Investigation of the Role of Thermal Boundary Layer Processes in Initiating Convection under the NASA SPACE Field Program.

Strategies:
The current NWS ground based network is not sufficient to capture the dynamic or thermodynamic structure leading to the initiation and organization of air mass moist convective events. Under this investigation we intend to use boundary layer mesoscale models (McNider and Pielke (1981) to examine the dynamic triggering of convection due to topography and surface thermal contrasts. VAS and MAM's estimates of moisture will be coupled with the dynamic solution to provide an estimate of the total convective potential. Visible GOES images will be used to specify incoming insolation which may lead to surface thermal contrasts and IR skin temperatures will be used to estimate surface moisture (via the surface thermal inertia) (Wetzel and Chang (1988))which can also induce surface thermal contrasts.

Plans:
We will use the SPACE-COHMEX data base to evaluate the ability of the joint mesoscale model satellite products to show skill in predicting the development of air mass convection. We will develop images of model vertical velocity and satellite thermodynamic measures to derive images of predicted convective potential. We will then after suitable geographic registration carry out a pixel by pixel correlation between the model/satellite convective potential and the "truth" which are the visible images.

Accomplishments:
During the first half of the first year of this investigation we have concentrated on two aspects of the project. The first has been in generating vertical velocity fields from the model for COHMEX case days. We have taken June 19 as the first case and have run the mesoscale model at several different grid resolutions. We are currently developing the composite model/satellite convective image. The second aspect has been the attempted calibration of the surface energy budget to provide the proper horizontal thermal contrasts for convective initiation. We have made extensive progress on this aspect using the FIFE data as a test data set. The calibration technique looks very promising.

Bibliography:
McNider, R.T. and R.A. Pielke , 1981: Boundary layer development over sloping terrain. *J. Atmos. Sci.* , 10, 2198-2212

Wetzel,P.J. and J. Chang,1988: evaoptranspiration from non uniform surfaces: a first approach for numerical weather prediction. *Mon. Wea. Rev.*, 116,600-62

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