

Doppler radars help increase monsoon rainfall prediction accuracy

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(PhysOrg.com) -- Doppler weather radar will significantly improve forecasting models used to track monsoon systems influencing the monsoon in and around India, according to a research collaboration including Purdue University, the National Center for Atmospheric Research and the Indian Institute of Technology Delhi.

Dev Niyogi, a Purdue associate professor of agronomy and earth and atmospheric sciences, said modeling of a [monsoon](#) depression track can have a margin of error of about 200 kilometers for landfall, which can be significant for storms that produce as much as 20-25 inches of rain as well as inland floods and fatalities.

"When you run a [forecast model](#), how you represent the initial state of the atmosphere is critical. Even if [Doppler radar](#) information may seem highly localized, we find that it enhances the regional [atmospheric conditions](#), which, in turn, can significantly improve the dynamic prediction of how the monsoon depression will move as the storm makes landfall," Niyogi said. "It certainly looks like a wise investment made in Doppler radars can help in monsoon forecasting, particularly the heavy rain from monsoon processes."

Niyogi, U.C. Mohanty, a professor in the Centre for Atmospheric Sciences at the Indian Institute of Technology, and Mohanty's doctoral student, Ashish Routray, collaborated with scientists at the National Center for Atmospheric Research and gathered information such as radial velocity and reflectivity from six Doppler weather radars that were

in place during storms. Using the Weather Research and Forecasting Model, they found that incorporating the Doppler radar-based information decreased the error of the monsoon depression's landfall path from 200 kilometers to 75 kilometers.

Monsoons account for 80 percent of the rain India receives each year. Mohanty said more accurate predictions could better prepare people for heavy rains that account for a number of deaths in a [monsoon season](#).

"Once a monsoon depression passes through, it can cause catastrophic floods in the coastal areas of India," Mohanty said. "Doppler radar is a very useful tool to help assess these things."

The researchers modeled monsoon depressions and published their findings in the *Quarterly Journal of the Royal Meteorological Society*. Future studies will incorporate more simulations and more advanced models to test the ability of Doppler radar to track monsoon processes. Niyogi said the techniques and tools being developed also could help predict landfall of tropical storm systems that affect the Caribbean and the United States.

More information: Impact of Doppler Weather Radar Data on Numerical Forecast of Indian Monsoon Depressions, A. Routray, et al., *Quarterly Journal of the Royal Meteorological Society* 2010.

Provided by Purdue University

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