LiDAR-Based Wildfire Prevention in WUI: The Automatic Detection, Measurement and Evaluation of Forest Fuels
www.nrfirescience.org/resource/19311
This paper describes a methodology using LiDAR point clouds with an ultra-high resolution in the characterization of forest fuels for further wildfire prevention and management. Biomass management strips were defined in three case studies using a particular Spanish framework. The data were acquired through a UAV platform. The...
Author(s): Marta Fernández-Álvarez, Julia Armesto, Juan Picos
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Prototype Downscaling Algorithm for MODIS Satellite 1 km Daytime Active Fire Detections
www.nrfirescience.org/resource/19763
This work presents development of an algorithm to reduce the spatial uncertainty of active fire locations within the 1 km MODerate resolution Imaging Spectroradiometer (MODIS Aqua and Terra) daytime detection footprint. The algorithm is developed using the finer 500 m reflective bands by leveraging on the increase in 2.13 ?m...
Author(s): Sanath S. Kumar, Joshua J. Picotte, Birgit Peterson
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Historical background and current developments for mapping burned area from satellite Earth observation
www.nrfirescience.org/resource/19137
Fire has a diverse range of impacts on Earth’s physical and social systems. Accurate and up to date information on areas affected by fire is critical to better understand drivers of fire activity, as well as its relevance for biogeochemical cycles, climate, air quality, and to aid fire management. Mapping burned areas was...
Author(s): Emilio Chuvieco, Florent Mouillot, Guido R. Van der Werf, Jesus San Miguel, Mihai A. Tanase, Nikos Koutsias, Mariano Garcia, Marta Yebra, Marc Padilla, Ioannis Z. Gitas, Angelika Heil, Todd J. Hawbaker, Louis Giglio
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Deriving Fire Behavior Metrics from UAS Imagery
www.nrfirescience.org/resource/19743
The emergence of affordable unmanned aerial systems (UAS) creates new opportunities to study fire behavior and ecosystem pattern-process relationships. A rotor-wing UAS hovering above a fire provides a static, scalable sensing platform that can characterize terrain, vegetation, and fire coincidently. Here, we present methods for...
Author(s): Christopher J. Moran, Carl A. Seielstad, Matthew R. Cunningham, Valentijn Hoff, Russell A. Parsons, Lloyd P. Queen, Katie Sauerbrey, Tim Wallace
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Incorporating biophysical gradients and uncertainty into burn severity maps in a temperate fire-prone forested region
As forest fire activity increases worldwide, it is important to track changing patterns of burn severity (i.e., degree of fire-caused ecological change). Satellite data provide critical information across space and time, yet how satellite indices relate to individual measures of burn severity on the ground (e.g., tree mortality or...  

Author(s): Brian J. Harvey, Robert A. Andrus, Sean C. Anderson  
Year Published: 2019  
Type: Document  
Book or Chapter or Journal Article

Standardized process to generate mapping of priority areas for protection against wildfires  
In the field of geographic information systems (GIS) there are certain tasks that are performed repetitively and are thus sometimes monotonous, where it is necessary to structure, integrate and analyze a series of georeferenced information, which, however, always carries the same sequence. Therefore, we developed a sequential model...  

Author(s): José G. Flores Garnica, Uri David Casillas Díaz, Alejandra Macías Muro  
Year Published: 2019  
Type: Document  
Conference Proceedings

Wildfire activity and land use drove 20th-century changes in forest cover in the Colorado front range  
Recent shifts in global forest area highlight the importance of understanding the causes and consequences of forest change. To examine the influence of several potential drivers of forest cover change, we used supervised classifications of historical (1938-1940) and contemporary (2015) aerial imagery covering a 2932?km2 study area...  

Author(s): Kyle Rodman, Thomas T. Veblen, Sara Saraceni, Teresa B. Chapman  
Year Published: 2019  
Type: Document  
Book or Chapter or Journal Article

Correction to: A case study comparison of LANDFIRE fuel loading and emissions generation on a mixed conifer forest in Northern Idaho, USA  
Following publication of the original article (Hyde et al., 2015), the authors have noticed two errors in the summarizing of our results and wish to point out the following corrections: – The LANDFIRE-FCCS layer showed a 200% higher duff loading relative to measured loadings, not the “300%” stated in the abstract – The 200...  

