Hyperspectral Remote Sensing Of Vegetation

This book shows recent and innovative applications of the use of hyperspectral technology for optimal quantification of crop, vegetation, and soil biophysical variables at various spatial scales, which can be an important aspect in agricultural management practices and monitoring. The articles collected inside the book are intended to help researchers and farmers involved in precision agriculture techniques and practices, as well as in plant nutrient prediction, to a higher comprehension of strengths and limitations of the application of hyperspectral imaging to agriculture and vegetation. Hyperspectral remote sensing for studying agriculture and natural vegetation is a challenging research topic that will remain of great interest for different sciences communities in decades.
Written by leading global experts, including pioneers in the field, the four-volume set on Hyperspectral Remote Sensing of Vegetation, Second Edition, reviews existing state-of- the-art knowledge, highlights advances made in different areas, and provides guidance for the

appropriate use of hyperspectral data in the study and management of agricultural crops and natural vegetation. Volume II, Hyperspectral Indices and Image Classifications for Agriculture and Vegetation evaluates the performance of hyperspectral narrowband or imaging spectroscopy data with specific emphasis on the uses and applications of hyperspectral narrowband vegetation indices in characterizing, modeling, mapping, and monitoring agricultural crops and vegetation. This volume presents and discusses topics such as the non-invasive quantification of foliar pigments, leaf nitrogen concentration of cereal crop, the estimation of nitrogen content in crops and pastures, and forest leaf chlorophyll content, among others. The concluding chapter provides readers with useful guidance on the highlights and essence of Volume II through the editors' perspective. Key Features of Volume II: Provides the fundamentals of hyperspectral narrowband vegetation indices and hyperspectral derivative vegetation indices and their applications in agriculture and vegetation studies. Discusses the latest advances in hyperspectral image classification methods and their applications. Explains the

massively big hyperspectral sensing data processing on cloud computing architectures. Highlights the state-of-the-art methods in the field of hyperspectral narrowband vegetation indices for monitoring agriculture, vegetation, and their properties such as plant water content, nitrogen, chlorophyll, and others at leaf, canopy, field, and landscape scales. Includes best global expertise on hyperspectral remote sensing of agriculture, crop water use, plant species detection, crop productivity and water productivity mapping, and modeling.
This book provides a comprehensive overview of the state of the art in the field of thermal infrared remote sensing. Temperature is one of the most important physical environmental variables monitored by earth observing remote sensing systems. Temperature ranges define the boundaries of habitats on our planet. Thermal hazards endanger our resources and well-being. In this book renowned international experts have contributed chapters on currently available thermal sensors as well as innovative plans for future missions. Further chapters discuss the underlying physics and image processing techniques for analyzing thermal data. Ground-breaking chapters on applications present

a wide variety of case studies leading to a deepened understanding of land and sea surface temperature dynamics, urban heat island effects, forest fires, volcanic eruption precursors, underground coal fires, geothermal systems, soil moisture variability, and temperature-based mineral discrimination. 'Thermal Infrared Remote Sensing: Sensors, Methods, Applications' is unique because of the large field it spans, the potentials it reveals, and the detail it provides. This book is an indispensable volume for scientists, lecturers, and decision makers interested in thermal infrared technology, methods, and applications.

Remote Sensing of Vegetation

Hyperspectral Remote Sensing of Vegetation: Biophysical and biochemical characterization and plant species studies

Theory and Applications

Hyperspectral Remote Sensing of Agriculture and Vegetation

Evaluating the Use of Hyperspectral Remote Sensing and Narrowband Spectral Vegetation Indices to Diagnose Onion Pink Root at the Leaf and Canopy Level

The aim of this study is to assess different Remote Sensing techniques for estimation of nitrogen content of vegetation in the Millingerwaard nature reserve using hyperspectral data and test which one is best.

