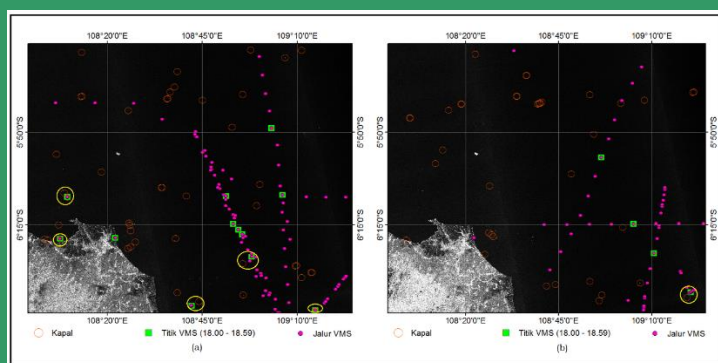
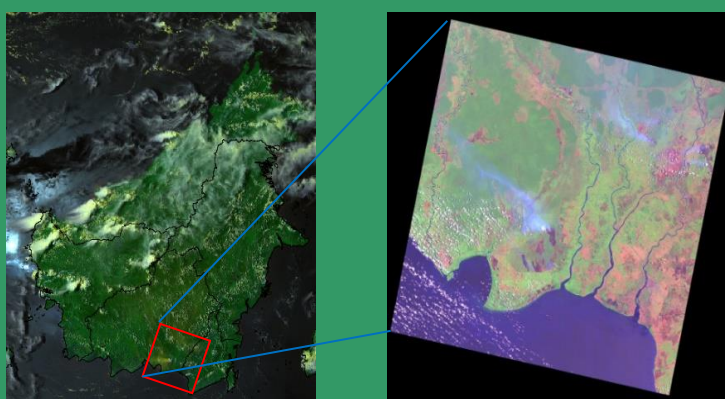




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Editorial Committee Preface

Dear IJReSES Readers,

We have a great pleasure in presenting the IJRESES Vo. 16 No. 2 December 2019 edition. Although it has been late, we try to deliver this publication to yours. The same as last edition, we present 9 articles of remote sensing technology and applications from scientists in different institutions.

Those articles are (1) Rolling Mosaic Method To Support The Development Of Potential Fishing Zone Forecasting For Coastal Areas, (2) Vertical Land Motion And Inundation Processes Based On The Integration Of Remotely Sensed Data And IPCC AR5 Scenarios In Coastal Semarang, Indonesia, (3) Fishing-Vessel Detection Using Synthetic Aperture Radar (SAR) Sentinel-1 (Case Study: Java Sea), (4) Hotspot Validation Of The Himawari-8 Satellite Based On Multisource Data For Central Kalimantan, (5) Cloud Identification From Multitemporal Landsat-8 Using K-Means Clustering, (6) Tendency For Climate-Variability-Driven Rise In Sea Level Detected In The Altimeter Era In The Marine Waters Of Aceh, Indonesia, (7) Application Of Land Surface Temperature Derived From ASTER TIR To Identify Volcanic Gas Emission Around Bandung Basin, (8) Classification Of Rice-Plant Growth Phase Using Supervised Random Forest Method Based On Landsat-8 Multitemporal Data, and (9) Monitoring Of Mangrove Growth And Coastal Changes On The North Coast Of Brebes, Central Java, Using Landsat Data.

Finally, enjoy your reading of the IJRESES Vol. 16 No. 2 December 2019, 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

Editorial Committee Members
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ABSTRACT

**THE UTILIZATION OF REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEMS FOR ANALYSIS OF LAND SUITABILITY FOR THE GROWING OF CIPLUKAN (*PHYSALIS ANGULATA L.*)/ Nur Adliani, Nirmawana Simarmata, Heriansyah Heriansyah
IJRESES, 16 (1) 2019 : 1-12**

