Review

Spatio-Temporal Mixed Pixel Analysis of Savanna Ecosystems—A Review

Supplementary Material

Table S1. Full List of Reviewed Research Articles.

Author (s) ,Year	Title	Journal
1. **Hansen et al., 2003**	Development of 500 meter vegetation continuous field maps using MODIS data	IEEE International Geoscience and Remote Sensing Symposium
2. **Hansen et al., 2004**	The Modis 500 Meter Global Vegetation Continuous Field Products	Analysis of Multi-Temporal Remote Sensing Images
3. **Fernandes et al., 2004**	Approaches to fractional land cover and continuous field mapping: A comparative assessment over the BOREAS study region.	Remote Sensing of Environment
4. **Schwarz and Zimmermann., 2005**	A new GLM-based method for mapping tree cover continuous fields using regional MODIS reflectance data	Remote Sensing of Environment
5. **DeFries et al., 1999**	Continuous fields of vegetation characteristics at the global scale at 1-km resolution.	Journal of Geophysical Research: Atmospheres
6. **Hansen et al., 1996**	Classification trees: an alternative to traditional land cover classifiers	International Journal of Remote Sensing
7. **Hansen et al., 2002**	Towards an operational MODIS continuous field of percent tree cover algorithm: examples using AVHRR and MODIS data.	Remote Sensing of Environment
8. **Zeng et al., 2003**	Interannual Variability and Decadal Trend of Global Fractional Vegetation Cover from 1982 to 2000	Journal of Applied Meteorology
9. **Hansen et al., 2005**	Estimation of tree cover using MODIS data at global, continental and regional/local scales.	International Journal of Remote Sensing
10. **Hansen et al.,2004**	Detecting Long-term Global Forest Change Using Continuous Fields of Tree-Cover Maps from 8-km	Ecosystems

Author (s) ,Year	Title	Journal
	Advanced Very High Resolution Radiometer (AVHRR) Data for the Years 1982–99	
11. Defries et al., 2000	Global continuous fields of vegetation characteristics: A linear mixture model applied to multi-year 8 km AVHRR data.	International Journal of Remote Sensing
12. Hansen et al., 2003	Global Percent Tree Cover at a Spatial Resolution of 500 Meters: First Results of the MODIS Vegetation Continuous Fields Algorithm.	Earth Interactions
13. Carroll et al., 2010	MODIS Vegetation Cover Conversion and Vegetation Continuous Fields.	Land Remote Sensing and Global Environmental Change
14. Jeganathan et al., 2009	Comparison of MODIS vegetation continuous field — based forest density maps with IRS-LISS III derived maps	Journal of the Indian Society of Remote Sensing,
15. Sexton et al., 2013	Global, 30-m resolution continuous fields of tree cover: Landsat-based rescaling of MODIS vegetation continuous fields with lidar-based estimates of error.	International Journal of Digital Earth
16. Hansen et al., 2008	A method for integrating MODIS and Landsat data for systematic monitoring of forest cover and change in the Congo Basin.	Remote Sensing of Environment
17. Hansen et al., 2002	Development of a MODIS tree cover validation data set for Western Province, Zambia..	Remote Sensing of Environment
18. Colditz et al., 2011	Land cover classification with coarse spatial resolution data to derive continuous and discrete maps for complex regions	Remote Sensing of Environment
19. DeFries et al., 1997	Subpixel forest cover in central Africa from multi-sensor, multitemporal data.	Remote Sensing of Environment
20. Hansen et al., 2011	Continuous fields of land cover for the conterminous United States using Landsat data: first results from the Web-Enabled Landsat Data (WELD) project.	Remote Sensing Letters

