

Proceedings of

# ISRS 2012 ICSANE

INTERNATIONAL SYMPOSIUM ON REMOTE SENSING 2012  
INTERNATIONAL CONFERENCE ON SPACE,  
AERONAUTICAL AND NAVIGATION ELECTRONICS

SONGDO CONVENIA,  
INCHEON, KOREA

10~12 OCTOBER 2012

Proceedings of

## ISRS 2012 ICSANE



**Organized by**

- Korean Society of Remote Sensing Korea (KSRS)
- Chinese (Taipei) Society of Photogrammetry and Remote Sensing (CSPRS)
- Remote Sensing Society of Japan (RSSJ)
- Technical Committee on Space, Aeronautical and Navigation Electronics of IEICE
- Standing Committee of Environmental Monitoring from Space of East Asia (EMSEA)

**Supported by**

- Ministry of Environment
- Korean Federation of Science and Technology Societies
- Incheon Development & Tourism Corporation

**In association with**

- 28<sup>th</sup> Fall Symposium of KSRS
- 4<sup>th</sup> Workshop on Environmental Geospatial Information
- 21<sup>th</sup> Annual Workshop of EMSEA

KSRS





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This work supported by the Korean Federation of Science and Technology Societies Grant Funded by the Korean Government.

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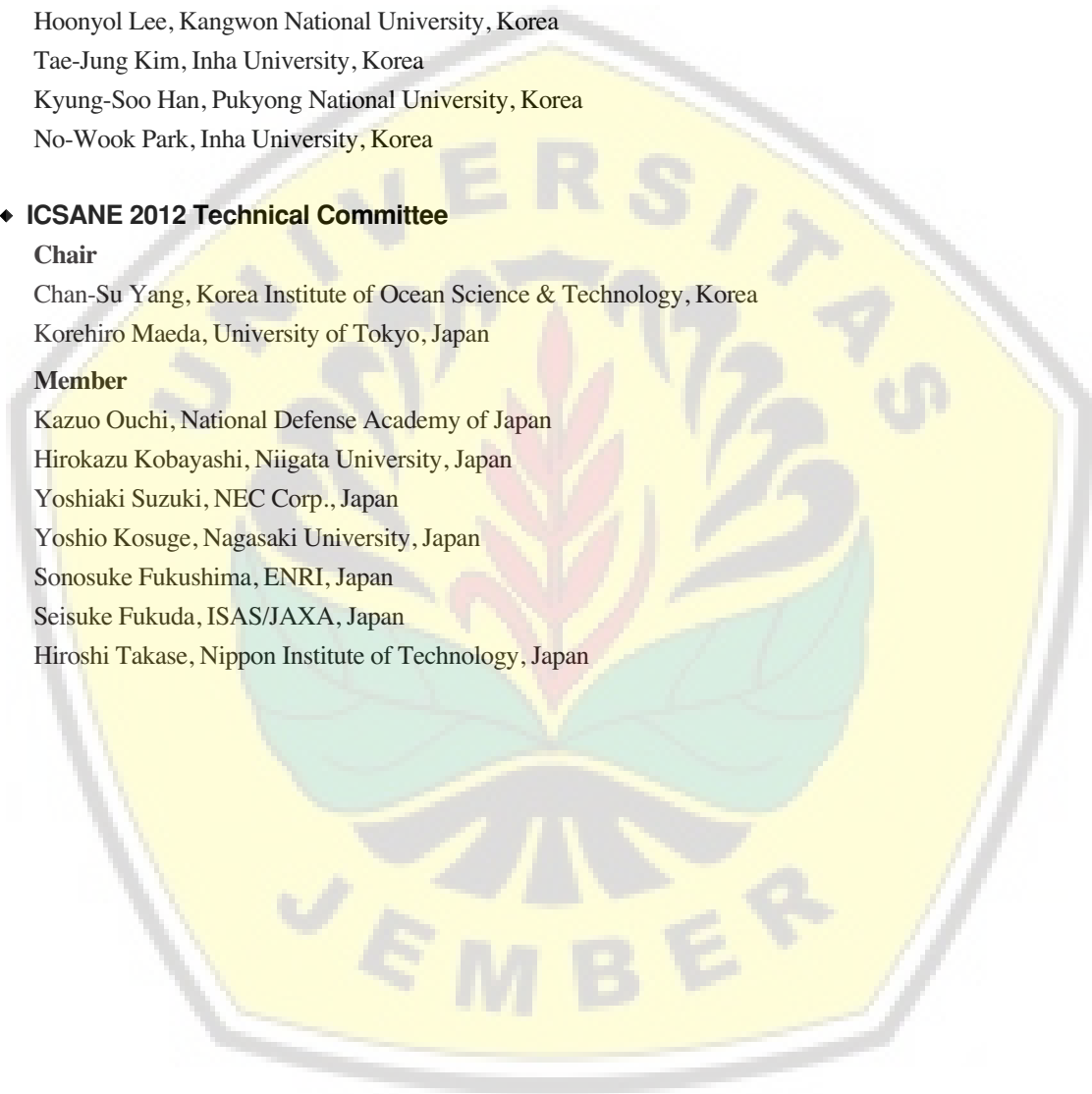
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**Chair Person : Prof. Woo-Kyun Lee**

Chair, Organizing Committee of ISRS2012  
Executive Director, Korean Society of Remote Sensing

Wednesday, 10<sup>th</sup> October 9:20 ~ 9:35 - Room E (1F)

### Welcome Messages

Welcome to ISRS 2012 ICSANE

***Prof. Kyu-Sung Lee***

President, Korean Society of Remote Sensing

***Dr. Shigeru Ozeki***

Chair, SANE Committee of IEICE

***Prof. Liang-Chien Chen***

President, Chinese (Taipei) Society of Photogrammetry and Remote Sensing

***Prof. Yasushi Yamaguchi***

President, Remote Sensing Society of Japan

### Congratulatory Messages

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***Prof. Yuei-An Liou***

Co-Chair of EMSEA, Taiwan

***Prof. Choen Kim***

Co-Chair of EMSEA, Korea

## Plenary Session 1

Wednesday, 10<sup>th</sup> October 9:35 ~ 10:35 - Room E (F1 Floor)

### Remote Sensing Applications to the Polar Regions

Yeadong Kim

Korea Polar Research Institute

Importance of monitoring in the polar regions has been increasing with the emerging concern for the global environmental change. It becomes extremely clear that coupling of ocean, atmosphere, cryosphere and biological processes should be considered and both Arctic and Antarctic need to be studied as entire systems for understanding the change. For instance the effects of global warming are greatly amplified and enhanced at high northern latitudes and stratospheric ozone depletion is clearly observed over the Antarctic during the austral springtime. The effect of surface temperature increase in the Arctic includes carbon release from thawing permafrost, a reduction in sea ice extent, ocean/atmospheric heat and gas (CO<sub>2</sub>, methane, ozone, etc.) exchange, surface albedo, coastal erosion and changes of the surface runoff that might effect the Arctic Ocean salinity and circulation. When considering Antarctica changes in global atmospheric circulation might alter both the mass balance of the ice sheet and the distribution of the highly seasonal sea ice concentration. The delicate marine ecosystem in the Southern Ocean is affected by local warming and by ultraviolet radiation from ozone depletion.