Author(s): Joshua C. Hyde, Eva K. Strand, Andrew T. Hudak, Dale Hamilton  
Year Published: 2019  
Type: Document  
Book or Chapter or Journal Article

Efficiency of remote sensing tools for post-fire management along a climatic gradient  
Forest managers require reliable tools to evaluate post-fire recovery across different geographic/climatic contexts and define management actions at the landscape scale, which might be highly resource-consuming in terms of data collection. In this sense, remote sensing techniques allow for gathering environmental data over large...
Dynamic wildfire navigation system
www.nrfirescience.org/resource/19498
Wildfire, a natural part of many ecosystems, has also resulted in significant disasters impacting ecology and human life in Australia. This study proposes a prototype of fire propagation prediction as an extension of preceding research; this system is called “Cloud computing based bushfire prediction”, the computational...

Relationships between satellite-based spectral burned ratios and terrestrial laser scanning
www.nrfirescience.org/resource/19851
Three-dimensional point data acquired by Terrestrial Lidar Scanning (TLS) is used as ground observation in comparisons with fire severity indices computed from Landsat satellite multi-temporal images through Google Earth Engine (GEE). Forest fires are measured by the extent and severity of fire. Current methods of assessing fire...

Comparison and integration of lidar and photogrammetric point clouds for mapping pre-fire forest structure
www.nrfirescience.org/resource/19424
Lidar is an established tool for mapping forest structure, but its sparse spatial and temporal coverage often preclude its use in studying forest disturbance. In contrast, aerial imagery has been and continues to be regularly collected in many regions, and advances in stereo image matching have automated the creation of dense...

Mapping coarse woody debris with random forest classification of centimetric aerial imagery
www.nrfirescience.org/resource/19805
Coarse woody debris (CWD; large parts of dead trees) is a vital element of forest ecosystems, playing an important role in nutrient cycling, carbon storage, fire fuel, microhabitats, and overall forest structure. However, there is a lack of effective tools for identifying and mapping both standing (snags) and downed (logs) CWD in...
Object-based classification of forest disturbance types in the conterminous United States
www.nrfirescience.org/resource/19360
Forest ecosystems provide critical ecosystem goods and services, and any disturbance-induced changes can have cascading impacts on natural processes and human socioeconomic systems. Forest disturbance frequency, intensity, and spatial and temporal scale can be altered by changes in climate and human activity, but without baseline...
Author(s): Lian-Zhi Huo, Luigi Boschetti, Aaron M. Sparks
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Assessing Landscape Fire Hazard by Multitemporal Automatic Classification of Landsat Time Series Using the Google Earth Engine in West-Central Spain
www.nrfirescience.org/resource/19768
Annual Land Use and Land Cover (LULC) maps are needed to identify the interaction between landscape changes and wildland fires. Objectives: In this work, we determined fire hazard changes in a representative Mediterranean landscape through the classification of annual LULC types and fire perimeters, using a dense Landsat Time...
Author(s): Natalia Quintero, Olga Viedma, Itziar R. Urbietza, José M. Moreno
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

LANDFIRE Remap Prototype Mapping Effort: Developing a New Framework for Mapping Vegetation Classification, Change, and Structure
www.nrfirescience.org/resource/19747
LANDFIRE (LF) National (2001) was the original product suite of the LANDFIRE program, which included Existing Vegetation Cover (EVC), Height (EVH), and Type (EVT). Subsequent refinements after feedback from data users resulted in updated products, referred to as LF 2001, that now served as LANDFIRE’s baseline datasets and are the...
Author(s): Joshua J. Picotte, Daryn Dockter, Jordan Long, Brian Tolk, Anne Davidson, Birgit Peterson
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Assessing and reinitializing wildland fire simulations through satellite active fire data
www.nrfirescience.org/resource/19103
Large wildfires can cover millions of hectares of forest every year worldwide, causing losses in ecosystems and assets. Fire simulation and modeling provides an analytical scheme to characterize and predict fire behavior and spread in several and complex environments. Spatial dynamics of large wildfires can be analyzed using...
Author(s): Adrián Cardil, Santiago Monedero, Joaquin Ramírez, Alberto Silva
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

A disturbance weighting analysis model (DWAM) for mapping wildfire burn severity in the presence of forest disease
www.nrfirescience.org/resource/19095
Forest ecosystems are subject to recurring fires as one of their most significant disturbances. Accurate mapping of burn severity is crucial for post-fire land management and vegetation regeneration monitoring. Remote-sensing-based monitoring of burn severity faces new challenges when forests experience both fire and non-fire...