Remote sensing data and geographic information systems are widely used for land suitability analysis for crops such as coffee and corn. This study aims to analyze and map suitable land for the plant known locally as ciplukan (*Physalis angulata L.*). As the cultivation of this plant is expected to be developed by the Institute of Technology of Sumatra, analysis of this type is needed. The parameters used in this study were slope, land use, rainfall and soil type. Information extraction from remote sensing data was carried out via visual interpretation of aerial photography used to create land-cover maps. Shuttle RADAR Topographic Mission (SRTM) data was converted from digital surface model (DSM) to digital terrain model (DTM) to provide elevation information. Land suitability analysis was performed using a scoring method and overlay analysis. The results obtained from the analysis identified several classes of land suitability for *Physalis angulata L.*, categorized as suitable, less suitable, and not suitable. The less suitable class, scored at 9 to 11, comprised a total area of 180.96 ha, while the suitable area, scored at 12, comprised a total area of 49.1 ha.

Keywords: *remote sensing aerial photos; GIS; Physalis angulata L.; land suitability*

**RETRIEVING COASTAL SEA SURFACE TEMPERATURE FROM LANDSAT-8 TIRS FOR WANGI-WANGI ISLAND, WAKATOBI, SOUTHEAST SULAWESI, INDONESIA/ Eko Susilo, Rizki Hanintyo, Adi Wijaya
IJRESES, 16 (1) 2019 : 13-22**

The new Landsat generation, Landsat-8, is equipped with two bands of thermal infrared sensors (TIRS). The presence of two bands provides for improved determination of sea surface temperature (SST) compared to existing products. Due to its high spatial resolution, it is suitable for coastal zone monitoring. However, there are still significant challenges in converting radiance measurements to SST, resulting from the limitations of in-situ measurements. Several studies into developing SST algorithms in Indonesia waters have provided good performance. Unfortunately, however, they have used a single-band windows approach, and a split-windows approach has yet to be reported. In this study, we investigate both single-band and split-window algorithms for retrieving SST maps in the coastal zone of Wangi-Wangi Island, Wakatobi, Southeast Sulawesi, Indonesia. Landsat-8 imagery was acquired on February 26, 2016 (01: 51: 44.14UTC) at position path 111 and row 64. On the same day, in-situ SST was measured by using Portable Multiparameter Water Quality Checker - 24. We used the coefficient of correlation (r) and root mean square error (RMSE) to determine the best algorithm performance by incorporating in-situ data and the estimated SST map. The results showed that there were differences in brightness temperature retrieved from TIRS band10 and band 11. The single-band algorithm based on band 10 for Poteran Island clearly showed superior performance ($r = 69.28\%$ and $RMSE = 0.7690^{\circ}C$). This study shows that the split-window algorithm has not yet produced an accurate result for the study area.

Keywords: *Landsat-8; single-band algorithm; split-window algorithm*

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ABSTRACT

BATHYMETRY EXTRACTION FROM SPOT 7 SATELLITE IMAGERY USING RANDOM FOREST METHODS/ Kuncoro Teguh Setiawan, Nana Suwargana, Devica Natalia Br. Ginting, Masita Dwi Mandini Manessa, Nanin Anggraini, Syifa Wismayati Adawiah, Atriyon Julzarika, Surahman Surahman, Syamsu Rosid, Agustinus Harsono Supardjo
IJRESES, 16 (1) 2019 : 23-30

The scope of this research is the application of the random forest method to SPOT 7 data to produce bathymetry information for shallow waters in Indonesia. The study aimed to analyze the effect of base objects in shallow marine habitats on estimating bathymetry from SPOT 7 satellite imagery. SPOT 7 satellite imagery of the shallow sea waters of Gili Matra, West Nusa Tenggara Province was used in this research. The estimation of bathymetry was carried out using two in-situ depth-data modifications, in the form of a random forest algorithm used both without and with benthic habitats (coral reefs, seagrass, macroalgae, and substrates). For bathymetry estimation from SPOT 7 data, the first modification (without benthic habitats) resulted in a 90.2% coefficient of determination (R^2) and 1.57 RMSE, while the second modification (with benthic habitats) resulted in an 85.3% coefficient of determination (R^2) and 2.48 RMSE. This research showed that the first modification achieved slightly better results than the second modification; thus, the benthic habitat did not significantly influence bathymetry estimation from SPOT 7 imagery.