The growing awareness for the global change comes when we have the capability of acquire global view from satellites. Since most of the land and ocean in high latitudes are remote, inhospitable and spacious the space borne remote sensing is essential to study the regions. For many earth observing satellites missions are designed primarily for the study of tropical to mid latitudes. However these satellites rotate along near polar orbits we may recover data for polar research. By extracting data from polar orbiting satellites large geographic area can be covered for longer time scales in the polar regions.

Satellites with radio altimeter measuring ice sheet topography and ocean surface, Synthetic Aperture Radar(SAR) providing high resolution all weather image of ocean, land and ice surface and GRCAE measuring slight mass variation provide very promising data to detect and predict the mass balance with improving accuracy. More recently laser altimeter and InSAR data provide a high spatial resolution and accurate pictures of ice dynamic.

Despite of satellite data availability in the polar regions and advance of remote sensing technique we still do not have enough data in term of quantity and quality to provide prediction for the mass balance and sea ice characteristics. It is required that more data coverage in high latitudes with high resolution device such as SAR and LIDAR to improve our ability to predict effects of future climate changes. At the same time in situ measurement is necessary to increase accuracy of the satellite data even logistic challenges of the field work limit detailed experiment in the polar environment.

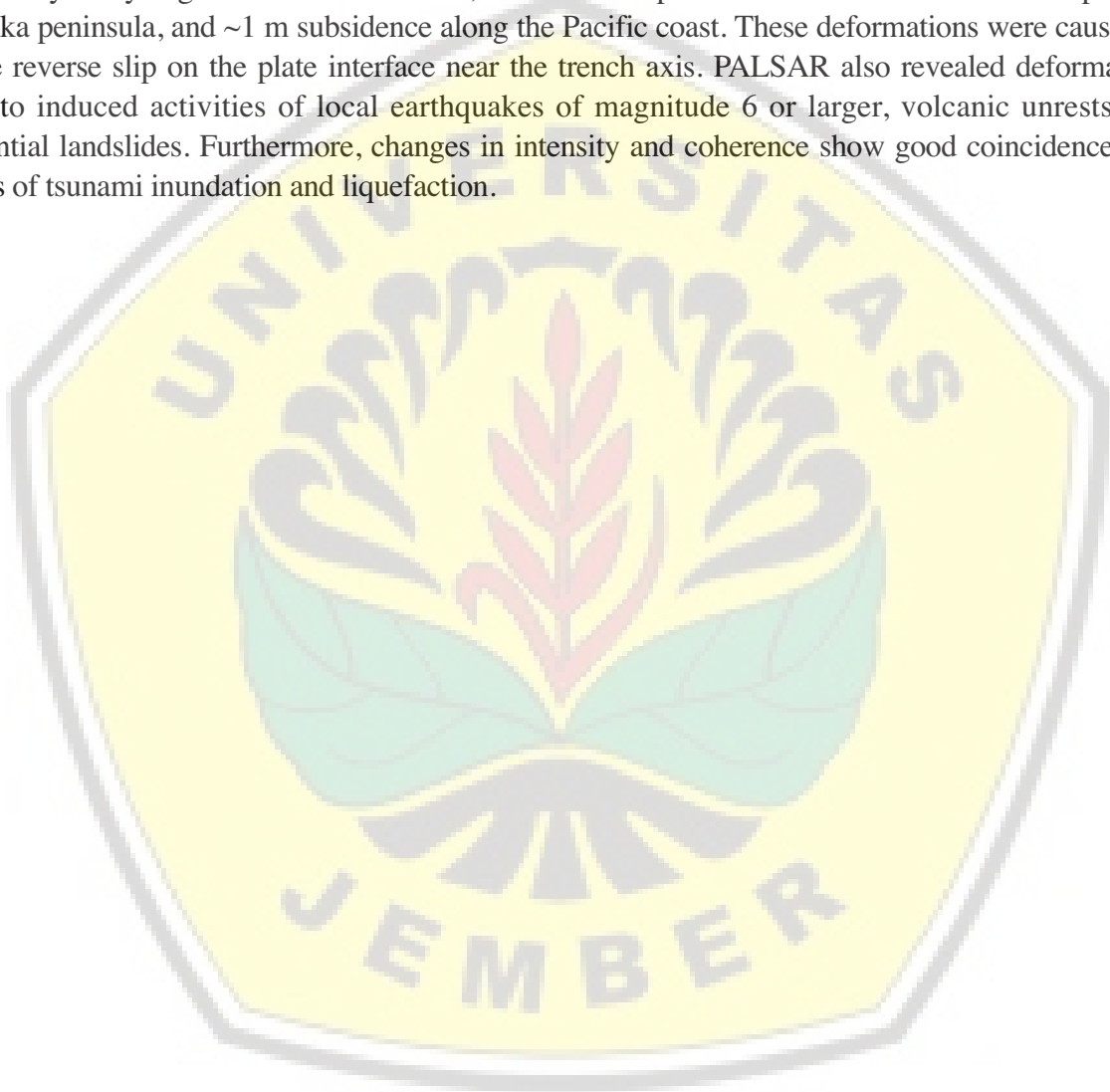
## Surface Movements during the 2011 Great Tohoku-Oki Earthquake Detected ALOS/PALSAR

Manabu Hashimoto<sup>1</sup>, Yo Fukushima<sup>1</sup>, and Youichiro Takada<sup>2</sup>

<sup>1</sup> Disaster Prevention Research Institute, Kyoto University

<sup>2</sup> Kamitakara Observatory, Disaster Prevention Research Institute, Kyoto University

The Tohoku earthquake of March 11, 2011 caused a remarkably large deformation over Honshu, Japan. By analyzing ALOS/PALSAR data, we detected up to 5 m of eastward shift at the tip of the Oshika peninsula, and ~1 m subsidence along the Pacific coast. These deformations were caused by huge reverse slip on the plate interface near the trench axis. PALSAR also revealed deformations due to induced activities of local earthquakes of magnitude 6 or larger, volcanic unrests, and potential landslides. Furthermore, changes in intensity and coherence show good coincidence with areas of tsunami inundation and liquefaction.





