2019 Advanced Institute on Health Investigation
and Air Sensing for Asian Pollution (AI on Hi-ASAP)
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Academia Sinica, Taipei, Taiwan

Health Investigation and Air Sensing for Asian Pollution (Hi-ASAP) Initiative

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Overview of Hi-ASAP

- a regional transdisciplinary research initiative which is developed under the umbrella of International Global Atmospheric Chemistry project – Monsoon Asia and Oceania Networking Group (IGAC-MANGO)
  - IGAC is a global research project under Future Earth, a global network of scientists, researchers, and innovators collaborating for a more sustainable planet
  - Future Earth emphasize: international multidisciplinary collaboration, solution-oriented science, and stakeholder engagement

Main goal of Hi-ASAP

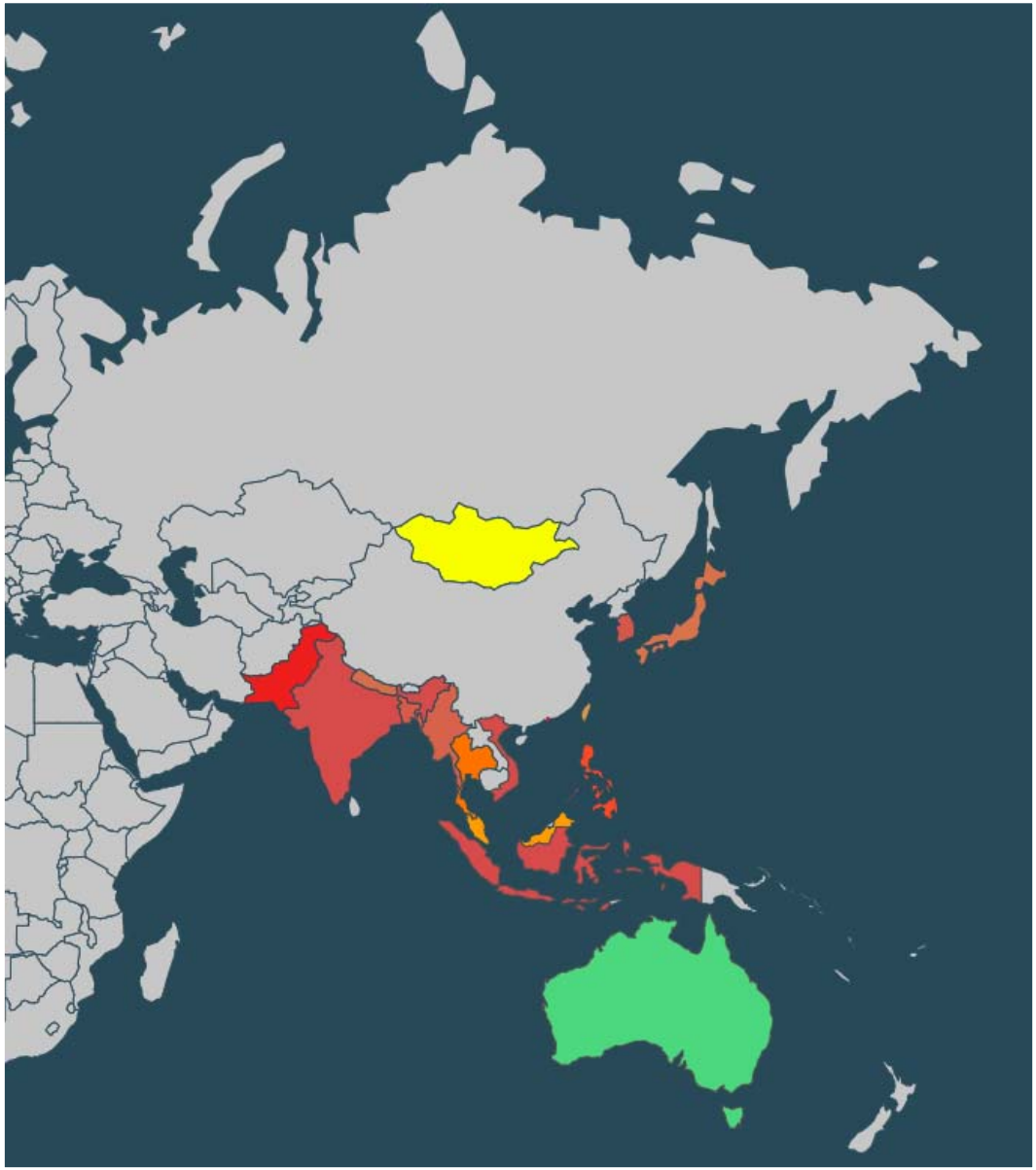
- Main goal: **to provide scientific evidences to support effective policy actions to reduce air pollution levels, in particular $PM_{2.5}$, in this region by applying newly developed low-cost sensors**
- Planning meeting was held in Academia Sinica, Taiwan, on May 17-19, 2019 with participants from 15 participating research groups in the Asia and the Pacific (AP) area
- The science and implementation plan is under review to be endorsed by Regional Advisory Committee of Regional Centre for Future Earth in Asia
  - Recognized as a great bottom up initiative that fits well with Future Earth in the region