Author(s): Yinan HE, Gang Chen, Angela De Santis, Dar A. Roberts, Yuyu Zhou, Ross K. Meentemeyer
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Incorporating biophysical gradients and uncertainty into burn severity maps in a temperate fire-prone forested region
www.nrfirescience.org/resource/19054
As forest fire activity increases worldwide, it is important to track changing patterns of burn severity (i.e., degree of fire-caused ecological change). Satellite data provide critical information across space and time, yet how satellite indices relate to individual measures of burn severity on the ground (e.g., tree mortality or...  
Author(s): Brian J. Harvey, Robert A. Andrus, Sean C. Anderson
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Detection of coarse woody debris using airborne light detection and ranging (LiDAR)
www.nrfirescience.org/resource/19024
Coarse woody debris (CWD) is an essential component of forest ecosystems that provides habitat for diverse species, functions in water and nutrient cycling, and can be a potential surface fuel in wildfires. CWD detection and mapping would enhance forestry and wildlife research and management but passive remote sensing technologies...
Author(s): Michael J. Joyce, John D. Erb, Barry A. Sampson, Ron A. Moen
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Giving ecological meaning to satellite-derived fire severity metrics across North American forests
www.nrfirescience.org/resource/19917
Satellite-derived spectral indices such as the relativized burn ratio (RBR) allow fire severity maps to be produced in a relatively straightforward manner across multiple fires and broad spatial extents. These indices often have strong relationships with field-based measurements of fire severity, thereby justifying their widespread...
Author(s): Sean A. Parks, Lisa M. Holsinger, Michael J. Koontz, Luke Collins, Ellen Whitman, Marc-Andre Parisien, Rachel A. Loehman, Jennifer L. Barnes, Jean-François Bourdon, Jonathan Boucher, Yan Boucher, Anthony C. Caprio, Adam Collingwood, Ronald J. Hall, Jane Park, Lisa B. Saperstein, Charlotte Smetanka, Rebecca J. Smith, Nicholas O. Soverel
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Escape Route Index: A Spatially-Explicit Measure of Wildland Firefighter Egress Capacity
www.nrfirescience.org/resource/19854
For wildland firefighters, the ability to efficiently evacuate the fireline is limited by terrain, vegetation, and fire conditions. The impacts of terrain and vegetation on evacuation time to a safety zone may not
be apparent when considering potential control locations either at the time of a wildfire or during pre-suppression...

Author(s): Michael J. Campbell, Wesley G. Page, Philip E. Dennison, Bret W. Butler
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Examining post-fire vegetation recovery with Landsat time series analysis in three western North American forest types
www.nrfirescience.org/resource/19436
Background: Few studies have examined post-fire vegetation recovery in temperate forest ecosystems with Landsat time series analysis. We analyzed time series of Normalized Burn Ratio (NBR) derived from LandTrendr spectral-temporal segmentation fitting to examine post-fire NBR recovery for several wildfires that occurred in three...
Author(s): Benjamin C. Bright, Andrew T. Hudak, Robert E. Kennedy, Justin D. Braaten, Azad Henareh Khalyani
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Deriving forest fire probability maps from the fusion of visible/infrared satellite data and geospatial data mining
www.nrfirescience.org/resource/19818
Information on fire probability is of vital importance to environmental and ecological studies as well as to fire management. This study aimed at comparing two forest fire probability mapping techniques, one based primarily on freely distributed EO (Earth observation) data from Landsat imagery, and another one based purely on GIS...
Author(s): Prashant K. Srivastava, George P. Petropoulos, Manika Gupta, Sudhir K. Singh, Tanvir Islam, Dimitra Loka
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Fire and burn severity assessment: calibration of Relative Differenced Normalized Burn Ratio (RdNBR) with field data
www.nrfirescience.org/resource/19414
The assessment of burn severity is highly important in order to describe and measure the effects of fire on vegetation, wildlife habitat and soils. The estimation of burn severity based on remote sensing is a powerful tool that, to be useful, needs to be related and validated with field data. The present paper explores the...
Author(s): Adrián Cardil, Blas Mola-Yudego, Ángela Blázquez-Casado, José Ramón González-Olabarria
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

Estimating canopy fuel attributes from low-density LiDAR
www.nrfirescience.org/resource/19789
Simulations of wildland fire risk are dependent on the accuracy and relevance of spatial data inputs describing drivers of wildland fire, including canopy fuels. Spatial data are freely available at national and regional levels. However, the spatial resolution and accuracy of these types of products often are
insufficient for...
Author(s): Peder S. Engelstad, Michael J. Falkowski, Peter T. Wolter, Aaron J. Poznanovic, Patty Johnson
Year Published: 2019
Type: Document
Book or Chapter or Journal Article

A World in Pixels: How New Research Is Helping to Predict Probability of High-Severity Fire
www.nrfirescience.org/resource/18051
With drought across much of the southern and western States, it’s shaping up to be another record year for wildfires. According to the National Oceanic and Atmospheric Administration, May 2018 was the fourthworst May since 2000 in terms of U.S. acres burned by wildfires. The year 2000 is a significant measuring point, since the...
Author(s): Sean A. Parks
Year Published: 2018
Type: Document
Research Brief or Fact Sheet