## Plenary Session 2

Wednesday, 10<sup>th</sup> October 10:50 ~ 12:10 - Room E (F1 Floor)

### **GEMS(Geostationary Environment Monitoring Spectrometer) onboard the GeoKOMPSAT to Monitor Air Quality and short-term climate change forcer in high Temporal and Spatial Resolution over Asia-Pacific Region**

**Jhoon Kim<sup>1</sup>, Hanlim Lee<sup>1</sup>, Rokjin J. Park<sup>2</sup>, Seung Hoon Lee<sup>3</sup>, Dai Ho Ko<sup>3</sup>, Chang Keun Song<sup>4</sup>,**

**Youdeog Hong<sup>4</sup>, Sukjo Lee<sup>4</sup>; H.W. Seo<sup>5</sup>, Jung Hun Woo<sup>6</sup>, Young Joon Kim<sup>7</sup>, Chul Han Song<sup>7</sup>,  
Jae Hwan Kim<sup>8</sup>, Kwang Mog Lee<sup>9</sup>, Jung-Moon Yoo<sup>10</sup>, Seon Ki Park<sup>10</sup>, Yong Sang Choi<sup>10</sup>,  
Myeongjae Jeong<sup>11</sup>, Kelly Chance<sup>12</sup>, Mijin Kim<sup>1</sup>, Sangseo Park<sup>1</sup>, Sang Soon Yong<sup>4</sup>**

<sup>1</sup> Yonsei University, Seoul, Korea; <sup>2</sup> Seoul National University, Seoul, Korea; <sup>3</sup> KARI, Daejeon, Korea;

<sup>4</sup> National Institute of Environment Research(NIER), Incheon, Korea;

<sup>5</sup> Ministry of Environment(ME), Gwacheon, Korea; <sup>6</sup> Konkuk University, Seoul, Korea;

<sup>7</sup> GIST, Gwangju, Korea; <sup>8</sup> Pusan National University, Pusan, Korea;

<sup>9</sup> Kyungpook National University, Daegu, Korea; <sup>10</sup> Ewha Womans University, Seoul, Korea;

<sup>11</sup> Gangreung Wonju National university; <sup>12</sup> Harvard Smithsonian Center for Astrophysics

A scanning UV-Visible Spectrometer, GEMS (Geostationary Environment Spectrometer) is planned to be launched in 2018 onboard a geostationary satellite, GeoKOMPSAT(Geostationary Korea Multi-Purpose SATellite by KARI(Korea Aerospace Research Institute), together with AMI(Advanced Meteorological Imager) and GOCI-2 (Geostationary Ocean Color Imager). The main objective of the mission is to provide measurements of O<sub>3</sub>, NO<sub>2</sub>, SO<sub>2</sub>, HCHO and aerosol in high temporal and spatial resolution. The spectral coverage of GEMS is 300-500 nm with 0.6 nm resolution, and the spatial coverage is 5 S - 45 N and 75 E - 145 E with 7 km × 8 km resolution at Seoul, Korea. SNR is 720 and 1500 at 320 and 450 nm, respectively. Data retrieval algorithm are under the development by using DOAS(different optical absorption spectroscopy) and optimal estimation technique. Additional products are cloud height by using rotational Raman scattering and O<sub>2</sub>-O<sub>2</sub> absorption, cloud fraction, aerosol optical depth, aerosol index, the height of aerosol layer by using O<sub>2</sub>-O<sub>2</sub> absorption, and Lambertian equivalent surface reflectance.

Synchronous measurements of air pollutants and short-term climate forcer together with the meteorological variables and ocean color information are expected to contribute to better scientific understanding on the distribution and transboundary transportation of air pollution, and on interactions between meteorology and air chemistry in the Asia-Pacific region. This mission is expected to improve the accuracy of air quality forecasting and reduce current discrepancy between the model and observation. Optional IR payload to measure CO<sub>2</sub>, CH<sub>4</sub> and CO are under the discussion with foreign collaborative partners. Furthermore, the constellation of the GeoKOMPSAT with Sentinel-4 by ESA and GEOCAPE by NASA in 2017- 2020 time frame can result in great synergistic outcomes including enhancing significantly our understanding in globalization of tropospheric pollution.

## **Initial Checkout Result of GCOM-W1(Shizuku)**

**Matsuaki KATO, Marehito KASAHARA, Toshitaka SASAKI, Norimasa ITO,  
Masaaki MOKUNO and Keizo NAKAGAWA**

Space Applications Mission Directorate, Japan Aerospace Exploration Agency

GCOM-W1:Global Change Observation Mission 1st-Water, “SHIZUKU”, was launched by HII-A Launch Vehicle No.21 on 17 May 2012 (UT) from the Tanegashima Space Center, and moved to the regular observation operation on 10 August 2012 (UT) after the initial checkout had been completed. This is the report of GCOM-W1 on-orbit checkout result.

## **Successful Launching of KOMPSAT-3 by H2-A Rocket**

**Hae-Jin CHOI**

KOMPSAT-3 Program Manager, Korea Aerospace Research Institute

KOMPSAT-3 is an earth observation satellite which is operating at the altitude of 685km sun-synchronous orbit and has a sub-meter class EO camera. It was launched successfully with GCOM-W by the H2-A rocket on May 18th 2012 at Tanegashima Space Center. It was the first cooperation between Korea & Japan in the field of space business. KARI and MHI/JAXA have had many technical interface meetings and safety reviews for 2 years. The experience of KOMPSAT-3 launch operation will be shared, and the lessons & learned will be discussed. KOMPSAT-3 is providing 0.7m high-resolution optical images which are more precise than those from KOMPSAT-2. The images will be demonstrated as well.

## **The Next-Generation Infrared Space Astronomy Mission SPICA**

**Takao NAKAGAWA, Hideo MATSUHARA, Yasuhiro KAWAKATSU, and SPICA Team**

Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency

We present the overview and the current status of SPICA (Space Infrared Telescope for Cosmology and Astrophysics), which is a mission optimized for mid- and far-infrared astronomy with a cryogenically cooled 3.2 m telescope. SPICA has high spatial resolution and unprecedented sensitivity in the mid- and far-infrared, which will enable us to address a number of key problems in present-day astronomy, ranging from the star-formation history of the universe to the formation of planets. To reduce the mass of the whole mission, SPICA will be launched at ambient temperature and cooled down on orbit by mechanical coolers on board with an efficient radiative cooling system, a combination of which allows us to have a 3-m class cooled (6 K) telescope in space with moderate total weight (3.7t). SPICA is proposed as a Japanese-led mission together with extensive international collaboration. ESA's contribution to SPICA has been studied under the framework of the ESA Cosmic Vision. The consortium led by SRON is in charge of a key focal plane instrument SAFARI (SPICA Far-Infrared Instrument). Korea and Taiwan are also important partners for SPICA. US participation to SPICA is under discussion. The SPICA project is now in the "risk mitigation phase". The target launch year of SPICA is 2022.

