003_10082003140546_10222003104819.asc	0.00000000	0.00000000	0.00000000	0.00000000	0	3706
MOD14.A2003297.1405-ASTFIRE_003_10242003140543_11072003203633.asc	0.50000000	0.81500000	0.00340000	0.03700000	7	3729
MOD14.A2003297.1405-ASTFIRE_003_10242003140552_11072003201838.asc	-0.00049100	-0.00049100	0.00044600	0.00044600	1	3732
MOD14.A2004038.1440-ASTFIRE_003_02072004144135_02272004181741.asc	0.07200000	0.55000000	0.00134000	0.00467000	8	3703
MOD14.A2004038.1440-ASTFIRE_003_02072004144144_02272004182141.asc	0.00000000	0.00000000	0.00000000	0.00000000	0	3703

Name of Output MODIS/INPE file	Morgan		Variance		MODIS/ASTER coincident observations	Total observations
	Min	Max	Min	Max		

INPE.A2003019.1440-ASTFIRE_003_01192003144147_06052003101611.asc	-0.00091000	0.59400000	0.00041400	0.00888000	20	3689
INPE.A2003019.1440-ASTFIRE_003_01192003144156_06052003101600.asc	0.00000599	0.50800000	0.00039100	0.01300000	10	3682
INPE.A2003019.1440-ASTFIRE_003_01192003144204_03152003155855.asc	0.10600000	0.75100000	0.00077200	0.04430000	7	3725
INPE.A2003019.1440-ASTFIRE_003_01192003144213_06052003104918.asc	-0.00042200	0.00038600	0.00386000	0.00038600	2	3742
INPE.A2003019.1440-ASTFIRE_003_01192003144222_06052003104921.asc	0.16100000	0.87900000	0.00170000	0.08610000	12	3697
INPE.A2003019.1440-ASTFIRE_003_01192003144231_03152003155909.asc	0.00000000	0.00000000	0.00000000	0.00000000	0	3742
INPE.A2003019.1440-ASTFIRE_003_01192003144240_03152003160128.asc	0.00000000	0.00000000	0.00000000	0.00000000	0	3741
INPE.A2003019.1440-ASTFIRE_003_01192003144249_03152003183937.asc	0.00000000	0.00000000	0.00000000	0.00000000	0	3741
INPE.A2003028.1435-ASTFIRE_003_01282003143550_06052003112632.asc	-0.00047500	0.87400000	0.00039300	0.05010000	29	3725
INPE.A2003028.1435-ASTFIRE_003_01282003143559_06052003113023.asc	-0.00049100	0.71500000	0.00043300	0.03470000	55	3707
INPE.A2003028.1435-ASTFIRE_003_01282003143608_06052003164616.asc	-0.00049800	0.88000000	0.00044600	0.09470000	54	3672
INPE.A2003028.1435-ASTFIRE_003_01282003143617_06052003165422.asc	-0.00049800	0.62000000	0.00044600	0.02430000	28	3662
INPE.A2003028.1435-ASTFIRE_003_01282003143626_03152003180029.asc	0.00000000	0.00000000	0.00000000	0.00000000	0	3663
INPE.A2003028.1435-ASTFIRE_003_01282003143634_06052003165756.asc	-0.00047500	0.91700000	0.00043300	0.19200000	35	3663
INPE.A2003241.1455-ASTFIRE_003_08292003145615_09202003114156.asc	-0.00049100	0.87700000	0.00039100	0.10700000	213	3687
INPE.A2003281.1405-ASTFIRE_003_10082003140529_10222003115440.asc	-0.00048300	0.73500000	0.00042600	0.01790000	18	3706
INPE.A2003281.1405-ASTFIRE_003_10082003140537_10222003092614.asc	-0.00047500	0.47400000	0.00039700	0.01620000	16	3712
INPE.A2003281.1405-ASTFIRE_003_10082003140546_10222003104819.asc	0.00000000	0.00000000	0.00000000	0.00000000	0	3706
INPE.A2003297.1405-ASTFIRE_003_10242003140543_11072003203633.asc	0.50000000	0.81500000	0.00340000	0.03700000	7	3729
INPE.A2003297.1405-ASTFIRE_003_10242003140552_11072003201838.asc	-0.00049100	-0.00049100	0.00044600	0.00044600	1	3732
INPE.A2004038.1440-ASTFIRE_003_02072004144135_02272004181741.asc	0.07200000	0.55000000	0.00134000	0.00467000	8	3703
INPE.A2004038.1440-ASTFIRE_003_02072004144144_02272004182141.asc	0.00000000	0.00000000	0.00000000	0.00000000	0	3703

Formats of the Output Files:

The *.asc output files are space delimited and the Moran, variance, and FRP data columns are formatted in scientific notation.

