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Summary report of the CARE for SEA Megacities and CORDEX-SEA: A Special Session

**in the “4th International Vietnam Conference on
Earth and Environmental Sciences (iVCEES-2024)”**

**International Centre for Interdisciplinary Science and Education (ICISE)
Quy Nhon, Vietnam
26-28 November 2024**

The “Climatic hazard Assessment to enhance Resilience against climate Extremes for Southeast Asian megacities (CARE for SEA megacities)” project is the latest activity under the Southeast Asia Regional Climate Downscaling / Coordinated Regional Climate Downscaling Experiment Southeast Asia (SEACLID / CORDEX-SEA) collaboration. Started in October 2023, this three-year project is funded by the Asia-Pacific Network for Global Change Research (APN). CARE for SEA megacities aims to generate city-scale climate hazard information for SEA megacities (Bangkok, Hanoi, Jakarta, Kuala Lumpur and Manila) under multiple SSP scenarios that will be relevant and useful for policy-making to enhance urban resilience in a globally warmer future.

A special session for CARE for SEA megacities and CORDEX-SEA was held on 26-28 November 2024, as part of the 4th International Vietnam Conference on Earth and Environmental Sciences (iVCEES-2024) in Quy Nhon, Vietnam. With support from APN and WCRP CORDEX, the conference was hosted by the University of Science and Technology of Hanoi (Vietnam), with the Manila Observatory (Philippines) as co-organizer. In addition, Rencontres du Vietnam and ICISE as co-sponsors provided logistical support in relation to meeting facilities, accommodation, and administrative and technical assistance.

The workshop aimed:

1. To coordinate and discuss updates on the empirical statistical downscaling (ESD), and land surface physics-based downscaling (LSP-DS) activities under the CARE for SEA megacities project;
2. To coordinate and discuss updates on the CMIP6 downscaling activities of CORDEX-SEA and identify opportunities for collaboration with similar initiatives in Southeast Asia; and
3. To provide a platform for engagement between climate researchers and stakeholders.

This special session—attended by 33 in-person and 10 online participants—provided a platform for CARE for SEA megacities collaborators and the CORDEX-SEA community to share updates and



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initial results of their downscaling activities, engage in discussions with stakeholders to share insights and feedback on user needs, and identify opportunities for collaboration.

The three-day Special Session S7: CARE for SEA megacities and CORDEX-SEA in the iVCEES-2024 has six sessions with 25 presentations in total, and the third day was for planning and discussion for the next activities of CARE for SEA megacities and CORDEX-SEA:

- Session 1 & 2: CORDEX-SEA downscaling updates by country, and regional downscaling activities in Southeast Asia
- Session 3: CARE for SEA megacities preliminary results and urban downscaling efforts in Southeast Asia
- Session 4: CARE for SEA megacities stakeholder session
- Session 5: Discussions for CORDEX-SEA
- Session 6: Discussions for CARE for SEA megacities project

In the plenary session for the first day of the iVCEES-2024 conference, one of the keynote speakers was Dr Faye Cruz, who shared the history, progress, and future directions of CORDEX-SEA. Dr Cruz also gave the introduction and welcoming remarks on the first session of the Special Session S7: CARE for SEA Megacities and CORDEX-SEA.

The two sessions during the first day (November 26, 2024) presented updates on the status of downscaling historical and projections of selected CMIP6 models, and preliminary results from the downscaled CMIP6 analysis. The initial results showed that models are able to capture temporal patterns well, although biases still persist. Bias correction after downscaling CMIP6 models is one of the recommendations to address this issue. Dr Rebecca Sawyer from the UK Met Office also discussed their collaboration with IMHEN for additional downscaling of CMIP6 at 12 km and introduced CLIMADA or CLIMate ADAPtation tool, which is an open-source quantitative modelling tool to conduct risk assessments.