Keywords: *bathymetry; random forest; SPOT 7*

THE USE OF C-BAND SYNTHETIC APERTURE RADAR SATELLITE DATA FOR RICE PLANT GROWTH PHASE IDENTIFICATION/ Anugrah Indah Lestari, Dony Kushardono
IJRESES, 16 (1) 2019 : 31-44

Identification of the rice plant growth phase is an important step in estimating the harvest season and predicting rice production. It is undertaken to support the provision of information on national food availability. Indonesia's high cloud coverage throughout the year means it is not possible to make optimal use of optical remote sensing satellite systems. However, the Synthetic Aperture Radar (SAR) remote sensing satellite system is a promising alternative technology for identifying the rice plant growth phase since it is not influenced by cloud cover and the weather. This study uses multi-temporal C-Band SAR satellite data for the period May-September 2016. VH and VV polarisation were observed to identify the rice plant growth phase of the Ciherang variety, which is commonly planted by farmers in West Java. Development of the rice plant growth phase model was optimized by obtaining samples spatially from a rice paddy block in PT Sang Hyang Seri, Subang, in order to acquire representative radar backscatter values from the SAR data on the age of certain rice plants. The Normalised Difference Polarisation Index (NDPI) and texture features, namely entropy, homogeneity and the Grey-Level Co-occurrence Matrix (GLCM) mean, were included as the samples. The results show that the radar backscatter value (σ_0) of VH polarisation without the texture feature, with the entropy texture feature and GLCM mean texture feature respectively exhibit similar trends and demonstrate potential for use in identifying and monitoring the rice plant growth phase. The rice plant growth phase model without texture feature on VH polarisation is revealed as the most suitable model since it has the smallest average error.

Keywords: *remote sensing satellite; SAR; C-band; texture feature; rice plant growth phase*

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ABSTRACT

**DETECTING DEFORMATION DUE TO THE 2018 MERAPI VOLCANO ERUPTION USING INTERFEROMETRIC SYNTHETIC APERTURE RADAR (INSAR) FROM SENTINEL-1 TOPS/ Suwarsono Suwarsono, Indah Prasasti, Jalu Tejo Nugroho, Jansen Sitorus, Rahmat Arief, Khalifah Insan Nur Rahmi, Djoko Triyono
IJRESES, 16 (1) 2019: 45-54**

This paper describes the application of Sentinel-1 TOPS (Terrain Observation with Progressive Scans), the latest generation of SAR satellite imagery, to detect displacement of the Merapi volcano due to the May-June 2018 eruption. Deformation was detected by measuring the vertical displacement of the surface topography around the eruption centre. The Interferometric Synthetic Aperture Radar (InSAR) technique was used to measure the vertical displacement. Furthermore, several Landsat-8 Thermal Infra Red Sensor (TIRS) imageries were used to confirm that the displacement was generated by the volcanic eruption. The increasing temperature of the crater was the main parameter derived using the Landsat-8 TIRS, in order to determine the increase in volcanic activity. To understand this phenomenon, we used Landsat-8 TIRS acquisition dates before, during and after the eruption. The results show that the eruption in the May-June 2018 period led to a small negative vertical displacement. This vertical displacement occurred in the peak of volcano range from -0.260 to -0.063 m. The crater, centre of eruption and upper slope of the volcano experienced negative vertical displacement. The results of the analysis from Landsat-8 TIRS in the form of an increase in temperature during the 2018 eruption confirmed that the displacement detected by Sentinel-1 TOPS SAR was due to the impact of volcanic activity. Based on the results of this analysis, it can be seen that the integration of SAR and thermal optical data can be very useful in understanding whether deformation is certain to have been caused by volcanic activity.

