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High resolution climatology
- towards climate change services

The interaction between the outflow of Typhoon Jangmi (2008) and the midlatitude jet during T-PARC

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When a tropical cyclone moves polewards it may interact with the midlatitude flow and undergo extratropical transition (ET). The presence of a tropical cyclone undergoing ET is often accompanied by low predictability for the Atlantic-European and Northwest-American sector. In this presentation the focus lies on the interaction between the outflow of Typhoon Jangmi and the midlatitude jet which occurred in September 2008 during the THORPEX Pacific Asian Regional Campaign (T-PARC). Shortly after recurvature an enhanced outflow was seen polewards of the decaying typhoon. As the typhoon approached the midlatitudes the jet expanded further south and the wind speed in the jet core increased.

Numerical simulations with the mesoscale COSMO model are used combined with potential vorticity (PV) inversion to investigate the physical mechanisms which are responsible for the interaction between Typhoon Jangmi and the midlatitude flow. The analysis of the PV structure along with trajectory calculations showed that most of the lifting of tropical air to the jet level occurs in a small band at the baroclinic zone. This results in an enhanced outflow and may explain the acceleration and deflection of the jet. Furthermore, a new PV anomaly evolves associated with latent heat release at the baroclinic zone. This low level PV anomaly shows characteristics of a diabatic Rossby wave, propagates along the baroclinic zone, and develops into an extratropical cyclone.
Piecewise PV inversion enables us to remove the storm from the meteorological fields and thus to quantify the impact of the tropical cyclone on the midlatitude flow. The PV surgery showed that the jet core wind speed is significantly accelerated when Jangmi is present. In summary, physical processes which occur at the baroclinic zone to the midlatitudes were found to be crucial for the direct impact of ET on the midlatitude flow.