Improved prediction of stream flow based on updating land cover maps with remotely sensed forest change detection
www.nrfirescience.org/resource/17965
The water balance in a watershed can be disrupted by forest disturbances such as harvests and fires. Techniques to accurately and efficiently map forest cover changes due to disturbance are evolving quickly, and it is of interest to ask how useful maps of different types of disturbances over time can be in the prediction of water...
Author(s): Alexander J. Hernandez, Sean P. Healey, Hongsheng Huang, R. Douglas Ramsey
Year Published: 2018
Type: Document
Book or Chapter or Journal Article

Mean composite fire severity metrics computed with Google Earth engine offer improved accuracy and expanded mapping potential
www.nrfirescience.org/resource/17913
Landsat-based fire severity datasets are an invaluable resource for monitoring and research purposes. These gridded fire severity datasets are generally produced with pre- and post-fire imagery to estimate the degree of fire-induced ecological change. Here, we introduce methods to produce three Landsat-based fire severity metrics...
Author(s): Sean A. Parks, Lisa M. Holsinger, Morgan A. Voss, Rachel A. Loehman, Nathaniel P. Robinson
Year Published: 2018
Type: Document
Book or Chapter or Journal Article

Digital soil mapping for fire prediction and management in rangelands
www.nrfirescience.org/resource/18782
Background: Soil properties have important effects on fire occurrence and spread, but soils are often overlooked in fire prediction models. Quantifying soil-fire linkages is limited by information in conventional soil maps, but digital soil mapping products (e.g., detailed soil property maps) could improve both wildfire prediction...
Author(s): Matthew R. Levi, Brandon T. Bestelmeyer
Year Published: 2018
How vegetation recovery and fuel conditions in past fires influences fuels and future fire management in five western U.S. ecosystems - JFSP Final Report
www.nrfirescience.org/resource/18062
Mixed severity wildfires burn large areas in western North America forest ecosystems in most years and this is expected to continue or increase with climate change. Little is understood about vegetation recovery and changing fuel conditions more than a decade post-fire because it exceeds the duration of most studies of fire effects...
Author(s): Andrew T. Hudak, Beth A. Newingham, Eva K. Strand, Penelope Morgan
Year Published: 2018
Type: Document
Book or Chapter or Journal Article

Detection of Annual Spruce Budworm Defoliation and Severity Classification Using Landsat Imagery
www.nrfirescience.org/resource/17947
Spruce budworm (SBW) is the most destructive forest pest in eastern forests of North America. Mapping annual current-year SBW defoliation is challenging because of the large landscape scale of infestations, high temporal/spatial variability, and the short period of time when detection is possible. We used Landsat-5 and Landsat-MSS...
Author(s): Parinaz Rahimzadeh-Bajgiran, Aaron R. Weiskittel, Daniel Kneeshaw, David A. MacLean
Year Published: 2018
Type: Document
Book or Chapter or Journal Article

Towards improved quantification and prediction of post-fire recovery in conifers: Expanding laboratory fire radiative energy-tree physiology experiments to a mature forest stand - JFSP Final Report
www.nrfirescience.org/resource/17721
Current assessments of the ecological impacts of fires, termed burn severity, investigate the degree to which an ecosystem has changed due to a fire and typically encompass both vegetation and soil effects. Burn severity assessments at local to regional scales are typically achieved using spectral indices (such as the differenced... 
Author(s): Crystal A. Kolden, Aaron M. Sparks
Year Published: 2018
Type: Document
Technical Report or White Paper

A VIIRS direct broadcast algorithm for rapid response mapping of wildfire burned area in the western United States
www.nrfirescience.org/resource/18835
We present a direct broadcast (DB) rapid response burned area mapping algorithm for Visible Infrared Imaging Radiometer Suite (VIIRS) data that combines products driven by the spectral signal of fire-affected areas from both emissive and reflective spectral bands. The algorithm processes VIIRS infrared M-bands (750 m) using...
Author(s): Shawn P. Urbanski, Bryce L. Nordgren, Carl Albury, Brenna Schwert, David Peterson, Brad Quayle, Wei Min Hao
Year Published: 2018
Type: Document
Prediction of forest canopy and surface fuels from lidar and satellite time series data in a bark beetle-affected forest
www.nrfirescience.org/resource/15535
Wildfire behavior depends on the type, quantity, and condition of fuels, and the effect that bark beetle outbreaks have on fuels is a topic of current research and debate. Remote sensing can provide estimates of fuels across landscapes, although few studies have estimated surface fuels from remote sensing data. Here we predicted and...
Author(s): Benjamin C. Bright, Andrew T. Hudak, Arjan J. H. Meddens, Todd J. Hawbaker, Jennifer S. Briggs, Robert E. Kennedy
Year Published: 2017
Type: Document
Book or Chapter or Journal Article

