

Mesoscale boundaries and thunderstorm initiation during SoWMEX/TiMREX

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It has long been realized that boundary layer convergence zones are precursors to convective development and organization. These low-level convergence zones often act to locally deepen the moist layer and create conditions favorable for thunderstorm initiation. In SoWMEX/TiMREX, NCAR SPOL was deployed at river mouth of Kao-Ping Xi in south Taiwan and was operated by US and Taiwan scientists and students. It was found that strong echo signals associated with mesoscale boundaries in clear air condition were observed by SPOL. Some of them were closely related to the initiation of deep convection over the area.

In this study, we have examined the low level elevation angle SPOL reflectivity maps observed during SoWMEX/TiMREX. More than 20 pronounced boundaries were identified during the daytime over the plain of Kao-Hsiung and Pingtung counties. Half of them were related to the initiation of thunderstorm in a later time but not all of them. In this study, we have chosen the case on 20 June 2008 for presentation. Horizontal convective rolls developed over land on the morning of this day. The boundary with stronger echo formed near shore and propagated toward the foothill with a speed of 4m/sec. The main boundary became wider while approached to the foothill. There were secondary boundaries developed on the tail of the main boundary. Deep convections were initiated while the same area near foothill was hit by the main and secondary boundaries. The origin of these boundaries are not known and will be discussed using surface observed data and theory developed earlier.