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Proceedings
of the International
Conference on Radioscience,
Equatorial Atmospheric
Science and Environment
and Humanosphere Science,
2021

Springer Proceedings in Physics

Volume 275

Indexed by Scopus

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ISSN 0930-8989

ISSN 1867-4941 (electronic)

Springer Proceedings in Physics

ISBN 978-981-19-0307-6

ISBN 978-981-19-0308-3 (eBook)

<https://doi.org/10.1007/978-981-19-0308-3>

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This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd.

The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Preface

The human environment is rapidly changing with complicated interactions, threatening human existence and human living. To establish the Sustainable Humanosphere, international collaboration and expansion of Humanosphere Science on a global scale is important.

In 2016, Research Institute for Sustainable Humanosphere (RISH) launched a program called the Humanosphere Asia Research Node (ARN) to strengthen the hub functions of international collaborative research and fostering talented people who expand the field of Humanosphere Sciences internationally. ARN integrates various facilities such as Equatorial Atmosphere Radar (EAR) and human networks in ASEAN region and Japan for consolidating the international collaborative research on “Sustainable Humanosphere.”

The Equatorial Atmosphere Radar (EAR) is a VHF atmospheric radar located in Kototabang, West Sumatra, Indonesia. It has been operated by collaboration between RISH and National Institute of Aeronautics and Space of Indonesia (LAPAN) since 2001. RISH has conducted a collaborative research program by using the EAR and its related facilities since 2005 to enhance scientific research activity conducted with the EAR and associated facilities. To exchange information on a wide range of research results from the EAR and related facilities during 20 years, and to further strengthen the international network, RISH and LAPAN organize the symposium. This symposium is a joint program of LAPAN-Kyoto University with the title “The 6th Asia Research Node Symposium on Humanosphere Science,” and “INternational Conference on Radioscience, Equatorial Atmospheric Science and Environment (INCREASE).” Due to the COVID-19 outbreak and travel restrictions, the symposium will be held online.

The symposium aims to share the concept and recent advances of Humanosphere in scientific and technological advances such as atmospheric science, environmental science, space science, material science, plant science, entomology, microbiology, ecology, forestry, wood science, chemistry, biochemistry, molecular biology, architecture, electromagnetic engineering, agriculture and other related sciences contributing to creating “Sustainable Humanosphere.”

“The 6th Asia Research Node Symposium on Humanosphere Science,” and “INternational Conference on Radioscience, Equatorial Atmospheric Science and Environment (INCREASE)” symposium was organized from the office of Research Center for Climate and Amospheric, LAPAN, on September 20–21, 2021, in Bandung, Indonesia, and held virtually considering high cases of COVID-19 around the globe.

Nevertheless, the committee received an overwhelming response in term of number of registered participants. The total participant attending this virtual symposium reach 114 people. The participants were from Indonesia, Japan, India, USA, Egypt, Europe, China and Australia.

We decided that the speakers could only present their work in oral for 10 m. After three or two speakers delivered their research, we accommodated question and answer sessions for 10 m for these speakers. Furthermore, we facilitate the manuscripts to be published at a journal with peer-reviewed process by experts in the field. One manuscript is reviewed by two reviewers and the handling editor decided whether a manuscript can be accepted or rejected mainly based on the reviewer’s comments. In this symposium, 182 manuscripts submitted, 80 manuscripts were proceeded to publication process and suitable for scientific publication.

We want to thank participants and speakers who attend and support the 6th Asia Research Node Symposium and INCREASE. Also, we thank to scientific committee and reviewers for their precious time, and lastly many thanks to the local organizing committee for the hard work so that the 6th Asia Research Node Symposium and INCREASE can be done successfully. See you all in the next ARN and INCREASE Symposium.

