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HR: 16:40h
AN: **U24A-02**
TI: Observations of the transition from shallow to deep convection during the North American Monsoon

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AB: The regular development of deep convection over the mountains in southern Arizona makes them an ideal location to study the onset and transition from shallow to deep convection. The convection that occurs during the North American Monsoon develops over the peaks a few hours after sunrise and development occurs slowly and in stages despite the presence of sufficient convective available potential energy (CAPE). A number of explanations for the episodic development have been proposed. These involve a modification of the column above the mountain by shallow convection that conditions the atmosphere for deep convection. The modification is likely due to moistening and/or changes to the static stability by warming the profile. Details of the transition from shallow to deep convection were explored during summer 2006 with support from the National Science Foundation. The Cumulus Photogrammetric In-Situ and Doppler Observations (CuPIDO) program utilized a network of ten portable automated mesonet stations (PAM-III), four of which were equipped to measure surface latent and sensible heat flux, two GPS based mobile sounding systems (MGAUS), two stereo pairs of digital cameras and the University of Wyoming King Air (with 95 GHz Doppler radar) to examine the onset and evolution of monsoon thunderstorms. This talk will describe the CuPIDO 2006 field program and present some preliminary results. Stereo- photogrammetric techniques are utilized to determine the three-dimensional structure of the clouds during various stages of the development. Changes to the vertical profile during the course of the development are examined using the sounding data and augmented by in-situ data from the aircraft. One specific example will be presented in which the breakdown of a stable layer at about the 500 mb level coincides with the onset of deep convection. The breakdown appears to be associated with warming of the profile in the lowest portion of the inversion

through the action of the shallow convection and cooling in the upper portion of the layer. The cooling appears to be due to evaporative cooling as dry environmental air is entrained in to the cloud tops. Data collected during CuPIDO will aid in our understanding of the interaction between cumulus clouds and the environment and the way this interaction contributes to the development of deep convection. An accurate representation of this process in forecast models will improve model performance and increase forecast skill.

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