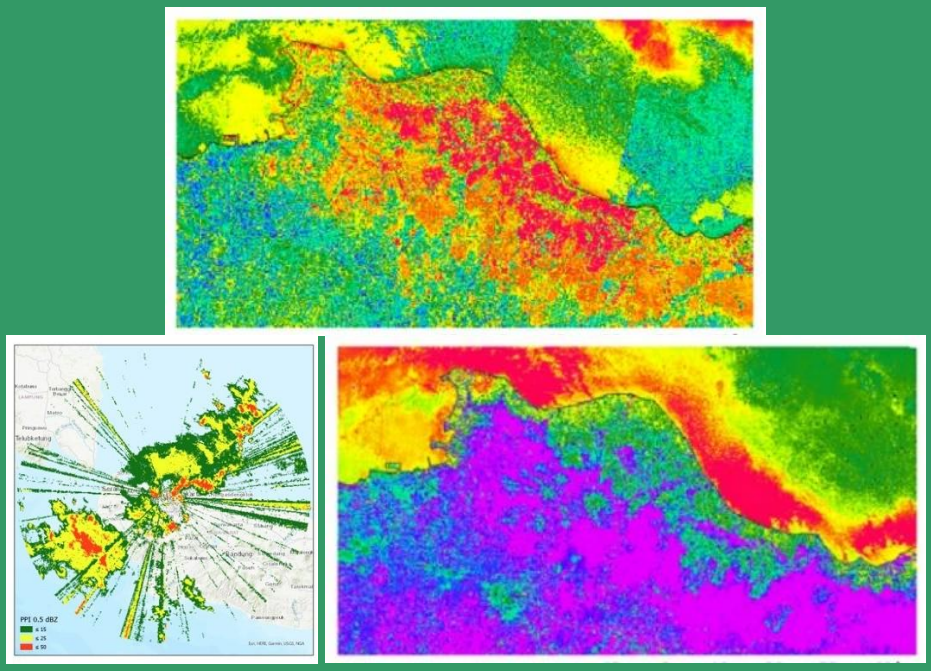
Vol. 18 No. 2 December 2021

P-ISSN 0216-6739; E-ISSN 2549-516X
Accreditation No. 30/E/KPT/2018

International Journal of Remote Sensing and Earth Sciences



Vol. 18 No. 2 December 2021

P-ISSN 0216-6739; E-ISSN 2549-516X
Accreditation No. 30/E/KPT/2018

Published by
Indonesian National Institute of Aeronautics and Space
(LAPAN)

International Journal of Remote Sensing and Earth Sciences

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Indonesian National Institute of Aeronautics and Space
(LAPAN)

Editorial Committee Preface

Dear IJReSES Readers,

We sincerely thank you for reading the International Journal of Remote Sensing and Earth Sciences Vol. 18 No 2, December 2021. In general, this journal is expected to enrich the serial publications on earth sciences. In particular this journal is aimed to present improvement in remote sensing studies and its applications on earth sciences. This journal also serves as the enrichment on earth sciences publication, not only in Indonesia and Asia but also worldwide.

This journal consists of papers discussing the particular interest in remote sensing field. Those papers are having remote sensing data for image processing, geosciences, oceanography, environment, disaster, mining activities, etc. A variety of topics are discussed in this seventeen edition. Briefly, the topics discussed in this edition are the studies of remote sensing data processing issues such as bathymetri, tsunami disaster risk, water resource, flood disaster areas, weathers, and peatland. There some new methods, new analysis, and new novelties on this edition.

Finally, enjoy your reading of the IJRESES Vol. 18 No. 2 December 2021, and please refer this journal content for your next research and publication. For editorial team members and the journal secretariat, thank you very much for all big supports for this volume publication.

Editor-in-Chief,

Dr M. Rokhis Khomarudin.

Vol. 18 No. 2 December 2021
P-ISSN 0216-6739; E-ISSN 2549-516X

Contribution Paper to:

IJReSES Secretariat
Indonesian National Institute of Aeronautics and Space (LAPAN)
Jl. Kalisari No. 8, Pekayon, Pasar Rebo, Jakarta 13710, INDONESIA
Telp. (021) 8710065, Fax. (021) 8722733
www.jurnal.lapan.go.id

Published by:
National Institute of Aeronautics and Space of Indonesia
(LAPAN)

INTERNATIONAL JOURNAL OF
REMOTE SENSING AND EARTH SCIENCES
Vol. 18 No. 2 December 2021
P-ISSN 0216-6739; E- ISSN 2549-516X
Accreditation No. 30/E/KPT/2018