Bandung, Indonesia

Dr. Erma Yulihastin
Editor in Chief of INCREASE
Proceeding 2021

Contents

1	Reducing Sugars Production from Oil Palm Empty Fruit Bunches (OPEFB) by Combined Dilute Acids-Hydrothermal Pretreatment	1
	Fahriya Puspita Sari, Fitria, Sita Heris Anita, Maulida Oktaviani, and Widya Fatriasari	
2	The Decline of Surface Global Solar Radiation at Palembang City of Indonesia Correlated to the Smoke Events in 2019	15
	Saipul Hamdi, Sumaryati, and Syahril Rizal	
3	Atmospheric Response to the Southern Java Upwelling Variability Associated with Positive Indian Ocean Dipole Event	25
	Rahaden Bagas Hatmaja, Christine Cecylia Munthe, Erma Yulihastin, and Kadiman Erfitra Pramudia	
4	Technological Properties of Formaldehyde Free Adhesives Based on Oxidized Starch Mixed with Different Crosslinkers for Plywood	39
	Apri Heri Iswanto and Muhammad Adly Rahandi Lubis	
5	Characteristic of Precipitable Water Vapor in 2017–2019 Over Bandung Estimated by GPS Data	51
	Atep Radiana, Saipul Hamdi, Arif Aditiya, Fahmi Rahmatia, and Sjafrizon	
6	Convectively Coupled Equatorial Waves (CCEWs) Triggering Torrential Rainfall Events Over Sumatra, Indonesia	61
	Muhamad R. Respati, Sandro W. Lubis, Sonni Setiawan, and Rahmat Hidayat	
7	Kelvin Wave Activity in the UTLS Over the Maritime Continent from GPS RO Measurements	83
	Diah A. Tiyas, Sandro W. Lubis, and Sonni Setiawan	

8	The Influence of the QBO on the MJO-Related Rainfall Variability over the Maritime Continent	97
	Aldiatama Jumanissaba, Sandro W. Lubis, and Sonni Setiawan	
9	Water Quality Assessment for Detecting Submarine Groundwater Discharge (SGD) Pollution in the Coastal Area of Krakas Beach, North Lombok District, Indonesia	121
	Wisnu Arya Gemilang, Ulung Jantama Wisna, and Hendra Bakti	
10	The Influence of Boreal Summer Madden–Julian Oscillation on Precipitation Extremes in Indonesia	133
	Fadhil R. Muhammad, Sandro W. Lubis, and Sonni Setiawan	
11	Smoke Propagation During Fire in Kalimantan and Sumatra in 2015 and 2019	145
	Sumaryati, Dita Fatria Andarini, Nani Cholianawati, and Asri Indrawati	
12	Dynamic Mechanical Properties of Acetylated Cassava Starch-Chitosan Based Film, With Addition of Sorghum Micro-Fibrillated Cellulose	159
	Yeyen Nurhamiyah, Resti Marlina, and Firda Aulya Syamani	
13	Characteristics of Acid Deposition in Urban and Sub-Urban Area	171
	Asri Indrawati, Dyah Aries Tanti, Nurokhman, Indra Chandra, Atep Radiana, Wiwiek Setyawati, and Sumaryati	
14	Evaluation of CCAM Seasonal Prediction by GSMaP Satellite Rainfall Data in Indonesia	183
	Haries Satyawardhana, Erma Yulihastin, Gammamerdianti, Candra Nur Ihsan, and Eka P. Wulandari	
15	Solar Wind Speed Time-Series Forecasting Based on Long Short-Term Memory (LSTM) Neural Network Model	193
	Tiar Dani, Rhorom Priyatikanto, Anton Winarko, and Gerhana Puannandra Putri	
16	On the Mechanism of Anomalously Wet and Cold Weather Over Java in June	199
	Suaydhi	
17	Outstanding Issues in the Future Rainfall Projection Over Indonesia	211
	Yudha Setiawan Djamil, Tri Wahyu Hadi, Wirid Birastrri, and Wang Xianfeng	

18 Atmospheric Residual Layer Height Variations on Clear and Rainy Days Based on High-Resolution Radiosonde and Global Positioning System Radio Occultation Data 219
 Resa Pratikasari, Nurjanna Joko Trilaksono, and Noersomadi

19 The Response of Rainfall in Sumatera to Indian Ocean Dipole Phenomenon 233
 Fahmi Rahmatia, Listi Restu Triani, and Amalia Nurlatifah

