

Severe Pre-frontal Convective Systems Observed during Mei-Yu Season

Shao-Chin Hunag¹, Ching-Hwang Liu¹ and Wen-Chau Lee²

¹ Department of Atmospheric Science, Chinese Culture University

² Earth Observing Laboratory, NCAR

Abstract

Severe weathers sometimes occurred in pre-frontal convective systems in the vicinity of Taiwan during the Mei-Yu season. The pre-frontal convective system consists of several lines/cells, some of them are able to develop and intensify under favorable environmental conditions. These convective cells are often short lived with a 2~3 hours live cycle which is very difficult to predict when and where they will occur. Although Doppler radars are able to identify their presence, however, their spatial scale is so small, it is hard to obtain the detail structure of these cells. In this study, two cases observed in 2007 and 2008 were analyzed. We attempt to understand the environmental conditions responsible for triggering this kind of strong convective system.

During SoWMEX/TiMREX 2008 experiment, a pre-frontal convective system was observed near Taiwan on 13-14 June 2008. This system is similar to the Tainan tornado observed in 2007. Preliminary radar analysis has shown the environmental characteristics between these two cases are very similar. However, there was no tornado/waterspout was reported in the later case. In 2007, the Mei-Yu front is more typical which is characterized by shallow vertical structure and strong horizontal wind shear between pre- and post-frontal environment. However, in 2008 case the horizontal wind shear and deeper convection over the front and the structure is similar to a squall line. The vertical wind shear, CAPE and bulk Richardson number is 6.81 m/s, 250 and 5.34 in case 2007, while 6.08 m/s, 150, and 4.18 in case 2008. The bulk Richardson number implied that there is a favorable condition to induce strong convection in both cases. The VAD analysis also suggested that a strong LLJ existence with strong vertical wind speed shear (about 6 m/s) may play the important roles for these pre-frontal convective cells to intensify.