Identification_Information:
Citation:
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Originator: U.S. Geological Survey and the U.S. Forest Service
Publication Date: 20091113
Title: Monitoring Trends in Burn Severity assessment of Fire Information: Fire Information

Geospatial_Data_Presentation_Form: Raster digital data for satellite imagery and derived products Vector data for fire perimeters
Publication_Information: Publication_Place: Sioux Falls, South Dakota or Salt Lake City, Utah
Publisher: U.S. Geological Survey and U.S. Forest Service
Online_Linkage: http://edc.usgs.gov or http://www.fs.fed.us/eng/rsac/
Description:
Abstract:
Monitoring Trends in Burn Severity (MTBS) is a multi-year project conducted through a partnership between the USGS EROS and the USDA Forest Service Remote Sensing Applications Center (RSAC). It is designed to consistently map the burn severity and perimeters of fires across all lands of the United States for the period spanning 1984 through 2010. MTBS is based on image processing and analysis methods currently utilized by the USGS and USFS for existing post-fire burn severity mapping efforts. The USGS Landsat Thematic Mapper image archive will provide a consistent and continuous source of 30 meter resolution data going back to 1984 for mapping burn severity of all fires greater than 1000 acres in the west and 500 acres in the east (east of 97W longitude).
Purpose:
The data generated by MTBS will be used to identify national trends in burn severity, providing information necessary to monitor the effectiveness of the National Fire Plan and Healthy Forests Restoration Act. MTBS is sponsored by the Wildland Fire Leadership Council (WFLC), a multi-agency oversight group responsible for implementing and coordinating the National Fire Plan and Federal Wildland Fire Management Policies. The MTBS project objective is to provide consistent, 30 meter resolution burn severity data and fire perimeters that will serve four primary user groups:1. National policies and policy makers such as the National Fire Plan and WFLC which require information about long-term trends in burn severity and recent burn severity impacts within vegetation types, fuel models, condition classes, and land management activities.2. Field management units that benefit from mid to broad scale GIS-ready maps and data for pre- and post-fire assessment and monitoring. Field units that require finer scale burn severity data will also benefit from increased efficiency, reduced costs, and data consistency by starting with MTBS data.3. Existing databases from other comparably scaled programs, such as Fire Regime and Condition Class (FRCC) within LANDFIRE, that will benefit from MTBS data for validation and updating of geospatial data sets.4. Academic and agency research entities interested in fire severity data over significant geographic and temporal extents.
Supplemental_Information:
The MTBS Fire-ID is generated by combining several attributes taken from Federal or State agency fire records.The first field is the Federal Agency or State identification, next is a code related to the sub unit of the reporting agency (i.e. specific forest, park, refuge, etc.), next is the agency code given to the individual fire, and lastly is the start date of the fire in the format: year month day.NOTES: some of the fields were not recorded for some fires. Records from different agencies contain different formats or incomplete information for the date of the fire.Multiple agencies report the same fire, preferentially; a Federal agency record was used to identify a fire and duplicate MTBS fire IDs are also noted below.Fires that were discovered with no corresponding fire record and met the fire size criteria were mapped and given an ?unknown?, ?state? or ?agency? Fire-ID if it can be determined and a latitude, longitude and estimated start date:

Unk-ddmmss-dddmmss-yyyymmddThe first ddmmss field refers to the north latitude of the fire centroid.The second dddmmss field refers to the west longitude of the fire centroid.The date field is the best estimate of the fire start date.NOTE: An unknown fire may, in fact, have a corresponding fire record, but the fire record contains the wrong location and/or year of occurrence and could not be matched with the fire found on the Landsat imagery.

Supplemental Fire Metadata

The download files available on the NPS Burn Severity website for the Chakina fire contain two different assessments: a two-scene dNBR assessment and a Single-Scene NBR assessment (designated with an SS in the file names). See 'Fire Information for Single Scene assessment' below.

