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THE FIFTH INTERNATIONAL CONFERENCE OF INDONESIAN SOCIETY FOR REMOTE SENSING (ICOIRS) AND MAPIN CONGRESS

17-20 September 2019, ITENAS-Bandung, West Java Indonesia

"The Revolution Of Earth Observation For a Better Human Life"

ABSTRACT

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2019 ICOIRS Proceeding The Fifth International Conferences of Indonesia Society for Remote Sensing (ICOIRS) 2019

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THE FIFTH INTERNATIONAL CONFERENCE OF INDONESIAN SOCIETY FOR REMOTE SENSING (ICOIRS) AND MAPIN CONGRESS

"The Revolution Of Earth Observation For a Better Human Life"

17-20 SEPTEMBER 2019
BALE DAYANG SUMBI
INSTITUT TEKNOLOGI NASIONAL BANDUNG
WEST JAVA - INDONESIA

FOREWORD

Assalamualaikum Warahmatullahi Wabarakatuh.

First, I would like to say thanks to all committee, sponsor, our students, and our colleague for supporting The Fifth International Conferences of Indonesian Society for Remote Sensing (ICOIRS) and Indonesian Society for Remote Sensing Congress.

The 5th ICOIRS and MAPIN Congress was organized by collaboration of Indonesian Society for Remote Sensing (ISRS/MAPIN), Institut Teknologi Nasional (ITENAS), Center for Remote Sensing Institut Teknologi Bandung, Universitas Pendidikan Indonesia, Universitas Winaya Mukti and Universitas Pajajaran and supported by Ministry of Researh, Technology and Higher Education (RISTEKDIKTI), Geospatial Information Agency (BIG), Indonesian National Institute of Aeronautics and Space (LAPAN), Agency for the Assessment and Application of Technology (BPPT), The Ministry of Agrarian Affairs and Spatial Planning/National Land Agency (ATR/BPN) and Meteorological, Climatological, and Geophysical Agency (BMKG). This event bring together researchers, policy makers, and practitioners from developed and developing countries to share insights into the challenges and opportunities of remote sensing technology and its application in solving the problems of Indonesia especially and South East Asia countries. It showcase cutting-edge research from around South East Asia, cutting-edge research from around South East Asia, focusing on themes of equity and risk, learning, capacity building, methodology, and possibly investment approaches in remote sensing. It explore practical adaptation policies and approaches, and share strategies for decision making to support global cooperation for conserving the earth and for a better human life.

The four-day conference among others consist of plenary, technical and poster sessions, panel discussions, congress of ISRS/MAPIN, exhibition, talk show, workshop, hands on training and city tour. We invite you to join us full time on The 5th ICOIRS and MAPIN Congress and make a successful conference on the application of Remote Sensing, Photogrammetry, GIS, GPS/GNSS, and other related digital mapping technologies in Indonesia and South East Asia.

Hopefully this technical programme can help and guide all of you to absorb all new things on this conference.

Please enjoy it. Thanks…

Wassalamualaikum warahmatullahi wabarakatuh

Sincerely
Dr. Soni Darmawan
(General Chair of ICOIRS2019 Organizing Committee)

KEYNOTE SPEAKERS

H. M. Ridwan Kamil, S.T., M.U.D.
Governor of West Java

Prof. Hasanuddin Z. Abidin
Head of Indonesian Geospatial Agency (BIG)

Dr. Orbita Roswintiarti, M.Sc
Deputy of Remote Sensing (LAPAN)

Prof.Dr.Ir. Dewayany Sutrisno, M.AppSc
President of Indonesian Society
for Remote Sensing (ISRS/MAPIN)

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National Cheng-Kung University, Taiwan

Prof. Wataru Takeuchi
Institute of Industrial Science, The University of Tokyo, Japan

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National Chiao Tung University, Taiwan

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Chiba University, Japan

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Universiti Teknologi Malaysia (UTM), Malaysia

Dr. Gay Jane Perez
University of The Philippines, Philippines

Li Zhang, Ph.D
Co-chair of the Coastal Zone Working Group of the Digital Silk Road
International Scientific Program (DBAR)
Chinese Academy of Sciences, China

Tanakorn Sritarapipat, Ph.D., ME., BE
Suranaree University of Technology, Thailand

Dr. Firman Hadi
Geoinformatics Centre – AIT, Thailand

INVITED SPEAKERS

Prof. Dr. Ir. Bangun Muljo DEA.DESS
Institut Teknologi Sepuluh Nopember

Prof. Projo Danoedoro
Universitas Gajah Mada

Prof. Dr. Ketut Wikantika
Institut Teknologi Bandung

Prof. Dr.-Ing Fahmi Amhar
Badan Informasi Geospasial (BIG)

Prof. Lilik Prasetyo
Institut Pertanian Bogor

Dr. Agustan
Pusat Teknologi Inventarisasi Sumberdaya Alam (PTISDA), BPPT.

