Improved climate forecasts sought out by new report

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Intraseasonal to interannual climate predictions play a key role in producing NOAA's weekly Global Tropics Benefits/Hazards Assessment product, which provides a one-to-two-week outlook of expected enhanced or suppressed rainfall, and regions where conditions are especially favorable or unfavorable for the development of tropical cyclones. Image credit: NOAA

From farmers to government officials in charge of efficiently managing Earth's precious water and energy resources, people all over the world rely on accurate short-term climate forecasts on timescales ranging from a few weeks to a few years to make more informed decisions. But today's climate forecast systems have limited ability to operate on such timescales. That's because it's difficult to realistically represent the complex interactions between Earth's ocean, atmosphere and land surface in the climate models from which forecasts are developed.

A new report by the National Academy of Sciences looks at the current

state of these climate predictions and recommends strategies and best practices for improving them. Duane Waliser, chief Earth scientist at NASA's Jet Propulsion Laboratory, Pasadena, Calif., was on the 12-member panel that conducted the NOAA-requested study.

Among the report's key recommendations:

• Continue research to better understand and use information from key sources of climate predictability, and interactions between the ocean and atmosphere, atmosphere and land, as well as volcanic eruptions, greenhouse gases and land use changes.

• Improve the basic building blocks of climate forecasts through better physical climate models, making more sustained physical observations, better incorporating observations into forecast systems, and increasing collaboration between forecast agencies and stakeholders in developing and implementing forecast strategies.

• Adopt best practices such as working more closely with research communities, particularly universities; making data that feed into and come out of forecasts publicly available; minimizing subjective forecast components; and using forecast metrics that better convey to the public the probability aspects of forecasts.

Waliser contributed his expertise in a phenomenon called the Madden-Julian Oscillation that exerts a powerful influence on short-term climate predictions. During this type of climate pattern, unusual variations of clouds, rainfall and large-scale atmospheric circulation move slowly eastward from the tropical Indian Ocean into the Pacific Ocean over the course of weeks, ebbing and flowing like waves in cycles lasting about 40 to 50 days. This climate pattern typically spans more than half the distance around Earth's equator. In the disturbed portion of the "wave," air rises, triggering showers and thunderstorms; in the sinking portion,

air subsides, inhibiting clouds and rainfall.

Madden-Julian Oscillation events can strongly influence long-term weather patterns and have widespread impacts around the globe. They can help trigger the beginning and end of the Asian and Indian monsoons and influence the development and evolution of El Niño, hurricanes and weather in Earth's mid-latitudes. Scientists want to incorporate information about the oscillation more accurately into the climate models that agencies around the world use to predict weather and climate.

"Ten years ago, our ability to forecast Madden-Julian Oscillation events was very limited," said Waliser. "Today, numerous operational forecast centers around the world are recognizing the importance of forecasting the MJO and are beginning to provide useful forecast information about it. This information, in turn, can be used to make better forecasts of other weather and climate phenomena.

"This new report highlights the key shortcomings and strategies needed to make more accurate climate forecasts-- not just of the Madden-Julian Oscillation, but of intraseasonal to interannual climate forecasts in general," he added. The full report, called "Assessment of Intraseasonal to Interannual Climate Prediction and Predictability," can be read and downloaded at: nationalacademies.org/morenews/20100908.html .

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