Ship Detection Using Polarimetric Radarsat 2 Data And

This volume brings together multiple perspectives on both the changing Arctic environment and the challenges and opportunities it presents for the shipping sector. It argues for the adoption of a forward-looking agenda that respects the fragile and changing Arctic frontier. With the accelerated interest in and potential for new maritime trade routes, commercial transportation and natural resource development, the pressures on the changing Arctic marine environment will only increase. The International Maritime Organization Polar Code is an important step toward Arctic stewardship. This new volume serves as an important guide to this rapidly developing agenda. Addressing a range of aspects, it offers a valuable resource for academics, practitioners, environmentalists and affected authorities in the shipping industry alike.

An Advanced Research Workshop (ARW) "Data Fusion Technologies for Harbour Protection" was held in Tallinn, Estonia 27 June–1 July, 2005. This workshop was organized by request of the NATO Security Through Science Programme and the Defence Investment Division. An ARW is one of many types of funded group support mechanisms established by the NATO Science Committee to contribute to the critical assessment of existing knowledge on new important topics, to identify directions for future research, and to promote close working relationships between scientists from different countries and with different professional experiences. The NATO Science Committee was approved at a meeting of the Heads of Government of the Alliance in December 1957, subsequent to the 1956 recommendation of "Three Wise Men" – Foreign Ministers Lange (Norway), Martino (Italy) and Pearson (Canada) on Non-Military Cooperation in NATO. The NATO Science Committee established the NATO Science Programme in 1958 to encourage and support scientific collaboration between individual scientists and to foster scientific development in its member states. In 1999, following the end of the Cold War, the Science Programme was transformed so that support is now devoted to collaboration between Partner-country and NATO-country scientists or to contributing towards research support in Partner countries. Since 2004, the Science Programme was further modified to focus exclusively on NATO Priority Research Topics (i. e. Defence Against Terrorism or Countering Other Threats to Security) and also preferably on a Partner country priority area.

The oceans cover approximately 71% of Earth's surface, 90% of the biosphere and contains 97% of Earth's water. Since the first launch of SEASAT satellite in 1978, an increasing number of SAR satellites have or will become available, such as the European Space Agency's ERS-1/-2, ENVISAT, and Sentinel-1 series; the Canadian RADARSAT-1/-2 and the upcoming RADARSAT Constellation Mission series satellites; the Italian COSMO-SkyMed satellites, the German TERRASAR-X and TANDEM-X, and the Chinese GAOFEN-3 SAR, among others. Recently, European Space Agency has launched a new generation of SAR satellites, Sentinel-1A in 2014 and Sentinel-1B in 2016. These SAR satellites provide researchers with free and open SAR images necessary to carry out their research on the global oceans. The scope of Advances in SAR Remote Sensing of Oceans is to demonstrate the types of information that can be obtained from SAR images of the oceans, and the cutting-edge methods needed for analysing SAR images. Written by leading experts in the field, and divided into four sections, the book presents the basic principles of radar backscattering from the ocean surface; introduces the recent progresses in SAR remote sensing of dynamic coastal environment and management; discusses the state-of-the-art methods to monitor parameters or phenomena related to the dynamic ocean environment; and deals specifically with new techniques and findings of marine atmospheric boundary layer observations. Advances in SAR Remote Sensing of Oceans is a very comprehensive and up-to-date reference intended for use by graduate students, researchers, practitioners, and R&D engineers working in the vibrant field of oceans, interested to understand how SAR remote sensing can support oceanography research and applications.