Dr. Soni Darmawan
Institut Teknologi Nasional Bandung

MAIN PROGRAMME

	07.30 - 08.30	08.30 - 09.45	09.45 -10.00	10.00 - 12.00	12.00-13.00	13.00-15.00	15.00-16.00	17.00-20.00
Day 1 - Tuesday (17th Sep 2019)	Registration	Opening Ceremony			Lunch	Commercial Session / Poster session Technical Session I Technical Session II Technical Session III Workshop GEE Commercial Session	Technical Session Technical Session I Technical Session II Technical Session III MAPIN Training Commercial Session	Gala Dinner for Invitation
Day 2 - Wednesday (18th Sep 2019)		Keynote Speaker	Coffee Break	Keynote speaker Technical Session I Technical Session II Technical Session III Geomatics Scientific Meeting Commercial Session	Lunch	Commercial Session / Poster session Technical Session I Technical Session II Technical Session III Geomatics Scientific Meeting Commercial Session	Technical Session Technical Session I Technical Session II Technical Session III Geomatics Scientific Meeting Commercial Session	

	07.30 - 08.30	08.30 - 09.45	09.45 -10.00	10.00 - 12.00	12.00-13.00	13.00-15.00	15.00-16.00	17.00-20.00
Day 3 - Thursday (19th Sep 2019)		Keynote Speaker	Coffee Break	Talkshow Technical Session I Technical Session II Technical Session III Technical Session Commercial Session	Lunch	Talkshow Technical Session I Technical Session II Technical Session III MAPIN Congress Commercial Session	Closing Ceremony	Gala Dinner for MAPIN Committee and invitation
Day 4 - Friday (20th Sep 2019)	Preparation	**CITY TOUR**						

Information:

- Yellow: Main Hall at Bale Dayang Sumbi
- Magenta: At second floor of Bale Dayang Sumbi
- Cyan: At second floor of Bale Dayang Sumbi
- Orange: At second floor of Bale Dayang Sumbi
- Purple: At Audio Visual, Building No. 12
- Yellow-green: Demonstration stage at Bale Dayang Sumbi
- Green: At Cafe Cinde

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Oil Palm Age Identification by using Sentinel-1 Data in Riau-Indonesia

Ita Carolita[1]*, Dede Dirgahayu[1], Tatik Kartika[1] and Heru Noviar[1]

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Abstract. Oil palm has become one of the most rapidly expanding equatorial crops in the world, with the global extent of oil palm cultivation increasing from 3.6 million ha in 1961 to 17.2 million ha in 2012. Indonesia has a very wide oil palm plantation that must be mapped well. By using oil palm maps that produced regularly, the Government can monitor the land-use changes easily. The important information that can be generated from oil palm plantation is age. Many information can be obtained if the age of oil palm can be known, for instance: the yield production and time for replantation. Mapping of oil palm land cover using satellite remote sensing data has been carried out in many studies across the tropics. Sentinel is one of satellite that has 2 kinds of sensors, optic, and SAR. This is very important for Indonesia as a tropical country that often covered by clouds. This study has objectives to build a model for estimation of oil palm age by using both sensors. The study area is Riau Province as this area has a very wide of oil palm plantation. The materials used in this research are Sentinel Data as the Primary data, the higher resolution data as supporting Primary data, and data from the field. Field data was collected under cooperation with PTPN 5. The methods for analyzing data are time series, spectral and backscatter analysis. The results of this research identify that using both sensors gives better accuracy than a single sensor of Sentinel.

