THE PHILIPPINE - AMERICAN Academy of Science & Engineering

40TH PAASE ANNIVERSARY & 2020 APAMS (ANNUAL SCIENTIFIC MEETING) PHILIPPINES

20 July (Mon) to 14 August 2020 (Fri) | 8:00 am to 10:30 am PH time (GMT+8)

Conference Theme: Outreach to Philippine Regions

8.2. PARALLEL SESSION: ENVIRONMENT AND ATMOSPHERE

03 August 2020, Monday | 8:00 am to 10:30 am PH time (GMT+8)

Host: **Dr. Juan M. Pulhin, *Professor***
University of the Philippines Los Baños (UPLB), Philippines

8:05 am - 8:35 am
Keynote Paper: Anthropogenic CO_2 : Sources and Impacts on the Environment and Climate
Dr. Josefino C. Comiso, *Senior Scientist (Emeritus)*
National Aeronautics and Space Administration (NASA), USA

8:35 am - 8:55 am
Concentration of Major Air Pollutants during Lockdown due to COVID-19 Pandemic in Southeast Asia
Dr. Mohd Talib Latif, *Professor*
Universiti Kebangsaan Malaysia (UKM), Malaysia

8:55 am - 9:10 am
Towards the Identification of Emergent Properties in Atmospheric Composition Using Satellite Data: A Case of Megacity Emissions Monitoring from Space
Dr. Avelino F. Arellano, Jr., *Associate Professor*
The University of Arizona (UA), USA

9:10 am - 9:25 am **Q&A**

9:25 am - 9:40 am
Monitoring of Changes in Environment to Enhance Resilience and Adaptation
Dr. Rex Victor O. Cruz, *Professor*
University of the Philippines Los Baños (UPLB), Philippines

9:40 am - 9:55 am
Climate Change Research and Communication in the Philippines
Dr. Rodel D. Lasco, *Executive Director*
Oscar M. Lopez (OML) Center, Philippines

9:55 am - 10:15 am
Advancing Science and Human Resource Capacity in Asia through Global Change Research: the Case of APN
Dr. Linda Stevenson, Head, *Division of Communication and Scientific Affairs*
Asia Pacific Network for Global Change Research (APN), Japan

10:15 am - 10:25 am **Q&A**

10:25 am - 10:30 am **Closing Remarks**

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PAASE: AGHAM AT KAALAMAN PARA SA BAYAN!

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8:05 am - 8:35 am **Keynote Presentation**

Anthropogenic CO_2: Sources and Impacts on the Environment and Climate

Dr. Josefino C. Comiso, *Senior Scientist (Emeritus)*
National Aeronautics and Space Administration (NASA), USA

The rapidly increasing amount of anthropogenic CO_2 in the atmosphere as observed in Mauna Loa, Hawaii has caused serious societal concerns because of known impacts on the climate and the environment. The NASA Aqua/AIRS mission has revealed that the spatial distribution is not uniformly distributed globally and high concentrations are observed in the Arctic and the equatorial regions. Recently launched NASA's Orbiting Carbon Observatory and JAXA's Greenhouse Gas Observation Satellite (GOSAT) has also made it possible to detect human carbon signal at a high precision and able to separate accurately such signals from seasonal fluctuations and identify not only the location of key sources but also the magnitude and temporal variability. Other greenhouse gases are also of concern but CO_2 has been the focus of research because of much longer residence time in the atmosphere and is the gas that has caused the most serious impacts on the climate and the environment. Increasing CO_2 is the result primarily of the burning of fossil fuel and deforestation and has resulted in the acceleration of global warming and at the same time in environmental pollution and the degradation of the Earth's ecological system. Unexpectedly, among the most serious environmental impacts is ocean acidification that would cause the formation of dead zones and the devastation of life in the oceans. Greenhouse warming would also cause a warmer ocean and the melt of glaciers and ice sheets that would lead to significant sea level rise that would lead to the displacements of coastal communities and the destruction of wetlands, mangroves and coastal ecology. A warmer ocean would also cause extremely powerful typhoons, extensive flooding while a warmer land would cause increases in areas affected by drought.