The recent launches of three fully polarimetric synthetic aperture radar (PolSAR) satellites have shown that polarimetric radar imaging can provide abundant data on the Earth's environment, such as biomass and forest height estimation, snow cover mapping, glacier monitoring, and damage assessment. Written by two of the most recognized leaders in this field, Polarimetric Radar Imaging: From Basics to Applications presents polarimetric radar imaging and processing techniques and shows how to develop remote sensing applications using PolSAR imaging radar. The book provides a substantial and balanced introduction to the basic theory and advanced concepts of polarimetric scattering mechanisms, speckle statistics and speckle filtering, polarimetric information analysis and extraction techniques, and applications typical to radar polarimetric remote sensing. It explains the importance of wave polarization theory and the speckle phenomenon in the information retrieval problem of microwave imaging and inverse scattering. The authors demonstrate how to devise intelligent information extraction algorithms for remote sensing applications. They also describe more advanced polarimetric analysis techniques for polarimetric target decompositions, polarization orientation effects, polarimetric scattering modeling, speckle filtering, terrain and forest classification, manmade target analysis, and PolSAR interferometry. With sample PolSAR data sets and software available for download, this self-contained, hands-on book encourages you to analyze space-borne and airborne PolSAR and polarimetric interferometric SAR (Pol-InSAR) data and then develop applications using this data.

This is a monograph concerning the scattering of electromagnetic waves from surfaces to generate information for the purposes of remote sensing. It combines, for the first time, a treatment of two important new ideas, namely information from the orientation or polarisation of the wave and how it can be combined with interferometry.

Issues in Analysis, Measurement, Monitoring, Imaging, and Remote Sensing Technology: 2013 Edition is a ScholarlyEditions™ book that delivers timely, authoritative, and comprehensive information about Analysis and Measurement. The editors have built Issues in Analysis, Measurement, Monitoring, Imaging, and Remote Sensing Technology: 2013 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Analysis and Measurement in this book to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Issues in Analysis, Measurement, Monitoring, Imaging, and Remote Sensing Technology: 2013 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at http://www.ScholarlyEditions.com/.

This book constitutes the proceedings of the 31st Australasian Joint Conference on Artificial Intelligence, AI 2018, held in Wellington, New Zealand, in December 2018. The 50 full and 26 short papers presented in this volume were carefully reviewed and selected from 125 submissions. The paper were organized in topical sections named: agents, games and robotics; AI applications and innovations; computer vision; constraints and search; evolutionary computation; knowledge representation and reasoning; machine learning and data mining; planning and scheduling; and text mining and NLP.

A wide variety of marginal basins, ranging from polar to equatorial regions, and a few sizeable enclosed basins, can all be included among the Asian Seas. The Arctic Ocean shelf seas off Siberia; the sheltered basins along the Pacific Ocean's western rim; the coastal seas of the northernmost Indian Ocean, including the semi-enclosed Red Sea and Persian Gulf; the Caspian Sea, the remnants of the Aral Sea and a score of brackish or freshwater lakes, such as Lake Balkhash and Lake Baykal; all exhibit a multiplicity of environmental features and processes. Understanding the peculiarities of such a large and varied collection of marine and coastal types requires integrated observation systems, among which orbital remote sensing must play an essential role. This volume reviews the current potential of Earth

Observations in assessing the many Asian seascapes, using both passive and active techniques in diverse spectral regions, such as measuring reflected visible and near-infrared sunlight and surface emissions in the thermal infrared and microwave range, or surface reflection of transmitted radar pulses in the microwave range. An in-depth evaluation of the available spectral regions and observation techniques, as well as of novel multi-technique methods, ensures that suitable tools are indeed accessible for exploring and managing the wealth of resources that the Asian Seas have to offer.

This book will guide you in the use of remote sensing for military and intelligence gathering applications. It is a must read for students working on systems acquisition or for anyone interested in the products derived from remote sensing systems.

This book is a printed edition of the Special Issue "Advances in SAR: Sensors, Methodologies, and Applications" that was published in Remote Sensing

Here is a review of the current potential of Earth Observations that devotes particular attention to the challenges posed by the European Seas. The assessment of surface parameters by means of passive techniques – which measure reflected visible and near-infrared sunlight, or surface emissions in the thermal infrared or microwave spectral regions – is addressed. Active techniques – which use transmitted impulses of visible or microwave radiation – are covered as well.