Keywords: Oil Palm Age, Sentinel, Time Series Analysis, Back Scatter Analysis

ICOIRS2019-207

Application of Interferometric SAR using Sentinel-1A for Flood Monitoring in South of Sulawesi, Indonesia

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Abstract. Updated information on flood mapping that recently occurred in South Sulawesi is an important necessity for site policymakers. Mapping of flood area during or soon after the flooding event is tremendous hardwork. However, using active-remote sensing namely InSAR (Interferometric Synthetic Aperture Radar) technique can overcome these limitatations. To achieve it, at least two radar images have to be obtained which is 1 image before and 1 image during/after a flood event. We selected 2 images Sentinel-1A GRDH data for the same pass direction and the same time acquisitition with polarization VH (Vertical-Horizontal), 12 days of temporal baseline. The images were then processed by SNAP Toolbox. The results show that Sentinel-1A succeeded in detecting and monitoring flood event, where inundated of water in Tallo River is visible in VH polarization.

Keywords: Flood, Sentinel, monitoring

Application of Interferometric SAR using Sentinel-1A for Flood Monitoring in South of Sulawesi, Indonesia

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Abstract An updated information of flood mapping that recently occurred in South Sulawesi is an important necessity for site policy makers. Mapping of flood area during or soon after the flooding event is tremendous hardwork. However using active-remote sensing namely InSAR (Interferometric Synthetic Aperture Radar) technique can overcome these limitatations. To achieve it, at least two radar images have to be obtained which is 1 image before and 1 image during/after flood event. We selected 2 images Sentinel-1A GRDH data for the same pass direction and the same time acquisitation with polarization VH (Vertical-Horizontal), 12 days of temporal baseline. The images were then processed by SNAP Toolbox. The results show that Sentinel-1A succeeded in detecting and monitoring flood event, where inundated of water in Tallo River is clearly visible in VH polarization.

1. Introduction

Recently, flood had occurred (25 January 2019) in South Sulawesi, Indonesia. The issue is necessary since there is a little information available about the site area. Since the study area is located in a tropical region, passive remote sensing displays certain limitations mainly cloud cover over the study area and data can only be acquired during the day, while on the other hand, active remote sensing (synthetic aperture radar) can overcome these restrictions due to the data that can be acquired potentially at any time even day or night and even penetrates cloud cover. However, using active remote sensing such as Sentinel-1A is value added since its low revisit time 12 days and it is value added for flood monitoring.

Some examples of successful application of radar for flood monitoring [1], [2]. Mapping disaster map, when flood is still occuring is another positive output of using remote sensing.

2. Study Area

The study area is along the Tallo River to the Bili-Bili Dam located in Southern of Ujung Pandang City, Makasar, South Sulawesi (Figure 1 and Figure 3.a). For the investigated flood area and damage analysis, the Sentinel-1A (C-Band) SAR data with Ground Range Detected (GRD) product format were used. The mode of satellite data is Interferometric Wide (IW) which has swath width area of 250 km and has a dual polarization (VV & VH). The GRD range azimuth resolution is 20x22 m with pixel spacing 10x10 m [3].

3. Data

This research used Sentinel-1A GRDH IW with the ESA (Europoean Space Agency) SNAP Procesor software with 2 images acquisition which is, before and during the flooding event. In this case, there are 2 data available dated at 13th and 25th January 2019 images. The first image acquisition (13/01/2019) is before flood and the second (25/01/2019) is during the flood. The flood occured on 25 January 2019. Because of the flooding event prolonged until subsequent days, Sentinel-1A is compatible for the site area since the time acquiring is at noon 15:34 – 15:35 local time. This means that Sentinel-1 captured the flood event and is suitable for this research. Table 1 shows the Sentinel-1A data.

Table 1. Satellite Sentinel-1A with dual polarization VV VH and azimuth range resolution 20x22 m.

Satellite Data	Pass Direction	Time	Track	Date (Jan 2019)	Orbit
Sentinel-1A IW GRDH	Ascending	15:34:27 pm	10	13	25457
				25	25632