20 Analysis and Verification of Fire Danger Rating System (FDRS) Parameters in Land and Forest Fire in West Kalimantan in 2019 and Its Relationship with Hotspots and Rainfall 247
 Jihan Putri Amelia, Zadrach Ledoufij Dupe, and Indah Prasasti

21 Exploring an Extension of Space Situational Awareness in Southeast Asian Region Utilizing EAR Observation Data 265
 Afrizal Bahar, Varuliantor Dear, Asnawi Husin, Agri Faturahman, Jiyo, and Rezy Pradipta

22 The Comparison of Z-R Relation Methods on Convective and Stratiform Rain of Quantitative Precipitation Estimation (QPE) in East Java Area 273
 L. Bangsawan, R. H. Jatmiko, and E. Nurjani

23 Ionospheric Observation Using Equatorial Atmosphere Radar (EAR) Kototabang for the 26 December 2019 Annular Solar Eclipse Research 287
 Agri Faturahman, Varuliantor Dear, Jiyo, Afrizal Bahar, Asnawi Husin, and Rezy Pradipta

24 Atmospheric Methane Variability During Upwelling Events in the Southern Coast of Java, Indonesia 295
 Rahaden Bagas Hatmaja, Fildzah ‘Adany, Wilin Julian Sari, and Prawira Yudha Kombara

25 Preliminary Study on the Utilization of Sugarcane Trash and Corncob for Xylo-Oligosaccharides and Xylose Production Through Dilute Acid Hydrolysis 305
 Thesalonica Yohana, M. Zuvan Maulana Fahrezi, Adetya Lianawati, Riska Surya Ningrum, Dwi Ajias Pramasari, Riksfardini A. Ermawar, Dewi Sondari, and Euis Hermiati

26 Influence of Local Wind Respect to the PM_{2.5} Dispersion in Bandung Basin 315
 Prawira Yudha Kombara and Nani Cholianawati

27	Correlation Between Radiation Measurement on the Field Slopes Using KURAMA-II(Kyoto University Radiation Mapping System) and Environmental Radioactivity in the Soil Depth Direction	327
	Yoshikatsu Ueda, Naoto Nihei, Rattanaporn Norarat, and Minoru Tanigaki	
28	Chemical Characteristics of Rainwater in Bandung and Koto Tabang	335
	Fandy Balbo, Rusmawan Suwarman, and Arika Indri Dyah Utami	
29	Evaluation of the Surface Wind Speed, Shear of Wind Speed, Shear of Wind Direction and Richardson Number at Soekarno-Hatta Airport Using Wyoming Radiosonde Data	351
	Ina Juaeni, Elfira Saufina, Ridho Pratama, Dita Fatria, Wendi Harjupa, and Ibnu Fathrio	
30	Interpolation Methods Evaluation on Arbitrary Straight Line of Flight Weather Data	363
	Aisya Nafiisyanti	
31	Performance Analysis of Platinum Wire Temperature Sensor for Radiosonde	371
	Soni Aulia Rahayu, Rachmat Sunarya, Edy Maryadi, Laras Toersilowati, Listi Restu Triani, and Christine Cecylia Munthe	
32	Feasibility Test of Using Disposable Baby Diaper Waste as Raw Material for Fiberboard	383
	Sri Purwati, Djoko Sihono Gabriel, and Kurnia Wiji Prasetyo	
33	Intraseasonal and Interannual Variability of Cumulonimbus Cloud Over the Maritime Continent	395
	Suaydhi and Gammamerdianti	
34	Impact of Plasma Depletion on the Occurrence of Scintillation in the Minimum Years Phase of Solar Cycle 23	407
	Ednofri and Susumu Saito	
35	Effect of Precipitation Time on the Physicochemical Properties of Modified Sago Starch	423
	Riska Surya Ningrum, Fadia Idzni Rodhibilah, Dewi Sondari, Sudarmanto, and Dwi Ajias Pramasari	
36	Air Quality in the Bandung Basin of Indonesia as Measured by Passive Sampler	435
	Wiwiek Setyawati, Dyah Aries Tanti, and Asri Indrawati	
37	A Low-Cost and Practical Method for Determining Raindrop Size from Spray Nozzle by Using a Mobile Phone Camera	449
	Jesi Pebralia and Iful Amri	