The main objective of this book is to provide a common platform for diverse concepts in satellite image processing. In particular it presents the state-of-the-art in Artificial Intelligence (AI) methodologies and shares findings that can be translated into real-time applications to benefit humankind. Interdisciplinary in its scope, the book will be of interest to both newcomers and experienced scientists working in the fields of satellite image processing, geo-engineering, remote sensing and Artificial Intelligence. It can be also used as a supplementary textbook for graduate students in various engineering branches related to image processing.

International Geosicence and Remote Sensing Symposium (IGARSS) is the annual conference sponsored by the IEEE Geoscience and Remote Sensing Society (IEEE GRSS), which is also the flagship event of the society The topics of IGARSS cover a wide variety of the research on the theory, techniques, and applications of remote sensing in geoscience, which includes the fundamentals of the interactions electromagnetic waves with environment and target to be observed the techniques and implementation of remote sensing for imaging and sounding the analysis, processing and information technology of remote sensing data the applications of remote sensing in different aspects of earth science the missions and projects of earth observation satellites and airborne and ground based campaigns The theme of IGARSS 2019 is Enviroment and Disasters, and some emphases will be given on related special topics

The Special Issue entitled "Remote Sensing in Vessel Detection and Navigation" comprises 15 articles on many topics related to remote sensing with navigational sensors. The sequence of articles included in this Special Issue is in line with the latest scientific trends. The latest developments in science, including artificial intelligence, were used. It can be said that navigation and vessel detection remain important and hot topics, and a lot of work will continue to be done worldwide. New techniques and methods for analyzing and extracting information from navigational sensors and data have been proposed and verified. Some of these will spark further research, and some are already mature and can be considered for industrial implementation and development.

Oil Spill Science and Technology, Second Edition, delivers a multi-contributed view on the entire chain of oil-spill related topics from oil properties and behaviors, to remote sensing through the management side of contingency planning and communicating oil spill risk perceptions. Completely new case studies are included with special attention to the Deepwater Horizon event, covering the impacts of wetlands and sand beaches, a mass balance approach, and the process for removing petroleum chemicals still trapped near Alabama beaches. Other new information on lingering oil left behind from the Exxon Valdez spill, the emergency system used in the Prestige incident, and coverage on the Heibei Spirit spill in Korea are also included. This updated edition combines technology with case studies to identify the current state of knowledge surrounding oil spills that will encourage additional areas of research that are left to uncover in this critical sector of the oil and gas industry. Updated with new chapters on risk analysis and communication, contingency planning, restoration, and case studies Supported with technological advances evolved from the Deepwater Horizon/BP oil tragedy and events in the Arctic/Antarctic Multi-contributed from various industry experts to provide an extensive background in technical equipment and worldwide procedures used today

Taking an innovative look at Synthetic Aperture Radar(SAR), this practical reference fully covers new developments inSAR and its various methodologies and enables readers to interpretSAR imagery An essential reference on polarimetric Synthetic Aperture Radar(SAR), this book uses scattering theory and radiative transfertheory as a basis for its treatment of topics. It is organized toinclude theoretical scattering models and SAR data analysistechniques, and presents cutting-edge research on theoreticalmodelling of terrain surface. The book includes quantitativeapproaches for remote sensing, such as the analysis of the Muellermatrix solution of random media, mono-static and bistatic SAR imagesimulation. It also covers new parameters for unsupervised surfaceclassification, DEM inversion, change detection from multi-temporalSAR images, reconstruction of building objects from multi-aspectSAR images, and polarimetric pulse echoes from multi-layeringscatter media. Structured to encourage methodical learning, earlier chapterscover core material, whilst later sections involve more advancednew topics which are important for researchers. The final chaptercompletes the book as a reference by covering SAR interferometry, acore topic in the remote sensing community. Features theoretical scattering models and SAR data analysistechniques Explains the simulation of SAR images for mono- and bi-staticradars, covering both qualitative and quantitative informationretrieval Chapter topics include: theoretical scattering models; SAR dataanalysis and processing techniques; and theoretical quantitativesimulation reconstruction and inversion techniques Structured to enable both academic learning and independentstudy, laying down the foundations first of all before advancing tomore complex topics Experienced author team presents mathematical derivations andfigures so that they are easy for readers to understand Pitched at graduate-level students in electrical engineering,physics, earth and space sciences, as well as researchers MATLAB code available for readers to run their ownroutines An invaluable reference for research scientists, engineers andscientists working on polarimetric SAR hardware and software,Application developers of SAR and polarimetric SAR, remote sensingspecialists working with SAR data – using ESA.