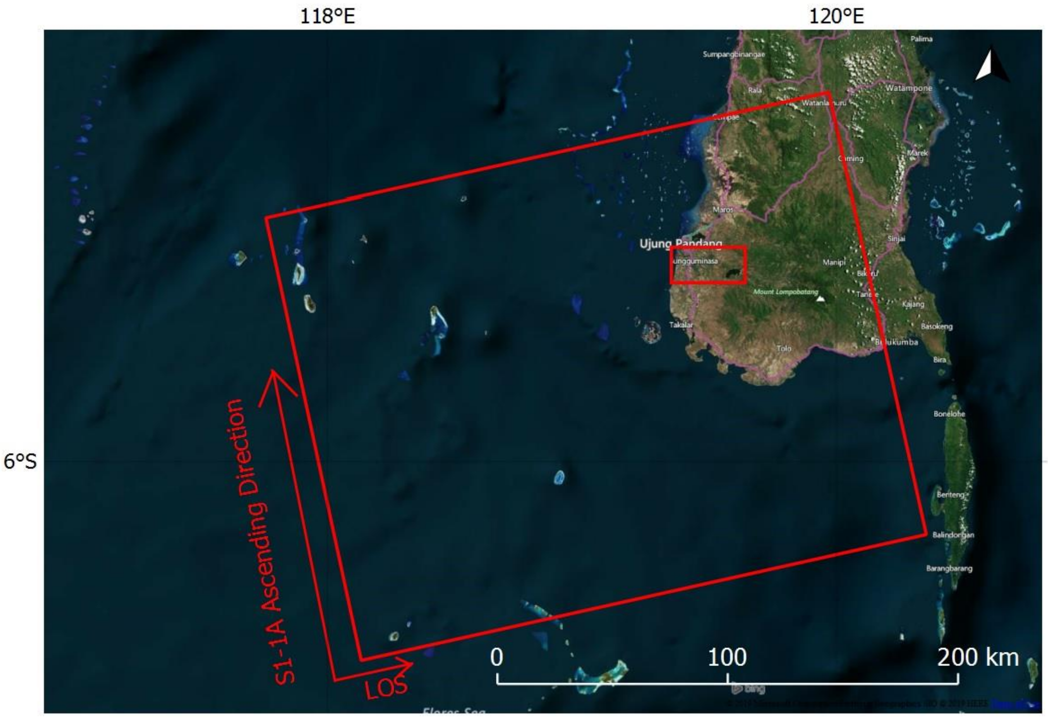

Fig.1 Small red rectangle is study Area, while large red rectangle refer to ascending mode of radar image. Purple line is the province main road.

4. Methodology

InSAR technique utilizes two or more SAR images in the format of SLC (Single Look Complex) or GRDH in order to extract information from a pair of SAR images at different acquisition times [4]. SAR emits its own energy of an electromagnetic wave to the earth surface with specific wavelength and frequency. The lowest frequency sensor has high sensitivity [5], [6] to surface feature with an accuracy of the topography and displacement in meter and millimetre respectively [7].

Flood area monitoring can be analyzed by its pixel coefficient of backscatter (Sigma 0), which has low values than other pixels because the radar signal is reflected away from the sensor and this results in the area looking dark (black) in SAR images. The processing flow using SNAP Processing Tool [8] which is shown in Figure 2.

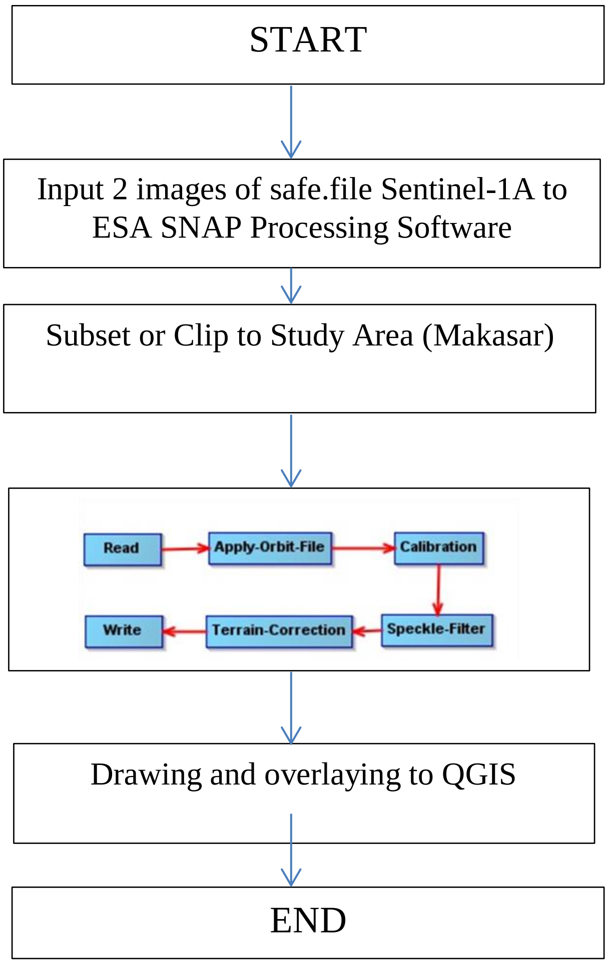

Figure 2. Flowcart of methodology with using ESA SNAP and QGIS

For flood detection and monitoring, we used before and during flood images to compare water and land area. To decide the value threshold, statictical analysis was applied for selecting the water area.