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Published by:
National Institute of Aeronautics and Space of Indonesia (LAPAN)

International Journal of
Remote Sensing and Earth Sciences
P-ISSN 0216 – 6739; E- ISSN 2549-516X Vol. 18 No. 1 June 2021
Accreditation No. 30/E/KPT/2018

ABSTRACT

OIL PALM PLANTATION DETECTION IN INDONESIA USING SENTINEL-2 AND LANDSAT-8 OPTICAL SATELLITE IMAGERY (CASE STUDY: ROKAN HULU REGENCY, RIAU PROVINCE)/ Yunita Nurmasari, Arie Wahyu Wijayanto
IJRESES, 18 (1) 2021 : 1-18

The objective of this work is to assess the capability of multispectral optical Landsat and Sentinel images to detect oil palm plantations in Rokan Hulu, Riau, one of the largest palm oil producers in Indonesia, by combining multispectral bands and composite indices. In addition to comparing two different sets of satellite images, we also ascertain which gives the best performance among the supervised machine learning classifiers CART Decision Tree, Random Forest, Support Vector Machine, and Naive Bayes. With the use of multispectral bands and derived composite indices, the best classifier achieved an overall accuracy of up to 92%. The findings and contributions of the study include: (1) insight into a set of feature combinations that provides the highest model accuracy, and (2) an extensive evaluation of machine learning-based classifiers on two different optical satellite imageries. Our study could further be beneficial for the government in providing more scalable plantation statistics.

Keywords: *remote sensing, oil palm detection, Sentinel-2, Landsat-8, supervised machine learning*

MACHINE LEARNING APPLIED TO SENTINEL-2 AND LANDSAT-8 MULTISPECTRAL AND MEDIUM-RESOLUTION SATELLITE IMAGERY FOR THE DETECTION OF RICE PRODUCTION AREAS IN NGANJUK, EAST JAVA, INDONESIA/ Terry Devara, Arie Wahyu Wijayanto
IJRESES, 18 (1) 2021 : 19-32

Statistics Indonesia (BPS) has been introducing the use of Area Sampling Frame (ASF) surveys from 2018 to estimate rice production areas, although the process continues to suffer from the high costs of human and other resources. To support this type of conventional field survey, a more scalable and inexpensive approach using publicly-available remote sensing data, for example from the Sentinel-2 and Landsat-8 satellites, has been explored. In this research, we compare the performance gain from Sentinel-2 and Landsat-8 images using a multiple composite-index enriched machine learning classifier to detect rice production areas located in Nganjuk, East Java, Indonesia as a case study area. We build a detection model from a set of machine learning classifiers, Decision Tree (CART), Support Vector Machine, Logistic Regression, Ensemble Bagging Methods (Random Forest and Extra Trees), and Ensemble Boosting Methods (AdaBoost and XGBoost). The composite indices consist of the NDVI and EVI for agricultural and forest areas, NDWI for water and cloud, and NDBI, NDTI, and BSI for built-up areas, fallows, and asphalt-based roads. Validated by k-fold cross-validation, Sentinel-2 and Landsat-8 achieved F1-scores of 0.930 and 0.919 respectively at the scale of 30 meters per pixel. Using a 10 meter resolution per pixel for the Sentinel-2 imagery showed an increased F1-score of up to 0.971. Our evaluation shows that the higher spatial resolution imagery of Sentinel-2 achieves a better prediction, not only performance-wise, but also as a better representation of actual conditions.

Keywords: *multispectral remote sensing, medium-resolution optic, machine learning, rice detection*

International Journal of
Remote Sensing and Earth Sciences
P-ISSN 0216 – 6739; E- ISSN 2549-516X Vol. 18 No. 1 June 2021
Accreditation No. 30/E/KPT/2018

ABSTRACT

APPLICATION OF LAPAN A3 SATELLITE DATA FOR THE IDENTIFICATION OF PADDY FIELDS USING OBJECT BASED IMAGE ANALYSIS (OBIA)/ Mukhoriyah Mukhoriyah, Dony Kushardono
IJRESES, 18 (1) 2021 : 33-42