Author (s) ,Year	Title	Journal
21. Potapov et al., 2019	Annual continuous fields of woody vegetation structure in the Lower Mekong region from 2000-2017 Landsat time-series.	Remote Sensing of Environment
22. Gao et al., 2014	Validation of MODIS vegetation continuous fields in two areas in Mexico.	2014 Third International Workshop on Earth Observation and Remote Sensing Applications (EORSA)
23. Amarnathet al., 2017	Evaluating MODIS-vegetation continuous field products to assess tree cover change and forest fragmentation in India – A multi-scale satellite remote sensing approach.	The Egyptian Journal of Remote Sensing and Space Science
24. Sarif et al., 2017	MODIS-VCF Based Forest Change Analysis in the State of Jharkhan	Proceedings of the National Academy of Sciences, India Section A: Physical Sciences,
25. White et al., 2005	Accuracy assessment of the vegetation continuous field tree cover product using 3954 ground plots in the south-western USA.	International Journal of Remote Sensing
26. Leinenkugel et al., 2014	Sensitivity analysis for predicting continuous fields of tree-cover and fractional land-cover distributions in cloud-prone areas.	International Journal of Remote Sensing
27. Gao et al., 2018	Assessing forest cover change in Mexico from annual MODIS VCF data (2000–2010).	International Journal of Remote Sensing
28. Xian et al., 2015	Characterization of shrubland ecosystem components as continuous fields in the northwest United States.	Remote Sensing of Environment
29. Baumann et al., 2018	Mapping continuous fields of tree and shrub cover across the Gran Chaco using Landsat 8 and Sentinel-1 data.	Remote Sensing of Environment
30. Liu et al., 2016	Assessment of the three factors affecting Myanmar's forest cover change using Landsat and MODIS vegetation continuous fields data.	International Journal of Digital Earth
31. Hayes et al., 2008	Estimating proportional change in forest cover as a continuous variable from multi-year MODIS data.	Remote Sensing of Environment

Author (s) ,Year	Title	Journal
32. **Homer et al., 2013**	Detecting annual and seasonal changes in a sagebrush ecosystem with remote sensing-derived continuous fields	Journal of Applied Remote Sensing
33. **Guan et al., 2012**	Multi-sensor derivation of regional vegetation fractional cover in Africa.	Remote Sensing of the Environment
34. **Cartus et al., 2011**	Large area forest stem volume mapping in the boreal zone using synergy of ERS-1/2 tandem coherence and MODIS vegetation continuous fields.	Remote Sensing of Environment
35. **Mathys et al., 2009**	Evaluating effects of spectral training data distribution on continuous field mapping performance	SPRS Journal of Photogrammetry and Remote Sensing
36. **Xian et al., 2013**	An approach for characterizing the distribution of shrubland ecosystem components as continuous fields as part of NLCD.	ISPRS Journal of Photogrammetry and Remote Sensing
37. **Reschke and Hüttich, 2014**	Continuous field mapping of Mediterranean wetlands using sub-pixel spectral signatures and multi-temporal Landsat data.	International Journal of Applied Earth Observation and Geoinformation
38. **Ribeiro et al., 2020**	Geographic Object-Based Image Analysis Framework for Mapping Vegetation Physiognomic Types at Fine Scales in Neotropical Savannas	Remote Sensing
39. **Neto et al., 2017**	Assessment Of Texture Features For Brazilian Savanna Classification: A Case Study In Brasília National Park	Revista Brasileira de Cartografia
40. **Souverijns et al., 2020**	Thirty Years of Land Cover and Fraction Cover Changes over the Sudano-Sahel Using Landsat Time Series.	Remote Sensing
41. **He et al., 2020**	Green Vegetation Cover Dynamics in a Heterogeneous Grassland: Spectral Unmixing of Landsat Time Series from 1999 to 2014.	Remote Sensing
42. **Yang & Crews, 2019**	Fractional Woody Cover Mapping of Texas Savanna at Landsat Scale.	Land
43. **Gessner et al., 2013**	Estimating the fractional cover of growth forms and bare surface in savannas. A multi-resolution approach based on regression tree ensembles.	Remote Sensing of Environment

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44. Arroyo et al., 2010	Integration of LiDAR and QuickBird imagery for mapping riparian biophysical parameters and land cover types in Australian tropical savannas	Forest Ecology and Management
45. Higginbottom et al., 2018	Mapping fractional woody cover in semi-arid savannahs using multi-seasonal composites from Landsat data.	ISPRS Journal of Photogrammetry and Remote Sensing
46. Urbazaev et al., 2015	Assessment of the mapping of fractional woody cover in southern African savannas using multi-temporal and polarimetric ALOS PALSAR L-band images.	Remote Sensing of Environment
47. Borges et al., 2020	Sentinel-1 and Sentinel-2 Data for Savannah Land Cover Mapping: Optimising the Combination of Sensors and Seasons.	Remote Sensing
48. Naidoo et al., 2016	L-band Synthetic Aperture Radar imagery performs better than optical datasets at retrieving woody fractional cover in deciduous, dry savannahs.	International Journal of Applied Earth Observation and Geoinformation
49. Guerschman et al.,2009	Estimating fractional cover of photosynthetic vegetation, non-photosynthetic vegetation and bare soil in the Australian tropical savanna region upscaling the EO-1 Hyperion and MODIS sensors.	Remote Sensing of Environment
50. Meyer & Okin, 2015	Evaluation of spectral unmixing techniques using MODIS in a structurally complex savanna environment for retrieval of green vegetation, non-photosynthetic vegetation, and soil fractional cover.	Remote Sensing of Environment
51. Marselis et al., 2018	Distinguishing vegetation types with airborne waveform lidar data in a tropical forest-savanna mosaic: A case study in Lopé National Park	Remote Sensing of Environment
52. Mishra et al., 2014	Relating spatial patterns of fractional land cover to savanna vegetation morphology using multi-scale remote sensing in the Central Kalahari.	International Journal of Remote Sensing