Fire Information for dNBR assessment
MTBS Fire ID: NPS-AKROWRSTNP-362-20090702
Duplicate MTBS Fire IDs: No duplicate fire IDs
Fire Name (if known): CHAKINA
Date of Fire: July 02, 2009
State: Alaska
Agency: NPS
MTBS Mapping Zone: Alaska
Geographic Area: Alaska
HUC4 Catalog Unit: 19020103
Type of Assessment: Initial
Acres within Fire Perimeter: 57134.5

Required spatial adjustment for co-registration of pre-fire NBR to post-fire NBR
X-shift adjustment: 0 meters (relative to post-fire NBR)
Y-shift adjustment: 0 meters (relative to post-fire NBR)

Landsat Path and Row: 65/17
Pre-Fire Landsat Date/Scene ID: Landsat 7 ETM+; August 17, 2007 / 70650172007229EDC00
Post-Fire Landsat Date/Scene ID: Landsat 7 ETM+; September 07, 2009 / 70650172009250EDC00

Output Dataset Projection Albers Equal Area
Units: Meters
Datum: WGS84
Spheroid: WGS84
1st Standard Parallel: 55 00 00
2nd Standard Parallel: 65 00 00
Central Meridian: -154 00 00
Latitude of Origin: 50 00 00
False Northing: 0
False Easting: 0

Image Subset Corner Coordinates (center of pixel, projected meters)
ULX: 559680
ULY: 1312680
LRX: 594180
LRY: 1286010
Rows: 890
Columns: 1151
Pixel size: 30 meters

Bounding Box

North Latitude: 61.35042 (61 21 01.49460650065)
South Latitude: 61.13923 (61 08 21.2246080145)
East Longitude: -142.92546 (-142 55 31.6421636016)
West Longitude: -143.41319 (-143 24 47.499923034)

Latitude and Longitude within Fire Perimeter
Latitude: 61.260857 (61 15 39.0852)
Longitude: -143.123108 (-143 07 23.1888)

Fire Perimeter Generation Method: Manual

dNBR offset value used to calculate RdNBR: 49

Burn severity thresholds
No Data Threshold: -970
Increased Greeness: -150
Low Threshold: 125
Moderate Threshold: 394
High Threshold: 700

Product List:
NPS-AKROWRSTNP-362-20090702_pre_refl.tif
Subset of Landsat scene used for pre-fire image (Bands 1-5, 7; Unsigned 8-bit GeoTIFF)

NPS-AKROWRSTNP-362-20090702_post_refl.tif
Subset of Landsat scene used for post-fire image (Bands 1-5, 7; Unsigned 8-bit GeoTIFF)

NPS-AKROWRSTNP-362-20090702_d.tif
dNBR used for burn severity analysis and mapping; subset to the fire area (Signed 16-bit GeoTIFF)

NPS-AKROWRSTNP-362-20090702_dt.tif
Thematic dNBR; Derived by thresholding dNBR subset (8-bit GeoTIFF)

NPS-AKROWRSTNP-362-20090702_rd.tif
Relative dNBR; subset to the fire area (Signed 16-bit GeoTIFF)

NPS-AKROWRSTNP-362-20090702.shp
Perimeter of detectable fire area derived from satellite imagery (ESRI shapefile)

NPS-AKROWRSTNP-362-20090702_cldshdw.shp
Mask for clouds, shadow, snow or anomallies intersecting fire area (ESRI shapefile)

d6517_20070817_6517_20090907.tif
dNBR for full Landsat scene (path/row: 65/17)

Processing Comments: SLC-OFF gaps obscure portions of the fire.

Burn severity thematic categories
0 - outside fire perimeter
1 - unburned to low severity
2 - low severity
3 - moderate severity
4 - high severity
5 - increased greenness
6 - nodata/non-processing mask

Fire Information for Single Scene assessment
MTBS Fire ID: NPS-AKROWRSTNP-362SS-20090702
Duplicate MTBS Fire IDs: No duplicate fire IDs
Fire Name (if known): CHAKINA
Date of Fire: July 02, 2009
State: Alaska
Agency: NPS
MTBS Mapping Zone: Alaska
Geographic Area: Alaska
HUC4 Catalog Unit: 19020103
Type of Assessment: Initial(SS)
Acres within Fire Perimeter: 57134.5

Required spatial adjustment for co-registration of pre-fire NBR to post-fire NBR
X-shift adjustment: 0 meters (relative to post-fire NBR)
Y-shift adjustment: 0 meters (relative to post-fire NBR)