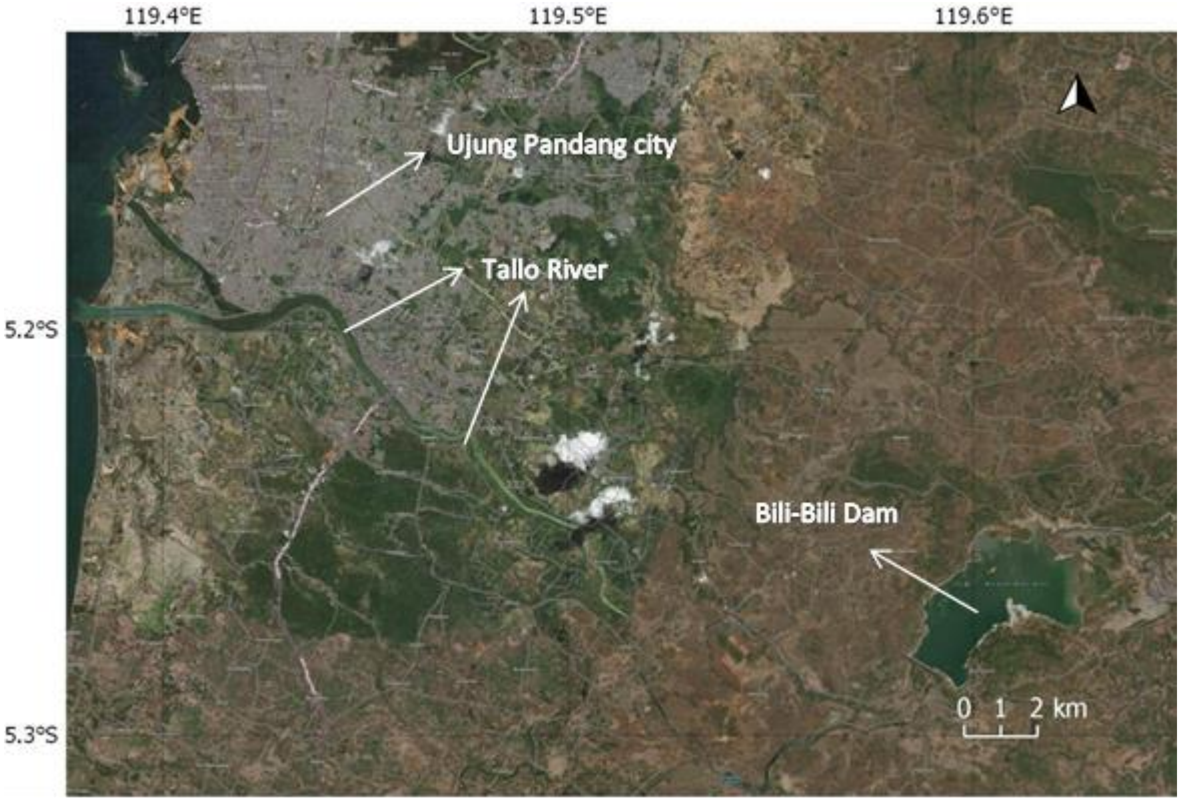

Figure 3.a. An aerial view of the study area, Near Tallo River, South Sulawesi Aeh (red rectangle in Fig.1(https://www.bing.com/maps/aerial). See VH before and during flood in Fig.3b-3c.