Modern Earth System Monitoring represents a fundamental change in the way scientists study the Earth System. In Oceanography, for the past two centuries, ships have provided the platforms for observing. Expeditions on the continents and Earth's poles are land-based analogues. Fundamental understanding of current systems, climate, natural hazards, and ecosystems has been greatly advanced. While these approaches have been remarkably successful, the need to establish measurements over time can only be made using Earth observations and observatories with exacting standards and continuous data. The 19 peer-reviewed contributions in this volume provide early insights into this emerging view of Earth in both space and time in which change is a critical component of our growing understanding.

This book maximizes reader insights into the field of mathematical models and methods for the processing of two-dimensional remote sensing images. It presents a broad analysis of the field, encompassing passive and active sensors, hyperspectral images, synthetic aperture radar (SAR), interferometric SAR, and polarimetric SAR data. At the same time, it addresses highly topical subjects involving remote sensing data types (e.g., very high-resolution images, multiangular or multiresolution data, and satellite image time series) and analysis methodologies (e.g., probabilistic graphical models, hierarchical image representations, kernel machines, data fusion, and compressive sensing) that currently have primary importance in the field of mathematical modelling for remote sensing and image processing. Each chapter focuses on a particular type of remote sensing data and/or on a specific methodological area, presenting both a thorough analysis of the previous literature and a methodological and experimental discussion

of at least two advanced mathematical methods for information extraction from remote sensing data. This organization ensures that both tutorial information and advanced subjects are covered. With each chapter being written by research scientists from (at least) two different institutions, it offers multiple professional experiences and perspectives on each subject. The book also provides expert analysis and commentary from leading remote sensing and image processing researchers, many of whom serve on the editorial boards of prestigious international journals in these fields, and are actively involved in international scientific societies. Providing the reader with a comprehensive picture of the overall advances and the current cutting-edge developments in the field of mathematical models for remote sensing image analysis, this book is ideal as both a reference resource and a textbook for graduate and doctoral students as well as for remote sensing scientists and practitioners.

This book is a printed edition of the Special Issue "Polarimetric SAR Techniques and Applications" that was published in Applied Sciences

This new Encyclopedia of Coastal Science stands as the latest authoritative source in the field of coastal studies, making it the standard reference work for specialists and the interested lay person. Unique in its interdisciplinary approach. This Encyclopedia features contributions by 245 well-known international specialists in their respective fields and is abundantly illustrated with line-drawings and photographs. Not only does this volume offer an extensive number of entries, it also includes various appendices, an illustrated glossary of coastal morphology and extensive bibliographic listings.

This thesis presents a groundbraking methodology for the radar international community. The detection approach introduced, namely perturbation analysis, is completey novel showing a remarkable capability of thinking outside the box. Perturbation analysis is able to push forward the performance limits of current algorithms, allowing the detection of targets smaller than the resolution cell and highly embedded in clutter. The methodology itself is extraordinary flexibe and has already been used in two other large projects, funded by the ESA (European Space Agency): M-POL for maritime surveillance, and DRAGON-2 for land classification with particular attention to forests. This book is a perfectly organised piece of work where every detail and perspective is taken into account in order to provide a comprehensive vision of the problems and solutions.

Radar-related technology is mainly processed within the time and frequency domains but, at the same time, is a multi-dimensional integrated system including a spatial domain for transmitting and receiving electromagnetic waves. As a result of the enormous technological advancements of the pioneers actively discussed in this book, research and development in multi-dimensional undeveloped areas is expected to continue. This book contains state-of-the-art work that should guide your research.