The role of agriculture is directly related to SDG No.2, which is running a programme until 2030 to reduce national poverty, eradicate hunger by increasing food security and improving nutrition and support sustainable agriculture. Problems faced include the reduction in agricultural land, which results in lower rice production, and the limited information on the monitoring of paddy fields using spatial data. The purpose of this study is to identify paddy fields using LAPAN A3 satellite imagery based on OBIA classification. The data used were from LAPAN A3 multispectral imagery dated 19 June 2017, Landsat 8 imagery dated 17 June 2017, DEM SRTM (BIG), and the Administrative Boundary Map (BIG). The analysis method was segmentation by grouping image pixels, and supervised classification by taking several sample areas based on Random Stratified Sampling. The results will be carried using a confusion matrix. The classification results produced four classes; watery paddy fields, vegetation paddy fields, fallow paddy fields, and non-paddy fields, using of the green, red, and NIR bands for the LAPAN A3 data. From the results of the segmentation process, there remain some oversegmented features in the appearance of the same object. Oversegmentation is due to an inaccurate value assignment to each algorithm parameter when the segmentation process is performed. For example, watery paddy fields appear almost the same as open land (fallow paddy fields), the water object is darker purple. The visual classification results (Landsat 8 data) are considered as the reference for the digital classification results (LAPAN A3). Forty-eight samples were taken and divided into four classes, with each class consisting of 12 samples. The results of the accuracy test show that the total accuracy of the object-based digital classification for visual classification is 62.5% with a Kappa accuracy value of 0.5. The conclusion is that LAPAN A3 data can be used to identify paddy fields based on spectral resolution and to complement Landsat 8 data. To improve the accuracy of the classification results, more samples and the correct RGB composition are needed.

Keywords: *paddy field, LAPAN A3, Landsat 8, object based image analysis (OBIA), supervised classification*

SPATIO-TEMPORAL ANOMALIES IN SURFACE BRIGHTNESS TEMPERATURE PRECEDING VOLCANO ERUPTIONS DETECTED BY THE LANDSAT-8 THERMAL INFRARED SENSOR (CASE STUDY: KARANGETANG VOLCANO)/ Suwarsono Suwarsono, Djoko Triyono, Muhammad Rokhis Khomarudin, Rokhmatuloh Rokhmatuloh
IJRESES, 18 (1) 2021: 43-52

Indonesia's geological as part of the "ring of fire" includes the consequence that community life could be affected by volcanic activity. The catastrophic incidence of volcanic eruptions in the last ten years has had a disastrous impact on human life. To overcome this problem, it is necessary to conduct research on the strengthening of the early warning system for volcanic eruptions utilising remote sensing technology. This study analyses spatial and temporal anomalies of surface brightness temperature in the peak area of Karangetang volcano during the 2018-2019 eruption. Karangetang volcano is an active volcano located in North Sulawesi, with a magmatic eruption type that releases lava flow. We analyse the anomalies in the brightness temperature from channel-10 of the Landsat-8 TIRS (Thermal Infrared Scanner) time series during the period in question. The results of the research demonstrate that in the case of Karangetang Volcano the eruptions of 2018-2019 indicate increases in the surface brightness temperature of the crater region. As this volcano has many craters, the method is also very useful to establish in which crater the center of the eruption occurred.

Keywords: *Surface brightness temperature, Karangetang Volcano, magmatic eruption, Landsat-8 TIRS*

International Journal of
Remote Sensing and Earth Sciences
P-ISSN 0216 – 6739; E- ISSN 2549-516X Vol. 18 No. 1 June 2021
Accreditation No. 30/E/KPT/2018

ABSTRACT

FISHING BOAT DISTRIBUTION ESTABLISHED BY COMPARING VMS AND VIIRS DATA AROUND THE ARU ISLANDS IN MALUKU INDONESIA/ Ruben van Beek, Jonson Lumban Gaol, Syamsul Bahri Agus
IJRESES, 18 (1) 2021: 53-62

Marine protected areas (MPAs) and no take zones (NTZs) are essential for the preservation of marine ecosystems. However, these important areas can be severely harmed by illegal fishing. All vessels above 30 gross tons are required to use vessel monitoring systems (VMSs) that enable vessel tracking by sending geographic data to satellites in each specific time period. The Visible Infrared Radiometer Suite (VIIRS) is a sensor on the National Oceanic and Atmospheric Administration (NOAA)-20 satellite that can detect the light-emitting diode (LED) light used by fishing vessels from space during the night time. In this research, VMS and VIIRS fishery data were combined in order to identify fishing vessels that were detected by the VIIRS sensor of the NOAA-20 satellite. The research was focused on an area near the Aru Islands in the Arafura Sea in Indonesia. Data on LED light used by the fishing techniques of purse seine and bouke ami were obtained for the whole of 2018. The data were then processed using R software. An R package called LLFI (LED Light Fisheries Identifier) was created, containing several R-functions that calculate VMS vessel position during satellite overpass time and then combine the VMS and VIIRS data attributes, resulting in a dataset comprising vessels identified from the VIIRS dataset. Out of all the estimated VMS fishing vessel positions during the VIIRS satellite overpass, approximately 51% could be assigned to fishing vessels detected from the VIIRS dataset. For bouke ami, the identification rate was approximately 87%, while that for small purse seine was around 39%. Ultimately, the LLFI package created daily paths for each identified fishing vessel, displaying all its movements during the day of its'identification. These daily paths did not show any activity within MPA or NTZ. The LLFI package was successful in combining VMS and VIIRS data, estimating VMS vessel positions during the VIIRS satellite overpass, identifying a percentage of the vessels, and creating a daily path for each identified vessel