5. Result

The results present a potential of detecting and monitoring flood event using 12 days of Sentinel-1A GRDH images with the intensity of the radar images. Clear differences of VH polarisation between before and during flood are described in Fig.3b and Fig.3c. An observation of Center of the figure clearly shows inundated flood by over loading water of Tallo River dominated by dark areas. Moreover the river makes its own flow directly to the Billi-Billi Dam (see bottom right corner of red rectangle in Fig.3c). In addition, the width of the Tallo River looks wider when compared to before flooding image (Fig.3c). More than that, in the East-West of the Billi-Billi Dam, the land area disappears, which is perhaps due to high intensity and the pressure of water come in to the dam (see green circle in Fig. 3c)

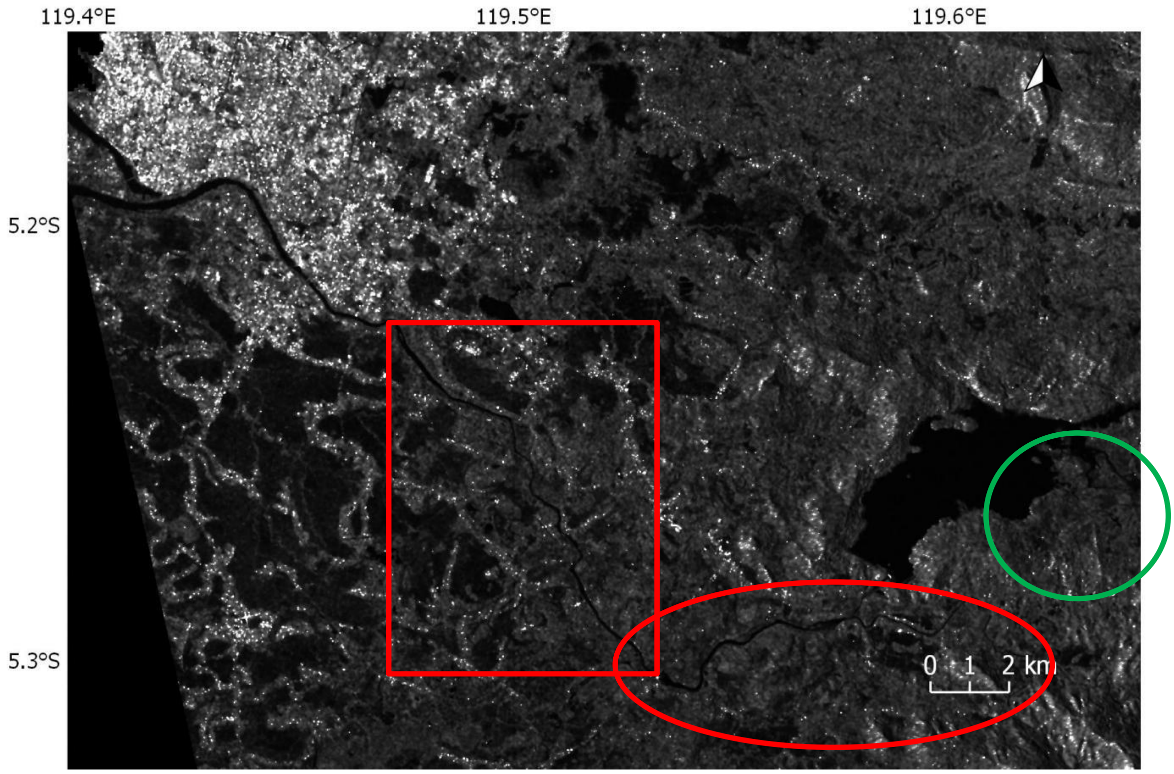

Figure 3.b. VH Before Flood

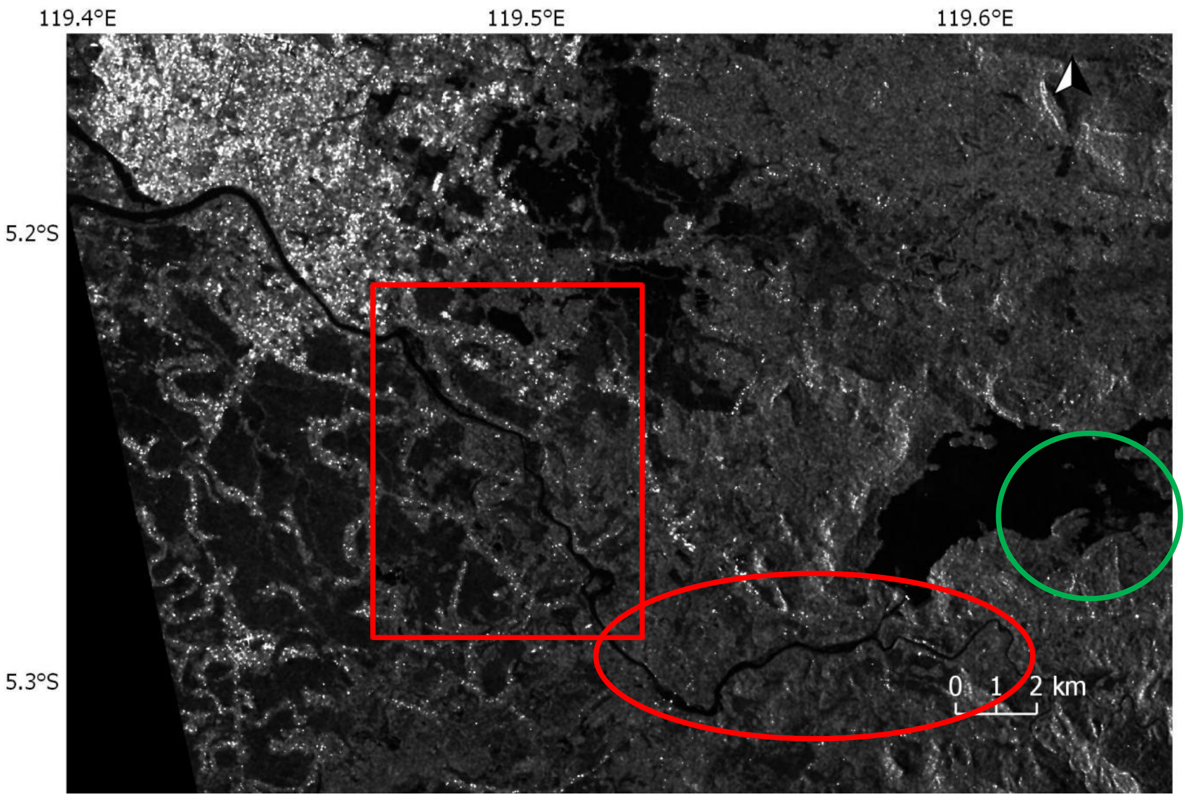

Figure 3.c. VH During Flood

6. Conclusion

This paper presents the potential of SAR classification technique to monitor flooding events in South Sulawesi with an active remote sensing Sentinel-1A GRDH IW using SNAP Processing Toolbox. The flooding features can be identified clearly and are highly visible in VH polarization.

7. Future Work

Since Sentinel-1A has another polarization VV, a comparison VV and VH is the next task beside Change Detection technique using SARPROZ by D. Perrisin which is to obtain the detail information of the differences in each pixels.

8. Acknowledgement