## **Closing Ceremony**

**Chair Person : Dr. Woo-Kyun Lee**

Chair, Organizing Committee of ISRS2012  
Executive Director, Korean Society of Remote Sensing

Friday, 12<sup>th</sup> October 12:30 ~ 13:00 - Room E (1F)

### **ISRS 2012 ICSANE Student Session Award**

***Dr. Chan-Su Yang***

Chair, Technical Committee of the ISRS 2012 ICSANE

***Dr. Korehiro Maeda***

Chair, Technical Committee of the ISRS 2012 ICSANE

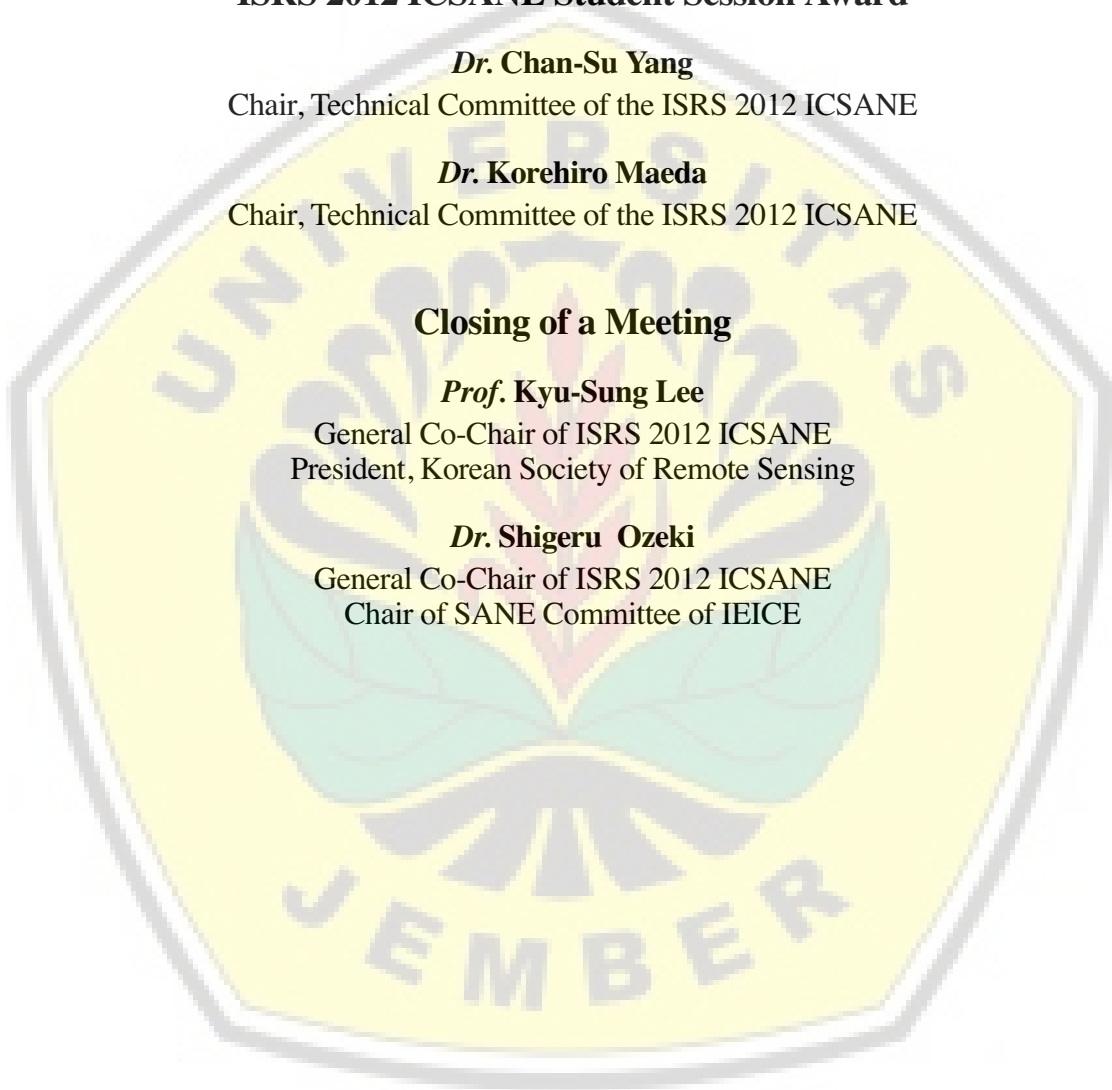
### **Closing of a Meeting**

***Prof. Kyu-Sung Lee***

General Co-Chair of ISRS 2012 ICSANE  
President, Korean Society of Remote Sensing

***Dr. Shigeru Ozeki***

General Co-Chair of ISRS 2012 ICSANE  
Chair of SANE Committee of IEICE



Poster Session 1

Lounge

(12:10 ~ 14:00)

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*NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATION TECHNOLOGY*

**16:40-17:00 Coffee Break**

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## Room A

### TA1

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10:20-10:40 Coffee Break

## Room B

### TB1

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10:20-10:40 Coffee Break

## Room D

### TD1

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 SINJAE YOO *MARINE ECOSYSTEM RESEARCH DIVISION, KOREA INSTITUTE OF OCEAN SCIENCE & TECHNOLOGY*
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10:20-10:40 Coffee Break

## Room A

**TA2**

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## Room D

**TD2**

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- 10:20-10:40 **Coffee Break**



## Poster Session 2

### Lounge

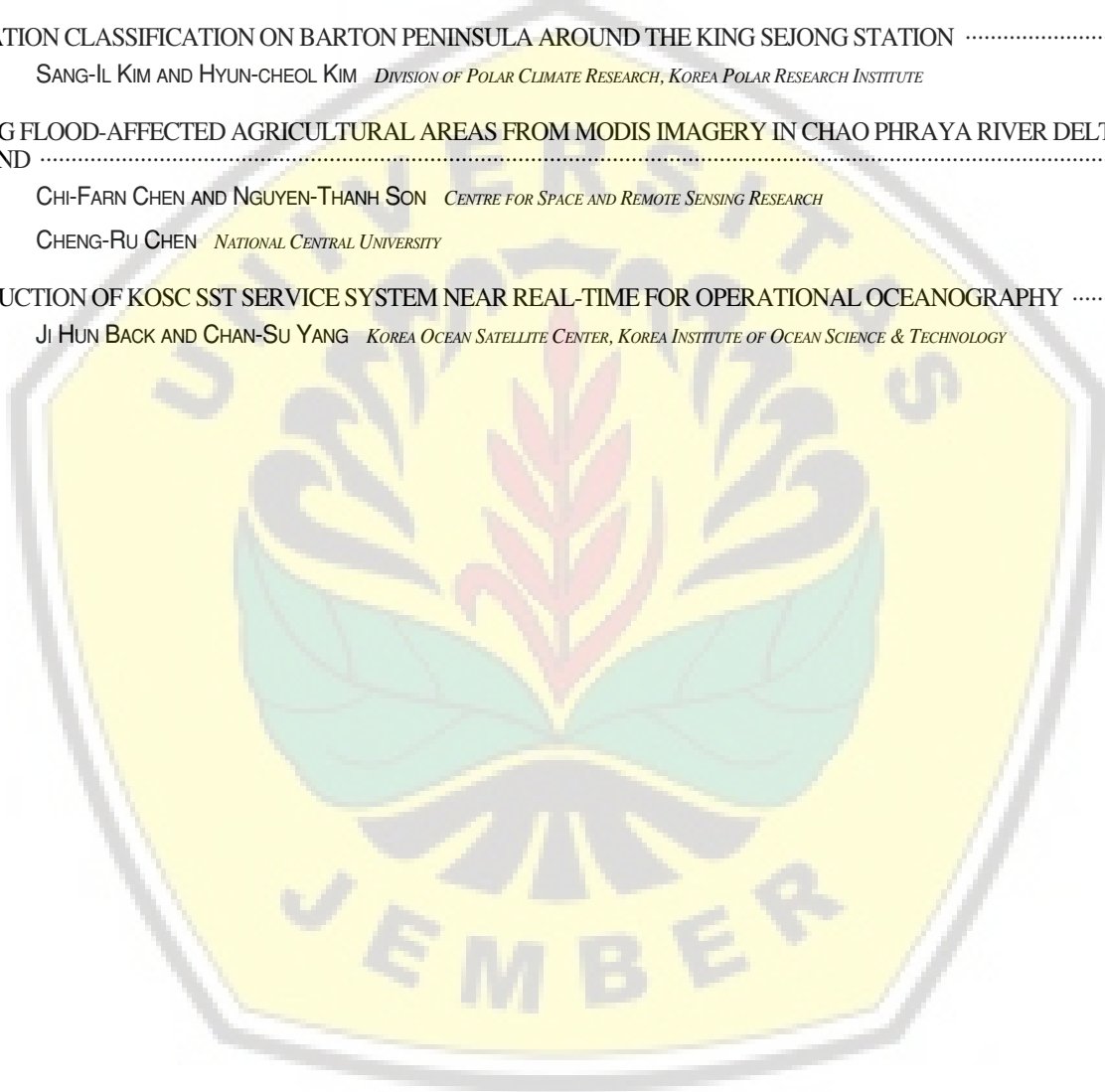
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16:40-17:00 Coffee Break