Author (s) ,Year	Title	Journal
53. **Ludwig et al., 2019**	Machine learning and multi-sensor based modelling of woody vegetation in the Molopo Area, South Africa.	Remote Sensing of Environment
54. **Wessels et al., 2019**	Mapping and Monitoring Fractional Woody Vegetation Cover in the Arid Savannas of Namibia Using LiDAR Training Data, Machine Learning, and ALOS PALSAR Data.	Remote Sensing
55. **Zhang et al., 2019**	From woody cover to woody canopies: How Sentinel-1 and Sentinel-2 data advance the mapping of woody plants in savannas.	Remote Sensing of Environment
56. **Chai et al., 2020**	Mapping the fractional cover of non-photosynthetic vegetation and its spatiotemporal variations in the Xilingol grassland using MODIS imagery (2000–2019)	Geocarto International
57. **Yang, 2019**	Woody Plant Cover Estimation in Texas Savanna from MODIS Products.	Earth Interactions
58. **Zhou et al., 2019**	A novel Method for Separating Woody and Herbaceous and Time Series.	Photogrammetric Engineering & Remote Sensing
59. **Hill et al., 2017**	Relationships between vegetation indices, fractional cover retrievals and the structure and composition of Brazilian Cerrado natural vegetation	International Journal of Remote Sensing
60. **Li et al., 2020**	Deep-learning based high-resolution mapping shows woody vegetation densification in greater Maasai Mara ecosystem	Remote Sensing of Environment
61. **Daldegan et al., 2019**	Spectral mixture analysis in Google Earth Engine to model and delineate fire scars over a large extent and a long time-series in a rainforest-savanna transition zone	Remote Sensing of Environment
62. **Hill et al., 2016**	Dynamics of the relationship between NDVI and SWIR32 vegetation indices in southern Africa: implications for retrieval of fractional cover from MODIS data.	International Journal of Remote Sensing

Author (s) ,Year	Title	Journal
63. Zhou et al., 2016	Retrieving understorey dynamics in the Australian tropical savannah from time series decomposition and linear unmixing of MODIS data.	International Journal of Remote Sensing
64. Liu et al., 2017	An Improved Estimation of Regional Fractional Woody/Herbaceous Cover Using Combined Satellite Data and High-Quality Training Samples	Remote Sensing
65. Ibrahim et al., 2019	Impact of Soil Reflectance Variation Correction on Woody Cover Estimation in Kruger National Park Using MODIS Data.	Remote Sensing
66. Nagelkirk & Dahlin, 2020	Woody Cover Fractions in African Savannas From Landsat and High-Resolution Imagery.	Remote Sensing
67. Mayes et al., 2015	Forest cover change in Miombo Woodlands: modeling land cover of African dry tropical forests with linear spectral mixture analysis.	Remote Sensing of Environment
68. Theseira et al., 2002	An evaluation of spectral mixture modelling applied to a semi-arid environment.	International Journal of Remote Sensing
69. Ferreira et al., 2007	Spectral linear mixture modelling approaches for land cover mapping of tropical savanna areas in Brazil.	International Journal of Remote Sensing
70. Ibrahim et al., 2018	Estimating fractional cover of plant functional types in African savannah from harmonic analysis of MODIS time-series data.	International Journal of Remote Sensing
71. Gaughan et al., 2013	Using short-term MODIS time-series to quantify tree cover in a highly heterogeneous African savanna.	International Journal of Remote Sensing
72. Elmore et al., 2000	Quantifying Vegetation Change in Semiarid Environments: Precision and Accuracy of Spectral Mixture Analysis and the Normalized Difference Vegetation Index.	Remote Sensing of Environment
73. Dawerlbait & Morari, 2011	LANDSAT, Spectral Mixture Analysis and Change Vector Analysis to Monitor Land Cover Degradation in a Savanna Region in Sudan (1987-1999-2008)	International Journal of Water Resources and Arid Environments