Human-induced global environmental changes are increasingly occurring at larger scales. Terrestrial vegetation is largely affected by such anthropologic land transformations. As a result, the ability to monitor the status of terrestrial vegetation is essential for understanding and managing these changes. The rich spectral information contained in hyperspectral data provides a promising source of information for earth observation of global change. However, the analytical methods for the retrieval of vegetation bioindicators from hyperspectral data are suggested to lack spatial transferability. This is important because spatial transferability is the underlying assumption in employing these methods at large scales. Therefore, to apply these analytical approaches confidently, study of their spatial transferability is required. Thus, the aim of this thesis is to assess the robustness of currently dominant empirical methods in the context of a sub-continental environmental gradient.In the first part of the study, the performance of commonly used spectral vegetation indices for the retrieval of leaf biochemical constituents was systematically assessed along a strong rainfall gradient in savannas of northern Australia. The results demonstrated that in cross-site situations the performance of the estimation of the foliar biochemical properties was dependent on the biochemical constituent. For example, estimation of leaf nitrogen content was largely consistent at the sampling sites while leaf chlorophyll and carotenoid contents were affected by fluctuations along the gradient. Furthermore, the study of the performance of the indices in a cross-species situation revealed that except for carotenoid content the narrowband predictors were species specific. These findings indicate that the observed inconsistency of the vegetation indices at the scale of this study is likely to affect the applications that utilise the prediction of leaf biochemical properties provided by these indices. The second part of the study assessed the robustness of partial least square regression (PLSR) multivariate technique for the retrieval of leaf biochemical properties along the NATT. The results showed that PLSR provided more consistent predictions across the sites along the gradient. This provided evidence that multivariate methods may be a better alternative in large scale estimations of biochemical constituents. Additionally, the spatial transferability of the partial least square regression technique was assessed and compared to the vegetation indices. It was demonstrated that no method was able to produce solutions transferable to the whole transect. The final part of the study incorporated the large scale transferability as an objective in a multiobjective optimisation framework to design transferable hyperspectral predictors of foliar biochemical properties. The method introduced improvements in the vegetation indices based estimations by finding an optimal waveband demonstrating both stability and performance in the predictions along the NATT. In summary, findings from this work contribute to the understanding of the reliability of the currently dominant information retrieval methods from narrowband hyperspectral reflectance data. The multiobjective optimisation method implemented in this work is of added benefit by providing a framework for addressing the issue of transferability.

"Imaging sensors designed to remotely observe the Earth can be used for land-cover studies of peatlands and other areas that provide carbon storage or other important ecosystem services. In order to improve our knowledge of remote sensing and peatland research, this study employed multiple types of remotely sensed data for the evaluation and testing of methodologies that aimed to map different characteristics of peatland vegetation. The study was conducted in two peatland ecosystems: 1) near James Bay Quebec, which is an important site for hydropower generation, and 2) Mer Bleue, an ombrotrophic bog near Ottawa, Ontario. For the first site and study, high-resolution aerial photographs and aerial hyperspectral imagery were used to generate land-cover maps over an area of proximately 145 km2. This study is based on a novel approach that integrates object-oriented classification (GEOBIA) for producing a classification/validation dataset as a base to classify hyperspectral imagery from two different airborne sensors. This methodology demonstrated the feasibility of using such an approach to distinguish between seven vegetation classes commonly found in peatlands. The maps exhibit mapping accuracies higher than 80 % and have a high level of confidence, for example the map produced with the CASI sensor has an overall accuracy of 88.18, 95 % CI [87.3, 89.02]. My findings provide a baseline for developing a more detailed research focus on topics related to land-use change and the stratification of the landscape to study the individual contributions of different plant functional types to the carbon cycle.For the second study, a field experiment was conducted aiming to characterize and map biophysical and biochemical characteristics of vegetation at high spatial scales (

Hyperspectral Remote Sensing of Vegetation: Advanced applications in remote sensing of agricultural crops and natural vegetation

Thermal Infrared Remote Sensing

Thermal Plants

Hyperspectral Remote Sensing of Vegetation, Second Edition, Four Volume Set

Remote Sensing of Plant Biodiversity

A Minimum Noise Fraction (MNF) noise reduction method was employed with aircraft retrieved hyperspectral reflectance data in combination with a Mixture-Tuned Matching algorithm (MTMF) to map distributions of pickleweed and jaumea in Morro Bay, CA.