38	Biomonitoring of Polycyclic Aromatic Hydrocarbons in the Ambient Air Using Plants: A Review	457
	Desy Sulistiyorini, Christophe Walgraeve, and Herman Van Langenhove	
39	Satellite Rainfall Estimation from Himawari-8 Multi Channels Observation Based on AWS Data Trained Machine Learning Methods	495
	Farid Lasmono, Risyanto, Fadli Nauval, Elfira Saufina, Trismidianto, and Teguh Harjana	
40	Utilization of Agroindustrial by Product for Bioinsecticide Production	507
	Kirana Sanggrami Sasmitaloka, Mulyorini Rahayuningsih, and Titi Candra Sunarti	
41	Spatial Distribution of Nutrient Export from the Catchment Area of Lake Rawapening	517
	Nunung Puji Nugroho	
42	Public Urban Park Quality Assessment Using Fuzzy C Means Classification of Land Surface Temperature and Social Function	531
	Arif Wicaksono	
43	Zone of Biodiversity Extinction in Coral Reef Ecosystem in Sumatra Island Using Climate Change Scenarios	545
	Muhammad Hanif, Rizki Atthoriq Hidayat, Giant Amor, Luhur Moekti Prayogo, Ahyuni, and Arie Yulfa	
44	Comparison of Cloud Base Height in Kototabang from Ceilometer, Radiosonde and Himawari-8 Observations During 2016–2020	559
	Ridho Pratama, Muhammad Fadhlan Putranto, Fahmi Rahmatia, Ina Juaeni, Risyanto, Wendi Harjupa, Fadli Nauval, and Marzuki Marzuki	
45	Influence of Different Pretreatment Methods and Yeast Strains on Xylitol Production from Sugarcane Trash Hemicellulose Hydrolysate	567
	Maulida Oktaviani, Fahriya Puspita Sari, Benjarat Bunterngsook, Euis Hermiati, Verawat Champreda, and Takashi Watanabe	
46	Modulation of Diurnal Cycle of Rainfall Over the Western Maritime Continent Associated with Cold Surge and the Madden–Julian Oscillation	583
	Aldi Krismon, Muhammad R. Abdillah, and Nurjanna Joko Trilaksono	

47	Comparative Analysis of Upwelling Characteristics in Northeast and Southwest of Indonesian Seas Area	593
	Sigit Kurniawan Jati Wicaksana and Iis Sofiati	
48	Analysis of the Variation of the Upper Citarum Discharge and Its Relationship with La Niña	605
	Edi Rikardo Sinaga, Rusmawan Suwarman, Edi Riawan, Yogi S. M. Simanjuntak, and Yudha Setiawan Djamil	
49	Evolution of Mesoscale Convective Complex and Its Atmospheric Conditions During Heavy Rain in Bandung, 22 February 2018	613
	Fauziah Fangia Indra and Trismidianto	
50	Flare Potentiality Associated to Different Sunspot Groups During Solar Cycle 24 Observed by BPAA Pasuruan	627
	Amatul Firdausya Nur Cahyaningtyas, Siska Filawati, and Silvi Oktavia Hanum	
51	Automatic True Color Composites Generation Based on NOAA JPSS Satellites Data	637
	Karunika Diwyacitta, Budhi Gustiandi, and Andy Indradjad	
52	Estimating the Impact of Spatio-temporal Land Cover Changes on Land Surface Temperature and Air Quality Using Satellite Data in Beas Valley, Himachal Pradesh, India	651
	Sayanta Ghosh, Renu Lata, Isha Thakur, K. C. Gouda, and J. C. Kuniyal	
53	Assessing the Impacts of Anthropogenic Activities on Air Quality: A Study During the Lockdown in 2nd Wave of COVID-19 Pandemic in the Kullu Valley of North-Western Himalaya	675
	Isha Thakur, Renu Lata, Jagdish Chandra Kuniyal, and Sayanta Ghosh	
54	Ozone Variability at 10 hPa Altitude in Indonesia Based on MERRA-2 Data	687
	Prawira Yudha Kombara and Ninong Komala	
55	Variation of the Wind Profiles in the Tropical Tropopause Layer Associated with QBO-MJO Connection: An Equatorial Atmosphere Radar Observation	695
	Arlif Nabilatur Rosyidah, Nurjanna Joko Trilaksono, and Noersomadi	
56	Effect of Meteorology Parameters on Air Pollutant Standard Index in the Urban Area (Case Study in Jakarta)	705
	Dessy Gusnita	