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74. **Dawelbait et al., 2017**	Using Landsat Images and Spectral Mixture Analysis to Assess Drivers of 21-Year LULC Changes in Sudan.	Land Degradation & Development
75. **Lopes et al., 2020**	Combining optical and radar satellite image time series to map natural vegetation: savannas as an example.	Remote Sensing in Ecology and Conservation
76. **Alencar et al., 2020**	Mapping Three Decades of Changes in the Brazilian Savanna Native Vegetation Using Landsat Data Processed in the Google Earth Engine Platform	Remote Sensing
77. **Kaszta et al., 2016**	Seasonal Separation of African Savanna Components Using Worldview-2 Imagery: A Comparison of Pixel- and Object-Based Approaches and Selected Classification Algorithms.	Remote Sensing
78. **Boggs, 2010**	Assessment of SPOT 5 and QuickBird remotely sensed imagery for mapping tree cover in savannas.	International Journal of Applied Earth Observation and Geoinformation
79. **Whiteside et al., 2011**	Comparing object-based and pixel-based classifications for mapping savannas	International Journal of Applied Earth Observation and Geoinformation
80. **Ma et al., 2013**	Spatial patterns and temporal dynamics in savanna vegetation phenology across the North Australian Tropical Transect	Remote Sensing of Environment
81. **Naidoo et al., 2012**	Classification of savanna tree species, in the Greater Kruger National Park region, by integrating hyperspectral and LiDAR data in a Random Forest data mining environment	ISPRS Journal of Photogrammetry and Remote Sensing
82. **Clark et al., 2010**	A scalable approach to mapping annual land cover at 250 m using MODIS time series data: A case study in the Dry Chaco ecoregion of South America.	Remote Sensing of Environment
83. **Anchang et al., 2019**	Trends in Woody and Herbaceous Vegetation in the Savannas of West Africa.	Remote Sensing

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84. Schwieder et al., 2016	Mapping Brazilian savanna vegetation gradients with Landsat time series.	International Journal of Applied Earth Observation and Geoinformation
85. Mathieu et al., 2013	Toward structural assessment of semi-arid African savannahs and woodlands: The potential of multitemporal polarimetric RADARSAT-2 fine beam images.	Remote Sensing of Environment
86. Cho et al., 2017	Response of Land Surface Phenology to Variation in Tree Cover during Green-Up and Senescence Periods in the Semi-Arid Savanna of Southern Africa.	Remote Sensing of Environment
87. Stuart et al., 2006	Classifying the Neotropical savannas of Belize using remote sensing and ground survey.	Journal of Biogeography
88. Cho et al., 2013	Mapping tree species composition in South African savannas using an integrated airborne spectral and LiDAR system.	Remote Sensing of Environment
89. Hassler et al., 2010	Vegetation pattern divergence between dry and wet season in a semiarid savanna – Spatio-temporal dynamics of plant diversity in northwest Namibia.	Journal of Arid Environments
90. van Passel et al., 2020	Monitoring Woody Cover Dynamics in Tropical Dry Forest Ecosystems Using Sentinel-2 Satellite Imagery.	Remote Sensing
91. Madonsela et al., 2017	Multi-phenology WorldView-2 imagery improves remote sensing of savannah tree species.	International Journal of Applied Earth Observation and Geoinformation
92. Tsalyuk et al., 2017	Improving the prediction of African savanna vegetation variables using time series of MODIS products	ISPRS Journal of Photogrammetry and Remote Sensing
93. Hüttich et al., 2011	Assessing effects of temporal compositing and varying observation periods for large-area land-cover mapping in semi-arid ecosystems: Implications for global monitoring.	Remote Sensing of Environment

