COMPUTER SIMULATIONS OF SPACE-BORNE METEOROLOGICAL SYSTEMS ON THE CYBER 205

MILTON HALEM

NASA/GODDARD SPACE FLIGHT CENTER

GREENBELT, MARYLAND

COMPUTER SIMULATIONS OF SPACE-BORNE METEOROLOGICAL SYSTEMS ON THE CYBER 205

M. Halem

NASA/Goddard Space Flight Center
Greenbelt, MD

ABSTRACT

The complete global specification of the state-of-the-atmosphere on a daily or more frequent basis is required for numerical weather forecasting. Although the number of atmospheric variables required are small, namely, temperature, winds, moisture and surface pressure, globally and throughout the atmosphere, no single space-borne instrument is able to meet these requirements at the desired degree of accuracy and coverage. As a result, investigators have proposed to NASA a number of composite systems with differing limitations in accuracy and coverage under different atmospheric conditions.

Because of the extreme expense involved in developing and flight testing these instruments, an extensive series of numerical modeling experiments to simulate the performance of these meteorological observing systems have been performed on the CYBER 205. The studies compare the relative importance of different global measurements of individual and composite systems of the meteorological variables needed to determine the state of the atmosphere. The assessments are made in terms of the systems ability to improve 12 hour global forecasts. Each experiment involves the daily assimilation of simulated data that is obtained from a data set we call "nature." This data is obtained from two sources: first, a long two-month general circulation integration with the GLAS 4th Order Forecast Model and second, global analysis prepared by the National Meteorological Center, NOAA, from the current observing systems twice daily. More than two dozen experiments representing different possible configurations were carried out and analyzed. The experiments extend over a typical winter month, February, and successive 12 hour forecasts are made from the analysis twice daily. Thus, statistics are compiled from a total of 56 forecasts for each experiment.

This voluminous number of experiments would have taken over a year on a dedicated 24 hour per day allocation on an Amdahl V-6. The study was completed in less than a month on an as available basis on the Cyber 205 at the NASA High Speed Computing Facility.