Landscape-scale quantification of fire-induced change in canopy cover following mountain pine beetle outbreak and timber harvest
www.nrfirescience.org/resource/15137
Across the western United States, the three primary drivers of tree mortality and carbon balance are bark beetles, timber harvest, and wildfire. While these agents of forest change frequently overlap, uncertainty remains regarding their interactions and influence on specific subsequent fire effects such as change in canopy cover....
Author(s): T. Ryan McCarley, Crystal A. Kolden, Nicole M. Vaillant, Andrew T. Hudak, Alistair M. S. Smith, Jason Kreitler
Year Published: 2017
Type: Document
Book or Chapter or Journal Article

Selecting Control Sites for Post-Fire Ecological Studies Using Biological Criteria and MODIS Time Series Data
www.nrfirescience.org/resource/16737
Wildland fires play a key role in the functioning and structure of vegetation. The availability of sensors aboard satellites, such as Moderate Resolution Imaging Spectroradiometer (MODIS), makes possible the construction of a time series of vegetation indices (VI) and the monitoring of post-fire vegetation recovery. One of the...
Author(s): Marcos A. Landi, Carlos Di Bella, Silvia Ojeda, Paola Salvatierra, Juan Argañaraz, Laura M. Bellis
Year Published: 2017
Type: Document
Book or Chapter or Journal Article

Estimating ladder fuels: a new approach combining field photography with LiDAR
www.nrfirescience.org/resource/14768
Forests historically associated with frequent fire have changed dramatically due to fire suppression and past harvesting over the last century. The buildup of ladder fuels, which carry fire from the surface of the forest floor to tree crowns, is one of the critical changes, and it has contributed to uncharacteristically large and...
Author(s): Heather A. Kramer, Brandon M. Collins, Frank K. Lake, Marek K. Jakubowski, Scott L. Stephens, Maggi Kelly
Year Published: 2016
Type: Document
Measuring radiant emissions from entire prescribed fires with ground, airborne, and satellite sensors - RxCADRE 2012
www.nrfirescience.org/resource/13855
Characterising radiation from wildland fires is an important focus of fire science because radiation relates directly to the combustion process and can be measured across a wide range of spatial extents and resolutions. As part of a more comprehensive set of measurements collected during the 2012 Prescribed Fire Combustion and...
Year Published: 2016
Type: Document
Book or Chapter or Journal Article

Development and validation of fuel height models for terrestrial lidar - RxCADRE 2012
www.nrfirescience.org/resource/13846
Terrestrial laser scanning (TLS) was used to collect spatially continuous measurements of fuelbed characteristics across the plots and burn blocks of the 2012 RxCADRE experiments in Florida. Fuelbeds were scanned obliquely from plot/block edges at a height of 20 m above ground. Pre-fire blocks were scanned from six perspectives and...
Author(s): Eric Rowell, Carl A. Seielstad, Roger D. Ottmar
Year Published: 2016
Type: Document
Book or Chapter or Journal Article

Modifying LANDFIRE geospatial data for local applications
www.nrfirescience.org/resource/15167
LANDFIRE’s suite of spatial data layers are a valuable resource for land managers because they stretch “wall-to-wall” across the US, are created with a consistent methodology and are updated over time. These data are designed to support broad-scale land management activities, and users are encouraged to critique and modify...
Author(s): Don Helmbrecht, Kori Blankenship
Year Published: 2016
Type: Document
Technical Report or White Paper

Automated integration of lidar into the LANDFIRE product suite
www.nrfirescience.org/resource/13609
Accurate information about three-dimensional canopy structure and wildland fuel across the landscape is necessary for fire behaviour modelling system predictions. Remotely sensed data are invaluable for assessing these canopy characteristics over large areas; lidar data, in particular, are uniquely suited for quantifying three-....
Author(s): Birgit Peterson, Kurtis J. Nelson, Carl A. Seielstad, Jason Stoker, William Matt Jolly, Russell A. Parsons
Year Published: 2015
Type: Document
Book or Chapter or Journal Article
Exploring how alternative mapping approaches influence fireshed assessment and human community exposure to wildfire
www.nrfirescience.org/resource/13949
Attaining fire-adapted human communities has become a key focus of collaborative planning on landscapes across the western United States and elsewhere. The coupling of fire simulation with GIS has expanded the analytical base to support such planning efforts, particularly through the "fireside" concept that identifies areas where...
Author(s): Joe H. Scott, Matthew P. Thompson, Julie W. Gilbertson-Day
Year Published: 2015
Type: Document
Book or Chapter or Journal Article