57 Atmospheric Conditions Associated with Northerly Surge, Borneo Vortex and Madden Julian Oscillation During the Extreme Rainfall Cases in Early 2021 Over the Western Part of the Maritime Continent	717
Anis Purwaningsih, Albert Klein Tank, and Jordi Vila	
58 Analysis of Multi-scale Meteorological Parameter Triggering Seroja Tropical Cyclone and Its Effect on Extreme Rainfall Over Nusa Tenggara Timur	737
Luthfiyah Jannatunnisa and Trismidianto	
59 Estimating Rainfall Data Using Tropical Rainfall Measuring Mission (TRMM) Data: A Study Case in Pesawaran Meteorology and Geophysics Agency	755
Ali Rahmat and Fajar Setiawan	
60 GSMaP Seasonal Rainfall Verification Over Western Java	761
Arifatus Hikmah Rusmanansari, Rusmawan Suwarman, Yudha Setiawan Djamil, and Yan Firdaus Permadhi	
61 Prediction of Extreme Rainfall of September 9, 2020 in Padang City Based on Clouds Brightness Temperature Difference from Himawari-8 Satellite Data	771
Nining Jumianti, Marzuki Marzuki, Wendi Harjupa, Risyanto, and Muhammad Fadhlan Putranto	
62 Simulation of Solar Flare Mechanism Based on Ideal Magnetohydrodynamics State by Disrupting the Stability of Magnetic Field Due to the Plasma Momentum Injection	789
Ni'matus Sholikhah and Bambang Setiahadhi	
63 Diurnal Variation of Fine Particulate Matter in Indonesia Based on Reanalysis Data	803
Nani Cholianawati	
64 Weather Prediction System Using Thomas-Fiering Model to Determine Initial Planting Recommendations in Bandung City	813
Candra Nur Ihsan and Nova Agustina	
65 Correlation Investigation Between Aerosols Properties, Meteorological, and Environmental Variables During Summer Monsoon in Riau Province, Indonesia	827
Wilin Julian Sari, Waluyo Eko Cahyono, Prawira Yudha Kombara, Emmanuel Adetya, and Rahaden Bagas Hatmaja	

66 Simulation and Evaluation of Particulate Matter (PM): A Case Study of Haze During September 2019 in Palangkaraya City, Indonesia 835
 Waluyo Eko Cahyono, Prawira Yudha Kombara, Wilin Julian Sari, and Emmanuel Adetya

67 Determination of Priority Locus of Handling Stunting and Regional-Based Stunting Management Strategies in Serang City 843
 Erti Nurfindarti and Nugrahana Fitria Ruhyana

68 Palu Koro Fault Zone Microzonation and Its Relation to Potential Hazard 861
 Muhammad Hanif, Adrin Tohari, and Dadan Dani Wardhana

69 Utilizing the Global Positioning System (GPS) Data from Sumatran GPS Array (SuGAR) to Measure Seismic Deformation Related to the Mw7.6 Padang Earthquake 2009 869
 Galang P. Refindo, Nabilla F. Syafitri, Tsany N. A. Yenuar, Muhammad Hamidi, Marzuki Marzuki, Elistia L. Namigo, and Deasy Arisa

70 The Characteristic of Solar Flare and CMEs that Caused SPE During 24th Solar Cycle 883
 Neflia

71 Continuum Study on Uranus at the Millimeter/Submillimeter Wavelength with ALMA Data 893
 Farahhati Mumtahana and Taufiq Hidayat

