



Impacts of Boreal Winter Monsoon Cold Surges and the Interaction with MJO on observed and projected future Southeast Asia rainfall

Charline Marzin (1), See-Yee Lim (2), and Prince Xavier (1)

(1) Met Office, Exeter, UK, (2) Centre for Climate Research Singapore, MSS, Singapore

The boreal winter monsoon has a pronounced effect in Southeast Asia (SEA), leading to annual flooding events in many parts of the region. There is greater concern during the months of November, December, January and February (NDJF) which are the wetter months in most parts of the region, and usually associated with cold surges that bring widespread rainfall. Although several studies related to the boreal winter monsoon in SEA have been carried out, studies focussing on the processes that influence the rainfall pattern in SEA are lacking.

A generalised cold surge index has been established for the SEA region based on the NDJF season. The CSI has been defined to be easily applicable for other related weather and climate studies. Around 20% of the NDJF days in the study period were classified as cold surge days, with an average of 4-5 cold surge episodes during the NDJF season with a surge length of about 5 days.

Cold surges tend to enhance the rainfall particularly over the central Maritime Continent region with contributions up to 40% of the total NDJF rainfall in some places and twice the rainfall intensity. During MJO days in phases 2-4, rainfall is observed to be significantly enhanced over most parts of the southwest SEA region, especially over the ocean to the west of Sumatra. Coexistence of MJO and cold surge days significantly enhances both mean and extreme rainfall over the central Maritime Continent and over the ocean to the west of Sumatra.

The cold surge index has also been applied to CMIP5 historical and future experiments to analyse the possible impacts of climate change on cold surges and associated extreme events in SEA.