Sample data records for INPE.A2003019.1440-ASTFIRE_003_01192003144147_06052003101611.asc

```
AST_L1B_003_01192003144147_06052003101611.hdf
MOD03.A2003019.1440.004.2003020002948.hdf
INPE.A2003019.1440.001.hdf
ASTFIRE_003_01192003144147_06052003101611.hdf
 17 11  753  696   4.448  -61.385 5    0  0.00E+00  0.00E+00    0.0   0.0   0.0 0.00E+00   0
 17 12  753  697   4.439  -61.386 5    0  0.00E+00  0.00E+00    0.0   0.0   0.0 0.00E+00   0
 17 13  753  698   4.430  -61.388 5    0  0.00E+00  0.00E+00    0.0   0.0   0.0 0.00E+00   0
 17 14  753  699   4.421  -61.389 5    0  0.00E+00  0.00E+00    0.0   0.0   0.0 0.00E+00   0
 17 15  753  700   4.413  -61.396 5    0  0.00E+00  0.00E+00    0.0   0.0   0.0 0.00E+00   0
 17 16  753  701   4.404  -61.397 5    0  0.00E+00  0.00E+00    0.0   0.0   0.0 0.00E+00   0
 17 17  753  702   4.395  -61.398 5    0  0.00E+00  0.00E+00    0.0   0.0   0.0 0.00E+00   0
...
 71 50  807  735   4.027  -60.966 5    0  0.00E+00  0.00E+00    0.0   0.0   0.0 0.00E+00   0
 71 51  807  736   4.017  -60.967 5    2  1.06E-01  8.05E-04    2.0   0.0   0.0 0.00E+00   0
 71 52  807  737   4.008  -60.969 5    2 -9.10E-04  8.28E-04    1.0   0.0   0.0 0.00E+00   0
 71 53  807  738   3.999  -60.970 5   21  4.75E-01  8.63E-03   10.5   0.0   0.0 0.00E+00   0
 71 54  807  739   3.990  -60.971 5    3  1.57E-01  1.16E-03    3.0   0.0   0.0 0.00E+00   0
 71 55  807  740   3.983  -60.978 5    0  0.00E+00  0.00E+00    0.0   0.0   0.0 0.00E+00   0
 71 56  807  741   3.974  -60.980 5    0  0.00E+00  0.00E+00    0.0   0.0   0.0 0.00E+00   0
 71 57  807  742   3.965  -60.981 5    0  0.00E+00  0.00E+00    0.0   0.0   0.0 0.00E+00   0
...
```

The *.txt output files are tab delimited and the Moran, variance, and FRP data columns are in a decimal format .

Sample data records for INPE.A2003019.1440-ASTFIRE_003_01192003144147_06052003101611.txt

```
AST_L1B_003_01192003144147_06052003101611.hdf
MOD03.A2003019.1440.004.2003020002948.hdf
INPE.A2003019.1440.001.hdf
ASTFIRE_003_01192003144147_06052003101611.hdf
     17     11     753     696     4.448     -61.385     5     0     0.0000000     0.0000000     0.00     0.00     0.00
0.0000000     0
     17     12     753     697     4.439     -61.386     5     0     0.0000000     0.0000000     0.00     0.00     0.00
0.0000000     0
     17     13     753     698     4.430     -61.388     5     0     0.0000000     0.0000000     0.00     0.00     0.00
0.0000000     0
     17     14     753     699     4.421     -61.389     5     0     0.0000000     0.0000000     0.00     0.00     0.00
0.0000000     0
     17     15     753     700     4.413     -61.396     5     0     0.0000000     0.0000000     0.00     0.00     0.00
0.0000000     0
     17     16     753     701     4.404     -61.397     5     0     0.0000000     0.0000000     0.00     0.00     0.00
0.0000000     0
     17     17     753     702     4.395     -61.398     5     0     0.0000000     0.0000000     0.00     0.00     0.00
0.0000000     0
...


     71     50     807     735     4.027     -60.966     5     0     0.0000000     0.0000000     0.00     0.00     0.00
0.0000000     0
     71     51     807     736     4.017     -60.967     5     2     0.1060000     0.0008050     2.00     0.00     0.00
0.0000000     0
     71     52     807     737     4.008     -60.969     5     2     -0.0009100    0.0008280     1.00     0.00     0.00
0.0000000     0
     71     53     807     738     3.999     -60.970     5     21    0.4750000     0.0086300     10.50    0.00     0.00
0.0000000     0
     71     54     807     739     3.990     -60.971     5     3     0.1570000     0.0011600     3.00     0.00     0.00
0.0000000     0
     71     55     807     740     3.983     -60.978     5     0     0.0000000     0.0000000     0.00     0.00     0.00
0.0000000     0
     71     56     807     741     3.974     -60.980     5     0     0.0000000     0.0000000     0.00     0.00     0.00
0.0000000     0


...
```