Capacity Building for Hi-ASAP

- Research groups from 17 different areas in the AP region have expressed their interests in collaboration under the framework of Hi-ASAP
- The first phase spans five years:
  - preparation (2019), start-up (2020), intensive monitoring (2021), data analysis (2022), and publication (2023)
- For international comparison, a common methodology is needed
  - a series of training workshops are needed to transfer the theory, knowledge, and application niches to researchers in H-ASAP to apply these common methodologies which are originally rooted from the developed countries (ex. Harvard T.H. Chan School of Public Health)

Study Area	Full Name	Research Field
Bangladesh (BD)	Abdus SALAM	AC#
	Mahbuba YESMIN	Health
Hong Kong (HK)	Kin-Fai HO	AC &Health
India (Nainital) (IN)	Manish Naja*	AC
India (Manauli) (IN)	Vinayak SINHA*	AC
	Harshita PAWAR	AC
	Swastik BHARDWAJ	Health
Indonesia (ID)	Puji LESTARI	AC
	Dwi AGUSTIAN	Health
Japan (JP)	Tatsuya NAGASHIMA	AC
	Lina MADANIYAZI	Health
Korea (KR)	Kiyoung LEE	AC & Health
	Sooyoung GUAK	AC & Health
Malaysia (MY)	Mohd Talib LATIF	AC
	Mazrura SAHANI	Health
Myanmar (MM)	Ohnmar May Tin HLAING	AC &Health
Nepal (NP)	Maheswar RUPAKHETI*	AC
	Yadav Prasad JOSHI	Health
Pakistan (PK)	Fahim KHOKHAR**	AC
	Ejaz Ahmad KHAN**	Health
Philippines (PH)	Maria Obiminda L. CAMBALIZA	AC
	John Q. WONG	Health
Singapore (SG)	Liya YU*	Analysis
Taiwan (TW)	SC Candice LUNG	AC & Health
	Wen-Cheng Vincent WANG	AC
Thailand (TH)	Kim OANH	AC
	Kraichat TANTRAKARNAPA	Health
Vietnam (VE)	Thi Hien TO	AC
	Tran Ngoc DANG	Health
Australia (AU)	Fabienne REISEN	Analysis

*: Absence in the planning meeting; **: on-line participation; #: Atmospheric Chemistry



Objectives of Advanced Institute on Hi-ASAP

- provide young to mid-career practitioners and researchers from the research groups interested in the Hi-ASAP initiative in the AP region with the knowledge, experience, and hands-on practices about the required techniques and methodologies, participants should have
  - Developed an understanding of the concepts, principles, and practices of low-cost sensing technologies for $PM_{2.5}$ and health indicators;
  - Enhanced comprehension of the applications of systems thinking on collaboration focusing on environmental sensing and health evaluation among scientists of different fields and between scientists and stakeholders;
  - Developed capacity on the application of the sensor technology on regional pollution transport, community source contribution quantification, exposure assessment, and health-indicator evaluation to design a study to reduce air pollution health risks

Objectives of Hi-ASAP

- To apply low-cost sensors
  - (1) to assess $PM_{2.5}$ exposure levels, patterns, behaviors, and source characteristics of short-term or peak exposures
  - (2) to evaluate the changes in health indicators of acute health effects
- in order to
  - (1) assess the short-term $PM_{2.5}$ damage coefficients of exposure-health relationship
  - (2) provide scientific evidences to set criteria or ceiling levels of $PM_{2.5}$ with shorter exposure periods (ex. seasonal, 8-hour or hourly)