Keywords: Vertical displacement; Landsat-8 TIRS; InSAR; Sentinel-1 TOPS SAR

**VARIABILITY OF SEA SURFACE TEMPERATURE (SST) AND CHLOROPHYLL-A (CHL-A) CONCENTRATIONS IN THE EASTERN INDIAN OCEAN DURING THE PERIOD 2002-2017/ Michelia Mashita, Jonson Lumban-Gaol
IJRESES, 16 (1) 2019: 55-62**

We analysed the variability of sea surface temperature (SST) and chlorophyll-a concentration (Chl-a) in the eastern Indian Ocean (EIO). We used monthly mean Chl-a and SST data with a 4-km spatial resolution derived from Level-3 Aqua Moderate-resolution Imaging Spectroradiometer (MODIS) distributed by the Asia-Pacific Data-Research Center (APDRC) for the period 2002-2017. Wavelet analysis shows the annual and interannual variability of SST and Chl-a concentration in the EIO. The annual variability of SST and Chl-a is influenced by monsoon systems. During a southeast monsoon, SST falls while Chl-a increases due to upwelling. The annual variability of SST and Chl-a is also influenced by the Indian Ocean Dipole (IOD). During positive phases of the IOD (2006, 2012 and 2015), there was more intense upwelling in the EIO caused by the negative anomaly of SST and the positive anomaly of Chl-a concentration.

Keywords: sea surface temperature; chlorophyll-a; eastern Indian ocean; aqua MODIS, monsoon; upwelling; IOD

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ABSTRACT

**IDENTIFICATION OF MANGROVE FORESTS USING MULTISPECTRAL SATELLITE IMAGERIES/ Anang Dwi Purwanto, Wikanti Asriningrum
IJRESES, 16 (1) 2019: 63-86**

The visual identification of mangrove forests is greatly constrained by combinations of RGB composite. This research aims to determine the best combination of RGB composite for identifying mangrove forest in Segara Anakan, Cilacap using the Optimum Index Factor (OIF) method. The OIF method uses the standard deviation value and correlation coefficient from a combination of three image bands. The image data comprise Landsat 8 imagery acquired on 30 May 2013, Sentinel 2A imagery acquired on 18 March 2018 and images from SPOT 6 acquired on 10 January 2015. The results show that the band composites of 564 (NIR+SWIR+Red) from Landsat 8 and 8a114 (Vegetation Red Edge+SWIR+Red) from Sentinel 2A are the best RGB composites for identifying mangrove forest, in addition to those of 341 (Red+NIR+Blue) from SPOT 6. The near-infrared (NIR) and short-wave infrared (SWIR) bands play an important role in determining mangrove forests. The properties of vegetation are reflected strongly at the NIR wavelength and the SWIR band is very sensitive to evaporation and the identification of wetlands.

Keywords: Mangrove; OIF; Landsat 8; Sentinel 2A; SPOT 6; Combinations

**DETECTING AND COUNTING COCONUT TREES IN PLEIADES SATELLITE IMAGERY USING HISTOGRAM OF ORIENTED GRADIENTS AND SUPPORT VECTOR MACHINE/ Yudhi Prabowo, Kenlo Nishida Nasahara
IJRESES, 16 (1) 2019: 87-98**

This paper describes the detection of coconut trees using very-high-resolution optical satellite imagery. The satellite imagery used in this study was a panchromatic band of Pleiades imagery with a spatial resolution of 0.5 metres. The authors proposed the use of a histogram of oriented gradients (HOG) algorithm as the feature extractor and a support vector machine (SVM) as the classifier for this detection. The main objective of this study is to find out the parameter combination for the HOG algorithm that could provide the best performance for coconut-tree detection. The study shows that the best parameter combination for the HOG algorithm is a configuration of 3 x 3 blocks, 9 orientation bins, and L2-norm block normalization. These parameters provide overall accuracy, precision and recall of approximately 80%, 73% and 87%, respectively.