Companion Files:

The companion file, filelist.csv, is an ASCII comma separated value file that lists the file names and the temporal and spatial details of the MODIS and ASTER files used in the analysis and as listed in Table 1 of Morisette et al. (2005).

filelist.csv sample record:

```
Day (dd), Month (mmm), Year (yyyy), MOD03 file name (geolocation), MOD14 File name (UMD MODIS input), INPE File name (INPE MODIS fire input),
ASTER Local Granule ID, ASTER Granule, Acquisition Time, ASTER Center Latitude, ASTER Center Longitude, ASTER % Cloud Cover, Related figure

19, Jan,2003, MOD03.A2003019.1440.004.2003020002948.hdf, MOD14.A2003019.1440.004.2003020203252.hdf, NPE.A2003019.1440.001.hdf,
AST_L1B#003_01192003144147_06052003101611.hdf, SC:AST_L1B.003:2013696081, 14:41:47, 4.14, -61.17, 59 ,

19, Jan, 2003, MOD03.A2003019.1440.004.2003020002948.hdf, MOD14.A2003019.1440.004.2003020203252.hdf, INPE.A2003019.1440.001.hdf,
AST_L1B#003_01192003144156_06052003101600.hdf, SC:AST_L1B.003:2013696076, 14:41:56, 3.61, -61.28, 27 ,

19, Jan, 2003, MOD03.A2003019.1440.004.2003020002948.hdf, MOD14.A2003019.1440.004.2003020203252.hdf, INPE.A2003019.1440.001.hdf,
AST_L1B#003_01192003144204_03152003155855.hdf, SC:AST_L1B.003:2011896728, 14:42:04, 3.07, -61.4, 13 ,


...
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Site boundaries: (All latitude and longitude given in degrees and fractions)

Site (Region)	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude	Geodetic Datum
Brazil (Brazil)	-68	-54	5	-11	World Geodetic System, 1984 (WGS-84)

Time period:

- The data set covers the period 2003/01/19 to 2004/02/07.

Platform/Sensor/Parameters measured include:

- TERRA (MORNING EQUATORIAL CROSSING TIME SATELLITE) / MODIS (MODERATE-RESOLUTION IMAGING SPECTRORADIOMETER) / FIRES
- AQUA (AFTERNOON EQUATORIAL CROSSING TIME SATELLITE) / MODIS (MODERATE-RESOLUTION IMAGING SPECTRORADIOMETER) / FIRES
- TERRA (MORNING EQUATORIAL CROSSING TIME SATELLITE) / ASTER (ADVANCED SPACEBORNE THERMAL EMISSION AND REFLECTION RADIOMETER) / FIRES

3. Data Application and Derivation:

Data are used to relate the MODIS fire detections (1km) with a 30m spatial resolution fire map derived from ASTER.

4. Quality Assessment:

Assessing the MODIS data quality is actual the purpose of these data. The ASTER fire map is assumed to be correct. While the accuracy of the ASTER fire map is not quantified, due to its

spatial resolution is it assumed to be accurate enough to assess the 1km MODIS product. One should be careful, as we are in Morisette et al., 2005, to note that the data compare MODIS to ASTER fire counts (and do not compare MODIS to actual ground truth fire counts or fire size).

5. Data Acquisition Materials and Methods:

Please see also Section 3 in: Morisette et al. (2005) where you will find the following information:

Data: Satellite fire detection algorithms

MODIS (Kaufman et al. 1998) is a 36-band instrument with substantially improved capabilities for fire mapping as compared to the AVHRR. The first MODIS sensor is on board the Terra satellite, which was launched in December 1999 and has a daytime local overpass of about 10:30 A.M. The second MODIS sensor is on board the Aqua satellite, launched in May 2002, with a 1:30 P.M. daytime local overpass. One of the land products derived from the MODIS sensor is a pixel resolution fire mask, separated into files representing 5 min of image acquisition along a given swath (Justice et al. 2002). The increased saturation temperatures of the 1-km-resolution 3.9- and 11- m sensors decrease the ambiguities leading to false alarms or omission errors typical of the AVHRR-based fire products (Giglio et al. 2003).

MODIS INPE

