



First AOGS-RAC Webinar on

Initiatives in Regional Cooperation

Wing Ip

January 27, 2021

AOGS-RAC Mission

The Regional Advisory Committee (RAC) is established to further fulfil the AOGS vision “In Asia for Asia and the World”. RAC members are AOGS Advocates who:

- Promote and advise on the allocation of resources and services that will support geosciences research and scholarships in their home countries**
- Provide community-based support in planning and promoting AOGS strategic master plan and processes**

RAC Mission is to develop AOGS into the largest non-profit, geoscience networking group in Asia and their main goals are to

- Enhance membership and participation from the geoscientists in ASEAN and India**
- Promote multi-lateral academic interaction among various research labs**
- Identify opportunities that address diversity, equity and inclusion**

AOGS-RAC (2020-2022)



[Malaysia]
Zamri Zainal ABIDIN
University of Malaya



[India]
Punyasloke BHADURY
Indian Institute of Science



[India]
Jitendra GOSWAMI
Physical Research Labor



[China]
Jiansen HE
Peking University



Wing-Huen IP
National Central University



[Indonesia]
Fajar Adi KUSUMO



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Natt LEELAWAT
Chulalongkorn University



[Taiwan]
Lang-Huang LIN
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[Canada/Vietnam]
Van-Thanh-Van NGUYEN
McGill University



[Japan]
Takehiko Satoh
Japan Aerospace Exploration Agency

The GDP Chart

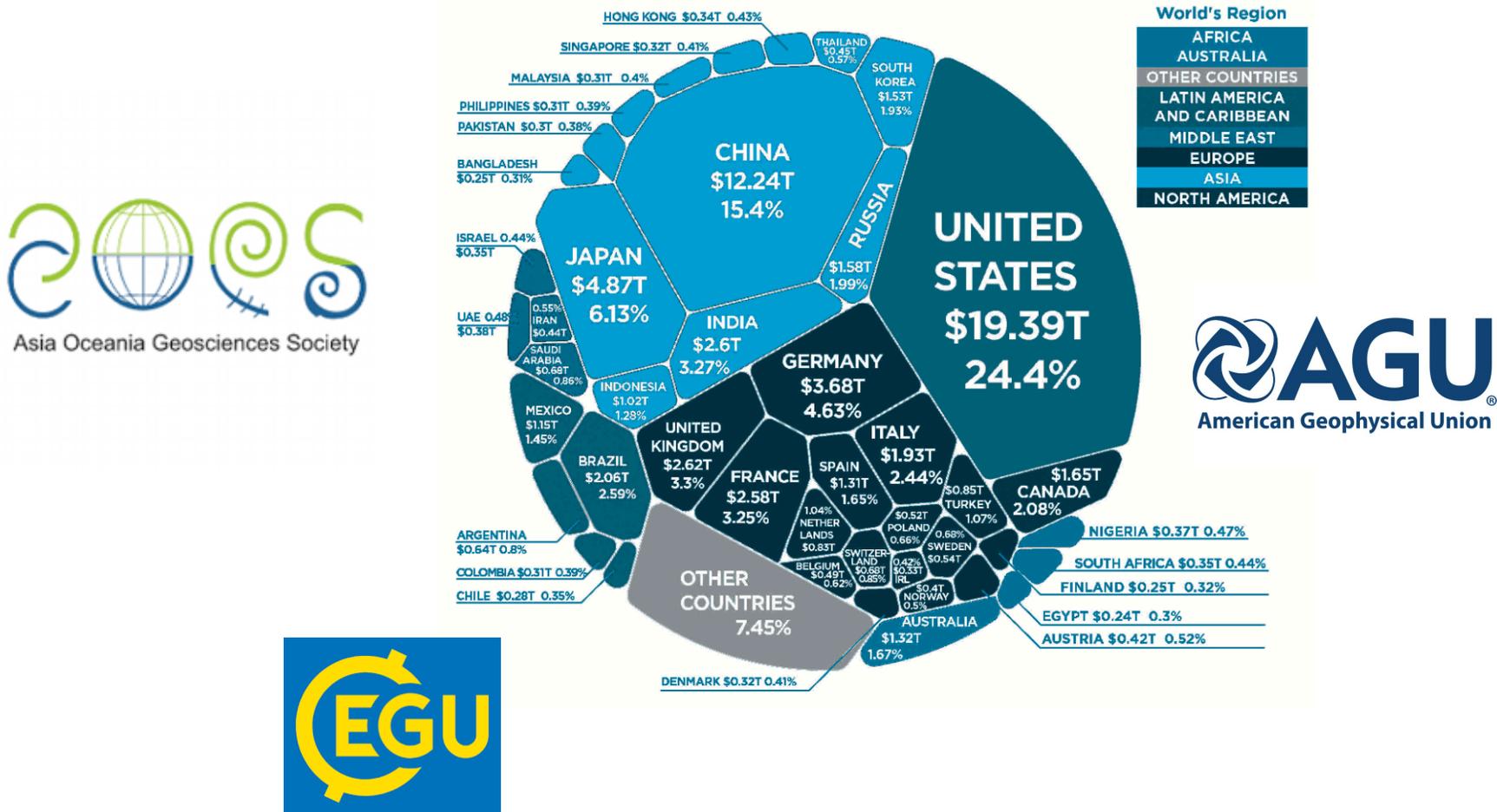
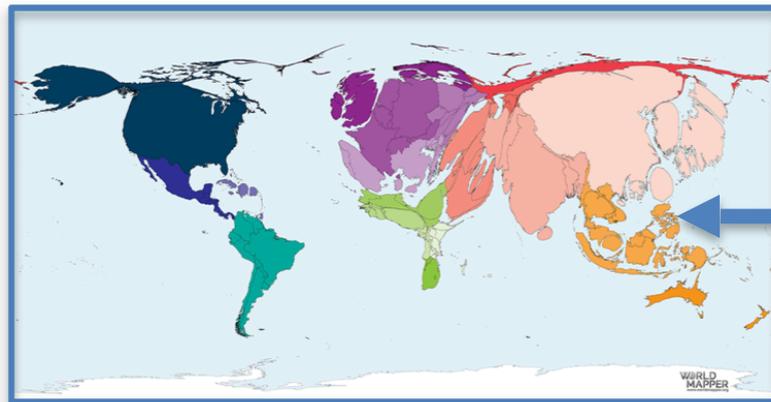