Keywords: coconut trees; Pleiades imagery; tree detection; histogram of oriented gradient; support vector machine

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ABSTRACT

**INTEGRATION OF GIS AND REMOTE SENSING FOR HOTSPOT DISTRIBUTION ANALYSIS IN BERBAK SEMBILANG NATIONAL PARK/ Andita Minda Mora, Bambang Hero Saharjo, Lilik Budi Prasetyo
IJRESES, 16 (1) 2019: 99-106**

Abstract. Remote sensing is composed of many interrelated processes to be able to consider physical objects such as buildings, land, and plants which are objects that can be discussed by applications discussed in various disciplines that discuss geology, forestry, soil science, and geography. The use of GIS and remote sensing for fire monitoring has been widely used. However, this study is the first study conducted in the TNBS area after the Berbak National Park (TNB) in Jambi to join the Sembilang National Park (TNS) in South Sumatra. Hotspot distribution in this study was obtained using Getis-Ord-Gi* statistics, hotspot data collected from 2000-2018 in the TNBS area. The results of the hotspot distribution during the 2000-2018 recorded by MODIS satellites with time acquisition and statistical analysis using Gi* show the results that the hotspots gathered (80% confidence level) outside the TNBS area, which is a mixed fields area. Further studies on causes of fire in terms of socio-economic and cultural needs to be done to get the right advice in reducing the risk of loss of forest cover and diversity in TNBS. Keywords: mitigation, hydrology, DAS.

Keywords: *Berbak Sembilang National Park; Getis-Ord-Gi*; hotspot; fire distribution; land use and land cover*

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ABSTRACT

**ROLLING MOSAIC METHOD TO SUPPORT THE DEVELOPMENT OF POTENTIAL FISHING ZONE FORECASTING FOR COASTAL AREAS/ Komang Iwan Suniada, Eko Susilo, Wingking Era Rintaka Siwi, Nuryani Widagti
IJRESES, 16 (2) 2019 : 107-120**

The production of the Indonesian Institute for Marine Research and Observation's mapping of forecast fishing areas (*peta prakiraan daerah penangkapan ikan* or PPDPI) based on passive satellite imagery is often constrained by high-cloud-cover issues, which lead to sub-optimal results. This study examines the use of the rolling mosaic method for providing geophysical variables, in particular, sea-surface temperature (SST) together with minimum cloud cover, to enable clearer identification of oceanographic conditions. The analysis was carried out in contrasting seasons: dry season in July 2018 and rainy season in December 2018. In general, the rolling mosaic method is able to reduce cloud cover for sea-surface temperature (SST) data. A longer time range will increase the coverage percentage (CP) of SST data. In July, the CP of SST data increased significantly, from 15.3 % to 30.29% for the reference 1D mosaic and up to 84.19 % to 89.07% for the 14D mosaic. In contrast, the CP of SST data in December tended to be lower, from 4.93 % to 13.03% in the 1D mosaic to 41.48 % to 51.60% in the 14D mosaic. However, the longer time range decreases the relationship between the reference SST data and rolling mosaic method data. A strong relationship lies between the 1D mosaic and 3D mosaics, with correlation coefficients of 0.984 for July and 0.945 for December. Furthermore, a longer time range will decrease root mean square error (RMSE) values. In July, RMSE decreased from 0.288°C (3D mosaic) to 0.471°C (14D mosaic). The RMSE value in December decreased from 0.387°C (3D mosaic) to 0.477°C (14D mosaic). Based on scoring analysis of CP, correlation coefficient and RMSE value, results indicate that the 7D mosaic method is useful for providing low-cloud-coverage SST data for PPDPI production in the dry season, while the 14D mosaic method is suitable for the rainy season.

Keywords: rolling mosaic, potential fishing zone forecast, coastal area, SST, cloud cover.

