FIRESEV East Severe Fire Potential, forest and woodland settings, 90th percentile 1000-hour fuel moisture index

Metadata also available as ArcGIS metadata attached to individual raster products at http://www.frames.gov/firesev-east

Metadata:

- Identification_Information
- Spatial_Data_Organization_Information
- Spatial_Reference_Information
- Entity_and_Attribute_Information
- Distribution_Information
- Metadata_Reference_Information
- Data_Quality_Information

Identification_Information:

Citation:

Citation_Information:

Title:

FIRESEV East Severe Fire Potential, forest and woodland settings, 90th percentile 1000-hour fuel moisture index

Edition: First release, April 2016, predictions based on 2014

Geospatial_Data_Presentation_Form: raster digital data

Online_Linkage: <http://www.frames.gov/firesev-east>

Originator:

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Publication_Date: 2016/04/06

Description:

Abstract:

The Eastern Fire Severity Mapping System project (FIRESEV East) is geared toward providing fire managers across the eastern United States critical information about the potential ecological effects of wildland fire at multiple levels of thematic, spatial, and temporal detail. A major component of FIRESEV East is a comprehensive map of the eastern U.S. depicting the potential for fires to burn with moderate to high severity if they should occur. Developed as a 30m-resolution raster dataset, the map is intended to be an

online resource that managers can download and use to evaluate the potential ecological effects associated with new and potential fire events. Using satellite-derived burn severity data from over 5,000 fires that burned from 2000 to 2013, together with geospatial topography, fuel moisture, and vegetation data, we produced statistical models using the Random Forest machine learning algorithm. We developed Random Forest models separately for forested and non-forested settings in each of 8 mapping regions. For each model, we selected the set of predictor variables (i.e., landscape characteristics) that provided the best possible predictions of high severity fire occurrence. Cross-validated classification accuracies for individual models ranged from 70% to 87% for forest models, and 69% to 85% for non-forest models. We used the Random Forest models to predict, for every 30m pixel in the East, the potential for moderate to high severity fire, conditional on that pixel experiencing fire at a particular percentile level of a 1000-hour fuel moisture index (where higher percentiles equal dryer conditions). This raster dataset represents the predicted severe fire potential at the 90th percentile, with non-burnable areas added in from the LANDFIRE 2012 Fire Behavior Fuel Model layer.
Purpose:
This dataset is part of a seamless, wall-to-wall, 30-meter raster geospatial layer covering all lands in the eastern United States that depicts the potential for moderate to high severity fire for each 30-m cell, based on remotely sensed severity metrics and statistical modeling.
Status:
Progress: Complete
Maintenance_and_Update_Frequency: None planned
Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: -104.358301
East_Bounding_Coordinate: -65.543151
North_Bounding_Coordinate: 51.017286
South_Bounding_Coordinate: 22.976649
Keywords:
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: wildland fire
Theme_Keyword: burn severity
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: Eastern United States
Place_Keyword: Region 18: South Central Plains and West Gulf Coastal Plain
Place_Keyword: Region 19: Ozark and Ouachita Highlands
Place_Keyword: Region 20: Central and Eastern Great Plains
Place_Keyword: Region 21: Great Lakes
Place_Keyword: Region 22: Southeastern Piedmont and Interior
Place_Keyword: Region 23: Eastern Gulf and Atlantic Coastal Plain
Place_Keyword: Region 24: Central and Southern Appalachian Mountains