Figure 1. The Voronoi diagram of GDP distribution by country in 2017.
 Figure source: <https://www.visualcapitalist.com/80-trillion-world-economy-one-chart/>

The AOGS' New Map (in PPP)



<https://worldmapper.org/maps/gdp-2018/>

Core Values

- Cooperative academic programs
- High-priority research topics for AOGS
- Scientific exchange and study opportunities
- Job opportunities
- Suggestions of topics for future scientific sessions

Projects

- (1) Young Scientist Showcases Virtual Talks
- (2) Extended Abstracts/Proceedings
- (3) AOGS Satellite Meetings
- (4) Regional Cooperation Initiatives Webinar

(1) Young Scientist Showcases Project

- Online talks by graduate students and early career researchers in Asia to introduce their works.
- Academic network building among young generation of Asian geoscientists.
- Development of scientific cooperation and mentorship across borders.

(1) Young Scientist Showcases Project



Energetic Ion Dynamics
Near the Cusp Region of Mercury

Eunjin Jang

Supervisor : prof. Chao Yue

Institute of Space Physics and Applied Technology, Peking University




Identifying the level of Geomagnetic Induced Current (GIC) at Malaysian Bulk Power System based on Space Weather Perturbation Impact

PRESENTED BY:

NAME: Kharismi Bin Burhanudin
(Center/Laboratory for Space Weather and Satellite System)
Postgraduate Student of Electrical Engineering Faculty