Landsat Path and Row: 65/17
Pre-Fire Landsat Date/Scene ID: Not applicable; Single scene assessment
Post-Fire Landsat Date/Scene ID: Landsat 7 ETM+; September 07, 2009 /
70650172009250EDC00

Output Dataset Projection Albers Equal Area
Units: Meters
Datum: WGS84
Spheroid: WGS84
1st Standard Parallel: 55 00 00
2nd Standard Parallel: 65 00 00
Central Meridian: -154 00 00
Latitude of Origin: 50 00 00
False Northing: 0
False Easting: 0

Image Subset Corner Coordinates (center of pixel, projected meters)
ULX: 559680
ULY: 1312680
LRX: 594180
LRY: 1286010
Rows: 890
Columns: 1151
Pixel size: 30 meters

Bounding Box
North Latitude: 61.35042 (61 21 01.49460650065)
South Latitude: 61.13923 (61 08 21.2246080145)
East Longitude: -142.92546 (-142 55 31.6421636016)
West Longitude: -143.41319 (-143 24 47.499923034)

Latitude and Longitude within Fire Perimeter
Latitude: 61.260857 (61 15 39.0852)
Longitude: -143.123108 (-143 07 23.1888)

Fire Perimeter Generation Method: Manual

dNBR offset value used to calculate RdNBR: No RdNBR produced; Single scene assessment

Burn severity thresholds
No Data Threshold: -9999
Increased Greeness: -9999
Low Threshold: 300
Moderate Threshold: 150
High Threshold: -175

Product List:
NPS-AKROWRSTNP-362SS-20090702_pre_refl.tif
Subset of Landsat scene used for pre-fire image. Not produced. Single scene assessment

NPS-AKROWRSTNP-362SS-20090702_post_refl.tif
Subset of Landsat scene used for post-fire image (Bands 1-5, 7; Unsigned 8-bit GeoTIFF)

NPS-AKROWRSTNP-362SS-20090702_n.tif
NBR used for burn severity analysis and mapping; subset to the fire area (Signed 16-bit GeoTIFF)

NPS-AKROWRSTNP-362SS-20090702_nt.tif
Thematic NBR; Derived by thresholding post-fire NBR subset (8-bit GeoTIFF)

NPS-AKROWRSTNP-362SS-20090702_rd.tif
Relative dNBR; Not produced; Single scene assessment

NPS-AKROWRSTNP-362SS-20090702.shp
Perimeter of detectable fire area derived from satellite imagery (ESRI shapefile)

NPS-AKROWRSTNP-362SS-20090702_cldshdw.shp
Mask for clouds, shadow, snow or anomallies intersecting fire area (ESRI shapefile)

70650172009250EDC00_nbr.tif
NBR included with full MTBS Landsat scene (path/row: 65/17)

Processing Comments:

Burn severity thematic categories
0 - outside fire perimeter
1 - unburned to low severity
2 - low severity
3 - moderate severity
4 - high severity
5 - increased greenness
6 - nodata/non-processing mask

Time_Period_of_Content:
Time_Period_Information:
Multiple_Dates/Times:
Currentness_Reference: ground condition
Status:
Progress: Complete
Maintenance_and_Update_Frequency: As needed
Spatial_Domain:
Bounding_Coordinates:

West_Bounding_Coordinate: 61.13923
East_Bounding_Coordinate: 61.35042
North_Bounding_Coordinate:
South_Bounding_Coordinate:

Keywords:
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: Raster digital data
Theme_Keyword: U.S. Geological Survey
Theme_Keyword: USGS
Theme_Keyword: Monitoring Trends in Burn Severity
Theme_Keyword: MTBS
Theme_Keyword: Burn Mapping
Theme_Keyword: Imagery
Theme_Keyword: Fire
Theme_Keyword: Landsat
Theme:
Theme_Keyword_Thesaurus: ISO 19115 Category
Theme_Keyword: imageryBaseMapsEarthCover
Place:
Place_Keyword_Thesaurus: U.S. Department of Commerce, 1995, Countries, dependencies, areas of special sovereignty, and their principal administrative divisions, Federal Information Processing Standard 10-4,): Washington, D.C., National Institute of Standards and Technology
Place_Keyword: United States
Place_Keyword: U.S.
Place_Keyword:US
Place_Keyword:July 02, 2009
Place:
Place_Keyword_Thesaurus: U.S. Department of Commerce, 1987, Codes for the identification of the States, the District of Columbia and the outlying areas of the United States, and associated areas (Federal Information Processing Standard 5-2): Washington, D.C., National Institute of Standards and Technology
Place_Keyword: NOT FOUND
Temporal:
Temporal_Keyword_Thesaurus: None
Temporal_Keyword: 1999-present
Access_Constraints: FTP data sets are available to any user.
Use_Constraints: There are no restrictions on use, except for reasonable and proper acknowledgement of information sources.
Point_of_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: U.S.Geological Survey
Contact_Position: Customer Service Representative
Contact_Address:
Address_Type: mailing and physical address
Address: 47914 252nd Street
Address: USGS EROS
City: Sioux Falls
State_or_Province: SD
Postal_Code: 57198-0001
Country: USA
Contact_Voice_Telephone: 605/594-6151
Contact_Voice_Telephone: 800/252-4547
Contact_TDD/TTY_Telephone: 605/594-6933
Contact_Facsimile_Telephone: 605/594-6589
Contact_Electronic_Mail_Address: custserv@usgs.gov

Contact_Electronic_Mail_Address: fsedc@usgs.gov
Hours_of_Service: 0800 - 1600 CT, M-F, -6 h GMT
Contact_Instructions: http://mtbs.gov/contactus.html
Data_Set_Credit: USGS and NASA
Native_Data_Set_Environment: Oracle, ERDAS Imagine, & ArcInfo
Data_Quality_Information:
Attribute_Accuracy: Attribute_Accuracy_Report: MTBS geospatial data (both vector and raster) are generated using consistent methods and procedures. The differenced Normalized Burn Ratio (dNBR) image datasets are examined on a fire by fire basis to develop a thresholded, or categorical, burn severity dataset.
Quantitative_Attribute_Accuracy_Assessment:
Attribute_Accuracy_Explanation: MTBS analysts examine the differenced Normalized Burn Ratio (dNBR) image for each fire in the context of remote sensing spectral data and any ancillary information available to the analyst. dNBR image data for each fire are thresholded into classes representing unburned areas; areas of low, moderate, high burn severities; and areas of increased vegetation response. Analysts follow guidelines established by subject matter experts in order to maintain consistency in discerning burn severity thresholds from fire to fire and minimize subjectivity.
Logical_Consistency_Report: These Landsat data are collected from a nominal altitude of 705 kilometers in a near-polar, near-circular, sun-synchronous orbit at an inclination of 98.2 degrees, imaging the same 183-km swath of Earth's surface every 16 days. The pixels representing the bands for the image are in the data set only once.
Completeness_Report: Fire Perimeter Generation Method: Manual (from metadata)
Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report: Each Landsat Thematic Mapper image used to create the burn severity assessment was precision terrain-corrected using 3-arc-second digital terrain elevation data (DTED), and georegistered using ground control points. This resulted in a root mean square registration error of less than 1 pixel (30 meters).Lineage:
Process_Step:
Process_Description: These data products are derived from Landsat Thematic Mapper data. A pre-fire scene and a post-fire scene are analyzed to create a Differenced Normalized Burn Ratio (dNBR) image. The dNBR image portrays the variations of burn severity within the fire.

The Landsat images are terrain corrected and geometrically rectifiedto an Albers Conical Equal Area map projection using the National Landsat Archive Production System (NLAPS). The images are further processed to convert bands 1-5 and 7 to at-satellite-reflectance. The Normalized Burn Ratio (NBR) is computed for each date of imagery using the following formula:

((Band 4 - Band 7) / (Band 4 + Band 7)) x 1000 = NBR

The differenced NBR is computed by subtracting the post-fire NBR from the pre-fire NBR:

PreNBR - PostNBR = dNBR

Further processing is required to generate the 'Relativized' dNBR (RdNBR). The RdNBR takes into account pre fire conditions related to the amount of vegetation cover vs. bare soil. In one sense, an area of 25% vegetation cover that burns completely should be considered 'high severity' as would an area of 100% cover that burned completely. The dNBR does not allow that distinction. To calculate the RdNBR, the analyst must determine the 'dNBR offset value': the average dNBR value of a nearby area of unburned vegetation (similar to the vegetation that did burn). The RdNBR is calculated as follows:

(dNBR - dNBROffset)/ (Square Root of (PreNBR/1000)) = RdNBR

Higher dNBR and RdNBR values are correlated with more severe burns. The dNBR image is evaluated to determine the threshold value between burned and unburned areas. The perimeter of the fire is delineated using the dNBR and/or post-fire reflectance image. The dNBR image, the pre-fire and post-fire TM images, and a fire perimeter vector file are provided in digital format.