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**10:20-10:40 Coffee Break**

## Room D

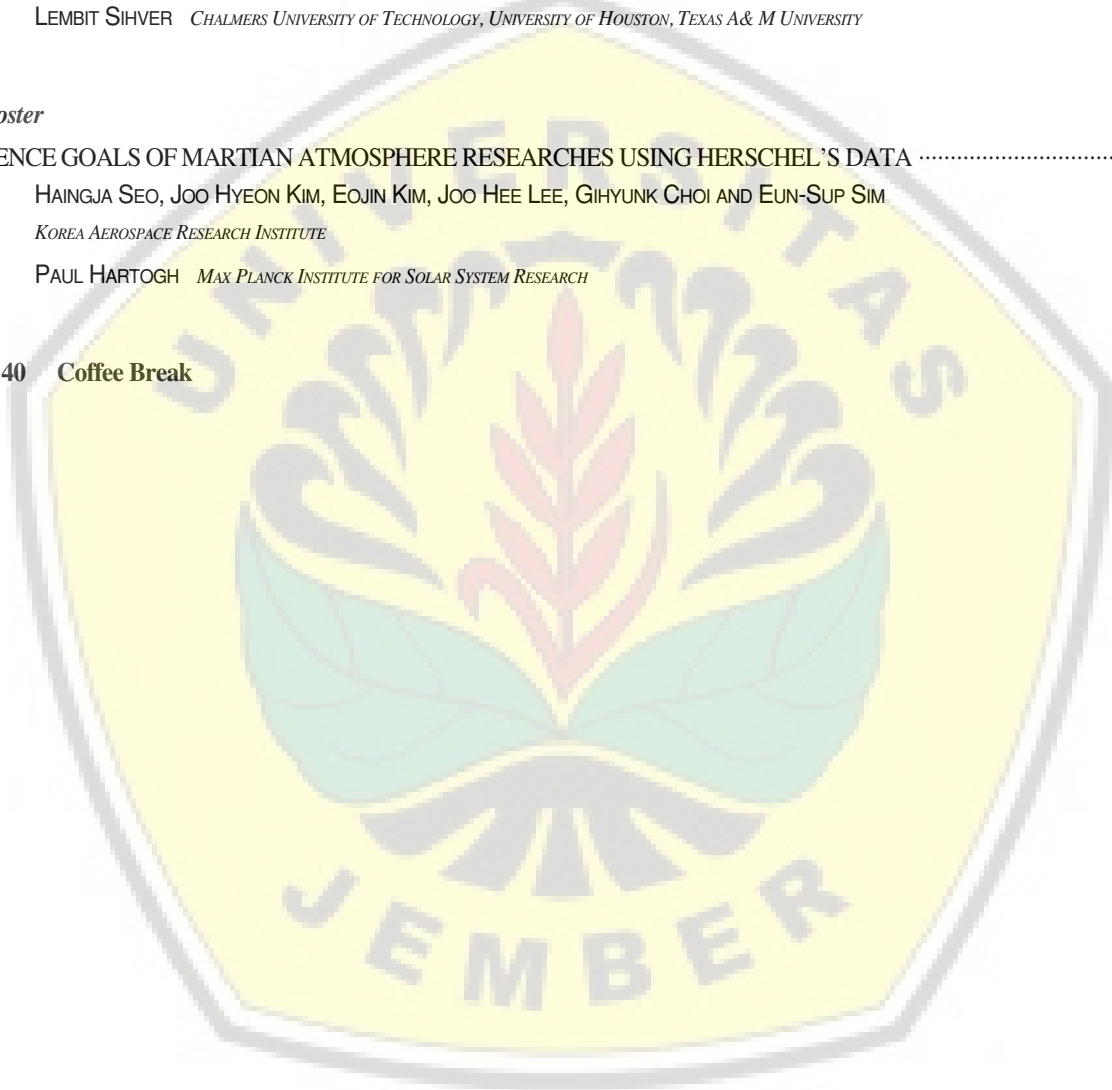
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## THRESHOLD-VARIATION ANALYSIS OF MOD14 ALGORITHM MODEL USING MODIS DATASETS OVER TROPICAL AREA IN INDONESIA

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**ABSTRACT:** The Moderate Resolution Imaging Spectroradiometer (MODIS) which is equipped with thermal bands for measuring the temperature of the earth's surface has been widely utilized in fire detection activities. Of the fire detection algorithms developed for MODIS the most commonly applied algorithm principle is the contextual algorithm. Such global algorithms for fire detection can be customized for local or regional areas to improve the accuracy of fire detection. For this reason there has been substantial research performed to apply and assess how accurate the global algorithm results are in certain local or regional areas. In principle, fire pixels detection is base on dichotomizing assessed imagery pixels values using certain threshold value. Determining the best threshold value leads to optimal detection results and minimum errors. This paper analyses the impact of variation of  $T_4$  and  $\Delta T$  threshold values on outputs from the MOD14 algorithm using MODIS data within different seasons in Indonesia. Analysis is conducted by analysis of the sensitivity of detected Fire Hotspots (FHS) to changes of  $T_4$  and  $\Delta T$  and also through statistical calculations. The results show that the sensitivity of the MODIS FHS algorithm is different between dry and wet seasons which indicates the need for different threshold values to be applied to optimise fire detection using MODIS within dry and wet seasons.