Author (s) ,Year	Title	Journal
94. **Müller et al., 2015**	Mining dense Landsat time series for separating cropland and pasture in a heterogeneous Brazilian savanna landscape	Remote Sensing of Environment
95. **Brandt et al., 2016**	Woody plant cover estimation in drylands from Earth Observation based seasonal metrics.	Remote Sensing of Environment
96. **Jin et al., 2013**	Phenology and gross primary production of two dominant savanna woodland ecosystems in Southern Africa.	Remote Sensing of Environment
97. **Archibald & Scholes, 2007**	Leaf green-up in a semi-arid African savanna - separating tree and grass responses to environmental cues.	Journal of Vegetation Science
98. **Cho & Ramoelo, 2019**	Optimal dates for assessing long-term changes in tree-cover in the semi-arid biomes of South Africa using MODIS NDVI time series (2001–2018).	International Journal of Applied Earth Observation and Geoinformation
99. **Hunter et al., 2020**	Inter-Seasonal Time Series Imagery Enhances Classification Accuracy of Grazing Resource and Land Degradation Maps in a Savanna Ecosystem.	Remote Sensing
100. **Liu et al., 2016**	Land Cover Characterization in West Sudanian Savannas Using Seasonal Features from Annual Landsat Time Series	Remote Sensing
101. **de Lemos et al., 2020**	Parametric Models to Characterize the Phenology of the Lowveld Savanna at Skukuza, South Africa	Remote Sensing
102. **Huesca et al., 2019**	Discrimination of Canopy Structural Types in the Sierra Nevada Mountains in Central California.	Remote Sensing
103. **Ibrahim et al., 2019**	Impact of Soil Reflectance Variation Correction on Woody Cover Estimation in Kruger National Park Using MODIS Data.	Remote Sensing
104. **Kolarik et al., 2020**	A multi-plot assessment of vegetation structure using a micro-unmanned aerial system (UAS) in a semi-arid savanna environment.	ISPRS Journal of Photogrammetry and Remote Sensing
105. **Lewis et al., 2017**	Indicators of burn severity at extended temporal scales: a decade of ecosystem response in mixed-conifer forests of western Montana.	International Journal of Wildland Fire

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106. Silveira et al., 2018	sing Spatial Features to Reduce the Impact of Seasonality for Detecting Tropical Forest Changes from Landsat Time Series.	Remote Sensing
107. Bueno et al., 2019	Object-Based Change Detection in the Cerrado Biome Using Landsat Time Series.	Remote Sensing
108. Symeonakis & Higginbottom, 2014	Bush encroachment monitoring using multi-temporal Landsat data and random forests.	The International Archives of the Photogrammetry, Remote Sensing and Spatial Information
109. Mitchard & Flintrop, 2013	Woody encroachment and forest degradation in sub-Saharan Africa's woodlands and savannas 1982-2006.	Philosophical Transactions of the Royal Society B: Biological Sciences
110. Cho et al., 2009	Spectral variability within species and its effects on Savanna tree species discrimination.	IEEE International Geoscience and Remote Sensing Symposium
111. Levick & Rogers, 2019	Context-dependent vegetation dynamics in an African savanna.	Landscape Ecology
112. Lupo et al.,2007	Categorization of land-cover change processes based on phenological indicators extracted from time series of vegetation index data.	International Journal of Remote Sensing
113. Alves & Pérez-Cabello, 2017	Multiple remote sensing data sources to assess spatio-temporal patterns of fire incidence over Campos Amazônicos Savanna Vegetation Enclave (Brazilian Amazon).	Science of The Total Environment
114. Campo-Bescós et al., 2013	Combined Spatial and Temporal Effects of Environmental Controls on Long-Term Monthly NDVI in the Southern Africa Savanna.	Remote Sensing
115. Levick et al., 2015	Monitoring the Distribution and Dynamics of an Invasive Grass in Tropical Savanna Using Airborne LiDAR.	Remote Sensing
116. LeVine & Crews, 2019	Three-dimensional forest reconstruction and structural parameter retrievals using a terrestrial full-waveform lidar instrument (Echidna®).	International Journal of Applied Earth Observation and Geoinformation
117. Scanlon et al., 2002	Determining land surface fractional cover from NDVI and rainfall time series for a savanna ecosystem.	Remote Sensing of Environment