" Information fusion resulting from multi-source processing, often called multisensor data fusion when sensors are the main sources of information, is a relatively young (less than 20 years) technology domain. It provides techniques and methods for: Integrating data from multiple sources and using the complementarity of this data to derive maximum information about the phenomenon being observed; Analyzing and deriving the meaning of these observations; Selecting the best course of action; and Controlling the actions. Various sensors have been designed to detect some specific phenomena, but not others. Data fusion applications can combine synergically information from many sensors, including data provided by satellites and contextual and encyclopedic knowledge, to provide enhanced ability to detect and recognize anomalies in the environment, compared with conventional means. Data fusion is an integral part of multisensor processing, but it can also be applied to fuse non-sensor information (geopolitical, intelligence, etc.) to provide decision support for a timely and effective situation and threat assessment. One special field of application for data fusion is satellite imagery, which can provide extensive information over a wide area of the electromagnetic spectrum using several types of sensors (Visible, Infra-Red (IR), Thermal IR, Radar, Synthetic Aperture Radar (SAR), Polarimetric SAR (PolSAR), Hyperspectral...). Satellite imagery provides the coverage rate needed to identify and monitor human activities from agricultural practices (land use, crop types identification...) to defence-related surveillance (land/sea target detection and classification). By acquiring remotely sensed imagery over earth regions that land sensors cannot access, valuable information can be gathered for the defence against terrorism. This books deals with the following research areas: Target recognition/classification and tracking; Sensor systems; Image processing; Remote sensing and remote control; Belief functions theory; and Situation assessment. "

This book presents a timely investigation of radar remote sensing observations for agricultural crop monitoring and advancements of research techniques and their applicability for crop biophysical parameter estimation. It introduces theoretical background of radar scattering from vegetation volume and semi-empirical modelling approaches that are the foundation for biophysical parameter inversion. The contents will help readers explore the state-of-the-art crop monitoring and biophysical parameter estimation using approaches radar remote sensing. It is useful guide for academicians, practitioners and policymakers.

This open access book focuses on the practical application of electromagnetic polarimetry principles in Earth remote sensing with an educational purpose. In the last decade, the operations from fully polarimetric synthetic aperture radar such as the Japanese ALOS/PalSAR, the Canadian Radarsat-2 and the German TerraSAR-X and their easy data access for scientific use have developed further the research and data applications at L,C and X band. As a consequence, the wider distribution of polarimetric data sets across the remote sensing community boosted activity and development in polarimetric SAR applications, also in view of future missions. Numerous experiments with real data from spaceborne platforms are shown, with the aim of giving an up-to-date and complete treatment of the unique benefits of fully polarimetric synthetic aperture radar data in five different domains: forest, agriculture, cryosphere, urban and oceans.

The book provides an advanced vision and trends of computational intelligence in cyberspace and cyber-enabled spaces. It reviews architectures and models, as well as state-of-the-art computational and interpretation capabilities for social, industrial, and multimedia applications. Cyber-enabled intelligence involves the design and development of intelligent and innovative application scenarios in social networks, computer vision, multimedia, and image processing. Application scenarios can also cover the applicability of intelligent sensing, data collection and predictive analysis in Internet of Things.

Radar polarimetry has been highly sought after for its use in the precise monitoring of Earth's surface. Polarimetric SAR Imaging explains the basic concepts of polarimetry and its diverse applications including: deforestation, tree classification, landslide detection, tsunamis, volcano eruptions and ash distribution, snow accumulation, rice field monitoring, urban area exploration, ship detection, among other applications. The explanations use actual data sets taken by Advanced Land Observing Satellite (ALOS and ALOS2). With the increasing problems presented by climate change, there is a growing need for detailed earth observation using polarimetric data. As the treatment of vector nature of radar waves is complex, there is a gap between the theory and the application. Polarimetric SAR Imaging: Theory and Applications addresses and fills this gap. Features: Provides cutting-edge polarimetric applications for earth observation with full color images. Includes detailed descriptions of theory, equations, expansions, and flowcharts, and numerous real examples. Explains concepts, data analysis, and applications in simple and

