

ADPC-ASMC Webinar on

Seasonal and Sub-seasonal Prediction in Southeast Asia

CONCEPT NOTE

Webinar Title: Seasonal and Sub-seasonal Prediction in Southeast Asia

Date: 7 March 2022 | 14:00 - 16:30 Hrs (GM+7)

Rationale:

Weather and climate related extreme events remain the key driving force for natural disasters and pose significant challenges for sustainable development in Southeast Asia. Weather and climate services provide essential information such as for crop planning (plantation to harvesting), for selecting travel routes over land, sea and air, for building roads and critical infrastructure, as well as for preparing against impending natural hazards. To serve these needs, weather and climate information is classified around multiple timescales such as: (a) weather (up to 7 – 15 days), (b) sub-seasonal (typically two weeks to two months), (c) seasonal (typically one to six months), and (d) climate change (typically 30 years or longer). The shorter timescales are focused on response actions while the longer timescales for preparedness planning. Weather, climate variability and climate change are interrelated, with global and regional aspects manifesting into local impacts. In the past decades, scientists and forecasts have made significant progress, with the emergence of sub-seasonal-to-seasonal (S2S) forecasts (covering the timescale of two weeks to 45 days). These will in the future help various sectors, communities and institutions to improve their decision-making in responding to natural hazards arising from weather and climate extremes.

Uncertainties of Predictions:

The chaotic features of the atmosphere limit the predictability of deterministic weather forecasts up to 7-15 days. Beyond this range, the predictability of atmospheric conditions can only be sensed from a statistical point of view and therefore forecasts must be expressed in probabilistic terms (Murphy and Winkler 1984). The main sources of uncertainty of forecasts come from the insufficient knowledge of initial conditions for the climate system and the lack of accuracy of weather and climate models (Curry and Webster 2011, Knutti et al. 2010, Slingo and Palmer 2011). These sources of uncertainty are explored using ensemble techniques based on independent forecasts from slightly different initial conditions (Gneiting and Raftery 2005; Palmer 2000), as well as by combining different climate model integrations (Weisheimer et al. 2009). At longer sub-seasonal and seasonal timescales, predictability comes from forcings in the climate system that vary at the sub-seasonal or longer timescale, for e.g. the Madden-Julian Oscillation, and the El Niño Southern Oscillation. Therefore, predictability at sub-seasonal and seasonal time scales is highly dependent on particular modes of climate variability, regions, seasons and variables.

Links to Climate Change:

Climate change is a major threat to Southeast Asia. The climate-related hazards are expected to increase in frequency or intensity with climate change in the future. However, the impacts will not be felt evenly as some communities are more exposed than others, or will experience changes

sooner or to a greater extent. Impacts are not limited by national boundaries. Upstream impacts can have implications downstream, and vice versa, and adaptation options implemented by one country may pose direct or significant cross-border implications for other countries. Southeast Asian countries are regarded as one of the most exposed regions to climate change in the world. Rising temperatures and changes in the intensity of rainfall, river flows, floods, and droughts are destroying or affecting homes, infrastructure, crops and fisheries. As a result, vulnerable communities are faced with food shortages and diminished livelihoods. Additionally, projected rises in sea levels are set to increase salinity and floods in the deltaic areas, damaging crops in the most productive areas of the basins. As a component to climate change adaptation, the development of sub-seasonal and seasonal predictions can help countries and populations prepare for these extreme events and mitigate some of the damages and losses.

Objective:

The main objectives of this proposed webinar are to:

- Improve understanding on the predictability at sub-seasonal (up to 45 days) and seasonal timescales (up to 6 months); and
- Introduce sub-seasonal and seasonal prediction products, with special emphasis on those relevant to high-impact weather events in Southeast Asia.

During this webinar, recent developments in S2S prediction and seasonal prediction will be discussed along with various sources of information as well as examples of applications Southeast Asia. There will be a Q&A session at the end to facilitate discussions and exchange of ideas.

Target participants

- Technical Staff of National Meteorological and Hydrological Services (NMHS)
- Technical Staff of National Disaster Management Organisations (NDMO)
- Researchers and Academic Staff from Academic Institutions
- Individuals who have interests in the subject

Reference:

Curry, J.A. and Webster, P.J. (2011) Climate Science and the Uncertainty Monster. Bureau of the American Meteorological Society, 175, 1667-1682. <https://doi.org/10.1175/2011BAMS3139.1>

Gneiting, T. and Raftery, A.E. (2005) Weather Forecasting Using Ensemble Methods. *Science*, 310, 248-249. <https://doi.org/10.1126/science.1115255>
Knutti R, Furrer R, Tebaldi C, Cermak J and Meehl G A 2010 Challenges in combining projections from multiple climate models *J. Clim.* 23 2739–58

Murphy, A. H. and Winkler, R. L. (1984). Probability forecasting in meteorology. *J. Amer. Statist. Assoc.* 79, 489–500.

Slingo, J. and Palmer, T., 2011. Uncertainty in weather and climate prediction. *Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences*, 369(1956), pp.4751-4767

Weisheimer, A., Doblas-Reyes, F.J., Palmer, T.N., Alessandri, A., Arribas, A., Deque, M., Keenlyside, N., MacVean, M., Navarra, A. and Rogel, P. (2009) ENSEMBLES – a new multi-model ensemble for seasonal-to-annual predictions: skill and progress beyond DEMETER in forecasting tropical Pacific SSTs. *Geophysical Research Letters*, 36, L21711.

***Meeting Details:**

Title: Webinar on “Seasonal and Sub-seasonal Prediction in Southeast Asia”

Date: 07th March 2022

Time: 1400 Hrs to 1630 Hrs (GMT +7)

Webinar Registration: https://zoom.us/webinar/register/WN_NQNUpWs4Q0KGqoMwiqg9Hw