Wildfire, wildlands, and people: understanding and preparing for wildfire in the wildland-urban interface - a forests on the edge report
www.nrfirescience.org/resource/16861
Fire has historically played a fundamental ecological role in many of America’s wildland areas. However, the rising number of homes in the wildland-urban interface (WUI), associated impacts on lives and property from wildfire, and escalating costs of wildfire management have led to an urgent need for communities to become “fire-...
Author(s): Susan M. Stein, Sara J. Comas, James P. Menakis, Mary A. Carr, Susan I. Stewart, Helene Cleveland, Lincoln Bramwell, Volker C. Radeloff
Year Published: 2013
Type: Document
Technical Report or White Paper

Beyond fire behavior and fuels: learning from the past to help guide us in the future
www.nrfirescience.org/resource/18397
The third IAWF Fire Behavior and Fuels Conference was held in Spokane, Washington, October 25-29, 2010, and commemorated the 100th anniversary of the 1910 fires in the Northern Rocky Mountains. The theme of the conference was appropriately titled ‘Beyond Fire Behavior and Fuels: Learning from the Past to Help Guide Us in the...
Year Published: 2011
Type: Document
Conference Proceedings

Mapping and estimating forest fuel with radar remote sensing
www.nrfirescience.org/resource/11084
With an increase in the risk of large fires across much of the Western United States, along with a growing variety of fuel types that result from changes in the landscape and management strategies, there has never been a more pressing need for accurate, cost-efficient, large scale forest fuel maps. Emerging remote sensing...
Author(s): Rachel Clark
Year Published: 2009
Type: Document
Research Brief or Fact Sheet

From the ground up, way up: measuring live fuel moisture with satellite imagery to fine-tune fire modeling in western ecosystems
www.nrfirescience.org/resource/11431
Remote sensing from space may well become one of the world's most effective, accurate, and efficient
ways to assess fire risk and thus manage large landscapes. The technology is evolving quickly, and researchers are busy keeping up. Some major western U.S. landscapes are just now being assessed for integrating remote sensing data...

Author(s): Rachel Clark
Year Published: 2009
Type: Document
Research Brief or Fact Sheet

Fuels Management - How to Measure Success: Conference Proceedings
www.nrfirescience.org/resource/18399
Fuels management programs are designed to reduce risks to communities and to improve and maintain ecosystem health. The International Association of Wildland Fire initiated the 1st Fire Behavior and Fuels Conference to address development, implementation, and evaluation of these programs. The focus was on how to measure success....

Author(s): Patricia L. Andrews, Bret W. Butler
Year Published: 2006
Type: Document
Conference Proceedings

Regression modeling and mapping of coniferous forest basal area and tree density from discrete-return lidar and multispectral satellite data
www.nrfirescience.org/resource/13131
We compared the utility of discrete-return light detection and ranging (lidar) data and multispectral satellite imagery, and their integration, for modeling and mapping basal area and tree density across two diverse coniferous forest landscapes in north-central Idaho. We applied multiple linear regression models subset from a suite...

Author(s): Andrew T. Hudak, Nicholas L. Crookston, Jeffrey S. Evans, Michael J. Falkowski, Alistair M. S. Smith, Paul E. Gessler, Penelope Morgan
Year Published: 2006
Type: Document
Book or Chapter or Journal Article

Accuracy and precision of two indirect methods for estimating canopy fuels
www.nrfirescience.org/resource/11036
We compared the accuracy and precision of digital hemispherical photography and the LI-COR LAI-2000 plant canopy analyzer as predictors of canopy fuels. We collected data on 12 plots in western Montana under a variety of lighting and sky conditions, and used a variety of processing methods to compute estimates. Repeated measurements...

Author(s): Abran Steele-Feldman, Elizabeth D. Reinhardt, Russell A. Parsons
Year Published: 2006
Type: Document
Conference Proceedings

Characterizing and mapping forest fire fuels using ASTER imagery and gradient modeling
www.nrfirescience.org/resource/7925
Land managers need cost-effective methods for mapping and characterizing forest fuels quickly and accurately. The launch of satellite sensors with increased spatial resolution may improve the accuracy and reduce the cost of fuels mapping. The objective of this research is to evaluate the accuracy and utility of imagery from the...

Author(s): Michael J. Falkowski, Paul E. Gessler, Penelope Morgan, Andrew T. Hudak, Alistair M. S. Smith
The use of Landsat 7 (ETM+) and AVIRIS data to map fuel characteristic classes in western ecosystems - Final Report to the Joint Fire Science Program

Summary of Findings: (1) Satellite imagery has the potential to map fuel models at the national and local levels: (a) Landsat. The Landfire project has shown that Landsat 7 (ETM+) data are useful for mapping fuels at the national level. Critical to developing accurate maps are data collected in the field on fuels and vegetation. At...