Research Questions

- What are the **peak $PM_{2.5}$ exposure levels** and patterns of Asian population, especially those **high-exposure or susceptible** populations?
- What are the **sources and activities** causing **peak $PM_{2.5}$** exposures and the **controllable factors** associated with those sources and activities?
- What are **the $PM_{2.5}$ damage coefficients of exposure-health relationship** of peak exposures for **lung and heart conditions**? Are the damage coefficients for the same health outcome **different in different $PM_{2.5}$ concentration ranges**? The huge differences in $PM_{2.5}$ levels in the MANGO region provide a testbed to evaluate this question
- What are the **chemical and toxicological properties** of high-exposure sources, especially **distinctive Asian sources**?
- Should there be **a ceiling value or short-term standard for $PM_{2.5}$** (ex. seasonal, 8-hour or hourly)? **What other considerations** needed to be included to promote the establishment of such a standard?

Member inclusion criteria

- (a) each participating research group has to have two partners with one in atmospheric chemistry and one in public health unless the leader has background in both fields;
- (b) this group is working on $PM_{2.5}$ research in the Asia and the Pacific area with necessary training to conduct panel-type epidemiological study to collect first-hand data to evaluate exposure-health relationships;
- (c) this group is passionate about air pollution and health research and ready to conduct research on this topic with the understanding that they will apply for funding to support their own study in their study area;
- (d) this group agrees on adopting common methodologies and observing data policy. The representatives from each research group participating in the meetings and related training workshops should sign confidentiality agreement to refrain from disclosing any information to third parties about the details of the study plan; and
- (e) the research group fails to abide to the aforementioned criteria at any stage of planning and implementation automatically lose the membership of Hi-ASAP

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Mongolia (MN)	Chonokhuu SONOMDAGVA	AC
	Enkhjargal ALTANGERE	Health
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	Tran Ngoc DANG	Health
Australia (AU)	Fabienne REISEN	Analysis

Data Policy

- Details are listed in the "Science and Implementation Plan of Hi-ASAP"
  - Common database
  - Data quality assurance/ quality control (QA/QC)
  - Data collection
  - Data upload
  - Institution review board (IRB) approval
  - Confidentiality
  - Credit sharing
  - Manuscript review
  - Data grace period
  - Publication grace period

Road map (1)

	Phase I (2019-2023)
Targeted population	General public with susceptible population (ex. elderly) with certain high-exposure periods, or high-exposure occupational groups
Anticipated scientific findings	
Exposure-health evaluation	(a) $PM_{2.5}$ damage coefficients for acute impacts in different seasons across Asia and the Pacific (AP) areas for the study population
Exposure assessment	(b) Identify high-exposure activities and high-contribution exposure sources of $PM_{2.5}$ for the study population
Environmental and community monitoring	(c) Quantify $PM_{2.5}$ community source contributions or investigate regional $PM_{2.5}$ transport
Chemical analysis and toxicity evaluation	(d) Evaluate chemical compositions and toxicity potentials for chosen high- exposure sources in different AP areas

Road map (2)

	Phase I (2019-2023)
Practical policy recommendations	1. Corresponding to the above scientific findings (a) Recommendations for short-term $PM_{2.5}$ standard/guidelines (b) Recommendations for priority control for certain high-exposure sources; (c) Recommendations for priority control for certain community sources; Recommendations for control for regional $PM_{2.5}$ pollution sources (a) Recommendations for control for certain sources (based on chemical and toxicity evaluation)
Stakeholder engagement (at different stages: in the beginning, during and in the end of research project)	Local community, occupational groups, Non-governmental organizations (NGOs), local/central policy makers, national and international environment and health agencies (ex. provide health promotion materials for behavior change)

Timetable for Phase I (2019-2020)

Year		Capacity building	Exposure- health Evaluation	Exposure assessment	Environmental and community monitoring	Chemical analysis and toxicity evaluation	Data analysis
2019	Preparation (apply for funding), engaging sensor manufacturers	Training on data collection protocols for environment, exposure and health	(1) provide QA/QC data for the selected $PM_{2.5}$ sensing devices and health devices by the end of year	The same as (1) Prepare questionnaires and Time-activity-diary	The same as (1)	(2) Identify priority	
2020	**Start-up**						
	First half year; engaging local communities or occupational groups, policy makers	Training on data cleaning and analysis for environmental and exposure data	(1) apply for institution review board (IRB); (2) conduct pilot study for 5 subjects and try out indoor/outdoor/personal monitoring, questionnaire collection, and health evaluation	The same as (2)	(3) set-up environmental sensing devices	(4) collect test samples	
	Second half year; engaging local communities or occupational groups, policy makers		(5) recruit more subjects; (6) carry out field works (questionnaire collection and health evaluation)	(6) carry out field works (indoor/outdoor/ personal monitoring, time-activity diary)	(6) carry out field works (environment and community monitoring)	(7) analyze test samples	(8) data analysis for pilot study; (9) prepare manuscripts for subsets of data, ex. environment and community monitoring