Advanced imaging spectral technology and hyperspectral analysis techniques for multiple applications are the key features of the book. This book will present in one volume complete solutions from concepts, fundamentals, and methods of acquisition of hyperspectral data to analyses and applications of the data in a very coherent manner. It will help readers to fully understand basic theories of HRS, how to utilize various field spectrometers and bioinstruments, the importance of radiometric correction and atmospheric correction, the use of analysis, tools and software, and determine what to do with HRS technology and data.

This Open Access volume aims to methodologically improve our understanding of biodiversity by linking disciplines that incorporate remote sensing, and uniting data and perspectives in the fields of biology, landscape ecology, and geography. The book provides a framework for how biodiversity can be detected and evaluated--focusing particularly on plants--using proximal and remotely sensed hyperspectral data and other tools such as LiDAR. The volume, whose chapters bring together a large cross-section of the biodiversity community engaged in these methods, attempts to establish a common language across disciplines for understanding and implementing remote sensing of biodiversity across scales. The first part of the book offers a potential basis for remote detection of biodiversity. An overview of the nature of biodiversity is described, along with ways for determining traits of plant biodiversity through spectral analyses across spatial scales and linking spectral data to the tree of life. The second part details what can be detected spectrally and remotely. Specific instrumentation and technologies are described, as well as the technical challenges of detection and data synthesis, collection and processing. The third part discusses spatial resolution and integration across scales and ends with a vision for developing a global biodiversity monitoring system. Topics include spectral and functional variation across habitats and biomes, biodiversity variables for global scale assessment, and the prospects and pitfalls in remote sensing of biodiversity at the global scale.

Sensors, Methods, Applications

Hyperspectral Remote Sensing

Hyperspectral Indices and Image Classifications for Agriculture and Vegetation

Monitoring of the Biophysical Status of Vegetation Using Multi-angular, Hyperspectral Remote Sensing for the Optimization of a Physically-based SVAT Model

Advanced Applications in Remote Sensing of Agricultural Crops and Natural Vegetation

Written by leading global experts, including pioneers in the field, the four-volume set on Hyperspectral Remote Sensing of Vegetation, Second Edition, reviews existing state-of-the-art knowledge, highlights advances made in different areas, and provides guidance for the appropriate use of hyperspectral data in the study and management of agricultural crops and natural vegetation. Volume I, Fundamentals, Sensor Systems, Spectral Libraries, and Data Mining for Vegetation introduces the fundamentals of hyperspectral or imaging spectroscopy data, including hyperspectral data processes, sensor systems, spectral libraries, and data mining and analysis, covering both the strengths and limitations of these topics. This book also presents and discusses hyperspectral narrowband data acquired in numerous unique spectral bands in the entire length of the spectrum from various ground-based, airborne, and spaceborne platforms. The concluding chapter provides readers with useful guidance on the highlights and essence of Volume I through the editors' perspective. Key Features of Volume I: Provides the fundamentals of hyperspectral remote sensing used in agricultural crops and vegetation studies. Discusses the latest advances in hyperspectral remote sensing of ecosystems and croplands. Develops online hyperspectral libraries, proximal sensing and phenotyping for understanding, modeling, mapping, and monitoring crop and vegetation traits. Implements reflectance spectroscopy of soils and vegetation. Enumerates hyperspectral data mining and data processing methods, approaches, and machine learning algorithms. Explores methods and approaches for data mining and overcoming data redundancy; Highlights the advanced methods for hyperspectral data processing steps by developing or implementing appropriate algorithms and coding the same for processing on a cloud computing platform like the Google Earth Engine. Integrates hyperspectral with other data, such as the LiDAR data, in the study of vegetation. Includes best global expertise on hyperspectral remote sensing of agriculture, crop water use, plant species detection, crop productivity and water productivity mapping, and modeling. Hyperspectral narrow-band (or imaging spectroscopy) spectral data are fast emerging as practical solutions in modeling and mapping vegetation. Recent research has demonstrated the advances in and merit of hyperspectral data in a range of applications including quantifying agricultural crops, modeling forest canopy biochemical properties, detecting crop stress and disease, mapping leaf chlorophyll content as it influences crop production, identifying plants affected by contaminants such as arsenic, demonstrating sensitivity to plant nitrogen content, classifying vegetation species and type, characterizing wetlands, and mapping invasive species. The need for significant improvements in quantifying, modeling, and mapping plant chemical, physical, and water properties is more critical than ever before to reduce uncertainties in our understanding of the Earth and to better sustain it. There is also a need for a synthesis of the vast knowledge spread throughout the literature from more than 40 years of research. Hyperspectral Remote Sensing of Vegetation integrates this knowledge, guiding readers to harness the capabilities of the most recent advances in applying hyperspectral remote sensing technology to the study of terrestrial vegetation. Taking a practical approach to a complex subject, the book demonstrates the experience, utility, methods and models used in studying vegetation using hyperspectral data. Written by leading experts, including pioneers in the field, each chapter presents specific applications, reviews existing state-of-the-art knowledge, highlights the advances made, and provides guidance for the appropriate use of hyperspectral data in the study of vegetation as well as its numerous applications, such as crop yield modeling, crop and vegetation biophysical and biochemical property characterization, and crop moisture assessment. This comprehensive book brings together the best global expertise on hyperspectral remote sensing of agriculture, crop water use, plant species detection, vegetation classification, biophysical and biochemical modeling, crop productivity and water productivity mapping, and