Author(s): Jan W. van Wagtendonk, Ralph Root, Carl H. Key
Year Published: 2005
Type: Document
Technical Report or White Paper

Demonstration and integration of systems for fire remote sensing, ground-based fire measurement, and fire modeling - Final Report to the Joint Fire Science Program

Proof-of-concept research is being conducted to: compare airborne and in situ, ground-based fire measurement systems; begin evaluation of two fire-behavior simulation models with these data; test approaches to incorporating improved wind-field and weather data in these models; test the utility of the airborne remote sensing for...

Author(s): Colin C. Hardy, Philip J. Riggan
Year Published: 2005
Type: Document
Technical Report or White Paper

Mapping relative fire regime condition class for the western United States

In 1999, a coarse-scale map of Fire Regime Condition Classes (FRCC) was developed for the conterminous United States (US) to help address contemporary fire management issues and to quantify changes in fuels from historical conditions. This map and its associated data have been incorporated into national policies (National Fire Plan...)

Author(s): James P. Menakis, Melanie Miller, Thomas Thompson
Year Published: 2004
Type: Document
Conference Proceedings

Evaluating the ASTER sensor for mapping and characterizing forest fire fuels in northern Idaho

Land managers need cost-effective methods for mapping and characterizing fire fuels quickly and accurately. The advent of sensors with increased spatial resolution may improve the accuracy and reduce the cost of fuels mapping. The objective of this research is to evaluate the accuracy and utility of imagery from the Advanced...

Author(s): Michael J. Falkowski, Paul E. Gessler, Penelope Morgan, Alistair M. S. Smith, Andrew T. Hudak
Year Published: 2004
Type: Document
Conference Proceedings
Using airborne laser altimetry to determine fuel models for estimating fire behavior

Airborne laser altimetry provides an unprecedented view of the forest floor in timber fuel types and is a promising new tool for fuels assessments. It can be used to resolve two fuel models under closed canopies and may be effective for estimating coarse woody debris loads. A simple metric-obstacle density-provides the necessary...

Author(s): Carl A. Seielstad, Lloyd P. Queen
Year Published: 2003
Type: Document
Book or Chapter or Journal Article

Effects of fire on landscape heterogeneity in Yellowstone National Park, Wyoming

A map of Yellowstone National Park (YNP) was derived from Landsat Thematic Mapper (TM) imagery and used to assess the isolation of burned areas, the heterogeneity that resulted from fires burning under moderate and severe burning conditions, and the relationship between heterogeneity and fire size. The majority of severely burned...

Author(s): Monica G. Turner, William W. Hargrove, Robert H. Gardner, William H. Romme
Year Published: 1994
Type: Document
Book or Chapter or Journal Article

Airborne infrared forest fire detection system: final report

This work was undertaken because of a mutual interest of the Department of Defense, Advanced Research Projects Agency (ARPA), and the USDA Forest Service in the problems of detecting hot targets against natural terrain backgrounds using airborne infrared (IR) line scanning instrumentation. The study objectives were broadly defined...

Author(s): Ralph A. Wilson, Stanley N. Hirsch, Forrest H. Madden, John B. Losensky
Year Published: 1971
Type: Document
Technical Report or White Paper

Project Fire Scan fire mapping final report, April 1962 to December 1966

Information about a fire's perimeter is a prerequisite for the control of large fires, whether caused by nuclear war, lightning, or man's carelessness. Visual aerial reconnaissance is usually limited by smoke. Location of a fire's perimeter with respect to surrounding terrain is difficult to determine at night by visual means. The...

Author(s): Stanley N. Hirsch
Year Published: 1968
Type: Document
Technical Report or White Paper

Project fire scan: fire detection interim report, April 1962 to December 1964

The original program objectives were to develop and test a heat-sensitive system capable of: (1) locating small fires, (2) mapping fire perimeters, and (3) measuring rates of fire spread. The usefulness of infrared mappers was to be examined by surveillance of fire sources in forest environments. The capability for locating fire...
Techniques for Wildfire Detection and Monitoring Part 1
www.nrfirescience.org/resource/18086
Certain areas are experiencing longer fire seasons, with more frequent and severe droughts. Wildfire detection, monitoring, and mitigation is increasingly important in these regions. Satellite remote sensing data is useful for identifying active fires, evaluating burned areas, and assessing fire emissions. This advanced training...
Type: Media