**KEY WORDS:** MODIS, contextual-algorithm, threshold, seasons, tropical-area.

### 1. INTRODUCTION

#### 1.1. Background

Fire plays a significant role within most terrestrial vegetation alteration and land cover change. During biomass burning gases and particulate matter are released into the atmosphere and contribute to atmospheric chemical reactions and physical processes. Biomass burning with the release of gases and aerosols potentially makes a significant contribution to climate change. Also, the change in the balance of an ecosystem due to the impact of burning biomes can affect the resilience of the ecosystem to adapt to climate change. Hence monitoring fire occurrence is significant in managing the impact of climate change. Scientists and policy decision makers in many countries are directing resources to the study of the effect of forest burning on the environment.

Indonesia government agencies which monitor fire using different satellite-based fire detection algorithms include the ASEAN Specialised Meteorological Centre (ASMC) in Forestry Ministry and Indofire in National Institute of Aeronautics and Space (LAPAN). Because agencies apply different methods in different locations and

times based on their governmental roles, they often report different results in a number of detected Fire Hotspots (FHS). Validation activities are therefore important to estimate the correct number of FHS.

Fire detection activities are performed not only in Indonesia but also in many areas of the world. NASA's science teams extensive research on fire detection issues has led to the development of an algorithm called 'MOD14 algorithm' which is applied globally but gives differing results on a regional basis. Researchers around the world continue to assess the accuracy of MOD14-based FHS detection method in their own areas to evaluate errors of omission and commission.

The most reliable data to validate results of recognised FHS from satellites is ground truth data. The Forestry Ministry as the authorised Indonesian government agency has this task. It collects fire data from local forestry agency (BKSDA) and also performs its own field validation. Ground data collection requires considerable effort in terms of funding, facilities, manpower, and time. Hence ground data are limited and in order to have confidence in FHS detection results other

validation methods are required. As an example, LAPAN validates FHS detection using a combination of ground data and high resolution satellite imagery such as Système Pour l'Observation de la Terre (SPOT) imagery for which they run their own satellite receiver in Pare-Pare Sulawesi.

The LAPAN approach did not provide a definite estimate of FHS detection accuracy reportedly due to some environmental factors. Here, haze and cloud were reported as a key factor influencing the accuracy of fire detection (Vetrita, Haryani, and Komaruddin, 2012).

Additionally, another environmental factor such as precipitation was reported as one other factor which obscured fire occurrence detection in the Brazilian Amazon region (Schroeder, Csiszar, and Morissette, 2008). Precipitation in Indonesia varies considerably between dry season and wet season. A high level of precipitation is commonly encountered in the wet season and there is typically little rain in dry season.

To account for environmental influences the statistical analysis of suitable temperature threshold values within the fire detection algorithm is another approach which has been used to investigate the accuracy of FHS detection. Liew et.al. (2006) proposed method to retrieve the optimal thresholds for fire detection from a statistical point of view. This paper studies the impacts of applying various thresholds in the MOD14 algorithm using MODIS datasets over Indonesia by considering the sensitivity of FHS detection in the dry and wet seasons.

## 1.2. Fire detection principle

Most satellite-based or airborne remote sensing instruments are designed to measure a combination of surface and atmospheric signals in the visible and near infra red spectrum. To gain better result in fire and burned scars monitoring from a fire detection perspective, the MODIS instrument aboard the Terra and Aqua satellites were designed to have improved satellite-based FHS detection capabilities by the addition of more channels in the thermal band compared its predecessor instruments, NOAA-AVHRR (National Oceanic and Atmospheric

Administration - Advanced Very High Resolution Radiometer).

In satellite remote sensing especially for passive remote sensing sensors, fire existence can be detected by thermal infra red sensors because most of the fires emit radiation in this range (3 – 12  $\mu\text{m}$ ) so satellite-base sensors for fire detection purposes are focus on this wavelength range.

Each channel of the satellite-based sensor has different sensitivity to land surface thermal properties. The radiated energy of fires can be derived from a combination of several channels. Kaufman, Kleidman, and King (1998) found in their simulation that the best channel to derive fire radiated energy is the 3,9  $\mu\text{m}$  channel because the relationship of the fire radiated energy and the apparent temperature is least sensitive to the mixture of temperature in the fires. They prove that the greatest contrast images between the fire pixel and the surrounding pixels is shown from the 3,9  $\mu\text{m}$  channel.

Accordingly, the most commonly used wavelength bands for fire detection are 4  $\mu\text{m}$  and 11  $\mu\text{m}$ . The 4  $\mu\text{m}$  channel is highly sensitive to the radiated energy emitted from fire, so it has a key role in remote sensing of fire. Brightness temperature calculated from this channel is notated as  $T_4$ . Additionally the 11  $\mu\text{m}$  channel on is not as sensitive as the 4  $\mu\text{m}$  channel but it is less influenced by surface reflection. Thus fire detection algorithms consider differences in sensed radiation from both channels.

## 1.3. Contextual Algorithm

Giglio, et.al (2003) performed fire detection using a contextual algorithm that exploits the strong emission of mid-infrared radiation from fires. The algorithm examines each pixel of the MODIS swath, and ultimately assigns to each one of the following classes: missing data, cloud, water, non-fire, fire, or unknown. The algorithm uses brightness temperatures derived from the MODIS 4  $\mu\text{m}$  and 11  $\mu\text{m}$  channels, denoted by  $T_4$  and  $T_{11}$ , respectively.

## 2. RESEARCH METHODS

The first step in contextual algorithm is a screening test. All examined pixels which cannot pass this test have

no chance to go into next steps and they are automatically classified as non fire pixels. The focusing of this research is on the screening step due to its very significant role in the fire detection algorithm. All pixels are examined where their value sit above the determined threshold value of  $T_4$  and  $\Delta T = T_4 - T_{11}$ .

This paper analyses FHS detection in respect to the variation of the  $T_4$  and  $\Delta T$  threshold values in the MOD14 algorithm using MODIS datasets over Indonesia. Curves of detected FHS numbers are constructed as the various values of  $T_4$  and  $\Delta T$ . Threshold values are changed in order to investigate the sensitivity of MODIS FHS detection in the dry and wet seasons over Indonesia.

This investigation has been conducted by partitioning MODIS data into two groups. The first group is MODIS data acquired within the dry season (Aug – Sep 2009) and the second group is datasets from the wet season (Feb 2010). The performance of the MOD14 FHS algorithm is evaluated for each group using graphs of FHS sensitivity and a T-test statistical analysis.

### 3. RESULTS AND DISCUSSIONS

This paper is concerned only with  $T_4$  and  $\Delta T$  parameters as they are used on both day and night time MODIS datasets. Iterating the various values of  $T_4$  and  $\Delta T$  threshold produce the graphs shown in Figure 1 and Figure 2.

