

Press Release

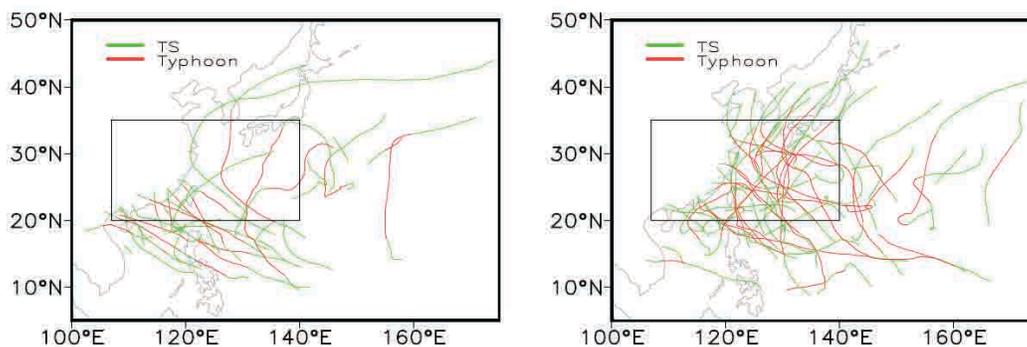
22 January, 2013

Breakthrough in the Prediction of Asian Summer Monsoon Rainfall and Tropical Storm Activity

The amount of rainfall and number of tropical storms during the summer monsoon season greatly impact the agriculture, economy, and people in Asia. Though meteorologists and climate scientists have worked for years to develop helpful prediction systems, seasonal predictions of these two types of weather phenomena are still poor. Scientists working at the International Pacific Research Center, University of Hawaii at Manoa, have now made a promising breakthrough for predicting in spring both the summer monsoon rainfall over East Asia and the number of tropical storms affecting East Asian coastal areas. The study is published in the January 21, 2013, *Proceedings of the National Academy of Sciences*.

The scientists have shown that both the East Asian summer monsoon and the storm activity in the western North Pacific are controlled by fluctuations in the western Pacific Subtropical High (WPSH), a major atmospheric circulation system in the global subtropics centered over the Philippine Sea. When this system is strong in summer, then monsoon rainfall tends to be greater than normal over East Asia, and in the western North Pacific there tend to be fewer tropical storms that make landfall.

With the help of computer modeling experiments, the scientists found that these summer fluctuations in the WPSH are more than 65% predictable in spring. When the Indo-Pacific warm pool shows a dipolar sea surface temperature anomaly (that is, an unusually warm Indian Ocean together with an unusually cool western North Pacific) or the central Pacific tends to cool in spring, then the WPSH will be strong and stable with ensuing greater summer monsoon rainfall over the East Asian monsoon front and the Ganges River Valley in India, but fewer tropical storms will affect East Asian coastal areas and the western subtropical Pacific. The team traced the rainfall and storm variability in the Asian monsoon region to the feedback occurring between the WPSH and the underlying Indo-Pacific warm-pool ocean.



Left: Tropical storm tracks for the 4 extremely strong WPSH years. Right: tropical storm tracks for the 4 extremely weak WPSH years.

“Our findings create a promising way for predicting monsoon rainfall and tropical storm days during the East Asian summer,” concludes lead author Bin Wang, meteorology professor at the University of Hawaii at Manoa and faculty at the International Pacific Research Center. “As a first step, we use global general circulation models to predict the fluctuations in the WPSH, and then in a second step, we use this forecast to predict rainfall and storm days in regional analyses. We have done hindcasts from 1979 to 2009 using this approach and have found substantially improved skills over the use of dynamical climate models in predicting the East Asian Summer Monsoon rainfall and tropical storm activity.”

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The International Pacific Research Center (IPRC) of the School of Ocean and Earth Science and Technology (SOEST), University of Hawaii at Manoa, is a climate research center founded to gain greater understanding of the climate system and the nature and causes of climate variation in the Asia-Pacific region and how global climate changes may affect the region. Established under the “U.S.-Japan Common Agenda for Cooperation in Global Perspective” in October 1997, the IPRC is a collaborative effort between agencies in Japan and the United States.