

Interannual variability of timing of monsoon-onset in South East Asia

*Ryosuke Kato¹, Tomohito Yamada²

1. Hokkaido university graduate school of engineering, 2. Hokkaido university faculty of engineering

There has been a lot of flooding in recent years in many places around the world because of climate change. In Thailand, in August 2011, there was a record-breaking heavy rainfall and the flood occurred on Chao Phraya river basin. About 800 people died in the flood and more than 9 million people suffered. In addition to human damages, the floods did much damage to agriculture area, industry area and urban area, and the total damage approximated to about 30 billion yen. The seasonal prediction of rainfall plays an important role in operating the dams for controlling the flood.

Especially, the onset of rainy season has an effect on agricultural fields. Rice production is one of the major agricultural practice in Thailand. It contributes 3600 which is about 12% of Thailand's GDP. In Thailand, Farmers usually raise two rice crops a year. The first seeding time and the second cultivating time is after the onset of rainy season. So, the onset of rainy season plays an important role in the rice agriculture. In the other agriculture fields, they also need to store adequate water in dams on rainy season to irrigate on dry season for cultivating rice whole year. For irrigating steadily in dry season, the seasonal prediction of rainfall is also utilized in operation of the large dams as dams can store more than 100 billion tons.

In this paper, we first examined the variation in onset of rainy season in Thailand by 37 years for the period 1981-2017. The definition of the monsoon onset date was the first Julian pentad in which monsoonal rainfall exceeds 5 mm/day following the method of Wang and Lin Ho [2002]. This variable is defined by the difference between the pentad mean and the January mean precipitation rates. The quantity is referred to as the relative pentad mean rainfall rate. Here, January mean rainfall represents the winter mean precipitation rate. Thus, the pentad essentially measures the contrast of the rainfall rates between a specific pentad and the corresponding winter.

We defined dates of monsoon onset by climatological pentad mean rainfall during 1981-2000 and compared the climatology with the pentad mean during 2001-2017. The monsoon onset dates in the western part of Thailand have shifted in advance of 10 days earlier. In the contrast, the onset dates in the eastern part of Thailand have shifted delay about 5 days.

To analyze possible factors causing the onset of rainy season, we applied probability density function to the onset dates and classified the earlier onset years and the later onset years. We examined the difference of the wind at 850hpa, 500hpa and 200hpa between earlier's year mean and climatology during 1981-2000. We followed the Welch's t-test and took significant difference at 95 % level. On May, western wind from Indian ocean becomes larger at 850hpa and eastern wind along 15N becomes larger than climatology.

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