

## Report for the year 2022 and future activities

### SOLAS Southeast Asia

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*This report has two parts:*

- **Part 1:** reporting of activities in the period of January 2022 - Jan/Feb 2023
- **Part 2:** reporting on planned activities for 2023 and 2024.

*The information provided will be used for reporting, fundraising, networking, strategic development and updating of the live web-based implementation plan. As much as possible, please indicate the specific SOLAS 2015-2025 Science Plan Themes addressed by each activity or specify an overlap between Themes or Cross-Cutting Themes.*

- 1 Greenhouse gases and the oceans;
  - 2 Air-sea interfaces and fluxes of mass and energy;
  - 3 Atmospheric deposition and ocean biogeochemistry;
  - 4 Interconnections between aerosols, clouds, and marine ecosystems;
  - 5 Ocean biogeochemical control on atmospheric chemistry;
- Integrated studies of high sensitivity systems;  
Environmental impacts of geoengineering;  
Science and society.

**IMPORTANT:** This report should reflect the efforts of the SOLAS community in the entire Southeast Asia you are representing (all universities, institutes, lab, units, groups, cities).

**First things first...Please tell us what the IPO may do to help you in your current and future SOLAS activities. ?**

We appreciate it if IPO can help the Southeast Asia Regional Panel to organise a Regional Workshop on SOLAS-related research every two years and help us in the process to get a research grant than focusing on research in Southeast Asia.

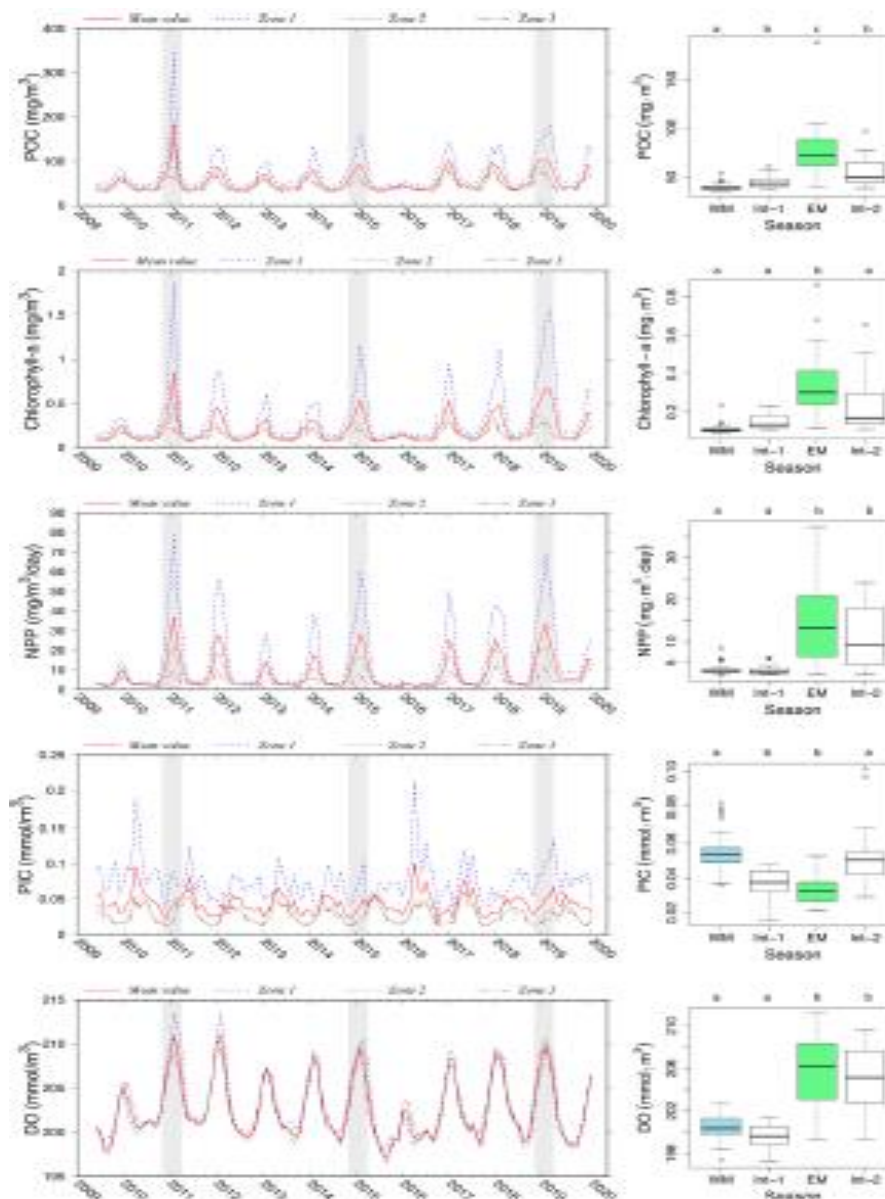
**PART 1 - Activities from January 2022 to Jan/Feb 2023**