**VERTICAL LAND MOTION AND INUNDATION PROCESSES BASED ON THE INTEGRATION OF REMOTELY SENSED DATA AND IPCC AR5 SCENARIOS IN COASTAL SEMARANG, INDONESIA/ Muhammad Rizki Nandika, Setyo Budi Susilo, Vincentius Siregar
IJRESES, 16 (2) 2019 : 121-130**

Vertical land motion (VLM) is an important indicator in obtaining information about relative sea-level rise (SLR) in the coastal environment, but this remains an area of study poorly investigated in Indonesia. The purpose of this study is to investigate the significance of the influence of VLM and SLR on inundation. We address this issue for Semarang, Central Java, by estimating VLM using the small baseline subset time series interferometry SAR method for 24 Sentinel-1 satellite data for the period March 2017 to May 2019. The interferometric synthetic aperture radar (InSAR) method was used to reveal the phase difference between two SAR images with two repetitions of satellite track at different times. The results of this study indicate that the average land subsidence that occurred in Semarang between March 2017 and May 2019 was from (-121) mm/year to + 24 mm/year. Through a combination of VLM and SLR scenario data obtained from the Intergovernmental Panel on Climate Change (IPCC), it was found that the Semarang coastal zone will continue to shrink due to inundation (forecast at 7% in 2065 and 10% in 2100).

Keywords: relative sea-level rise, interferometry, remote sensing, InSAR

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ABSTRACT

FISHING-VESSEL DETECTION USING SYNTHETIC APERTURE RADAR (SAR) SENTINEL-1 (CASE STUDY: JAVA SEA)/ Sarah Putri Fitriani, Jonson Lumban Gaol, Dony Kushardono
IJRESES, 16 (2) 2019 : 131-142

The synthetic aperture radar (SAR) instrument of Sentinel-1 is a remote sensing technology being developed to enable the detection of vessel distribution. The purpose of this research is to study fishing-vessel detection using SAR Sentinel-1 data. In this study, the constant false alarm rate method (CFAR) for Sentinel-1 data is used for the detection of fishing vessels in Indramayu sea waters. The data used to detect ships includes SAR Sentinel-1A images and vessel monitoring system (VMS) data acquired on 8 March and 20 March 2018. SAR Sentinel-1 imagery data is obtained through pre-processing and object identification using Sentinel Application Platform (SNAP) software. Overlay analysis is then used to enable discrimination of immovable and movable objects and validation of ships detected from SAR Sentinel-1 imagery is performed using VMS data. From overlay analysis, 46 ships were detected on 8 March 2018 and 39 ships on 20 March 2018. Of all the ship points detected using SAR Sentinel-1, 7.06% could be detected by VMS data while 92.94% could not. The number of ships detected by SAR Sentinel-1 is greater than those detected by VMS because not all ships use VMS devices.

Keywords: *Fishing vessels detection, synthetic aperture radar (SAR), Sentinel-1, Java Sea, vessel monitoring system (VMS)*

HOTSPOT VALIDATION OF THE HIMAWARI-8 SATELLITE BASED ON MULTISOURCE DATA FOR CENTRAL KALIMANTAN/ Khalifah Insan Nur Rahmi, Sayidah Sulma, Indah Prasasti
IJRESES, 16 (2) 2019 : 143-156

The Advanced Himawari Imager (AHI) is the sensor aboard the remote-sensing satellite Himawari-8 which records the Earth's weather and land conditions every 10 minutes from a geostationary orbit. The imagery produced known as Himawari-8 has 16 bands which cover visible, near infrared, middle infrared and thermal infrared wavelength potentials to monitor forestry phenomena. One of these is forest/land fires, which frequently occur in Indonesia in the dry season. Himawari-8 can detect hotspots in thermal bands 5 and band 7 using absolute fire pixel (AFP) and possible fire pixel (PFP) algorithms. However, validation has not yet been conducted to assess the accuracy of this information. This study aims to validate hotspots identified from Himawari images based on information from Landsat 8 images, field surveys and burnout data. The methodology used to validate hotspots comprises AFP and PFP extraction, determining firespots from Landsat 8, buffering at 2 km from firespots, field surveys, burnout data, and calculation of accuracy. AFP and PFP hotspot validation of firespots from Landsat-8 is found to have higher accuracy than the other options. In using Himawari-8 hotspots to detect land/forest fires in Central Kalimantan, the AFP algorithm with 2km radius has accuracy of 51.33% while the PFP algorithm has accuracy of 27.62%.