Source_Used_Citation_Abbreviation: TM
Process_Date: Unknown
Process_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: U.S.Geological Survey
Contact_Position: Customer Service Representative
Contact_Address:
Address_Type: mailing and physical address
Address: 47914 252nd Street
Address: USGS EROS
City: Sioux Falls
State_or_Province: SD
Postal_Code: 57198-0001
Country: USA
Contact_Voice_Telephone: 605/594-6151
Contact_TDD/TTY_Telephone: 605/594-6933
Contact_Facsimile_Telephone: 605/594-6589
Contact_Electronic_Mail_Address: custserv@usgs.gov
Contact_Electronic_Mail_Address: fsedc@usgs.gov
Hours_of_Service: 0800 - 1600 CT, M-F, -6 h GMT
Distribution_Information:
Distributor:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: U.S. Geological Survey
Contact_Position: Principal Scientist, Land Cover Applications
Contact_Address:
Address_Type: mailing and physical address
Address: 47914 252nd Street
Address: USGS EROS
City: Sioux Falls
State_or_Province: SD
Postal_Code: 57198-0001
Country: USA
Contact_Voice_Telephone: 605/594-6151
Contact_TDD/TTY_Telephone: 605/594-6933
Contact_Facsimile_Telephone: 605/594-6589
Contact_Electronic_Mail_Address: custserv@usgs.gov
Contact_Electronic_Mail_Address: fsedc@usgs.gov
Hours_of_Service: 0800 - 1600 CT, M-F, -6 h GMT
Contact_Instructions: http://mtbs.gov/contactus.html
Resource_Description: Downloadable Data
Distribution_Liability: No warranty expressed or implied is made by the USGS regarding the use of the data, nor does the act of distribution constitute any such warranty.
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name: Geo-TIFF

Format_Version_Number: 1
Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
Network_Resource_Name: http://mbts.cr.usgs.gov/viewer
Digital_Form:
Digital_Transfer_Information:
Format_Name: DNBR Geo-TIFF
Format_Version_Number: 1
Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
Network_Resource_Name: http://mbts.cr.usgs.gov/viewer
Digital_Form:
Digital_Transfer_Information:
Format_Name: Shape file
Format_Version_Number: 1
Digital_Transfer_Option:
Online_Option:
Computer_Contact_Information:
Network_Address:
Network_Resource_Name: http://mbts.cr.usgs.gov/viewer
Fees: None
Turnaround: Same day
Metadata_Reference_Information:
Metadata_Date: 20091113
Metadata_Contact:
Contact_Information:

Contact_Organization_Primary:
Contact_Organization:
U.S Geological Survey
Contact_Position: Science & Applications BranchContact_Address:
Address_Type: mailing and physical address
Address: 47914 252nd Street
Address: USGS EROS
City: Sioux Falls
State_or_Province: SD
Postal_Code: 57198-0001
Country: USA
Contact_Voice_Telephone: 605/594-6151
Contact_TDD/TTY_Telephone: 605/594-6933
Contact_Facsimile_Telephone: 605/594-6589
Contact_Electronic_Mail_Address: custserv@usgs.gov
Contact_Electronic_Mail_Address: fsedc@usgs.gov
Hours_of_Service: 0800 - 1600 CT, M-F, -6 h GMT
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: local time
Metadata_Access_Constraints: None
Metadata_Use_Constraints: None
Metadata_Security_Information:
Metadata_Security_Classification_System: None
Metadata_Security_Classification: Unclassified
Metadata_Security_Handling_Description: None
Metadata_Extensions:
Online_Linkage: http://www.esri.com/metadata/esriprof80.html

Profile_Name: ESRI Metadata Profile