**1. Scientific highlight**

*Describe one scientific highlight with a title, text (max. 300 words), a figure with legend and full references. Please focus on a result that would not have happened without SOLAS, and we are*

most interested in results of international collaborations. (If you wish to include more than one highlight, feel free to do so).

Physical conditions, diurnal and intraseasonal variations and climate variations will greatly affect biogeochemical cycles and ecosystems in the South Java upwelling area. The results of this study show that there are spatiotemporal trends in chlorophyll-a (Chl-a), nutrients, and particulate carbon in response to the seasonal upwelling process in Southern Java. Concentrations of chlorophyll-a (Chl-a), net primary production (NPP), particulate organic carbon (POC), nitrate, and phosphate increased during the upwelling period in July-October. Meanwhile, silicate showed a different pattern, where the highest concentrations were found in March to May which is hypothesized to be correlated with the Indonesian Throughflow (ITF). Each year, the highest peak of POC concentration was detected earlier (in September) compared to PIC concentration (in October-November). Elevated POC concentrations from September to November occurred at the outlets of the Sunda Strait, Bali and Lombok. Lombok Strait. Records show that the highest POC concentrations occur throughout the year in coastal areas. Carbon and nutrient enrichment occurred from July to November during the upwelling period. The highest positive peaks of biogeochemical parameters during September 2011, 2015, and 2019, which coincided with El Niño-Southern Oscillation (ENSO) and Indian Ocean Dipole (IOD) events.



**Figure 1.** Temporal variability of biogeochemical and physical factors of the South Java upwelling area during 2010–2020. The shaded areas show the concurrent periods of IOD and El Niño events. NINO3=Niño SST Index on 5N-5S, 150W-90W; DMI=Dipole Mode Index, WM=west monsoon, Int-1 and Int-2=first and second inter monsoon, respectively, EM=east monsoon. The

box plots on the right panel are averaged over Zones 1–3. The letter notation in the boxplots indicates significant differences among seasons (Kruskal–Wallis with posthoc Dunn test,  $p < 0.05$ ).

Citation: Wajyudi et al, Regional Studies in Marine Science 59 (2023) 102802.

**2. Activities/main accomplishments in 2022 (e.g., projects; field campaigns; workshops and conferences; model and data intercomparisons; capacity building; international collaborations; contributions to int. assessments such as IPCC; collaborations with social sciences, humanities, medicine, economics and/or arts; interactions with policy makers, companies, and/or journalists and media).**