Keywords: *Led Light Fisheries, MPA, Vessel Monitoring, VIIRS, VMS*

COASTLINE CHANGE ANALYSIS ON BALI ISLAND USING SENTINEL-1 SATELLITE IMAGERY/ Suhendra Suhendra, Christopher Ari Setiawan, Teja Arief Wibawa, Berta Berlian Borneo
IJRESES, 18 (1) 2021: 63-72

Bali is well-known as a popular tourism location for both local and foreign tourists. There are nine areas designated for tourism, eight of which are coastal. However, due to coastal erosion, the coastline of Bali is changing every year. The purpose of this study is to determine the changes that took place between 2015 and 2020 using Sentinel-1 satellite imagery. The study was conducted along the coastline of Bali Island at coordinates 08° 53' 35.5648" S, 114° 24' 41.8359" E and 08° 00' 46.7865" S, 115° 44' 17.5928" E. The coastlines were identified using the Otsu image thresholding method and linear tidal correction was performed. The coastline change analysis was made using the transect method. Ground truths were conducted in representative areas where major changes had occurred, either as a result of abrasion or accretion. According to the Sentinel-1 analysis, the coastline changes in Bali during the period 2015 – 2020 were mainly caused by abrasion, apart from at Buleleng, which were generally caused by accretion. Abrasion in Bali is dominantly affected by strong currents and high waves meanwhile accretion which having weak currents and low waves was more affected by human factor such as the construction in this study area.

Keywords*: Bali, coastline change, Sentinel-1, abrasion, accretion*

International Journal of
Remote Sensing and Earth Sciences
P-ISSN 0216 – 6739; E- ISSN 2549-516X Vol. 18 No. 1 June 2021
Accreditation No. 30/E/KPT/2018

ABSTRACT

HYDRO-METEOROLOGICAL ASPECTS OF THE 2021 SOUTH KALIMANTAN FLOOD: TOPOGRAPHY, TIDES, AND PRECIPITATION/ Munawir Bintang Pratama, Rafida Multazima, Ismail Naufal Azkiarizqi
IJRESES, 18 (1) 2021: 73-90

The 2021 South Kalimantan flood was recorded as the most serious ever to have taken place in the province. It occurred due to high-intensity rain during the period 10-19 January, accompanied by a spring tide. This study provides an overview of the disaster, with reference to the hydro-meteorological conditions (topography, tides, and precipitation). The method used was the analysis of the precipitation and its monthly rainfall pattern anomalies using remote sensing data. A Digital Elevation Model (DEM) was also analyzed to indicate the most noticeably flood-affected area. In certain areas, total precipitation during the ten days reached 672.8 mm, with daily precipitation peaking at 255 mm on January 14, greater than the 25-year return period value. The flood coincided with a spring tide, which peaked at 1.21 m on the evening of January 15. Using 20- year GPM data, it was found that ENSO and IOD coexisted with both the highest and lowest anomalies. With a La Niña event at the end of 2020, a positive precipitation anomaly in 2021 was expected. The extreme precipitation is suspected to be the main driver of the 2021 South Kalimantan flood, whose impact was worsened by the spring tides. This study conducts further research on the correlation between land-use change, rainfall, spring tide and flooding in South Kalimantan. In addition, it is recommended that the government plan flood risk management by prioritizing areas based on vulnerability to climate hazards.