clear language aimed at an intuitive comprehension. Provides specific and unique examples of PolSAR images derived from actual space and airborne systems (ALOS/ALOS2, PiSAR-x/L) Covers the wide range of the radar polarimetry, especially the decomposition of the polarimetry data, an original method developed by the author using the Japanese polarimetric SAR data Illustrated in full color using images generated by polarimetric techniques, this book is easy to understand and use for both student and expert, and is an excellent resource both in the classroom and in the field.

This book discusses in detail the science and morphology of powerful hurricane detection systems. It broadly addresses new approaches to monitoring hazards using freely available images from the European Space Agency's (ESA's) Sentinel-1 SAR satellite and benchmarks a new interdisciplinary field at the interface between oceanography, meteorology and remote sensing. Following the launch of the first European Space Agency (ESA) operational synthetic aperture radar satellite, Sentinel-1, in 2014, synthetic aperture radar (SAR) data has been freely available on the Internet hub in real-time. This advance allows weather forecasters to view hurricanes in fine detail for the first time. As a result, the number of synthetic aperture radar research scientists working in this field is set to grow exponentially in the next decade; the book is a valuable resource for this large and budding audience.

This book proceedings collects ?a number of papers presented at the International Conference on Sensing and Imaging, which was held at Guangxi University of Science and Technology from October 15-18, 2018. Sensing and imaging is an interdisciplinary field covering a variety of sciences and techniques such as optics, electricity, magnetism, heat, sound, and computing technologies. The field has diverse applications of interest such as image processing techniques.The results in the book bridge the gap between theory and applications, translating techniques into better products. The text will appeal to students, professionals and researchers alike.

This book presents new and advanced concepts, theories and methodologies in polarimetric synthetic aperture radar (PolSAR) target scattering mechanism modeling and interpretation, which is dedicated to bridge the gap between the acquired data and practical applications. It proposes adaptive and generalized polarimetric target decompositions, to precisely interpret the target scattering mechanisms. Further, it develops a uniform polarimetric matrix rotation theory and a polarimetric coherence pattern visualization and interpretation tool to completely explore and characterize the deep information and target signatures in the rotation domain. Finally, it demonstrates land cover classification, target detection, natural disaster damage investigation and mapping applications which use the novel scattering mechanism investigation tools. The book is a valuable resource for senior undergraduate and postgraduate students, teachers, engineers and researchers in the field of microwave remote sensing, radar polarimetry, imaging radar, and environmental studies.

Provides a scientific basis for the cleanup and for the assessment of oil spills Enables Non-scientific officers to understand the science they use on a daily basis Multi-disciplinary approach covering fields as diverse as biology, microbiology, chemistry, physics, oceanography and toxicology Covers the science of oil spills from risk analysis to cleanup and through the effects on the environment Includes case studies examining and analyzing spills, such as Tasman Spirit oil spill on the Karachi Coast, and provides lessons to prevent these in the future

Changes in sea surface roughness are usually associated with a change in the sea surface wind field. This interaction has been exploited to measure sea surface wind speed by scatterometry. A number of features on the sea surface associated with changes in roughness can be observed by synthetic aperture radar (SAR) because of the change in Bragg backscatter of the radar signal by damping of the resonant ocean capillary waves. With various radar frequencies, resolutions, and modes of polarization, sea surface features have been analyzed in numerous campaigns, bringing various datasets together, thus allowing for new insights into small-scale processes at a larger areal coverage. This Special Issue aims at investigating sea surface features detected by high spatial resolution radar systems, such as SAR.

This book is a printed edition of the Special Issue "Application of Artificial Neural Networks in Geoinformatics" that was published in Applied Sciences