Author (s) ,Year	Title	Journal
118. Ndayisaba et al., 2016	Understanding the Spatial Temporal Vegetation Dynamics in Rwanda.	Land
119. Parente & Ferreira, 2018	Assessing the Spatial and Occupation Dynamics of the Brazilian Pasturelands Based on the Automated Classification of MODIS Images from 2000 to 2016	Remote Sensing
120. Bucini et al., 2009	Woody cover and heterogeneity in the Savannas of the Kruger National Park, South Africa.	IEEE International Geoscience and Remote Sensing Symposium
121. Yang et al., 2012	Landsat remote sensing approaches for monitoring long-term tree cover dynamics in semi-arid woodlands: Comparison of vegetation indices and spectral mixture analysis.	Remote Sensing of Environment
122. Cho et al., 2010	Improving Discrimination of Savanna Tree Species Through a Multiple-Endmember Spectral Angle Mapper Approach: Canopy-Level Analysis.	IEEE Transactions on Geoscience and Remote Sensing
123. Gill & Phinn, 2009	Improvements to ASTER-Derived Fractional Estimates of Bare Ground in a Savanna Rangeland.	IEEE Transactions on Geoscience and Remote Sensing
124. Borini Alves et al., 2018	Fusing Landsat and MODIS data to retrieve multispectral information from fire-affected areas over tropical savannah environments in the Brazilian Amazon.	International Journal of Remote Sensing
125. Yang & Prince, 2000	Remote sensing of savanna vegetation changes in Eastern Zambia 1972-1989.	International Journal of Remote Sensing
126. Tarimo et al., 2015	Spatial distribution of temporal dynamics in anthropogenic fires in miombo savanna woodlands of Tanzania	Carbon Balance and Management
127. Schmidt et al., 2012	Long term data fusion for a dense time series analysis with MODIS and Landsat imagery in an Australian Savanna	Journal of Applied Remote Sensing
128. Santos et al., 1999	A linear spectral mixture model to estimate forest and savanna biomass at transition areas in Amazonia	IEEE International Geoscience and Remote Sensing Symposium.

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129. Carvalho et al., 2003	Spectral mixture analysis of ASTER image in Brazilian Savanna.	IIGARSS 2003-2003 EEE International Geoscience and Remote Sensing Symposium
130. Liu et al., 2017	Using data from Landsat, MODIS, VIIRS and PhenoCams to monitor the phenology of California oak/grass savanna and open grassland across spatial scales.	Agricultural and Forest Meteorology
131. Hill, 2013	Vegetation index suites as indicators of vegetation state in grassland and savanna: An analysis with simulated SENTINEL 2 data for a North American transect.	Remote Sensing of Environment
132. Munyati & Sinthumule, 2013	Assessing change in woody vegetation cover in the Kruger National Park, South Africa, using spectral mixture analysis of a Landsat TM image time series.	International Journal of Environmental Studies
133. Garcia & Ustin, 2001	Detection of interannual vegetation responses to climatic variability using AVIRIS data in a coastal savanna in California	IEEE Transactions on Geoscience and Remote Sensing
134. Edwards et al., 2018	A comparison and validation of satellite-derived fire severity mapping techniques in fire prone north Australian savannas: Extreme fires and tree stem mortality	Remote Sensing of Environment
135. Ferreira et al., 2013	Biophysical Properties of Cultivated Pastures in the Brazilian Savanna Biome: An Analysis in the Spatial-Temporal Domains Based on Ground and Satellite Data.	Remote Sensing
136. Dennison & Roberts et al., 2003	Endmember selection for multiple endmember spectral mixture analysis using endmember average RMSE.	Remote Sensing of Environment
137. Roberts et al., 2002	Large area mapping of land-cover change in Rondônia using multitemporal spectral mixture analysis and decision tree classifiers	Journal of Geophysical Research: Atmospheres
138. Mishra & Crews, 2014	Estimating fractional land cover in semi-arid central Kalahari: the impact of mapping method	Geocarto International