Considering the shape of the curves in both figures it is clear that FHS detection is more sensitive to the change in  $T_4$  threshold values rather than  $\Delta T$  changes. This is used as a basis for further analysis into whether there is significant seasonal influence on the sensitivity of the fire detection algorithm over Indonesia.

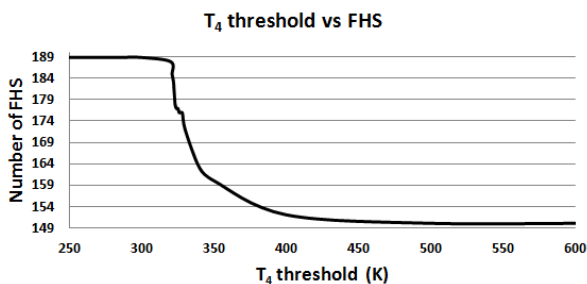


Figure 1. Plot of  $T_4$  threshold values (K) and detected FHS number

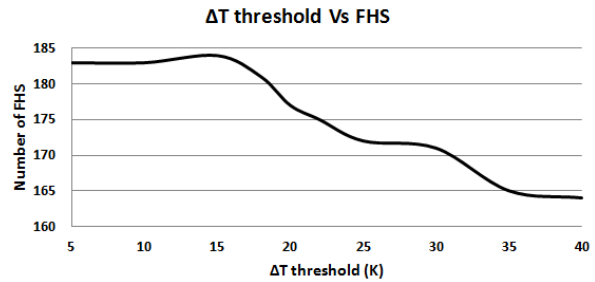


Figure 2. Plot of  $\Delta T$  threshold values (K) and detected FHS number

Indonesia has only two seasons - the dry season and the wet season. In the dry season precipitation is very low and most vegetation suffers from drought and is prone to be burning. Naturally, the dry season has a higher average temperature than the wet season.

Investigation of seasonal impacts to fire detection has been conducted by changing threshold values then recompiling the MOD14 algorithm. By normalising the detected number of FHS in dry and wet season separately as percentages, a variation of the  $T_4$  threshold values results in different sensitivity curves as shown in Figure 3 and Figure 4.

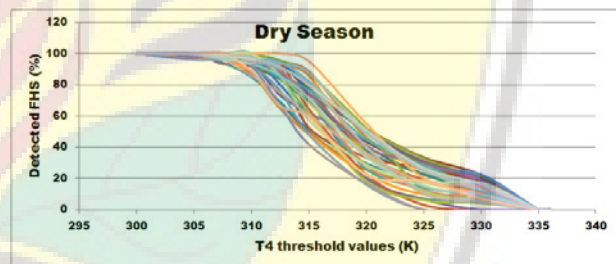


Figure 3. Dry season plot of  $T_4$  threshold values (K) and relative detected FHS (%)

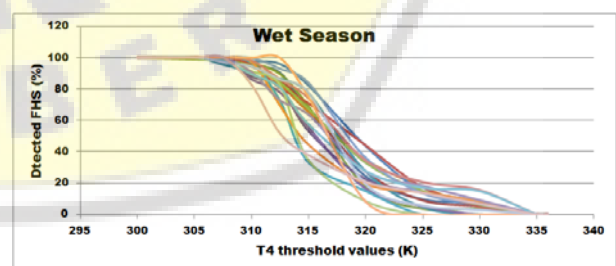


Figure 4. Wet season plot of  $T_4$  threshold values (K) and relative detected FHS (%)

The difference in the curves between the dry season and wet season data is clearly seen by calculating average number of fires detected in each season. The average values from the curves in Figure 3 and Figure 4 is shown in Figure 5.

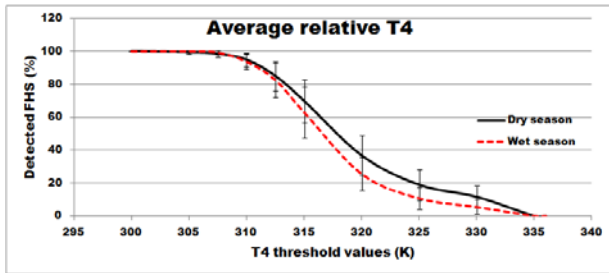


Figure 5. Plot of T4 threshold values (K) and average of relative detected FHS (%)

Figure 5 shows that the MOD14 algorithm displays different sensitivity when it is applied to dry season data compare to wet season data. It indicates that to obtain a certain level of FHS detection sensitivity a higher  $T_4$  threshold value is required in the dry season compare to the wet season.

To confirm the claim above, a statistical analysis was performed to the dry and wet season data groups. The analysis of T-test is mostly used to assess the means differences between two groups (Moore and McCabe, 2003). The T-test is applied to the FHS data from Figure 5 and the results are shown in Table 1.

Table 1. Results of T-test analysis

	Mean	Std. Deviation	Significance (2-tailed)
Dry season	55.8391	42.57335	.001
Wet season	52.7209	44.27578	.003

The results of the T-test analysis show that the dry season data has a statistically significant higher mean value than the wet season data. It indicates that for a given threshold of  $T_4$ , the MOD14 algorithm possesses higher sensitivity for dry season datasets compared to the other season. The 2-tailed significance values from the T-test analysis from both seasons sit under 0.05 (Table 1) which confirms that both datasets display significantly different means of the population (Pallant, 2011). We can interpret this as meaning that there is a change in the sensitivity of the MOD14 algorithm to choice of  $T_4$  threshold between the dry and wet seasons and that the accuracy of FHS detection is also significantly different between dry and wet season as a result. Accordingly we find that in the wet season a lower  $T_4$  threshold value is required to gain the

same accuracy in FHS detection as dry season. This is a logical finding because increased rain in the wet season leads to decreasing environmental temperature and the temperature of fires are also lower as a result.

#### 4. CONCLUSIONS

The screening test is the first step of the contextual fire detection algorithm for MODIS and has two significant parameters namely  $T_4$  and  $\Delta T$ , of which  $T_4$  affects the accuracy of FHS detection significantly more than  $\Delta T$ . The MOD14 algorithm shows different sensitivity to the choice of  $T_4$  threshold between dry and wet season in Indonesia based on the characteristics of the curves of detected FHS. Statistical analysis indicates that the dry season fire detection algorithm requires a higher  $T_4$  threshold value compared to the wet season in order to provide results at the same level of accuracy. We believe this to be due to the lower environmental temperature characteristic of the wet season which exhibits significantly higher rainfall.