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8:35 am - 8:55 am **Concentration of Major Air Pollutants during Lockdown due to COVID-19 Pandemic in Southeast Asia**

Dr. Mohd Talib Latif, *Professor*
Universiti of Kebangsaan Malaysia (UKM), Malaysia

The COVID-19 pandemic has forced many governments in the world including countries in Southeast Asia (SEA) to implement some form of lockdown in order to minimize the spread of the virus. This study aims to determine the influence of lockdown toward the level of major atmospheric pollutants in Southeast Asia, particularly in Malaysia. In this study, we used aerosol optical depth (AOD) observations from Himawari-8 satellite, along with tropospheric NO2 column density from Aura-OMI over SEA, and ground-based air pollution measurements at several stations across Malaysia, in order to quantify the changes in aerosol and major air pollutants associated with the reducing number of motor vehicles and shutdown of industrial activities. The lockdown has led to a notable decrease in AOD over SEA and in the pollution outflow over the oceanic regions, while a significant decrease (27% - 30%) in tropospheric NO2 was observed over areas not affected by seasonal biomass burning. Overall, the concentration of PM10, PM2.5, NO2, SO2, and CO concentrations have been decreased by 26–31%, 23–32%, 63–64%, 9–20%, and 25–31%, respectively, in the urban areas during the lockdown phase, compared to the same periods in 2018 and 2019. Surface ozone (O3) is the only gas that shows an overall increasing trend during the lockdown at 10% (2019) and 3% (2018), respectively. Further investigation using diurnal patterns showed that NO2 and CO were both reduced significantly during the rush hours, indicating how a reduction in motor vehicles on the roads influences the levels of these pollutants.

Universiti Kebangsaan Malaysia
National University of Malaysia

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8:55 am - 9:10 am **Towards the Identification of Emergent Properties in Atmospheric Composition Using Satellite Data: A Case of Megacity Emissions Monitoring from Space**

Dr. Avelino F. Arellano, Jr., *Associate Professor*
The University of Arizona (UA), USA

THE UNIVERSITY OF ARIZONA.

It is imperative that we provide more accurate and consistent analysis of anthropogenic pollution emissions at scales relevant to air quality, energy, and environmental policy. Here, we present proof-of-concepts that explore modeling and satellite observational constraints on atmospheric composition to infer bulk characteristics of anthropogenic combustion in megacities. In particular, we present joint analyses of co-emitted combustion products such as CO2, CH4, NO2, CO, SO2, and aerosols over several megacities of the world. Each of these constituents exhibit distinct atmospheric signatures that depend on fuel type, combustion technology, process, practices and regulatory policies. Our results show that distinguishable patterns and relationships between the increases in concentrations across the megacity due to emissions of these constituents enable us to: a) identify attributable trends in combustion activity and efficiency, and b) reconcile discrepancies between state-to-country-based emission inventories and modeled concentrations of these constituents. Our results suggest that satellite-derived decadal trends in relative abundance of these species can reveal combustion emission pathways in China and United States. However, this is not the case for cities in sub-Saharan Africa where an emergence of a rise in anthropogenic combustion in this region cannot be seen from space. While there is an opportunity to apply similar analysis to other cities (e.g., Metro Manila, Mexico City, New Delhi), we find a compelling need for ground-based megacity-scale emissions monitoring to help reconcile several systematic differences and confounding factors. This will be discussed in the context of international activities like the International Global Atmospheric Chemistry (IGAC).