Author (s) ,Year	Title	Journal
	(spectral unmixing vs. object-based image analysis) and vegetation morphology	
139. **Yu et al., 2019**	Discrimination of Senescent Vegetation Cover from Landsat-8 OLI Imagery by Spectral Unmixing in the Northern Mixed Grasslands	Canadian Journal of Remote Sensing
140. **Bendini et al., 2020**	Combining environmental and Landsat analysis ready data for vegetation mapping: a case study in the Brazilian savanna biome.	International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences
141. **Forkuor et al., 2017**	Multiscale Remote Sensing to Map the Spatial Distribution and Extent of Cropland in the Sudanian Savanna of West Africa.	Remote Sensing
142. **Duncan & Franklin, 1994**	Estimating fractional vegetation cover at the subpixel scale in a semiarid region using a statistical mixture model and remotely sensed data	IEEE International Geoscience and Remote Sensing Symposium
143. **Kanniah et al., 2009**	Evaluation of Collections 4 and 5 of the MODIS Gross Primary Productivity product and algorithm improvement at a tropical savanna site in northern Australia.	Remote Sensing of Environment
144. **Schneibel et al., 2017**	Using Annual Landsat Time Series for the Detection of Dry Forest Degradation Processes in South-Central Angola	Remote Sensing
145. **Sá et al., 2003**	Assessing the feasibility of sub-pixel burned area mapping in miombo woodlands of northern Mozambique using MODIS imagery.	International Journal of Remote Sensing
146. **Okhimamhe, 2003**	ERS SAR interferometry for land cover mapping in a savanna area in Africa	International Journal of Remote Sensing
147. **Amaral et al., 2015**	Mapping invasive species and spectral mixture relationships with neotropical woody formations in southeastern Brazil.	ISPRS Journal of Photogrammetry and Remote Sensing
148. **Shimabukuro et al., 2020**	Discriminating Land Use and Land Cover Classes in Brazil Based on the Annual PROBA-V 100 m Time Series.	IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing

Author (s) ,Year	Title	Journal
149. Sano etal.,2005	Synthetic Aperture Radar (L band) and Optical Vegetation Indices for Discriminating the Brazilian Savanna Physiognomies: A Comparative Analysis.	Earth Interactions
150. Abade et al., 2015	Comparative Analysis of MODIS Time-Series Classification Using Support Vector Machines and Methods Based upon Distance and Similarity Measures in the Brazilian Cerrado-Caatinga Boundary.	Remote Sensing
151. Hartfield & van Leeuwen, 2018	Woody Cover Estimates in Oklahoma and Texas Using a Multi-Sensor Calibration and Validation Approach.	Remote Sensing
152. de Souza Mendes et al., 2019	Optical and SAR Remote Sensing Synergism for Mapping Vegetation Types in the Endangered Cerrado/Amazon Ecotone of Nova Mutum—Mato Grosso	Remote Sensing
153. Fisk et al., 2019	Comparison of Hyperspectral Versus Traditional Field Measurements of Fractional Ground Cover in the Australian Arid Zone	Remote Sensing
154. Sow et al., 2013	Estimation of Herbaceous Fuel Moisture Content Using Vegetation Indices and Land Surface Temperature from MODIS Data.	Remote sensing
155. Gessner et al., 2015	Multi-sensor mapping of West African land cover using MODIS, ASAR and TanDEM-X/TerraSAR-X data..	Remote Sensing of Environment
156. Bobée et al., 2012	Analysis of vegetation seasonality in Sahelian environments using MODIS LAI, in association with land cover and rainfall.	Journal of Arid Environments
157. Cherchali et al., 2000	Retrieval of temporal profiles of reflectances from simulated and real NOAA-AVHRR data over heterogeneous landscapes.	International Journal of Remote Sensing

Author (s) ,Year	Title	Journal
158. Dubovyk et al., 2015	Monitoring vegetation dynamics with medium resolution MODIS-EVI time series at sub-regional scale in southern Africa.	International Journal of Applied Earth Observation and Geoinformation
159. Hill et al., 2013	Use of Vegetation Index “Fingerprints” From Hyperion Data to Characterize Vegetation States Within Land Cover/Land Use Types in an Australian Tropical Savanna.	IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing
160. Johansen et al., 2010	Mapping riparian condition indicators in a subtropical savanna environment from discrete return LiDAR data using object-based image analysis.	Ecological Indicators
161. Hill et al., 2012	Dynamics of vegetation indices in tropical and subtropical savannas defined by ecoregions and Moderate Resolution Imaging Spectroradiometer (MODIS) land cover	Geocarto International
162. Jamali et al., 2014	Automated mapping of vegetation trends with polynomials using NDVI imagery over the Sahel.	Remote Sensing of Environment
163. Tong et al., 2017	Revisiting the coupling between NDVI trends and cropland changes in the Sahel drylands: A case study in western Niger.	Remote Sensing of Environment
164. Brandt et al., 2016	Woody plant cover estimation in drylands from Earth Observation based seasonal metrics.	Remote Sensing of Environment
165. Bogan et al., 2019	maging spectrometry-derived estimates of regional ecosystem composition for the Sierra Nevada, California.	Remote Sensing of Environment
166. Karlson et al., 2015	Mapping Tree Canopy Cover and Aboveground Biomass in Sudano-Sahelian Woodlands Using Landsat 8 and Random Forest.	Remote Sensing
167. Awuah et al., 2020	Probabilistic Mapping and Spatial Pattern Analysis of Grazing Lawns in Southern African Savannahs Using WorldView-3 Imagery and Machine Learning Techniques.	Remote Sensing