Keywords: *Natural Disaster, Hydrological Hazard, Meteorological Hazard, Indonesia, Extreme Events, Precipitation Anomaly*

RADAR-BASED STOCHASTIC PRECIPITATION NOWCASTING USING THE SHORT-TERM ENSEMBLE PREDICTION SYSTEM (STEPS) (CASE STUDY: PANGKALAN BUN WEATHER RADAR)/ Abdullah Ali, S. Supriatna, Umi Sa'adah
IJRESES, 18 (1) 2021: 91-102

Nowcasting, or the short-term forecasting of precipitation, is urgently needed to support the mitigation circle in hydrometeorological disasters. Pangkalan Bun weather radar is single-polarization radar with a 200 km maximum range and which runs 10 elevation angles in 10 minutes with a 250 meters spatial resolution. There is no terrain blocking around the covered area. The Short-Term Ensemble Prediction System (STEPS) is one of many algorithms that is used to generate precipitation nowcasting, and is already in operational use. STEPS has the advantage of producing ensemble nowcasts, by which nowcast uncertainties can be statistically quantified. This research aims to apply STEPS to generate stochastic nowcasting in Pangkalan Bun weather radar and to analyze its advantages and weaknesses. Accuracy is measured by counting the possibility of detection and false alarms under the 5 dBZ threshold and plotting them in a relative operating characteristic (ROC) curve. The observed frequency and forecast probability is represented by a reliability diagram to evaluate nowcast reliability and sharpness. Qualitative analysis of the results showed that the STEPS ensemble produces smoothed reflectivity fields that cannot capture extreme values in an observed quasi-linear convective system (QLCS), but that the algorithm achieves good accuracy under the threshold used, up to 40 minutes lead time. The ROC shows a curved upper left-hand corner, and the reliability diagram is an almost perfect nowcast diagonal line.

Keywords: *weather radar, nowcasting, Short Term Ensemble Prediction Systems (STEPS)*

International Journal of
Remote Sensing and Earth Sciences
P-ISSN 0216 – 6739; E- ISSN 2549-516X Vol. 18 No. 1 June 2021
Accreditation No. 30/E/KPT/2018

ABSTRACT

ESTIMATION OF ABOVEGROUND CARBON STOCK USING SAR SENTINEL-1 IMAGERY IN SAMARINDA CITY/ Bayu Elwanto Bagus Dewanto, Retnadi Heru Jatmiko
IJRESES, 18 (1) 2021: 103-116

Estimation of aboveground carbon stock on stands vegetation, especially in green open space, has become an urgent issue in the effort to calculate, monitor, manage, and evaluate carbon stocks, especially in a massive urban area such as Samarinda City, Kalimantan Timur Province, Indonesia. The use of Sentinel-1 imagery was maximised to accommodate the weaknesses in its optical imagery, and combined with its ability to produce cloud-free imagery and minimal atmospheric influence. The study aims to test the accuracy of the estimated model of above-ground carbon stocks, to ascertain the total carbon stock, and to map the spatial distribution of carbon stocks on stands vegetation in Samarinda City. The methods used included empirical modelling of carbon stocks and statistical analysis comparing backscatter values and actual carbon stocks in the field using VV and VH polarisation. Model accuracy tests were performed using the standard error of estimate in independent accuracy test samples. The results show that Samarinda Utara subdistrict had the highest carbon stock of 3,765,255.9 tons in the VH exponential model. Total carbon stocks in the exponential VH models were 6,489,478.1 tons, with the highest maximum accuracy of 87.6 %, and an estimated error of 0.57 tons/pixel.

Keywords: *stands vegetation; carbon stock estimation; remote sensing; Sentinel-1 imagery; Samarinda City*

International Journal of
Remote Sensing and Earth Sciences
P-ISSN 0216 – 6739; E- ISSN 2549-516X Vol. 18 No. 2 December 2021
Accreditation No. 30/E/KPT/2018

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A NEW INTERPRETATION OF THE EXISTENCE OF THE PANJANG REGIONAL FAULT BASED ON DEM AND FIELD OBSERVATIONS IN LAMPUNG, SUMATRA, INDONESIAD LAMPUNG, SUMATRA, INDONESIA OBSERVATION AT LAMPUNG, SUMATRA, INDONESIA/ Luhut Siringoringo
IJRESES, 18 (2) 2021: 117-124

Referring to the regional geological map sheet of Tanjung Karang, the existence of the Panjang regional fault in the Sukarame area (the research area) is still debated. This can be seen from the dashed line on the map, which indicates that the existence of the fault is still unclear. The objective of this research is to ascertain the existence of the Panjang Fault, together with information on its type and direction. The method used was to integrate the tectonic geomorphological sections through Digital Elevation Model (DEM) interpretations and field observations result. Field observations were made to confirm the existence of these structures. We found that the Panjang regional fault in the research area does exist. From the south of research area, the fault apparently continues into the research area. It is a normal fault in a northwest-southeast direction. The existence of the fault is also supported by the discovery of water springs during the field observations. The fault has cut aquifers so that the groundwater appears on the surface as water springs.