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03 August 2020, Monday | 8:00 am to 10:30 am PH time (GMT+8)

9:25 am - 9:40 am **Monitoring of Changes in Environment to Enhance Resilience and Adaptation**

Dr. Rex Victor O. Cruz, *Professor*

University of the Philippines Los Baños (UPLB), Philippines

Changes in climate, land use and land cover in recent years have been rapid and extensive causing substantial changes in landscapes and ecosystems, often with serious consequences on the quality of the environment and of the ecosystem services. Degradation of soil, water and habitats, biodiversity loss, pest and disease outbreaks, and crop productivity loss, are amongst the foremost repercussions of changes in climate and increasing human activities. The key to a lasting resolution of these concerns is to enhance the precision of responses by filling in gaps in understanding of the dynamic interactions of human activities with the natural systems.

In 2015 the program called MODECERA (Monitoring and Detection of Ecosystem Change for Enhancing Resilience and Adaptation) was launched by a consortium of SUCs led by UPLB and the DOST. This program was designed to set up a Philippine network of ecosystem and watershed observation stations (PEWON) in strategic areas across the country. It was envisioned to maintain PEWON for at least ten years to buildup time-series datasets and knowledge on the interactions of ecosystems within a watershed, and changes in ecosystems and watersheds as influenced by climate change and human activities. The PEWON was originally designed to have at least 14 watersheds but started with 8 watersheds in various regions of the country before funding ran out after just two years of operation. This presentation highlights the challenges and experiences in establishing and maintaining PEWON.

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9:40 am - 9:55 am **Climate Change Research and Communication in the Philippines**

Dr. Rodel D. Lasco, *Executive Director*
Oscar M. Lopez (OML) Center, Philippines

Oscar M. Lopez Center
Science for Climate Resilient Communities

The Philippines is one of the most vulnerable countries to climate change. To enhance the resilience of its people, the Oscar M Lopez Center conducts action research to produce useable information for various stakeholders. This effort is complemented by a strong communications program to help disseminate the message.

We present some of the on-going research efforts of the center. One study is the analysis of the link between the Covid-19 pandemic and climate resilience. Among the emerging lessons is that national agencies, local government units (LGUs), civil society organizations, and the business sector must focus on modifying current response strategies to increase the resilience of the people. Adapting to multiple hazards requires developing solutions holistically, maximizing synergy while minimizing conflicts.

In addition, we also share our effort to produce an award-winning documentary on climate change in the Philippines. This film weaves stories from several areas of the country to highlight the impacts of climate hazards on local communities and how people are adapting to them. Finally, we discuss how we are linking with policy makers to find solutions to climate risks in the country.

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Dr. Linda Stevenson, *Head, Division of Communication and Scientific Affairs*

Asia Pacific Network (APN) for Global Change Research, Japan

Through its core programmes of regional research and capacity development, the Asia-Pacific Network for Global Change Research (APN) is enhancing the capacity of researchers in Asia to conduct research in global environmental change and sustainability for science-based policy and decision-making. On the types of projects undertaken by APN, a recent knowledge synthesis for the period 2013-2018, indicates that 115 APN-supported projects in the Asia region centred on community-based adaptation and mitigation in areas including biodiversity and ecosystems, climate-induced extreme events, water-food-energy nexus, sustainable waste management, and climate education. Drawing on this, we discuss the critical challenges in effectively addressing scientific and human resource capacity in Asia, and show strategic approaches and best practices to advance the capacity to conduct interdisciplinary policy-relevant scientific research and communicate the results to policy and decision-making bodies and other key stakeholders. Examples of projects are provided in the regional and local context in countries of Asia, illustrating a local study on institutional climate resilience in Aurora, the Philippines. Further outputs by way of a compiled special issue of 15 projects on climate impacts, vulnerability and adaptation are shown, the results of which are expected to add value to the scientific literature3. In essence, APN approaches in undertaking global change research is advancing science and human capacity in Asia that will help shape local and regional responses to global environmental and climate change, risk reduction and resilience, and sustainable development, in order to tackle adverse impacts on natural and human systems.

APN ASIA-PACIFIC NETWORK FOR GLOBAL CHANGE RESEARCH

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