SV: Prof Madya Ir. Dr. Mohamad Huzaimy Bin Jusoh
Co-SV: Prof Madya Ir. Dr. Ahmad Farid Bin Abidin
Dr. Muhamad Nabil Bin Hidayat





GEOCHEMISTRY OF SEDIMENTARY ROCKS FROM NORTH CHINA CRATON: IMPLICATIONS FOR PROVENANCE, ENVIRONMENT OF DEPOSITION AND TECTONIC SETTINGS

Presenter: Yasin Rahim
Adviser: Qiugen Li



Solar Radio Astronomy

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REMOTE DATA ACQUISITION OF GEOMAGNETIC DATA USING MAGDAS IN MALAYSIA LOW LATITUDE REGION

ASIA OCEANIA GEOSCIENCES SOCIETY 2020

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Characterization of iron-ore in upper layer alluvium, coupled with mineral phase equilibria and solubility in shallow groundwater of lower Kelantan Basin, North-eastern coast of Malaysian Peninsula

By
Usman Abdullahi Usman
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Post-graduate research fellow
(Doctor of Philosophy)

Research supervision by:
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(1) Young Scientist Showcases Project

Personal Information

Name: Disyacitta Awanda
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Education background:
2013-2018:

- Undergraduate: Cartography and Remote Sensing, Faculty of Geography, Universitas Gadjah Mada, Indonesia.

 2019-Present:

- Master degree: Master Program of Remote Sensing Science of Technology, Center for Space and Remote Sensing Research, National Central University, Taiwan.



Disyacitta Awanda

Monitoring Land Subsidence Induced by Groundwater Change Using Sentinel 1 and GRACE Satellite Observations

PERSONAL INFORMATION

Yan Akhbar Pamungkas - Indonesian
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Research Interests
Synthetic Aperture Radar (SAR), Landscape Evolution, Land Subsidence, Urban and Regional Planning, Tourism Management.

Educational Background
2nd Year Master Student of Center for Space and Remote Sensing Research (CSRSR), National Central University, Taiwan (2019 – present)
Bachelor degree of Urban and Regional Planning, Universitas Brawijaya, Indonesia (2013 – 2017)

Working Experiences
Urban Planner (September 2018 – January 2019)
Urban and Regional Scientist (2017-2018)



巴志軒

Identifying The Seasonal Relationship between Aerosol Properties and Urban Heat Island (UHI) in Megalopolis Cities

Presenter: Debora Truly Marpaung

Advisor: Prof. Lin, Tang-Huang

2020/12/04



Debora Truly

Personal Information



- Name: **PhD. DUONG THI LOI**
- Nationality: **VIET NAM**
- Occupation: **Lecturer, Cartography – Remote Sensing and GIS Department, Faculty of Geography, HNUE.**
- Email: duongloi1710@gmail.com
- Interests: **geography, application of GIS and remote sensing**

INTEGRATION OF GIS AND REMOTE SENSING FOR EVALUATING FOREST CANOPY DENSITY INDEX IN THAI NGUYEN PROVINCE, VIETNAM

Authors: Trung-Hieu Ha, Loi Duong Thi
University of Transport and Communications, Vietnam
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27/10/17

PERSONAL INFORMATION



Full name: **Ha Trung Hieu**
Email: hieuhh@utc.edu.vn
Lecturer, Researcher at University of Transport and Communications, Vietnam

Education background
 - Undergraduate student and Master student in Civil Engineering at University of Transport and Communication, Vietnam
 - PhD student (2017-2020) Ph.D. Program for Civil Engineering, Water Resources Engineering and Infrastructure Planning, major: Geo-informatics – Feng Chia University, Taiwan

Research interests:
 - Civil Engineering
 - Time series data analysis
 - Geo-informatics technologies and applications

16/10/17

(2) Extended Abstracts

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EPSC-DPS Joint Meeting 2019
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EPSC
EPSC-DPS Joint Meeting 2019
15-20 September 2019 | Geneva, Switzerland

DSMC Simulation of Europa's Gas Plume

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Abstract

The evidence of the water vapor plume at Europa has been found by [1]. We adopt a DSMC (Direct Simulation Monte Carlo) method with the gravitational effect to investigate the gas expansion from the collisional region close to the Europa's surface to the free flow region. It allows us to study the deposition of different size of icy dust grains on the surface. In addition, we also extend the model of gas ejection from Europa to the Jovian system. We will show the gas torus around the orbit of Europa.