Keywords: *regional, Lampung, Panjang fault, Sumatra, geomorphology*

ANALYSIS OF THE PENETRATION CAPABILITY OF VISIBLE SPECTRUM WITH AN ATTENUATION COEFFICIENT THROUGH THE APPARENT OPTICAL PROPERTIES APPROACH IN THE DETERMINATION OF A BATHYMETRY ANALYTICAL MODEL/ Kuncoro Teguh Setiawan, Gathot Winarso, Muhammad Ulin Nuha, Maryani Hartuti, Devica Natalia BR Ginting, . Emiyati, Kholifatul Azis, Fajar Bahari Kusuma, Wikanti Asriningrum
IJRESES, 18 (2) 2021: 125-138

The attenuation coefficient (Kd) can be extracted by an apparent optical properties(AOP) approach to determine marine shallow-water habitat bathymetry based on an analytical method. Such a method was employed in the Red Sea by Benny and Dawson in 1983 using Landsat MSS imagery. Therefore, we applied the Benny and Dawson algorithm to extract bathymetry in shallow marine waters off Karimunjawa Island, Jepara, Central Java, Indonesia. We used the SPOT 6 satellite, which has four multispectral bands with a spatial resolution of 6 meters. The results show that three bands of SPOT 6 data (the blue, green, and red bands) can produce bathymetric information up to 30.29, 24.63 and 18.58 meters depth respectively. The determinations of the attenuation coefficients of the three bands are 0.08069, 0.09330, and 0.39641. The overall accuracy of absolute bathymetry of the blue, green, and red bands is 61.12%, 65.73%, and 26.25% respectively, and the kappa coefficients are 0.45, 0.52, and 0.13.

Keywords: *Analytical Method, Benny and Dawson, SPOT 6, Karimunjawa*

International Journal of
Remote Sensing and Earth Sciences
P-ISSN 0216 – 6739; E- ISSN 2549-516X Vol. 18 No. 2 December 2021
Accreditation No. 30/E/KPT/2018

ABSTRACT

SPATIAL ANALYSIS OF THE TSUNAMI RISK IN PALABUHANRATU SUB-DISTRICT, SUKABUMI REGENCY, INDONESIA BASED ON THE DISASTER CRUNCH MODELSPATIAL ANALYSIS OF THE TSUNAMI RISK IN PALABUHANRATU SUB-DISTRICT, SUKABUMI REGENCY, INDONESIA BASED ON THE DISASTER CRUNCH/ Inti Raidah Hidayat, Sudaryatno
IJRESES, 18 (2) 2021: 139-152

Palabuhanratu Sub-District is one of the southern coastal areas of Java that has the potential to be exposed to tsunamis, with an estimated run-up of between 12-20 meters. Accordingly, it is necessary to conduct tsunami disaster mitigation by analysing the level of tsunami risk in the district to reduce potential losses if a tsunami occurs. This study aims to map the level of tsunami risk in Palabuhanratu Sub-District based on the disaster crunch model, which is a risk model that integrates vulnerability and tsunami hazard factors. The tsunami vulnerability analysis uses a weighted overlay quantitive approach, while the tsunami hazard analysis employs simulation of tsunami propagation by COMCOT V.1.7; the tsunami inundation reduction model; cost distance analysis; and fuzzy membership analysis. The results of the tsunami risk analysis show that villages included in the high-, medium-, and low-risk categories are Citepus, Palabuhanratu, and Jayanti. The percentage of high-risk areas in the three villages are 10% (139 hectares), 20.3% (114 hectares), and 0.01% (0.13 hectares) respectively. The higher the risk of a tsunami in an area, the higher the losses that will be incurred by the local population.

Keywords: *tsunami risk level;Disaster Crunch model;COMCOT V.1.7.*

DETECTING SURFACE WATER AREAS AS ALTERNATIVE WATER RESOURCE LOCATIONS DURING THE DRY SEASON USING SENTINEL-2 IMAGERY (CASE STUDY: LOWLAND REGION OF BEKASI-KARAWANG, WEST JAVA PROVINCE)/ Jalu Tejo Nugroho, Suwarsono Suwarsono, Galdita Aruba Chulafak, Atriyon Julzarika, Johannes Manalu, Sri Harini, Argo Suhadha, Sayidah Sulma
IJRESES, 18 (2) 2021: 153-162

