

**DOCTORAL THESIS INFORMATION WITH NEW SCIENTIFIC  
CONTRIBUTION, THEORETICAL STUDY**

1. Dissertation title: *A study on the role of rapid radar data assimilation using WRF model for very short-range quantitative precipitation forecasting for Ho Chi Minh city area*

Code: 9440222; Major: Meteorology and Climatology

2. PhD Candidate: Truong Ba Kien

Advisors: 1. Assoc. Prof. Duong Hong Son

2. Assoc. Prof. Ngo Duc Thanh

Training Institution: Viet Nam Institute of Meteorology, Hydrology, and Climate Change.

3. Introduction to the Dissertation:

Currently, the accuracy of quantitative precipitation forecasting, especially extremely short-term quantitative rain, is still a big challenge for operational and professional forecasting agencies in the world as well as in Vietnam. Ho Chi Minh City is a dynamic economic city that is developing very fast with a rapid urbanization rate, an economic capital for the whole country, however, the infrastructure has not been able to keep up with this development.

The weather radar network of Vietnam is increasingly being completed with a network of 10 upgraded radar stations covering the entire territory as well as innovation of assimilation technology that helps for hourly updating data assimilation for WRF model to predict the very short-range rainfall forecasting for small areas. Therefore, this study with the main goal is to improve the accuracy of very short-range of quantitative rainfall forecasting for Ho Chi Minh City area based on rapidly updated assimilating radar data for the WRF model.

4. New contributions of Dissertation:

- The thesis has tested and determined a suitable set of physical parameters for the HCM-RAP system to be applied in quantitative forecasting of very short-range quantitative precipitation (1-6 hours) for the Ho Chi Minh City area. According to the assimilation method, the radar is quickly updated hourly for the WRF model.

- The thesis has analyzed and evaluated the effectiveness of observed elements of radar in rapidly updated assimilation and determined the specific contribution of reflectivity and radial velocity to the accuracy of rainfall forecast at 1-6h leadtime with different rainfall thresholds. It shows that reflectivity has the



biggest influence in improving the skill of very short-range <sup>Phu luc II, 10, 9</sup> quantitative precipitation forecasting in compared to non-assimilating. The quantitative forecast of 4-6 hours leadtime indicated that it is better in comparison to radar extrapolation, solving the aboved gaps and in association with radar extrapolation of 1-3 hours ahead to improve the quality of very short-range quantitative precipitation forecasting for the Ho Chi Minh City area.

Representative of Advisors

PhD Candidate



Assoc. Prof. Dương Hồng Sơn

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