1. Introduction

The one of the target of JUICE mission, the Jovian icy moon, Europa, with a radius of 1560 km and a bulk density of 3.03 g cm⁻³ covered by an icy crust has an albedo 0.64, one of the highest of Galilean moons. The vapor plume activity has been detected on Europa by the ultraviolet emissions of Hubble Space Telescope observations in November and December, 2012. It was suggested that two 200 km high plumes of water vapor with line-of-sight column densities of about 10²⁰ m⁻². The two sources are located at the southern hemisphere. [2] and [3] presented a new transit observation of Europa that show a second event of plumes raising the possibility of a consistently active source of erupting material on Europa. [4] showed the evidence of plume on Europa by using the in-situ observations of the Plasma Wave Spectrometer on the Galileo spacecraft. The water vapor plume might be related to the existence of the subsurface ocean [5] which has the potential to harbor life. In this work, we will show the motion of dust grains in the gas plume and the gas transfer to the Jovian system.

2. Method

2.1 DSMC Method

The DSMC method is proposed by [6] for solving the Boltzmann equation using direct simulation of particle collision kinetics, which can capture the non-equilibrium phenomena automatically and without any convergence problem. This method can be applied to all the rarefaction regions of gas flow from the collisional region to the free flow region. The ideal of DSMC method is to decouple the movement and collision phase by assuming a time step which is smaller than the mean collision time. By simulating a large amount of particles and taking average of steady flow samples, the gas flow distribution can be calculated. A 3D DSMC code, called PDSC++ [7], has been developed by using unstructured grid, variable time step scheme, and being parallelized for the cluster computing [8] [9].

2.2 Motion of Dust Grains

The motion of dust grains in the gas flow is by the gravity force and the drag force which can be written as:

$$m \frac{dv}{dt} = \frac{1}{2} C_d \sigma_d (\mathbf{v}_{gas} - \mathbf{v}_{dust}) |\mathbf{v}_{gas} - \mathbf{v}_{dust}| \rho_{gas} + \frac{GMm}{r^2} \hat{r}$$

where m and M are the mass of dust grain and Europa, σ_d is the cross section of dust grains, C_d is the drag coefficient, \mathbf{v}_{gas} is the velocity of the local gas flow, \mathbf{v}_{dust} is the velocity of dust grains, and ρ_{gas} is the mass density of the local gas flow.

2.3 The Three-body Problem

To apply the DSMC method to the gravitational field of Europa and Jupiter system. The equations of motion on a rotating coordinate system can be written as:

$$\begin{aligned} \ddot{x} &= 2y + x - \frac{(1-\mu)(x-x_1)}{r_1^3} - \frac{\mu}{r_2^2}(x-x_2) \\ \ddot{y} &= -2x + y - \frac{(1-\mu)y}{r_1^3} - \frac{\mu}{r_2^2}y \\ \ddot{z} &= -\left(\frac{1-\mu}{r_1^3} + \frac{\mu}{r_2^3}\right)z \end{aligned}$$

where

$$\begin{aligned} \mu &= m_2 / (m_1 + m_2) \\ x_1 &= \mu, x_2 = 1 - \mu \\ r_1 &= [(x-x_1)^2 + y^2 + z^2]^{1/2} \\ r_2 &= [(x-x_2)^2 + y^2 + z^2]^{1/2} \end{aligned}$$

m_1 and m_2 are the mass of Jupiter and Europa. The unit of time is $2\pi/T_1$ and T_1 is the orbit period of Europa ($T_1 = 85$ hr). The unit of length is normalized to the distance between Jupiter and Europa.