Webinar

The Basics of Satellite Data for Smoke and Fire - Part 1
www.nrfirescience.org/resource/19697
"The Basics of Satellite Data for Smoke and Fire" is presented in two parts for a total of about 16 minutes. These videos introduce concepts such as the distinction between polar-orbiting and polar-stationary satellites, descriptions of satellite instrumentation to collect smoke or fire data, and popular data products for smoke and...
Type: Media

Webinar

LANDFIRE
www.nrfirescience.org/resource/18009
LANDFIRE is an ongoing research project and database that contains geospatial data products that describe existing vegetation composition and structure, potential vegetation, surface and canopy fuel characteristics, historical fire regimes, and fire regime condition class. LANDFIRE provides fire and land managers with the...
Type: Website

Website

What’s New in LANDFIRE: Remap
www.nrfirescience.org/resource/19542
This webinar seeks to inform participants about what to expect from LANDFIRE Remap products, and what has and has not changed from previous product offerings. We will discuss what we have learned since February 2019 when the products were made available to users in the Northwest, and how LANDFIRE resources can address specific fire...
Type: Media

Webinar

GIS- Things you need to know
www.nrfirescience.org/resource/19535
March 28th, 2019. Part of the Interagency Spring Fire Operations Meeting, the presentation gave an update on new and continuing GIS uses available.
Type: Media

Seminar

What’s New in LANDFIRE: Remap
This webinar seeks to inform participants about what to expect from LANDFIRE Remap products, and what has and has not changed from previous product offerings. We will discuss what we have learned since February 2019 when the products were made available to users in the Northwest, and how LANDFIRE resources can address specific fire...

Type: Media

Webinar

FTEM Release Webinar for USFS
www.nrfirescience.org/resource/18093
A webinar presenting the new Fuels Treatment Effectiveness Monitoring (FTEM) system to USDA FS. (Duration 01:05)
Type: Media

Webinar

Unmanned Aerial Vehicles (Drones) for Measuring Canopy Fuels and Aerial Ignitions
www.nrfirescience.org/resource/19248
This webinar combines two expert views of using drones in fire management. First Patrick Shin of Northern Arizona University will briefly discuss his research on using drones to evaluate canopy fuels and then Jim Higgins, Chief Engineer at Drone Amplified, will discuss how drones can be used for igniting prescribe fire and...
Type: Media

Webinar

The Basics of Satellite Data for Smoke and Fire - Part 2
www.nrfirescience.org/resource/19698
"The Basics of Satellite Data for Smoke and Fire" is presented in two parts for a total of about 16 minutes. These videos introduce concepts such as the distinction between polar-orbiting and polar-stationary satellites, descriptions of satellite instrumentation to collect smoke or fire data, and popular data products for smoke and...
Type: Media

Video

Monitoring Trends in Burn Severity (MTBS)
www.nrfirescience.org/resource/18010
Monitoring Trends in Burn Severity (MTBS) is a multi-year project designed to consistently map the burn severity and perimeters of fires across all lands of the United States from 1984 and beyond. The data generated by MTBS will be used to identify national trends in burn severity, providing information necessary to monitor the...
Type: Website

Website

What’s New in LANDFIRE: Remap
www.nrfirescience.org/resource/19677
This webinar seeks to inform participants about what to expect from LANDFIRE Remap products, and what has and has not changed from previous product offerings. We will discuss what we have learned since February 2019 when the products were made available to users in the Northwest, and how LANDFIRE resources can address specific fire...
Type: Media
ArcFuels
www.nrfirescience.org/resource/18006
ArcFuels is a library of ArcGIS macros developed to streamline fire behavior modeling and spatial analyses for fuel treatment planning. The macros link: 1) key wildfire behavior models; 2) fuels and vegetation data (e.g. Landfire, FVS databases); 3) MS Office, and 4) ArcGIS. ArcFuels is used to rapidly design and test fuel...
Type: Website

Mapping Burned Areas from the Landsat Archive
www.nrfirescience.org/resource/19537
Complete and accurate burned area data are needed to document patterns of fires, to quantify their drivers, and to assess the impacts on human and natural systems. Unfortunately, existing fire occurrence datasets are known to be incomplete. In response, we developed the Landsat Burned Area BA algorithm that identifies burned areas...
Type: Media

Quantifying Restoration Across the Sage Steppe: Mapping Conifer Cover, Removal Efforts, and Fire
www.nrfirescience.org/resource/19531
See how remote sensing is being used to track progress in conifer management. This video was presented by Jason Reinhardt – University of Minnesota-Minneapolis at the Harnessing Technology to Improve Conservation Effectiveness on Western Working Lands| Society for Rangeland Management Annual Conference, Minneapolis, Minnesota,...
Type: Media