1. We organise SOLAS online Workshop on 'Surface Ocean Lower Atmosphere Study in Southeast Asia - Linking Ocean-Atmosphere Interactions with Climate and People on 23rd August 2022. Recording of the workshop is now available at the SOLAS YouTube channel, here: <http://cutt.ly/jX8OS7v>
2. Indonesian researchers under the coordination of the Naval Hydro-Oceanographic Center conducted a research cruise in the Banda Sea. This research cruise is called "Ekspedisi Jala Citra 2 - 2022: Banda", which was conducted from June 16 - August 15, 2022. During the cruise, measurements of chlorophyll-a, pH, and dissolved oxygen were conducted at several points in the Banda Sea.
3. Prof. Iskhaq Iskandar, a member of SOLAS Southeast Asia, was actively involved in the preparation of the IPCC cycle 6 assessment report in working group 1. Prof. Iskhaq became one of the lead authors in Chapter 11: Weather and climate extreme events in a changing climate.
4. Prof. Yee Jun Tham, a member of SOLAS Southeast Asia, conducted a field measurement on a coastal island for 3 months starting from November 2022. The campaign aimed to investigate the marine atmospheric volatile halocarbons, DMS, N<sub>2</sub>O<sub>5</sub>, HONO and nonmethane hydrocarbons in the South China Sea.
5. Prof Mohd Talib Latif organised the Asia Pacific Network for Global Change Research (APN-GCR) workshop on air quality measurement via satellite during the COVID19 lockdown and International Global Atmospheric Chemistry - Monsoon Asia and Oceania Networking Group (IGAC-MANGO) Meeting in Kuala Lumpur, Malaysia (18-20th October 2022).
6. Dr Fiona Keng Seh Lin, a member of SOLAS Southeast Asia involve with the organization of the 19th Asia Oceania Geosciences Society Meeting. Virtual, 1 – 5 Aug 2022.
7. Collaboration between researchers from Universiti Kebangsaan Malaysia, Universiti Malaya, Universiti of Nottingham (Malaysia campus) and the University of East Anglia (UEA), United Kingdom, in the atmospheric measurement of anthropogenic halocarbon
8. Collaboration between researchers from Universiti Malaya and the University of East Anglia, (UEA) on the short-lived halocarbon emissions from tropical marine algae under changing environmental conditions.
9. Dr Fiona Keng Seh Lin, a member of SOLAS Southeast Asia involve with a project on Air-Land-Biota Interaction: Production and emission of halocarbon from marine algae during climate change (Higher Education Centre of Excellence Grant, IOES-2014F, Funded by the Ministry of Higher Education, Malaysia)
- 10.6 Dr Fiona Keng Seh Lin, a member of SOLAS Southeast Asia involve with a project on Assessing the variability of gases relevant to climate change and sources at a coastal

**3. List SOLAS-related publications published in 2022 (only PUBLISHED articles) and if any, weblinks to models, datasets, products, etc.**

1. A. J. Wahyudi, K. Triana, Y. Masumoto, A. Rachman, M. R. Firdaus, I. Iskandar, and H. Meirinawati (2022), Carbon and nutrient enrichment potential of South Java upwelling area as detected using hindcast biogeochemistry variables, *Regional Studies in Marine Science*, Vo. 59, 102802 (<https://www.sciencedirect.com/science/article/abs/pii/S2352485522003978>)
2. R. Uning, M. T. Latif, H. H. A Hamid, and S. Suratman (2022), A floating chamber system for VOC sea-to-air flux measurement near the sea surface, *Environmental Monitoring and Assessment*, Vo. 194, Pp. 531 (<https://doi.org/10.1007/s10661-022-10237-y>)
3. Ong, J.H., Wainwright, B.J., Jain, S.S. et al. Species and spatio-environmental effects on coral endosymbiont communities in Southeast Asia. *Coral Reefs* 41, 1131–1145 (2022). <https://doi.org/10.1007/s00338-022-02254-7>
4. Lamit, N., Tanaka, Y. Acidic tropical estuary maintained with primary forests: spatial and temporal variations in salinity, pH, and dissolved oxygen. *J Coast Conserv* 26, 38 (2022). <https://doi.org/10.1007/s11852-022-00883-2>

**4. Did you engage any stakeholders/societal partners/external research users in order to co-produce knowledge in 2022? If yes, who? How did you engage?**

We engaged the Asia Pacific Network for Global Change Research (APN-GCR) and applied for a research grant for air quality monitoring using satellites and the determination of microplastics in the atmosphere near the coastal environment (under review for the second phase).

We work together with International Global Atmospheric Chemistry - Monsoon Asia and Oceania Networking Group (IGAC-MANGO) via several related projects and grants.

**PART 2 - Planned activities for 2023 and 2024**

**1. Planned major national and international field studies and collaborative laboratory and modelling studies (incl. all information possible, dates, locations, teams, work, etc.).**

The team from Malaysia, Thailand and Vietnam has worked together and applied for the Asia Pacific Network - Global Change Research grant (APN) entitled: Establishing a pilot network for microplastic monitoring and analysis in the coastal environment of Southeast Asia.

**2. Events like conferences, workshops, meetings, summer schools, capacity building etc. (incl. all information possible).**

Every three-month webinar from an expert in Southeast Asia

**3. Funded national and international projects/activities underway.**

APN Project among researchers in Asian Monsoon Region countries on monitoring air quality using satellite images.

**4. Plans / ideas for future national or international projects, programmes, proposals, etc. (please indicate the funding agencies and potential submission dates).**

SCOR group ocean-related study in Southeast Asia

**5. Engagements with other international projects, organisations, programmes, etc.**

We are working together with researchers in related fields including International Global for Atmospheric Chemistry (IGAC)

**Comments**