In Indonesia, drought is a type of disaster that often occurs, especially during the dry season. What is most needed at such times is the availability of sufficient water sources to meet shortages. Therefore, water source locations are vital during the dry season in order to meet needs. To meet this information need, remote sensing data offer a precise solution. This research proposes a rapid method of detecting surface water areas based on remote sensing image data. It focuses on the use of remote sensing satellite imagery to detect objects and the location of surface water sources. The purpose of the study is to rapidly identify objects and locate surface water sources using Sentinel-2 MSI (MultiSpectral Instrument), one of the latest types of remote sensing satellite data. Several water index (WI) methods were applied before deciding which was most suitable for detecting surface water objects. The lowland region of Bekasi-Karawang, a drought prone area, was designated as the research location. The results of the research show that by using Sentinel-2 MSI imagery, MNDWI (Modified Normalized Water Index) is the appropriate parameter to detect surface water areas in the lowland region of Bekasi-Karawang, West Java Province, Indonesia, during times of drought. The method can be employed as an alternative approach based on remote sensing data for the rapid detection of surface water areas as alternative sources of water during the dry season. The existence of natural water sources (swamps, marshes, ponds) that remain during this time can be used as alternative water resources. Further research is still needed which focuses on different geographical conditions and other regions in Indonesia.

Keywords: *surface water area, drought, Bekasi-Karawang, Sentinel-2, NDWI*

International Journal of
Remote Sensing and Earth Sciences
P-ISSN 0216 – 6739; E- ISSN 2549-516X Vol. 18 No. 2 December 2021
Accreditation No. 30/E/KPT/2018

ABSTRACT

SPECTRAL CHARACTERISTICS OF FLASH FLOOD AREAS FROM MEDIUM SPATIAL OPTICAL IMAGERY/ Muhammad Priyatna, Muhammad Rokhis Khomarudin, Galdita Aruba Chulafak, Sastra Kusuma Wijaya
IJRESES, 18 (2) 2021: 163-176

This study aims to investigate surface reflectance changes over flash flood areas in Nusa Tenggara Timur, Indonesia. Fifteen sample points from Sentinel-2 satellite imagery were used to analyse the differences in reflectance of areas before and after flash flood events. The method used involved analysis of the significant differences in the dreflectance values of each Sentinel-2 channel. The analysis results show that channels 6, 7, and 8A displayed significant differences compared to the others with regard to reflectance before and after flooding, for both settlements and shrubs. The results could be used for further research in building a reflectance index for the rapid detection of affected areas, with a focus on these channels.

Keywords: *Reflectance, flash flood, disaster, bush, and settlement*

COMPARISON OF THE RADIOMETRIC CORRECTION LANDSAT-8 IMAGE BASED ON OBJECT SPECTRAL RESPONSE AND VEGETATION INDEX/ Fadila Muchsin, . Supriatna, Adhi Harmoko, Indah Prasasti, Mulia Inda Rahayu, Liana Fibriawati, Kuncoro Adi Pradhono
IJRESES, 18 (2) 2021: 177-188

Landsat-8 standard level (level 1T) data received by users still in digital form can be used directly for land cover/land use mapping. These data have low radiometric accuracy when used to produce information such as vegetation indices, biomass, and land cover/land use classification. In this study, radiometric/atmospheric correction was conducted using FLAASH, 6S, DOS, TOA+BRDF and TOA method to eliminate atmospheric disturbances and compare the results with field measurements based on object spectral response and NDVI values. The results of the spectral measurements of objects in paddy fields at harvest time in the Cirebon Regency, West Java, Indonesia show that the FLAASH and 6S method have spectral responses that are close to those of objects in the field compared to the DOS, TOA and TOA+BRDF methods. For the NDVI value, the 6S method has the same tendency as the object's NDVI value in the field.

Keywords: *Landsat-8, atmospheric correction, spectral response, NDVI*

International Journal of
Remote Sensing and Earth Sciences
P-ISSN 0216 – 6739; E- ISSN 2549-516X Vol. 18 No. 2 December 2021
Accreditation No. 30/E/KPT/2018

ABSTRACT

PRELIMINARY STUDY OF A RADIO FREQUENCY INTERFERENCE FILTER FOR NON-POLARIMETRIC C-BAND WEATHER RADAR IN INDONESIA (CASE STUDY: TANGERANG WEATHER RADAR)/ Abdullah Ali, Iddam Hairuly Umam, Hidde Leijnse, Umi Sa'adah
IJRESES, 18 (2) 2021: 189-202