3. Result

Figure 1 shows an example of DSMC result of gas plume from Europa. Due to the gravitational effect, the gas stream line shows most of gas can't escape from the gravity of Europa. We assume a gas production rate of 500 kg/s with an initial velocity of 1 km/s and a temperature of 150 K. For the next step, we will tracking the trajectories of dust grains in the gas flow. The deposition of dust also will be modeled. In addition, we will also investigate the gas transfer for Europa to its gas torus by extending the DSMC model.

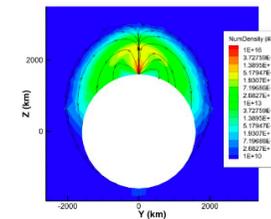
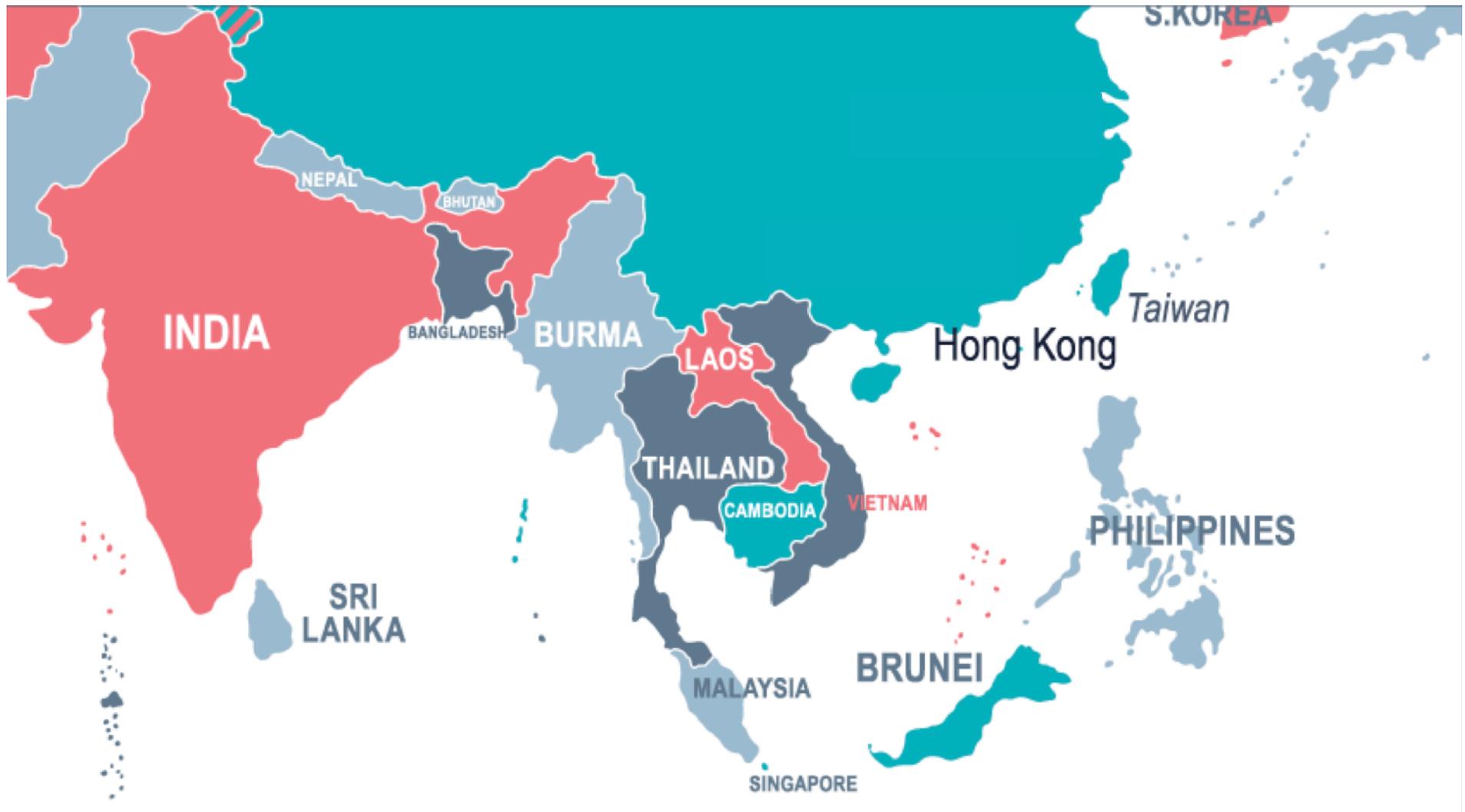


