# 16C.7 A STUDY OF THE SUSTAINING MECHANISM OF LANDFALLING TROPICAL CYCLONES

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## 1. INTRODUCTION

Observations show that some tropical cyclones would be defunct soon after their landfall while others may sustain their vortex circulation for many days even to be resurgent. Researches (Chen 1998) indicated that the sustaining power of a landfall tropical cyclone might be closely related to moisture supply, acquisition of energy from baroclinic sources and upper air divergent conditions. Apart from these physical hypotheses, statistics suggest that the average time length of tropical cyclone circulation over land is relating to the roughness of landing ground, seasons and intensity of storms in landing time. Tropical cyclone circulation could sustain a longer time period if they land over a plain area rather than mountainous district. In average, climate feature in August is favorable to longer sustentation of a landfalling tropical cyclone. Major typhoon would more strongly decrease its intensity than the weak one when they made landfall. But the major one could maintain its circulation longer over land than the weak one.

## 2. MECHANISM ANALYSIS

Tropical cyclone will basically be dissipated after they made landfall because the abundant water vapor supply from the ocean is cut off. Some tropical cyclones could prolong its dissipative period over land if they keep the horizontal moisture transportation from the atmospheric environment. Numerical simulation with MM5V2 was carried out for Typhoon Winne (9711) and Todd (9806). Winne sustained 5 days over land while Todd dissipated 1 day after its landing. Results (Zeng 2000) demonstrate that the moisture transportation plays a major role for the sustaining of a landfalling tropical cyclone over land. On the other hand, a control test was made for typhoon Todd with and without moisture supply one day before its landfall. Results also demonstrate that Todd will dissipate within 24 hours if its moisture transportation from the south boundary is cut off.

The second important role for the sustaining of landfalling tropical cyclone is an upper level divergence field or connecting with an upper level outflow channel. Most of landfalling tropical cyclones with longer term sustaining would associate with a strong divergence field on upper level. Those strong divergences usually arise from a subtropical anticyclone or aloft jet stream.

Landing tropical cyclone transition will provide itself baroclinic energy from the mid-latitude cold air (Foley, et al. 1995). Tropical cyclone over land will become a sort of hybrid structure with warm in the right semicircle and cold in the left semicircle. The solenoid field of the hybrid system would strengthen the remanent circulation. On the other hand, the potential energy of the hybrid system would be released and converted into kinetic energy. Those processes could resurrect the vortex circulation and sustain it longer over land**.**

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Study also shows that the active meso-scale strong convective system related to certain topography effect would be favorable to the sustentation of the landing storms.

## 3. SUMMARY

One of the major forecasting issues of the landfalling tropical cyclone is the sustentation/decay of the cyclone, moisture continuously supply or the landing cyclone connecting with a water vapor channel, which is the major condition for the sustentation of the landing cyclone. Upper level strong divergence field including outflow channel associated with the cyclone and acquisition of the baroclinic energy from mid-latitude circulation as well as the meso-scale strong convection activities related to the topographic effect are also favorable to sustentation of the landing tropical cyclones.

## 4. REFERENCES

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