



## **The Dynamics of an Extreme Precipitation Event in Northeastern Vietnam in 2015 and its Predictability in the ECMWF Ensemble Prediction System**

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A record-breaking rainfall event occurred in northeastern Vietnam in late July-early August 2015. The coastal region in the Quang Ninh province was severely hit, with station rainfall sums in the range of 1000 to 1500 mm. The heavy rainfall led to flooding and landslides, which resulted in an estimated economic loss of 108 million USD and 32 fatalities.

Using a multitude of data sources and ECMWF ensemble forecasts, the synoptic-dynamic development and practical predictability of the event is investigated in detail for the four-day period 1200 UTC 25 July 2015 to 1200 UTC 29 July 2015 during which the major portion of the rainfall was observed. A slowly moving upper-level subtropical trough and the associated surface low in the northern Gulf of Tonkin promoted sustained moisture convergence and convection over northeastern Vietnam. The humidity was advected in a moisture transport band lying across the Indochina Peninsula and emanating from a tropical storm over the Bay of Bengal. Analyses of the ECMWF ensemble forecasts clearly showed a sudden emergence of predictability of the extreme event at lead times of three days that was associated with the correct forecasts of the intensity and location of the subtropical trough in the 51 ensemble members.

Thus, the Quang Ninh event is a good example in which the otherwise poor predictability of tropical convective rainfall is temporarily enhanced due to large-scale synoptic forcing; in the present case it was due to a tropical–extratropical interaction that has not been documented before for the region and season. As a consequence, the present study is a suitable contribution to the recently launched WMO HIWeather initiative under the research theme “Predictability and Processes” that aims at understanding regime-dependent changes in the forecast skill of high-impact weather events.