Figure 1 DSMC result of a gas plume on Europa.

References

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- [2] Sparks, W. B., Hand, K. P., McGrath, M.A., et al., The Astrophysical Journal, 829, 21. (2016)
- [3] Sparks, W. B., Schmidt, B. E., McGrath, M.A., et al., The Astrophysical Journal, 839, 5. (2017)
- [4] Jia X., Kivelson M. G., Khurana, K., et al., Nature Astronomy, 2, 459. (2018)
- [5] Kivelson, M.G., Khurana, K. K., Joy S., et al., Science 267, pp 1239-1241. (1997)
- [6] Bird, G. A., "Molecular Gas Dynamics and the Direct Simulation of Gas Flows" Oxford: Oxford Univ. Press. (1994)
- [7] Su, C.-C., "Parallel Direct Simulation Monte Carlo (DSMC) Methods for Modeling Rarefied Gas Dynamics", PhD Thesis, Department of Mechanical Engineering, National Chiao Tung University, Hsinchu, Taiwan. (2013)
- [8] Wu, J. S., Tseng, K. C., Wu, F. Y., Comput. Phys. Commun., 162, 166. (2004)
- [9] Su, C.-C., K.-C. Tseng, H.-M. Cave, et al., Computers & Fluids, Vol. 39, pp. 1136-1145. (2010)

(3) AOGS Satellite Meetings



(3) AOGS Satellite Meetings

AOGS Satellite Meeting Proposal Form

Title	Understanding Carbon and Nitrogen Dynamics in Large Rivers and Coastal Oceans
Meeting Venue	Biswa Bangla Convention Centre, Kolkata, India
Meeting Duration	Two days
Time Schedule	From 21/04/2020 to 22/04/2020
AOGS Section(s)	Biogeosciences, Hydrological Sciences,
Main Organizer	(Name) Punyasloke Bhadury (Affiliation) Indian Institute of Science Education and Research Kolkata (e-mail address) pbhadury@iiserkol.ac.in

(4) Regional Scientific Co-operation Initiatives in Geosciences Webinars



Chun-Chieh WU

National Taiwan University



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Florian M. SCHWANDNER

NASA



Steven D. VANCE

NASA



Yoshiharu OMURA

Kyoto University



Ping-Yu CHANG

National Central University



Young-Oh KIM

Seoul National University



Bhoopesh MISHRA

University of Leeds

Agenda

- 09:00am AOGS President's Welcome
Chun-Chieh WU, National Taiwan University
- 09:15am Chair's Opening & Introduction to AOGS Regional Advisory Committee
Wing-Huen IP, National Central University
- 09:30am [SE] Solid Earth Sciences Initiatives
Florian M. SCHWANDNER, NASA
- 10:00am [PS] Planetary Sciences Initiatives
Steven D. VANCE, NASA
- 10:30am [ST] Solar & Terrestrial Sciences Initiatives
Yoshiharu OMURA, Kyoto University
- 11:00am [IG] Interdisciplinary Geoscience Initiatives
Ping-Yu CHANG, National Central University
- 11:30am [HS] Hydrological Sciences Initiatives
Young-Oh KIM, Seoul National University
- 12:00pm [BG] Biogeosciences Initiatives
Bhoopesh MISHRA, University of Leeds
- 12:30pm Meeting adjourned

Thanks for Joining.