Starting mid-2002, daily processing of MODIS direct broadcast data began at INPE. INPE's satellite receiving station located in Cuiaba, Mato Grosso, in central Brazil receives Terra and Aqua imagery and disseminates that information to the Centro de Previsao de Tempo e Estudos Climaticos (CPTEC: Center for Weather Forecast and Climate Studies) in Cachoeira Paulista, Sao Paulo, where fire products are designed and implemented. The MODIS INPE algorithm relies on the well-consolidated methodology of fixed threshold algorithms (Setzer and Pereira 1991; Setzer et al. 1994; Setzer and Malingreau 1996; Li et al. 2001). INPE has successfully used this method with the NOAA AVHRR series of satellite data for nearly two decades. The daytime algorithm uses empirically derived thresholds. Pixels are classified as fire if two conditions are satisfied: band 20 > 3000 digital numbers (DNs) and band 9 < 3300 DNs. The band 20 test is used to determine pixels that are potentially associated with vegetation fires at the surface while the band 9 test is used to eliminate eventual sources of contamination that affect the fire product (e.g., bright targets). The nighttime algorithm requires one condition, band 20 > 3000. Text files with fire coordinates are disseminated to regional fire monitoring centers (e.g., PROARCO) and made available to the user community under a Web-based GIS system within approximately 2 h after the satellite overpass time (information online at http://tucupi.cptec.inpe.br/queimadas/index_modis.html).

MODIS EOS

Fire detection within the EOS MODIS fire products is performed using a contextual algorithm that exploits the strong emission of midinfrared radiation from fires (Dozier 1981; Matson and Dozier 1981). Briefly, multiple tests are applied to each pixel of the MODIS swath that look for the characteristic signature of an active fire in which the 4- m brightness temperature, as well as the 4- and 11- m brightness temperature difference, departs substantially from that of the nonfire background. Relative thresholds are adjusted based on the natural variability of the scene. Additional specialized tests are used to eliminate false detections caused by sun glint, desert boundaries, and errors in the water mask. The algorithm ultimately assigns to each pixel one of the following classes: missing data, cloud, water, nonfire, fire, or unknown. A detailed description of the detection algorithm is provided by Giglio et al. (Giglio et al. 2003). In this study we used the Collection 4 level 2 (swath based) fire product, available from the Land Processes Distributed Active Archive Center (DAAC) via the EOS Data Gateway (http://edcimswww.cr.usgs.gov/pub/imswelcome/).

ASTER

ASTER (Yamaguchi et al. 1998), also on board the Terra satellite, provides near-nadir view measurements in four visible and near-infrared bands between 0.52 and 0.86 m, six shortwave infrared (SWIR) bands between 1.6 and 2.43 m, and five thermal infrared (TIR) bands between 8.125 and 11.65 m at 15-, 30-, and 90-m resolutions, respectively. The coincident high-resolution, multispectral measurements within a 60 km swath near the center of the MODIS swath provide a unique opportunity to analyze the finescale features within the MODIS pixels, such as active fires. In this study we utilized 22 ASTER Level 1B calibrated radiance scenes obtained through the NASA Earth Observing System Data Gateway (EDG) (http://edcimswww.cr.usgs.gov/pub/imswelcome/).

The companion file (filelist.csv) provides a table containing the file names that provide the unique identifier for each image data set for the Terra MODIS Thermal Anomalies/Fire 5-min Level 2 1-km swath (MOD14), the Terra MODIS Level 1A Geolocation data (MOD03; required input for proper geolocation of MOD14 swath data), and the ASTER Level 1B data. All of these data can be found in the EOS data gateway by searching for this file name as the local granule ID. Figure 1 shows the distribution of these scenes in space and the companion file provides details for the acquisition date, time, center latitude and longitude, cloud cover, and file name for each ASTER scene and the associated MODIS file names.

Sensors used include:

- MODIS (MODERATE-RESOLUTION IMAGING SPECTRORADIOMETER)
- MODIS (MODERATE-RESOLUTION IMAGING SPECTRORADIOMETER)
- ASTER (ADVANCED SPACEBORNE THERMAL EMISSION AND REFLECTION RADIOMETER)

6. Data Access:

This data is available through the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC) [http://www.daac.ornl.gov] or the EOS Data Gateway [http://redhook.gsfc.nasa.gov/%7Eimswww/pub/imswelcome/].

Data Archive Center:

Contact for Data Center Access Information:

E-mail: uso@daac.ornl.gov
Telephone: +1 (865) 241-3952
FAX: +1 (865) 574-4665

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