The second day (November 27, 2024) started with the session for CARE for SEA megacities updates on urban downscaling with LSP-DS (i.e. using the HRLDAS (High-resolution Land Data Assimilation System) model). The speakers discussed the pros and cons of this approach in their initial results. For example, LSP-DS can simulate near-surface thermal conditions comparable to conventional downscaling approaches with less computational resources; however, there are limitations such as the tendency to simulate smaller diurnal temperature range, absence of land-atmosphere feedback, and its performance over mountainous regions. The next session explored



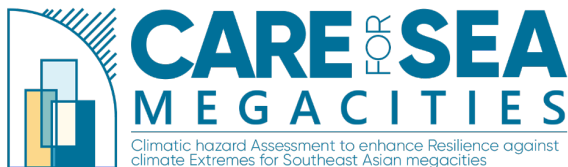
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different approaches—such as dynamical downscaling coupled with urban canopy models and statistical downscaling—to investigate impacts of urbanization on local climate and to estimate the efficacy of mitigation solutions. One of the recommendations to help improve the simulations of urban effects was to include the representation of anthropogenic heat sources and to use different data sources. This session helped provide context for the breakout group discussions in the stakeholder session.

The stakeholder session aimed to discuss how climate data supports a city's adaptation plan for extreme events. Its specific objectives were to understand the stakeholder context and needs, to identify potential applications of climate data for adaptation and planning, and to devise a strategy in generating and delivering climate data to support this plan. The session started with breakout groups per city with guided questions for the stakeholders and climate researchers; afterwards, each city reported back in the plenary. All cities agreed that multi-stakeholder collaboration ensures holistic solutions by combining resources and expertise for climate adaptation. Involving stakeholders in all stages of research and adaptation efforts fosters effective solutions through co-ownership and knowledge-sharing practices from beginning to end. The discussion also suggested that the best way to communicate and deliver the data is through training and workshops and developing tools that can help the stakeholders to use the data, ultimately towards better climate risk information.

The last day of the conference (November 28, 2024) was focused on the discussion of the next steps for CORDEX-SEA and CARE for SEA megacities. For CORDEX-SEA, most downscaling runs from different groups will be finished by February 2025. Coordination for the data sharing and analysis of the downscaled runs is ongoing. Use of a coupled air-sea model for the region will also be explored next year. For the CARE for SEA megacities, a review of Year 1 activities and plans for Year 2 were discussed. Task assignments for the model runs for each city were finalized to facilitate coordination among the group. Remaining agenda items that were not covered will be discussed in the regular online meetings of the project.



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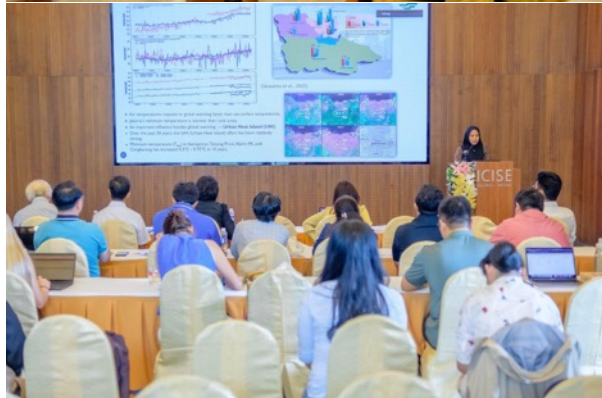
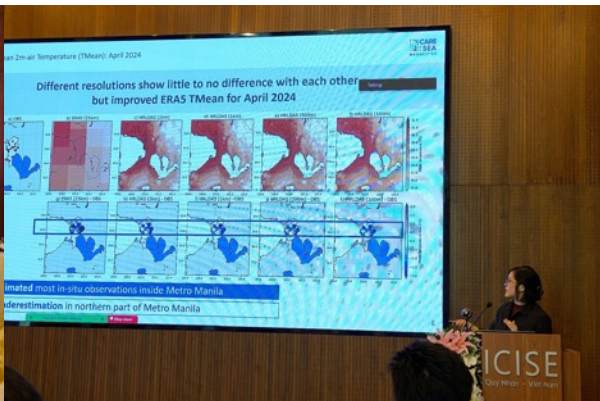
Participants of the CARE for SEA Megacities and CORDEX-SEA: A Special Session in the iVCEES-2024, Quy Nhon, Vietnam, 26-28 November 2024



Photos from the plenary session of iVCEES-2024



Presentations during the Special session S7: CARE for SEA Megacities and CORDEX-SEA



**Presentations during the Special session S7: CARE for SEA Megacities and CORDEX-SEA
(continued)**



Discussion of each city in the stakeholder session



Presentation of each city during the plenary of the stakeholder session