

## EVALUATION AND DEVELOPMENT OF NEW VAS REMOTE SENSING ALGORITHMS

William L. Smith, 1225 W. Dayton St., Madison, WI, 53706, (608)264-5325  
W. Paul Menzel, 1225 W. Dayton St., Madison, WI, 53706, (608)264-5325

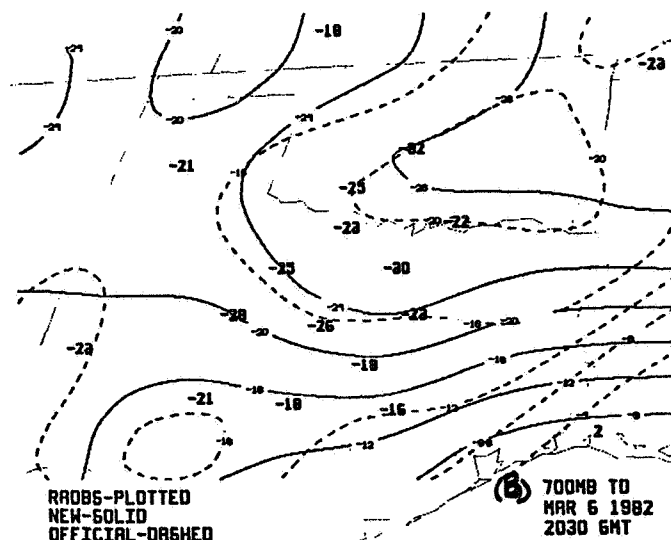
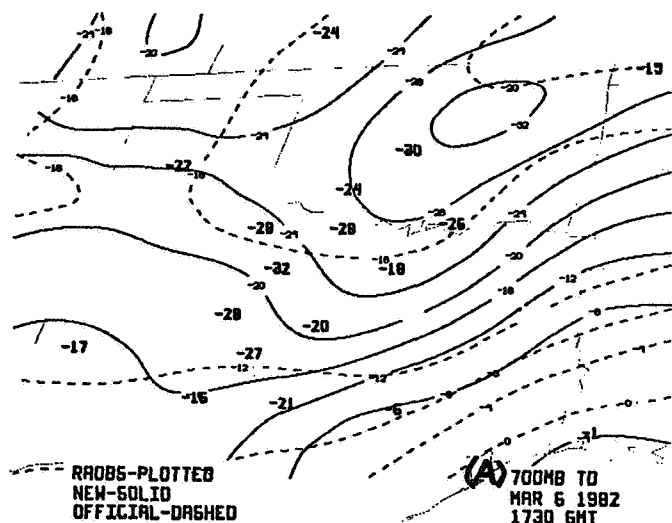
### Introduction

This research is part of an ongoing program to improve VAS remote sensing capabilities through algorithm improvements and product refinements. The AVE/VAS data sets are used to evaluate potential improvements.

### Accomplishments to Date in FY 84

During FY 84 a new physical algorithm has been developed to permit the simultaneous retrieval of temperature/moisture profiles and surface skin temperature by direct analytical solution of the radiative transfer equation. The new algorithm alleviates the problem associated with the interdependencies of water vapor retrieval on temperature retrieval and their dependencies on surface emissions. Simultaneous solution of all these quantities is achieved in one calculation using the available radiance observations; the previous algorithm achieved a solution only after several iterations. Since only a single matrix inversion is required for the specification of all parameters, the solution is computationally efficient. Ancillary observations of temperature and/or moisture from surface sensors on aircraft can be readily incorporated into the solution.

Simulation tests of the method indicate improved performance over the previous iterative technique, particularly for the lower troposphere and for water vapor. Fig. 1 shows a comparison of 700 mb dewpoint temperature analyses based upon the new method (solid) and the older "official" method (dashed) produced from two 6 March 1982 data sets separated by three hours. The AVE/VAS radiosonde observations are shown. One can see much closer agreement with radiosondes and better time continuity of the VAS moisture produced by the new retrieval method over older iterative method used to produce the "official" data set.



### Focus of Current Research Activities

An attempt is being made to incorporate polar orbiting microwave observation in the profile retrieval process in order to achieve better spatial continuity of VAS sounding products. The use of 1 km resolution visible data to improve sounding retrievals under partial cloudiness is also being investigated.

### Plans for FY-85

1. Completion of a fully amalgamated geostationary satellite (VAS) and polar satellite (MSU) sounding retrieval capability.
2. Development of algorithms to produce retrieval products (e.g., moisture and stability) at the full resolution of the VAS (7 km) for mesoscale applications.
3. Intercomparisons of VAS retrieved profiles with mesoscale vertical and horizontal resolution soundings to be obtained by the HIS interferometer and MAMS imager being tested aboard the NASA ER-2 aircraft.