72 Spatial Modeling of Tidal Flood Due to the Fishpond to Tidal Waves in Bengkalis, Indonesia 915
 Giant Amor, Muhammad Hanif, Arie Yulfa, Rizki Athorik Hidayat, and Poppy Indrayani

73 Indo-Australian Plate Velocity Measurement During Interseismic Phase in 2010–2014 Using Sumatran GPS Array (SuGAR) Data 925
 Vira Friska, Deasy Arisa, Marzuki Marzuki, and Fadilla Monica

74 Deformation Analysis During the Pre-, Co- and Post-Seismic Phases Associated with the 2019 Mw6.0 Mentawai Earthquake Using Satellite Geodetic Technology from Sumatran GPS Array (SuGAR) Data 935
 Fadilla Monica, Deasy Arisa, Marzuki Marzuki, and Vira Friska

75 Assessing Potential Human and Economic Loss of Tsunami Impact in Cilacap City, Indonesia a Geospatial Approach 947
 Ranie Dwi Anugrah and Stevani Anggina

76	Effects of El-Nino and La-Nina on the Velocity Potential at 200 hPa over Maritime Continent	957
	Eddy Hermawan, Tyo Maulana, Rahmat Gernowo, and Dita Fatria Andarini	
77	Soil Tillage System and Water Management Effect on Soil Physical Properties and Yield in Rainfed Paddy Field	971
	Nourma Al Viandari, Anicetus Wihardjaka, Heru Bagus Pulunggono, and Suwardi	
78	Geochemical Weathering Indices of Volcanic Soil After the Eruption from Mount Sinabung in 2020	979
	Retno Leodita Lubis, Juniarti Juniarti, Saftia Laila Rajmi, Aldi Nanda Armer, Novika Yulanda, Fakhrijal Rizki Hidayat, Hazi Zulkhakim, Ichsan Faishal Syukri, Frisa Irawan Ginting, and Dian Fiantis	
79	2D and 3D Subsurface Geological Model of Baribis Fault Zone Using the Gravity Method	991
	Muhammad Hanif and Lina Handayani	
80	Risk Management of Spaceport in Indonesia: Vulnerability Level of Biak Spaceport	999
	Intan Perwitasari, Stevani Anggina, and Arif Nur Hakim	

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Chapter 1

Reducing Sugars Production from Oil Palm Empty Fruit Bunches (OPEFB) by Combined Dilute Acids-Hydrothermal Pretreatment



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Abstract OPEFB (oil palm empty fruit bunches) is one of the residues of oil-palm industry which can be utilized as bioethanol feedstock due to its high holocellulose content of about 60%. As with other bioethanol production from lignocellulosic biomass, OPEFB must be pretreated before subsequent enzymatic hydrolysis to break down or loosen the linkage of cellulose, hemicellulose, and lignin. Therefore, this study investigated the influence of three different acids (oxalic, maleic, and sulfuric acids), three concentrations (1, 3, 5%), and three heating durations (15, 30, 45 min) in an autoclave (121.1 °C) on the pretreatment of OPEFB and to evaluate sugar production after enzymatic hydrolysis of the pretreated OPEFB. The results show that maleic acid gave the highest reducing sugar yield of 19.78% at a 5% concentration for a 15 min heating duration. On comparison, 16.41 and 15.40% of reducing sugar yields were obtained from oxalic acid (5%, 15 min) and sulfuric acid (1%, 15 min) pretreated OPEFB, respectively. This study shows the promising result of using maleic acid for lignocellulosic pretreatment compared to oxalic and sulfuric acids.

1.1 Introduction

Lignocellulosic biomass is an intriguing alternative feedstock for the generation of biofuels, bio-based chemicals, and biomaterial precursors. Over the last two decades, lignocellulosic biomass such as sugarcane bagasse has grown in popularity [1], while bamboo [2], corn cob, rice husk, cassava peel [3] has been extensively studied for biofuel production. Oil palm empty fruit bunches (OPEFB) are the most researched

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