modeling. It provides the pertinent facts, synthesizing findings so that readers can get the correct picture on issues such as the best wavebands for their practical applications, methods of analysis using whole spectra, hyperspectral vegetation indices targeted to study specific biophysical and biochemical quantities, and methods for detecting parameters such as crop moisture variability, chlorophyll content, and stress levels. A collective "knowledge bank," it guides professionals to adopt the best practices for their own work.
Written by leading global experts, including pioneers in the field, the four-volume set on Hyperspectral Remote Sensing of Vegetation, Second Edition, reviews existing stateof- the-art knowledge, highlights advances made in different areas, and provides guidance for the appropriate use of hyperspectral data in the study and management of agricultural crops and natural vegetation. Hyperspectral remote sensing or imaging spectroscopy data has been increasingly used in studying and assessing the biophysical

and biochemical properties of agricultural crops and natural vegetation. Volume III, Biophysical and Biochemical Characterization and Plant Species Studies demonstrates the methods that are developed and used to study terrestrial vegetation using hyperspectral data. This volume includes extensive discussions on hyperspectral data processing and how to implement data processing mechanisms for specific biophysical and biochemical applications such as crop yield modeling, crop biophysical and biochemical property characterization, and crop moisture assessments. The concluding chapter provides readers with useful guidance on the highlights and essence of Volume III through the editors' perspective. Key Features of Volume III: Covers recent abilities to better quantify, model, and map plant biophysical, biochemical water, and structural properties. Demonstrates characteristic hyperspectral properties through plant diagnostics or throughput phenotyping of plant biophysical, biochemical, water, and structural properties. Establishes plant traits through hyperspectral imaging spectroscopy data as well as its integration with other data, such as LiDAR, using data from various platforms (ground-based, UAVs, and earth-observing satellites). Studies photosynthetic efficiency and plant health and stress through hyperspectral narrowband vegetation indices. Uses hyperspectral data to discriminate plant species and\or their types as well as their characteristics, such as growth stages. Compares studies of plant species of agriculture, forests, and other land use\land cover as established by hyperspectral narrowband data versus multispectral broadband data. Discusses complete solutions from methods to applications, inventory, and modeling considering various platform (e.g., earth-observing satellites, UAVs, handheld spectroradiometers) from where the data is gathered. Dwells on specific applications to detect and map invasive species by using hyperspectral data.

Remote Sensing Handbook - Three Volume Set

Hyperspectral Remote Sensing of

Vegetation
Hyperspectral Remote Sensing of the Spatial and Temporal Heterogeneity of Low Arctic Vegetation
Fundamentals and Practices
Hyperspectral Remote Sensing of Vegetation - a Transect Approach