Keywords: *hotspot, Himawari-8, validation, Landsat-8, forest/land fire*

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ABSTRACT

CLOUD IDENTIFICATION FROM MULTITEMPORAL LANDSAT-8 USING K-MEANS CLUSTERING/ Wismu Sunarmodo, Anis Kamilah Hayati
IJRESES, 16 (2) 2019 : 157-164

In the processing and analysis of remote-sensing data, cloud that interferes with earth-surface data is still a challenge. Many methods have already been developed to identify cloud, and these can be classified into two categories: single-date and multi-date identification. Most of these methods also utilize the thresholding method which itself can be divided into two categories: local thresholding and global thresholding. Local thresholding works locally and is different for each pixel, while global thresholding works similarly for every pixel. To determine the global threshold, two approaches are commonly used: fixed value as threshold and adapted threshold. In this paper, we propose a cloud-identification method with an adapted threshold using K-means clustering. Each related multitemporal pixel is processed using K-means clustering to find the threshold. The threshold is then used to distinguish clouds from non-clouds. By using the L8 Biome cloud-cover assessment as a reference, the proposed method results in Kappa coefficient of above 0.9. Furthermore, the proposed method has lower levels of false negatives and omission errors than the FMask method.

Keywords: cloud identification, Landsat-8, K-means clustering

TENDENCY FOR CLIMATE-VARIABILITY-DRIVEN RISE IN SEA LEVEL DETECTED IN THE ALTIMETER ERA IN THE MARINE WATERS OF ACEH, INDONESIA/ Guntur Adhi Rahmawan and Ulung Jantama Wisna
IJRESES, 16 (2) 2019 : 165-178

Long-term sea level rise (SLR) leads to increasing frequency in overtopping events resulting from polar ice liquefaction triggered by rising global temperatures. Aceh province is directly bordered by the Indian Ocean, and is subject to the influence of ocean-atmosphere interactions which have a role in triggering temperature and sea level anomalies. Elevated sea level is possibly caused by temperature-induced water mass redistributions. This study aimed to prove that the Indian Ocean Dipole (IOD) and El-Nino-Southern Oscillation (ENSO) had an influence on sea level change in Aceh waters over the six years 2009–2015. Sea level anomaly (SLA) was identified using Jason-2 satellite data for the 2009–2015 period, to enable the mathematical prediction of SLR rate for further years. We found that SLR was approximately 0.0095 mm/year with an upward trend during the six years of observation. Overall, negative mode of IOD and positive phase of ENSO tend to trigger anomalies of sea level at certain times, and have a stronger influence on increasing SLA and sea surface temperature anomaly (SSTA) which takes place in a 'see-saw' fashion. Over the period of observation, the strongest evidence of IOD-correlated SLA, ENSO-correlated SLA and SSTA-correlated SLA were identified in second transitional seasons, with more than 50% of R² value. The upward trend in SLA is influenced by climatic factors that successively control ocean-atmosphere interactions in Aceh's marine waters.

Keywords: Sea level rise, altimeter, Aceh waters, Indian Ocean Dipole, sea level anomaly

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ABSTRACT

APPLICATION OF LAND SURFACE TEMPERATURE DERIVED FROM ASTER TIR TO IDENTIFY VOLCANIC GAS EMISSION AROUND BANDUNG BASIN/ Zaki Hilman, Asep Saepuloh, and Very Susanto
IJRESES, 16 (2) 2019 : 179-186