Author (s) ,Year	Title	Journal
168. Spiekermann et al., 2015	Woody vegetation and land cover changes in the Sahel of Mali (1967–2011).	International Journal of Applied Earth Observation and Geoinformation
169. Bégué et al., 2011	Can a 25-year trend in Soudano-Sahelian vegetation dynamics be interpreted in terms of land use change? A remote sensing approach.	Global Environmental Change
170. Dardel et al., 2014	Re-greening Sahel: 30 years of remote sensing data and field observations (Mali, Niger)	Remote Sensing of Environment
171. Rian et al., 2009	Analysis of Climate and Vegetation Characteristics along the Savanna-Desert Ecotone in Mali Using MODIS Data.	GIScience & Remote Sensing
172. Marston et al., 2017	Scrubbing Up: Multi-Scale Investigation of Woody Encroachment in a Southern African Savannah.	Remote Sensing
173. Verhoeye & de Wulf, 2002	Land cover mapping at sub-pixel scales using linear optimization techniques	Remote Sensing of Environment
174. Camargo et al., 2019	A Comparative Assessment of Machine-Learning Techniques for Land Use and Land Cover Classification of the Brazilian Tropical Savanna Using ALOS-2/PALSAR-2 Polarimetric Images.	Remote Sensing
175. Asner et al., 1997	Unmixing the directional reflectances of AVHRR sub-pixel landcovers.	IEEE Transactions on Geoscience and Remote Sensing
176. Bastin et al., 1997	Comparison of fuzzy c-means classification, linear mixture modelling and MLC probabilities as tools for unmixing coarse pixels	International Journal of Remote Sensing
177. Brandt et al., 2014	Local Vegetation Trends in the Sahel of Mali and Senegal Using Long Time Series FAPAR Satellite Products and Field Measurement (1982–2010).	Remote Sensing
178. Higginbottom & Symeonakis, 2020	Identifying Ecosystem Function Shifts in Africa Using Breakpoint Analysis of Long-Term NDVI and RUE Data.	Remote Sensing
179. Herrero et al., 2020	An Evaluation of Vegetation Health in and around Southern African National Parks during the 21st Century (2000–2016).	Applied Sciences

Author (s) ,Year	Title	Journal
180. Murungweni et al., 2020	Rainfall Trend and Its Relationship with Normalized Difference Vegetation Index in a Restored Semi-Arid Wetland of South Africa.	Sustainability
181. Blentlinger & Herrero, 2020	Tale of Grass and Trees: Characterizing Vegetation Change in Payne's Creek National Park, Belize from 1975 to 2019.	Applied Sciences
182. Mbatha & Xulu, 2018	Time Series Analysis of MODIS-Derived NDVI for the Hluhluwe-Imfolozi Park, South Africa: Impact of Recent Intense Drought.	Climate
183. Bunting et al., 2018	Understanding Long-Term Savanna Vegetation Persistence across Three Drainage Basins in Southern Africa.	Remote Sensing
184. Herrero et al., 2019	Integrating Surface-Based Temperature and Vegetation Abundance Estimates into Land Cover Classifications for Conservation Efforts in Savanna Landscapes.	Sensors
185. Sun et al., 2018	Optimizing kNN for Mapping Vegetation Cover of Arid and Semi-Arid Areas Using Landsat Images.	Remote Sensing
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187. Traore et al., 2014	Assessing Long-Term Trends In Vegetation Productivity Change Over the Bani River Basin in Mali (West Africa)	Journal of Geography and Earth Sciences
188. Palamuleni et al., 2007	Mapping rural savanna woodlands in malawi: a comparison of maximum likelihood and fuzzy classifiers.	IEEE International Geoscience and Remote Sensing Symposium
189. Jia et al., 2015	Global Land Surface Fractional Vegetation Cover Estimation Using General Regression Neural Networks From MODIS Surface Reflectance.	IEEE Transactions on Geoscience and Remote Sensing

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