Written by leading global experts, including pioneers in the field, the four-volume set on Hyperspectral Remote Sensing of Vegetation, Second Edition, reviews existing state-of-the-art knowledge, highlights advances made in different areas, and provides guidance for the appropriate use of hyperspectral data in the study and management of agricultural crops and natural vegetation. Volume IV, Advanced Applications in Remote Sensing of Agricultural Crops and Natural Vegetation discusses the use of hyperspectral or imaging spectroscopy data in numerous specific and advanced applications, such as forest management, precision farming, managing invasive species, and local to global land cover change detection. It emphasizes the importance of hyperspectral remote sensing tools for *studying vegetation processes and functions as well as the appropriate use of hyperspectral data for vegetation management practices. The concluding chapter provides readers with useful guidance on the highlights and essence of Volume IV through the editors' perspective. Key Features of Volume IV: Guides readers to harness the capabilities of the most recent advances in applying hyperspectral remote sensing technology to the study of terrestrial vegetation. Includes specific applications on agriculture, crop management practices, study of crop stress and diseases, crop characteristics based on inputs (e.g., nitrogen, irrigation), study of vegetation impacted by heavy metals, gross and net primary productivity studies, light use efficiency studies, crop water use and actual evapotranspiration studies, phenology monitoring, land use and land cover studies, global change studies, plant species detection, wetland and forest characterization and mapping, crop productivity and crop water productivity mapping, and modeling.*

Encompasses hyperspectral or imaging spectroscopy data in narrow wavebands used across visible, red-edge, near-infrared, far-infrared, shortwave infrared, and thermal portions of the spectrum. Explains the implementation of hyperspectral remote sensing data processing mechanisms in a standard, fast, and efficient manner for their applications. Discusses cloud computing to overcome hyperspectral remote sensing massive big data challenges. Provides hyperspectral analysis of rocky surfaces on the earth and other planetary systems.

An accessible yet rigorous introduction to remote sensing and its application to the study of vegetation for advanced undergraduate and graduate students. The underlying physical and mathematical principles of the techniques disucussed are explained in a way readily understood by those without a strong mathematical background.

Hyperspectral Remote Sensing: Theory and Applications offers the latest information on the techniques, advances and wide-ranging applications of *hyperspectral remote sensing, such as forestry, agriculture, water resources, soil and geology, among others. The book also presents hyperspectral data integration with other sources, such as LiDAR, Multi-spectral data, and other remote sensing techniques. Researchers who use this resource will be able to understand and implement the technology and data in their respective fields. As such, it is a valuable reference for researchers and data analysts in remote sensing and Earth Observation fields and those in ecology, agriculture, hydrology and geology. Includes the theory of hyperspectral remote sensing, along with techniques and applications across a variety of disciplines Presents the processing, methods and techniques utilized for hyperspectral remote sensing and in-situ data collection Provides an overview of the state-of-the-art, including algorithms, techniques and case studies*

Monitoring of the Biophysical Status of Vegetation

Using Multi-angular, Hyperspectral Remote Sensing for the Optimization of a Physically-based SVAT Mode

Hyperspectral Remote Sensing of Canopy Scale Vegetation Stress Associated with Buried Gas Pipelines
Hyperspectral Remote Sensing and Spectral Signature Applications
Hyperspectral Remote Sensing for Detecting Vegetation Affected by Hydrocarbons in the Amazon Forest

The Treasure Valley of Idaho and Eastern Oregon produces around 30% of the nation's annual summer storage onion crop. To profitably produce an onion crop, growers must attain both high total yields and bulbs of sufficient size. Onion pink root (causal agent Setophoma terrestris) is capable of destroying the onion root system during the growing season, resulting in foliar symptoms that imitate those of nutrient or drought stress and bulbs that are underdeveloped and small in size. The aim of this study was to evaluate the usefulness of hyperspectral remote sensing and narrowband spectral vegetation indices (SVIs) as a tool to diagnose onion pink root in the field and discriminate its symptoms from those of nitrogen and water stress. A field experiment was established in Parma, ID in 2018 and 2019 to which 3 moderate and consistent individual stress treatments were applied to the onion cultivars SV4643NT and Vaquero. Pink root, nitrogen, and drought stress were imposed using a combination of natural inoculum, soil fumigation (chloropicrin), fertilizer, and drip