Gas emission in volcanic areas is one of the features that can be used for geothermal exploration and to monitor volcanic activity. Volcanic gases are usually emitted in permeable zones in geothermal fields. The use of thermal infrared radiometers (TIR) onboard of advanced spaceborne thermal emission and reflection radiometers (ASTER) aims to detect thermal anomalies at the ground surface related to gas emissions from permeable zones. The study area is located around Bandung Basin, West Java (Indonesia), particularly the Papandayan and Domas craters. This area was chosen because of the easily detected land surface temperature (LST) following emissivity and vegetation corrections (T_{cveg}). The ASTER TIR images used in this study were acquired by direct night and day observation, including observations made using visible to near-infrared radiometers (VNIR). Field measurements of volcanic gases composed of SO_2 and CO_2 were performed at three different zones for each of the craters. The measured SO_2 concentration was found to be constant over time, but CO_2 concentration showed some variation in the craters. We obtained results suggesting that SO_2 gas measurements and T_{cveg} are highly correlated. At Papandayan crater, the SO_2 gas concentration was 334.34 ppm and the T_{cveg} temperature was 35.67 °C, results that are considered highly anomalous. The same correlation was also found at Domas crater, which showed an increased SO_2 gas concentration of 35.39 ppm located at a high-anomaly T_{cveg} of 30.65 °C. Therefore, the ASTER TIR images have potential to identify volcanic gases as related to high T_{cveg} .

Keywords: remote sensing, volcanic gas emission, land surface temperature (LST)

CLASSIFICATION OF RICE-PLANT GROWTH PHASE USING SUPERVISED RANDOM FOREST METHOD BASED ON LANDSAT-8 MULTITEMPORAL DATA/ Dwi Wahyu Triscowati, Bagus Sartono, Anang Kurnia, Dede Dirgahayu, Arie Wahyu Wijayanto
IJRESES, 16 (2) 2019 : 187-196

Data on rice production is crucial for planning and monitoring national food security in a developing country such as Indonesia, and the classification of the growth phases of rice plants is important for supporting this data. In contrast to conventional field surveys, remote sensing technology such as Landsat-8 satellite imagery offers more scalable, inexpensive and real-time solutions. However, utilising Landsat-8 for classification of rice-plant phase required spectral pattern information from one season, because these spectral patterns show the existence of temporal autocorrelation among features. The aim of this study is to propose a supervised random forest method for developing a classification model of rice-plant phase which can handle the temporal autocorrelation existing among features. A random forest is a machine learning method that is insensitive to multicollinearity, and so by using a random forest we can make features engineering to select the best multitemporal features for the classification model. The experimental results deliver accuracy of 0.236 if we use one temporal feature of vegetation index; if we use more temporal features, the accuracy increases to 0.7091. In this study, we show that the existence of temporal autocorrelation must be captured in the model to improve classification accuracy.

Keywords: rice-plant classification, temporal autocorrelation, temporal features engineering, random forest, Landsat-8

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ABSTRACT

**MONITORING OF MANGROVE GROWTH AND COASTAL CHANGES ON THE NORTH COAST OF BREBES, CENTRAL JAVA, USING LANDSAT DATA/ Tri Muji Susantoro, Ketut Wikantika, Lissa Fajri Yayusman, Alex Tan, M. Firman Ghozali
IJRESES, 16 (2) 2019 : 197-214**

Severe abrasion occurred in the coastal area of Brebes Regency, Central Java between 1985 and 1995. Since 1997, mangroves have been planted around the location as a measure intended to prevent further abrasion. Between 1996 and 2018, monitoring has been carried out to assess coastal change in the area and the growth and development of the mangroves. This study aims to monitor mangrove growth and its impact on coastal area changes on the north coast of Brebes, Central Java Province using Landsat series data, which has previously proven suitable for wetland studies including mangrove growth and change. Monitoring of mangrove growth was analysed using the normalised difference vegetation index (NDVI) and the green normalised difference vegetation index (GNDVI) of the Landsat data, while the coastal change was analysed based on the overlaying of shoreline maps. Visual field observations of WorldView 2 images were conducted to validate the NDVI and GNDVI results. It was identified from these data that the mangroves had developed well during the monitoring period. The NDVI results showed that the total mangrove area increased between 1996 and 2018 about 9.82 km², while the GNDVI showed an increase of 3.20 km². Analysis of coastal changes showed that the accretion area about 9.17 km² from 1996 to 2018, while the abrasion being dominant to the west of the Pemali River delta about 4.81 km². It is expected that the results of this study could be used by government and local communities in taking further preventative actions and for sustainable development planning for coastal areas.

Keywords: *abrasion, accretion, NDVI, GNDVI*