Authors would like to thank European Space Agency, who has provided Sentinel-1A GRDH data for free in the website and for SNAP Sentinel-1 Processing Tool. And to Badan Pengelolahaan Sumber Daya Manusia (BPSDM), Aceh Government which is provide the schoolarship in Universiti Sains Malaysia.

9. References

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ICOIRS2019-208

Correlation Analysis of PM10 Air Pollution with NDVI (Normalized Difference Vegetation Index) Based on Landsat-8 and Sentinel-2A Satellite Images

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Abstract. Dust particulates in the air Suspended Particulate Matter (SPM) is a mixture of various organic and inorganic compounds with small diameters ranging from <1 micron - 500 microns. Particulate (PM10) is an air particle that is less than 10 microns in size. This study correlates the NDVI vegetation index with PM10 in Bandung, West Java in 2001 - 20019 from these results show the relationship between NDVI and air pollution index is negative or inversely proportional, which means the higher (+) NDVI, the air pollution index decreases (-) with a confidence level of 39.35% in 2001, 45.13% in 2006, 60.04% in 2011, 36.83% in 2016, 50.71% in 2019 and 46.96% in 2018 and 48.96% in 2019 with Sentinel. Thus, the NDVI index can be used to obtain air pollution information that indicates if the NDVI index value in the extraction will get a correlation value between Landsat 8 satellite images and Sentinel 2A where the correlation results on field measurements are Landsat at 68.93% and Sentinel 90.15%.

Keywords: Particulate matter, PM10, PM2.5, Landsat 8, Sentinel 2A, NDVI, TVDI