Place_Keyword: Region 25: Northeastern Coast and Northern Appalachian Mountains
Temporal:
Temporal_Keyword_Thesaurus: None
Temporal_Keyword: 2013
Access_Constraints: None
Use_Constraints:
This product is the result of predictive statistical modeling. While it is based on empirical observations of burn severity from past wildland fires, those observations are subject to many sources of error. Those errors, combined with the inherent uncertainties in statistical modeling, create a certain degree of error and uncertainty in this data product. Users of this dataset should recognize this uncertainty and critically evaluate its usefulness on any future wildland fire incident in light of other sources of information about landscape characteristics, fuels, weather, and predicted fire behavior.
Point_of_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization:
USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Lab
Contact_Person: Greg Dillon
Contact_Position: Spatial Fire Analyst
Contact_Address:
Address_Type: Unknown
Address: 5775 US Hwy 10 W
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State_or_Province: MT
Postal_Code: 59808
Country: USA
Contact_Voice_Telephone: 406-829-6783
Contact_Electronic_Mail_Address: gdillon@fs.fed.us
Data_Set_Credit:
This product was developed at the USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Lab in Missoula, MT, USA, in cooperation with the Department of Forest, Rangeland, and Fire Sciences at the University of Idaho, Moscow, ID, USA. Funding for this work was provided by the USDA Forest Service through two programs in the Rocky Mountain Research Station: the Wildland Fire Management Research, Development and Application (WFM RD&A) program and the Fire Modeling Institute. Portions of the work were facilitated through Research Joint Venture Agreement number RJVA 14-JV-11221637-122 between the University of Idaho and the USDA Forest Service Rocky Mountain Research Station.
Native_Data_Set_Environment:
Microsoft Windows Server 2012 R2 Version 6.3 (Build 9600) Service Pack 1; ESRI ArcGIS 10.2.2.3552
Time_Period_of_Content:

Time_Period_Information:
Single_Date/Time:
Calendar_Date: 2013
Currentness_Reference: ground condition

Spatial_Data_Organization_Information:
Direct_Spatial_Reference_Method: Raster
Raster_Object_Information:
Raster_Object_Type: Pixel
Row_Count: 95507
Column_Count: 94995

Spatial_Reference_Information:
Horizontal_Coordinate_System_Definition:
Planar:
Map_Projection:
Map_Projection_Name: Albers Conical Equal Area
Albers_Conical_Equal_Area:
Standard_Parallel: 29.5
Standard_Parallel: 45.5
Longitude_of_Central_Meridian: -96.0
Latitude_of_Projection_Origin: 23.0
False_Easting: 0.0
False_Northing: 0.0
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method: coordinate pair
Coordinate_Representation:
Abscissa_Resolution: 0.000000003752798072298447 4
Ordinate_Resolution: 0.000000003752798072298447 4
Planar_Distance_Units: Meter *Geodetic_Model:*
Horizontal_Datum_Name: D North American 1983
Ellipsoid_Name: GRS 1980
Semi-major_Axis: 6378137.0
Denominator_of_Flattening_Ratio: 298.257222101

Entity_and_Attribute_Information:
Detailed_Description:
Entity_Type:
Entity_Type_Label: FIRESEV East Severe Fire Potential (SFP)
Entity_Type_Definition: Predicted severe fire potential

Entity_Type_Definition_Source: None
Attribute:
Attribute_Label: Rowid
Attribute_Definition: Internal feature number.
Attribute_Definition_Source: ESRI
Attribute_Domain_Values:
Unrepresentable_Domain:
Sequential unique whole numbers that are automatically generated.
Attribute:
Attribute_Label: VALUE
Attribute_Definition:
Predicted severe fire potential for each pixel, on a 0 to 100 scale; Values > 100 represent non-burnable land
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: 191
Enumerated_Domain_Value_Definition: Developed lands (urban, suburban, roads, etc.)
Enumerated_Domain_Value_Definition_Source: LANDFIRE 2012 FBFM40 raster dataset
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: 192
Enumerated_Domain_Value_Definition: Perennial snow and ice
Enumerated_Domain_Value_Definition_Source: LANDFIRE 2012 FBFM40 raster dataset
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: 193
Enumerated_Domain_Value_Definition: Non-burnable agricultural lands
Enumerated_Domain_Value_Definition_Source: LANDFIRE 2012 FBFM40 raster dataset
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: 198
Enumerated_Domain_Value_Definition: Open water
Enumerated_Domain_Value_Definition_Source: LANDFIRE 2012 FBFM40 raster dataset
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: 199
Enumerated_Domain_Value_Definition: Bare ground

Enumerated_Domain_Value_Definition_Source: LANDFIRE 2012 FBFM40 raster dataset
Attribute_Domain_Values:
Enumerated_Domain:
Enumerated_Domain_Value: 0 to 100
Enumerated_Domain_Value_Definition: Severe Fire Potential
Enumerated_Domain_Value_Definition_Source:
Percentage of classification trees (out of 1500) within the Random Forest model that predicted the given pixel would burn with high severity if it experienced fire at the specified 1000-hour fuel moisture percentile.
Beginning_Date_of_Attribute_Values: 20141001
Ending_Date_of_Attribute_Values: 20161031
Attribute_Definition_Source: Random Forest modeling and LANDFIRE FBFM40
Attribute:
Attribute_Label: COUNT
Attribute_Definition: Number of pixels in each value
Attribute_Domain_Values:
Unrepresentable_Domain: Values represent the count of pixels with each raster value
Attribute_Definition_Source: ESRI