#### REFERENCES :

- L. Giglio, J. Descloitres, C.O. Justice, and Y.J. Kaufman, 2003, An Enhanced Contextual Fire Detection Algorithm for MODIS, *Remote Sensing of Environment* 87:273-282.
- Y.J. Kaufman, R.G. Kleidman, and M.D. King, 1998, SCAR-B fires in the tropics: Properties and remote sensing from EOS-MODIS, *Journal of Geophysical Research* 103 (D24):31955-31968.
- S.C. Liew, A. Lim, and L.K. Kwoh. 2006. Deriving Optimal Threshold for Active Fire Detection. In *Proc. IEEE International Geoscience and Remote Sensing Symposium*. Denver, Colorado, USA.
- D.S. Moore, and G.P. McCabe, 2003, *Introduction To The Practice Of Statistics*, 4th ed, New York, W.H. Freeman and Company.
- J. Pallant, 2011, *SPSS Survival Manual*, 4th ed, New South Wales, Allen & Unwin.
- W. Schroeder, I. Csiszar, and J. Morisette, 2008, Quantifying the impact of cloud obscuration on remote sensing of active fires in the Brazilian Amazon, *Remote Sensing of Environment* 112 (2):456-470.
- Y. Vetrita, N.S. Haryani, and M.R. Komaruddin, 2012, Validasi Hotspot MODIS Indofire di Propinsi Riau, *Jurnal Geomatika* 18 (1):1-13.

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MYOUNG-SEOK SUH	8	SEONGSU JEONG	595
MYUNG-HEE JO	37,40	SEON-WOONG JANG	434,437
N. HASEBE	582	SEUL-HYUN PARK	396
N. YAMASHITA	582	SEUNG HEE KIM	185
NAKHAPAKORN KANCHANA	603	SEUNGJAE HAN	560
NAM-WON MOON	344	SEUNG-JO KIM	119
NAOTO EBUCHI	599	SEUNGJOON KWON	43,47
NAOYUKI YAMASHITA	578	SEUNG-YEOL OH	434,437
NGUYEN THANH HOAN	195	SHAHAB SHERAFATI	118,543
NGUYEN-THANH SON	466	SHIH-YUAN LIN	347
NOBUAKI NISHI	316	SHINGO KOBAYASHI	578
NOBUHIRO TOMIYAMA	229	SHIN-HUI LI	99
NOBUYUKI HASEBE	578,587,613,617	SHOUHEI KIDERA	153
NO-WOOK PARK	139,215	SINJAE YOO	292
OBAID AL-SHEHHI	523	SOL-E CHOI	382
OLIVIER FORNI	582,578	SOOAHM RHEE	507
OLIVIER GASNAULT	578,582	SOOYOUNG PARK	149
OSAMU SAITOU	446	SOYEON KIM	396
PATRIC SEIFERT	4	SO-YEON KIM	407
PAUL HARTOGH	591	SUG-WHAN KIM	395
PETER FEARNES	539	SU-HYUN PARK	73,77
PETER T.Y. SHIH	607	SU-JIN CHOI	81
PIN-YU HUANG	15	SUNG WOONG SHIN	59
PO-CHIA YEH	511	SUNGCHUL HONG	595
R. C. REEDY	582	SUNG-HWAN PARK	280
REIKO TANAKA	617	SUNG-JAE KIM	40
RICHARD STARR	617	SUNGKYUN SHIN	4,142
ROBERT REEDY	578	SUN-GU LEE	131
RYO YAMAGUCHI	153	SUNGWOOK HONG	441
RYUTARO TATEISHI	195	SUN-JU LEE	51
S. KOBAYASHI	582	T. B. CHAE	504
SAEED AL-MANSOORI	523	T. PLATZ	609
SANG HYOUK SEO	549	TAE HWA KIM	549,552
SANGA-NGOIE KAZADI	569	TAE-HO KIM	577
SANGGOO KANG	369	TAEJIN PARK	207,383
SANG-HOON HONG	399	TAEJUNG KIM	173,507
SANG-IL AHN	103,492	TAE-SUNG KIM	441
SANG-IL KIM	462	TAI-HYUN HAN	55
SANG-RYOOL LEE	454	TAKAO KOBAYASHI	586
SANG-SOON YONG	413,500	TAKEHITO MORIMATSU	300
SANG-WAN KIM	407	TAKEO TADONO	229

TAKURO KODAMA	617	YA-WEN LIN	573
TAKURO MASUDA	203	YEE-JIN CHEON	69, 73, 77
TANG-HUANG LIN	136, 259, 308	YI-CHEN SHAO	169
TATSUAKI OKADA	578, 617	YI-HSING TSENG	332, 336, 340
TEE-ANN TEO	99	YING LI	195
TERUO OHSAWA	296, 358	YONG IL KIM	114, 223
TETSUO KIRIMOTO	153	YONG-HOON KIM	344
TETSUSHI TACHIKAWA	536	YONG-HYUN CHUNG	437
THACH NGOC NGUYEN	449	YONG-SEUNG KIM	131
TIAN-YUAN SHIH	193	YOSHIAKI HONDA	403
TIMOTHY J. FAGAN	617	YOSHIHARU AMANO	617
TOMOHIRO YAMASHITA	296	YOUNG BAEK SON	245
TORU OHTA	617	YOUNG J. KIM	86
TOSHIYUKI KOBAYASHI	195	YOUNG JE PARK	245
TSEVENGEE ENKHZAYA	195	YOUNG JOO KWAK	149
TSUNEO MATSUNAGA	108, 515	YOUNG M. NOH	142
TSUTOMU YAMANOKUCHI	229	YOUNG-JE PARK	56, 309, 387, 388
W. V. BOYNTON	582	YOUNGMIN NOH	4
WATARU TAKEUCHI	548	YOUNGSUN KIM	413, 500
WEI-TSUN LIN	193	YOUNG-WAN CHOI	527
WEN-CHANG YANG	324	YOUN-KYU KIM	390, 391
WEN-CHI CHANG	15, 508	YOUN-SOO KIM	131, 399
WENDY WRIGHT	241	YU OISHI	108, 515
WE-SUB EOM	390, 391	YU-CHI YANG	3
WILLIAM BOYNTON	617	YU-CHIA HUNG	336
WON SEOK CHOI	114	YU-CHUAN CHANG	22
WON-GYUM KIM	344	YU-CHUN YEN	511
WON-MOON CHOI	417	YUEI-AN LIOU	389
WOOK HYUN CHOI	552	YU-HUA LU	181
WOOK PARK	248	YU-HWAN AHN	55, 245, 387
WOO-KYUN LEE	207, 382, 383	YUJI KUWAHARA	146, 446
WOYONG HAN	442	YUJI SAKUNO	288, 316, 366
XIAOYE LIU	241	YUKARI FUJIBAYASHI	578
Y. KAROUJI	582	YUKI OYAMA	617
Y.J. KIM	4	YUKIO KOIBUCHI	316
YA-CHING HSU	271	YUKO TAKEYAMA	358
YALI ZHANG	304	YUNJAE CHOUNG	37
YANG-JEN CHEN	90	YUN-JOU LIN	33
YAO-CHENG KUO	458	YUSAKU ONO	403
YAO-TSUNG LIN	99	YU-TANG HUANG	233
YASUHIRO NAKAMURA	284	YUZURU KAROUJI	578, 613
YASUHIRO YOKOTA	108	ZACH GUBRAN	260
YASUSHI YAMAGUCHI	536	ZHENYU ZHANG	241
YASUYUKI WATABE	515		