I. Introduction

The PSU/NCAR mesoscale modeling system consists of a mesoscale model (currently version 4, referred to as MM4) and several auxiliary programs which perform the preprocessing and postprocessing of the input to and output from the forecast model. The mesoscale model (Anthes and Warner, 1978; Anthes *et al.*, 1987) was developed beginning in 1971 by students and scientists of the Department of Meteorology at the Pennsylvania State University (PSU). Since 1982, the modeling system has been improved, extended, and tested by scientists at both PSU and the National center for Atmospheric Research (NCAR). Development continues as an ongoing effort at both sites.

DATAGRID and RAWINS, two auxiliary programs of the modeling system, together access all of the meteorological data used as input to the mesoscale model. DATAGRID accesses archived large-scale analyses from the National Meteorological Center (NMC) or the European Center for Medium-range Weather Forecasts (ECMWF), or real-time analyses and forecasts from the NMC Medium Range Forecast (MRF) model and interpolates them to the horizontal grid of the mesoscale model. These interpolated analyses contain no smaller-scale meteorological information than was in the original fields. However, the raw observations likely contain mesoscale information which was filtered out to produce the coarse-resolution analyses. RAWINS improves the interpolated analyses by using them as a first guess for an objective analysis procedure, nudging them toward actual surface and upper-air observations. The resulting mesoscale analyses from RAWINS then contain information on a scale smaller than the original global or hemispheric analyses. The output from RAWINS, the improved analyses at the surface and at pressure levels, is later used as input to the program INTERP, which vertically interpolates these analyses to the vertical coordinate of the model to produce the model's initial fields.

This document discusses in detail the auxiliary programs DATAGRID and RAWINS, and is intended to update previous documentation for these two programs (Haagenson, 1987; Seaman and Haagenson, 1985). Other components of the modeling system are documented in Gill (1992) and Haagenson *et al.* (1990).

The purpose of this document is threefold:

1. to provide users of the PSU/NCAR modeling system with an overview of the methods used in DATAGRID and RAWINS;
2. to provide users with some instructions for running DATAGRID and RAWINS;
3. to provide users with reference material about the codes of DATAGRID and RAWINS, in case users desire to modify the programs for their own purposes.

Section II of this document discusses some of the design requirements of the forecast model, and introduces certain conventions and definitions which are used throughout the document. Sections III and IV discuss DATAGRID and RAWINS individually. Each of Sections III and IV first provides a description of the purpose and methods of the program; second, information needed to use the program; and third, a discussion of the details of the code itself. The discussion of DATAGRID (Section III) includes an additional discussion of an auxiliary program which may need to be run in conjunction with the DATAGRID program.