Note: data and associated QA/QC results should be uploaded every half year beginning at June 2020; each research group should submit sample files to databases by June 2020 and submit raw and clean datasets from pilot study starting December 2020

Timetable for Phase I (2021)

Year		Capacity building	Exposure- health Evaluation	Exposure assessment	Environmental and community monitoring	Chemical analysis and toxicity evaluation	Data analysis
2021	Intensive monitoring						
	First half year; engaging study population	Training on data cleaning and analysis for health data and exposure-health evaluation	(1) carry out and finish field works for the first season	The same as (1)	The same (1)	(2) collect filters and analyze key compositions for the first season	(3) Clean data and compile into database
	Second half year; engaging study population		(4) carry out and finish field works for the second season	The same as (4)	The same as (4)	(5) collect filters and analyze key compositions for the second season	The same as (3); (6) integrate environmental, exposure, and health data; (7) prepare manuscripts

Timetable for Phase I (2022)

Year		Capacity building	Exposure- health Evaluation	Exposure assessment	Environmental and community monitoring	Chemical analysis and toxicity evaluation	Data analysis
2022	Data analysis						
	First half year; engaging policy makers and study population		(1) evaluate exposure-health relationships	(2) assess exposure levels, patterns, behaviors, and sources of short-term or peak exposures	(3) assess contribution of community sources and characterize regional $PM_{2.5}$ transport	(4) chemical analysis	
	Second half year; engaging policy makers and study population	discussion for comparing exposure patterns and exposure-health relationships	(6) write up manuscripts for individual study area; (7) compile statistical results (damage coefficients, source contributions, etc.) into databases for meta analysis	The same as left-column (6) (7)	The same as left-column (6) (7)	(8) chemical analysis results	(5) evaluate potential short-term $PM_{2.5}$ levels as a short-term standard; (9) meta analysis and synthesis

Timetable for Phase I (2023)

Year		Capacity building	Exposure- health Evaluation	Exposure assessment	Environmental and community monitoring	Chemical analysis and toxicity evaluation	Data analysis
2023	Publication						
	First half year; engaging policy makers, media, and study population		(1) write up manuscripts	The same as (1)	The same as (1)		(2) meta analysis and synthesis
	Second half year; engaging policy makers, media, and study population	discussion for chemical analysis and meta analysis	(3) conduct data analysis for $PM_{2.5}$ compositions	The same as (3)	The same as (3)	The same as (3)	(4) prepare manuscripts

Seed Grant (1)

- a "call-for-proposal" will be announced no later than 3-6 months after this AI
  - The participants will be invited to submit research proposals followed by a competitive reviewing process
  - Only limited numbers of proposals (four, based on previous experiences) will be granted for one year
  - IRDR ICoE-Taipei and the core collaborator will review and announce results no later than 3 months after the closing of the proposal submission
  - the grantees will be required to submit a report to IRDR ICoE-Taipei and the core collaborator no later than 2 months after the end of the executive period

Seed Grant (2)

- Qualification:
  - Lead PI is belong to one of the participating research groups of Hi-ASAP and from a developing country
- Award: up to USD 15,000 each project for one year
  - Up to USD 12,000 in the beginning of the project
  - Up to USD 3,000 after handing in the final report in the end of the project

Expectation on Proposals

- (1) A pilot study of Hi-ASAP
  - Conduct panel-type $PM_{2.5}$ epidemiological study with methodologies and techniques taught in this AI (recruit subjects and carry out personal exposure-health evaluation with $PM_{2.5}$ sensors and Rooti RX)
  - Specify your research questions, studied area, targeted populations, detailed exposure and health monitoring strategies, and expected outcomes and social impacts
  - Emphasize multidisciplinary collaboration (atmospheric chemistry and public health), solution-oriented, and stakeholder engagement
- (2) Participating research groups with higher scores in the final presentation of AI on Hi-ASAP have higher ranking
- (3) Proposals with systems diagrams are preferred

Any question?

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