C-Band weather radar that operates at a frequency of 5 GHz is very vulnerable to radio frequency interference (RFI) because it is located on a free used frequency. RFI can cause image misinterpretation and precipitation echo distortion. The new allocation for free spectrum recommended by the World Radio Conference 2003 and weather radar frequency protection in Indonesia controlled by the Balai Monitoring Spektrum Frekuensi (BALMON) have not provided permanent protection against weather radar RFI. Several RFI filter methods have been developed for polarimetric radars, but there have been no studies related to RFI filters on non-polarimetric radars in Indonesia. This research aims to conduct an initial study of RFI filters on such radars. Four methods were applied in the initial study. The Himawari 8 cloud mask was used to eliminate interference echo based on VS, IR, and I2 channels, while the nature of false echo interference that does not have a radial velocity value was used as the basis for the application of the Doppler velocity filter. Another characteristic in the form of consistent echo interference up to the maximum range was used as the basis for applying a beam filling analysis filter with reflectivity thresholds of 5 dBZ and 10 dBZ, with beam filling of more than 75%. Finally, supervised learning Random Forest (RF) was also used to identify interference echo based on the characteristics of the sampling results on reflectivity, radial velocity, and spectral width data. The results show that the beam filling analysis method with a threshold of 5 dBZ provides the best RFI filter without eliminating echo precipitation.

Keywords: *weather radar; radio frequency interference; filtering algorithm*

GROUNDWATER LEVEL ESTIMATION MODEL ON PEATLANDS USING SAR SENTINEL-1 DATA IN PART OF RIAU, INDONESIA/ Ardila Yananto, Junun Sartohadi, Hero Marhaento, . Awaluddin
IJRESES, 18 (2) 2021: 201-216

The character of peatlands has the ability to store large amounts of water, but the surface of the peatlands dries quickly and easy to burn during the dry season. Research aims to build a model to estimate groundwater level of peatland. Statistical analysis of Karl Pearson Product Moment correlation test was used to determine the relationship between the back scatter values and the Surface Soil Moisture (SSM) values from the Sentinel-1 SAR data processing with the groundwater level values measured using the Sipalaga instrument. Regression analysis was used to determine the model that could be used to estimate the groundwater level of peatlands in the study area based on the results of Sentinel-1 SAR data processing. The results showed that the Sentinel-1 SAR data with the Sigma_0 format in decibel (db) units with VV polarization had the highest correlation value with the groundwater level data of peatlands measured using the Sipalaga instrument, with a value of r -0.648 (moderate correlation). Model to estimate water level of peatlands was Y = -101.629 + (-7.414 x), where 'Y' was the groundwater level of peatlands in the study area and 'x' was the Sentinel-1 SAR data with Sigma_0 format in decibel (db) units with VV polarization. The spatial and temporal patterns of peatlands groundwater level in the study area from Sentinel-1 SAR data showed peatlands that to survive at a water level <40 cm was in the area around of the Rokan River and also in plantation areas, especially Acacia plantations, where canals were made to irrigate and land management.

Keywords: Forest and Land Fires, Peatlands, Ground Water Level, Sentinel-1

International Journal of
Remote Sensing and Earth Sciences
P-ISSN 0216 – 6739; E- ISSN 2549-516X Vol. 18 No. 2 December 2021
Accreditation No. 30/E/KPT/2018

ABSTRACT

HAIL IDENTIFICATION BASED ON WEATHER FACTOR ANALYSIS AND HIMAWARI 8 SATELLITE IMAGERY (CASE STUDY OF HAIL ON 2ND MARCH 2021 IN MALANG INDONESIA)/
Marinda Nur Auliya, Aditya Mulya
IJRESES, 18 (2) 2021: 217-228

A hail phenomenon occurred in Malang, Sumbermanjing Wetan District (8°6'S and 112°24'E) on March 2, 2021. According to the Regional National Disaster Management Agency, it was accompanied by heavy rain and strong winds, which caused several trees to fall, resulting in damage to people's houses (BNPBD, 2021). Hail is precipitation in the form of ice, usually an irregular round shape produced by cumulonimbus convective clouds (AMS, 2019). The research was conducted by examining global, regional, and local weather factors and analysing the cloud characteristics from satellite image data during hail events. Based on the analysis, it was found that ENSO, sea surface temperature anomalies, and MJO had no effect on the incidence of the hail. The streamline map showed the presence of shearlines and tropical cyclones around the Malang area, and the temperature significantly decrease from 07.00 UTC to 08.00 UTC of 4.4°C and from 08.00 UTC to 09.00 UTC of 3.6°C with significant increase in humidity from 07.00 UTC to 08.00 UTC of 10%. The cloud top temperature was analysed to be at the ripe stage at 07.40 UTC and 8.40 UTC, at -68.2°C.

Keywords: *hail, cumulonimbus, Himawari-8*