irrigation. Onion samples and hand-held, hyperspectral radiometric measurements were collected weekly from the time of bulb initiation to the time of plant maturity to study the effects of stress on onion phenotype and reflectance at the leaf and canopy level. Results from the destructive sampling suggest that the proportion of diseased roots is significantly reduced by soil fumigation with chloropicrin. Furthermore, the total nitrogen content of onion leaves sampled from the nitrogen stressed (non-fertilized) plots were significantly reduced from the content of those taken from optimally fertilized plots. All stress treatments significantly reduced plant biomass, although not at the same growth stage nor to the same extent. Reflectance spectra were analyzed using 40 established SVIs. Preliminary analysis determined a similar relative relationship among treatments for most of the SVIs utilized. Three SVIs: triangular vegetation index (TVI), normalized difference vegetation index (NDVI), and optimized soil-adjusted vegetation index (OSAVI) were selected for detailed analysis. Only small variations in SVI value were observed between treatments at the leaf level. At canopy-level, stress treatments consistently lowered index values, though not always significantly and not always to the same degree. Results from standard regression analysis suggest that SVI value is closely related to the biomass of SV4643NT (R2 = 0.67 to 0.79) and Vaquero (R2 = 0.73 to 0.83) onions, likely because of the direct relationship between plant biomass and

parameters which account for the fraction of vegetation that covers the soil (such as leaf area index (LAI)). Overall, we found that SVIs, particularly those which include a band in the near-infrared region (700-1000 nm), are overwhelmingly sensitive to variation in canopy LAI as opposed to other vegetation parameters such as plant pigment composition (i.e. chlorophyll) in scenarios where the crop canopy does not completely cover the soil. This presents a challenge to the practical use of hyperspectral remote sensing and narrowband SVIs as a tool to diagnose onion stress at the canopy level.

A volume in the three-volume Remote Sensing Handbook series, Remote Sensing of Water Resources, Disasters, and Urban Studies documents the scientific and methodological advances that have taken place during the last 50 years. The other two volumes in the series are Remotely Sensed Data Characterization, Classification, and Accuracies, and Land Reso

Hyperspectral remote sensing is an emerging, multidisciplinary field with diverse applications that builds on the principles of material spectroscopy, radiative transfer, imaging spectrometry, and hyperspectral data processing. While there are many resources that suitably cover these areas individually and focus on specific aspects of the hyperspectral remote sensing field, this book provides a holistic treatment that thoroughly captures its multidisciplinary nature. The content is oriented toward the physical principles of hyperspectral remote sensing as opposed to

applications of hyperspectral technology. Readers can expect to finish the book armed with the required knowledge to understand the immense literature available in this technology area and apply their knowledge to the understanding of material spectral properties, the design of hyperspectral systems, the analysis of hyperspectral imagery, and the application of the technology to specific problems.

Application in Vegetation Monitoring : Proefschrift

Airborne Hyperspectral Remote Sensing of Salt Marsh Vegetation in Morro Bay

A Thesis

Estimation of N Content of Natural Vegetation Using Hyperspectral Remote Sensing Data

The Role of Phenology, Vegetation Colour, and Intrinsic Ecosystem Components

Understanding ecosystem structure and function requires familiarity with the techniques, knowledge and concepts of the three disciplines of plant physiology, remote sensing and modelling. This is the first textbook to provide the fundamentals of these three domains in a single volume. It then applies cross-disciplinary insights to multiple case studies in vegetation and landscape science. A key feature of these case studies is an examination of relationships among climate, vegetation structure and vegetation function, to address fundamental research questions. This book is for advanced students and researchers who need to understand and apply knowledge from the disciplines of plant physiology, remote sensing and modelling. It allows readers to integrate and synthesise knowledge to produce a holistic understanding of the structure, function and behaviour of