Distribution_Information:
Distributor:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Fire Research and Management Exchange System (FRAMES)
Contact_Instructions:
For problems with online data availability or download use the contact page at <http://www.frames.gov/about/contact-frames/>
Contact_Address:
Address_Type: mailing and physical address
Address: <http://www.frames.gov>
City: NA
State_or_Province: NA
Postal_Code: NA
Country: NA
Contact_Voice_Telephone: NA
Distribution_Liability: See access and use constraints information.

Metadata_Reference_Information:
Metadata_Date: 20160401
Metadata_Contact:

Contact_Information:
Contact_Organization_Primary:
Contact_Organization:
USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Lab
Contact_Person: Greg Dillon
Contact_Position: Spatial Fire Analyst
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Address: 5775 US Hwy 10 W
City: Missoula
State_or_Province: MT
Postal_Code: 59808
Country: USA
Contact_Voice_Telephone: 406-829-6783
Contact_Electronic_Mail_Address: gdillon@fs.fed.us
Metadata_Standard_Name: FGDC Content Standard for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998

Data_Quality_Information:
Lineage:
Process_Step:
Process_Description:
This raster dataset is primarily the product of Random Forest model predictions. The main categories of inputs were as follows:

1. The response variable in Random Forest models was an observation of binary burn severity (moderate to high severity or not) assembled from approximately 5,000 fires that burned between 2000 and 2013. We derived these burn severity observations from Normalized Burn Ratio (NBR) and Differenced Normalized Burn Ratio (dNBR) images produced using LANDSAT before and after image pairs for each individual fire by the Monitoring Trends in Burn Severity project (http://www.mtbs.gov).

2. Topographic predictor variables were based on the 30-m National Elevation Dataset (NED) from the US Geological Survey, acquired in December 2014. We derived several topographic indices from the NED, including: percent slope, hierarchical slope position, topographic position index (at different scales), Martonne's dissection coefficient (at different scales), and elevation relief ratio (at different scales).

3. A solar radiation predictor variable was also developed from the NED. We used the ArcGIS Area Solar Radiation Tool to calculate incoming solar radiation for the two solstices and one equinox. The solar radiation predictor variable was created by taking the average of these three rasters.

4. Normalized Differenced Vegetation Index (NDVI). For building the Random Forest model, 250m resolution MODIS imagery was used for both pre-fire NDVI and for creating a current (2014) spatial prediction. We used MODIS monthly NDVI products for the current NDVI. For each 1 degree x 1 degree latitude/longitude tile, we chose the monthly NDVI for the most common month of fire occurrence for that tile.

5. 1000-hour Fuel Moisture Index. For building the Random Forest model, we calculated the localized 1000-hour fuel moisture index percentile for each of our sample points. The input for this was a set of modeled daily gridded weather variables for 1980 to 2013 from the North American Regional Reanalysis (NARR). The native raster resolution of NARR products is 32km, but we acquired a set that had been downscaled to 4km. W.M. Jolly (USDA Forest Service, Fire Sciences Lab) adjusted the downscaled NARR data to produce potential temperature (i.e., temperature at sea level) and then calculated daily 1000-hour fuel moisture rasters at 4km. We extracted the full daily series at each of our sample pixel locations, then identified the lowest fuel moisture that occurred during the time each fire was burning (within 10 days of fire detection date). From these numbers, we calculated the 1000-hour fuel moisture percentile at the time of burning, specific to each sample location. As low fuel moisture values mean dryer conditions, but most other fire weather indices (e.g., ERC) express higher fire potential with higher numbers, we flipped our fuel moisture index so that higher percentiles reflect dryer conditions. For creating a current (2014) spatial prediction, we simply set 1000-hour fuel moisture constant across the entire landscape. Therefore, the product associated with these metadata reflects an assumption of 90th percentile (i.e., very dry) 1000-hour fuel moisture index for every pixel.
Process_Date: 2016
Logical_Consistency_Report: None
Completeness_Report: None
