THE ROLE OF DIABATIC HEATING IN THE NUMERICAL PREDICTION OF LONG WAVES

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A two level model incorporating heating was developed to investigate the behavior of the atmospheric long waves (wave nos. 1-4). The technique of introducing heating permitted a free upper boundary with respect to vertical motion; thereby, permitting the vertically integrated divergence to be other than zero. The importance of a non-zero vertically integrated divergence was pointed out by Bolin and Wiin-Neilsen.

The model permitted the near steady state long waves which characterize observed long wave behavior. The validity of the approach was demonstrated by two independent numerical investigations.

1) Realistic heating values obtained from independent investigations were substituted into the equations under assumed steady state conditions. The required phase and amplitude relationships of the mean motion and the mean vertical shear were computed. The values computed were quite realistic.

2) The observed behavior of the harmonic components covering a specific five day period was computed and substituted in the appropriate equations of the model. The assumed heating distribution required by the model to produce this behavior was computed. The geographic reality of this heating distribution was a striking substantiation of the extent of truth in the way the model accounts for atmospheric long wave behavior.

The hopeful significance of this investigation is that it will lead to some applicable dynamic principles pertinent to extended period weather prediction.