forests, woodlands and grasslands.
Written by leading global experts, including pioneers in the field, the four-volume set on Hyperspectral Remote Sensing of Vegetation, Second Edition, reviews existing state-of-the-art knowledge, highlights advances made in different areas, and provides guidance for the appropriate use of hyperspectral data in the study and management of agricultural crops and natural vegetation. Volume I, Fundamentals, Sensor Systems, Spectral Libraries, and Data Mining for Vegetation introduces the fundamentals of hyperspectral or imaging spectroscopy data, including hyperspectral data processes, sensor systems, spectral libraries, and data mining and analysis, covering both the strengths and limitations of these topics. Volume II, Hyperspectral Indices and Image Classifications for Agriculture and Vegetation evaluates the performance of hyperspectral narrowband or imaging spectroscopy data with specific emphasis on the uses and applications of hyperspectral narrowband vegetation indices in characterizing, modeling, mapping, and monitoring agricultural crops and vegetation. Volume III, Biophysical and Biochemical Characterization and Plant Species Studies demonstrates the methods that are developed and used to study terrestrial vegetation using hyperspectral data. This volume includes extensive discussions on hyperspectral data processing and how to implement data processing mechanisms for specific biophysical and biochemical applications such as crop yield modeling, crop biophysical and biochemical property characterization, and crop moisture assessments. Volume IV, Advanced Applications in Remote Sensing of Agricultural Crops and Natural Vegetation discusses the use of hyperspectral or imaging spectroscopy data in numerous specific and advanced applications, such as forest management, precision farming, managing invasive

species, and local to global land cover change detection. Arctic tundra ecosystems are experiencing warming twice the global average and Arctic vegetation is responding in complex and heterogeneous ways. Shifting productivity, growth, species composition, and phenology at local and regional scales have implications for ecosystem functioning as well as the global carbon and energy balance. Optical remote sensing is an effective tool for monitoring ecosystem functioning in this remote biome. However, limited field-based spectral characterization of the spatial and temporal heterogeneity limits the accuracy of quantitative optical remote sensing at landscape scales. To address this research gap and support current and future satellite missions, three central research questions were posed: Does canopy-level spectral variability differ between dominant low Arctic vegetation communities and does this variability change between major phenological phases? How does canopy-level vegetation colour images recorded with high and low spectral resolution devices relate to phenological changes in ...

Hyperspectral Remote Sensing of Vegetation Parameters Using Statistical and Physical Models

Hyperspectral Remote Sensing of Individual Gravesites - Exploring the Effects of Cadaver Decomposition on Vegetation and Soil Spectra

Principles, Techniques, and Applications

Biophysical and Biochemical Characterization and Plant Species Studies

Quantification of Vegetation Stress Via Hyperspectral Remote Sensing Data

Contributed papers presented at the National Seminar on "Hyperspectral Remote Sensing and Spectral Signature Databse Management System," held on February 14-15,

2008 at Annamalai University.

"The detection of clandestine graves is an emerging tool in hyperspectral remote sensing. Though previous studies have demonstrated that it is possible to use hyperspectral remote sensing techniques in detection of mass graves, there is a lack of studies demonstrating the feasibility to utilize this same technology for the detection of individual burial sites. This thesis summarizes the first year of a multi-year study to ascertain the detectable changes to vegetation and soil spectra caused by the chemicals released from a single decomposing body. Eighteen pig (Sus scrofa) carcasses were buried in a temperate environment in Ottawa, ON. Three scenarios were examined; surface body deposition, 30 cm, and 90 cm soil cover. A Twin Otter aircraft with hyperspectral sensors covering the visible to shortwave infrared range was used to collect the imagery. In addition to the airborne sensor, a portable spectroradiometer was used to collect plant and soil spectra in the lab (the soil and plant samples were collected coincidentally with the airborne imagery). Through chemical analysis of the soil collected both before site set up and coincidentally with the airborne imagery, I was able to determine the changes in chemistry and spectra caused by decomposing cadavers rather than just soil disturbance. Statistical analysis of the Chlorophyll and Carotenoids extraction demonstrates separability of vegetation into three categories: 1) background, 2) disturbed soil, shallow and deep graves, and 3) surface burials. Statistical analysis of the vegetation spectra corresponded to the chemical analysis in differentiating between background, disturbed soil, shallow and deep graves, and surface burials, as well analysis of the soil spectra allowed for separation into disturbed soil, shallow and deep graves, and surface burials. " --

Fundamentals, Sensor Systems, Spectral Libraries, and Data Mining for Vegetation

Mapping the Invasive Plant Arundo Donax and Associated Riparian Vegetation Using Hyperspectral Remote Sensing

Vegetation Dynamics

Determination and Monitoring of Vegetation Stress Using Hyperspectral Remote Sensing

A Synthesis of Plant Ecophysiology, Remote Sensing and Modelling