2. Scientific program descriptions

2.1 United States Weather Research Program (USWRP)

Chandrakant Bhumralkar

After more than a decade of development by a broad cross-section of the U. S. atmospheric research community involved in planning for the National STORM Program, the Subcommittee on Atmospheric Research (SAR) of the Committee on Earth and Environmental Sciences (CEES) led the development of a strategic plan to realize the objectives of STORM so as to improve our nation's capability to provide accurate short-term forecasts of weather. This strategic plan will guide the planning and implementation of what is now called the United States Weather Research Program (USWRP), which was approved by the President's Office of Science and Technology Policy in 1992. Recently, the USWRP Program Office responsibilities were shifted from the NOAA Office of the Chief Scientist to the Office of Oceanic and Atmospheric Research in NOAA. The current activities include completion of: the science and implementation plan, the post-field phase activities of the STORM-FEST experiment (the first multiscale field experiment conducted under the auspices of the USWRP, held in early 1992), and the data management system.

The USWRP is charged with achieving operational atmospheric prediction based on mesoscale observations and model results, and establishing the scientific and technological basis for global atmospheric mesoscale prediction by the year 2000. Key scientific questions being addressed under USWRP are:

- What is the role of scale interactions in determining mesoscale weather system structure, movement, and evolution?
- What are the feedbacks of these interactions and processes to weather on the large scale?
- What processes determine the timing, location, amount, and type of precipitation?
- How do mesoscale weather events impact hydrology?
- What are the limits of mesoscale predictability?

The modernization of the National Weather Service observing systems to include a network of 30 wind profilers in the central U. S., over 1000 Automated Surface Observing System (ASOS) stations, essentially complete coverage of the nation with a broad network of NEXRAD (WSR-88D) Doppler radars , and the GOES-Next satellite suite with its improved

profiling and imaging capability, will form the foundation for a range of systems tests and mesoscale research field experiments never before possible. The USWRP places high priority on developing science plans and defining specific implementation activities for: (a) fundamental research, (b) forecast applications, (c) predictive modeling, (d) data collection, analyses, and management, and (e) education and training. While there has been some early attention to item (d) with regard to the proposed multiscale field experiment, the USWRP will work with the scientific community to address the larger issue of *multiscale experiments versus smaller efforts focussed on regional forecast problems, as vividly demonstrated in the recent outbreaks of severe weather over the southeastern U. S.* Specific field experiments and other acitvities will be developed by the USWRP Scientific Advisory Committee (SAC) working in conjunction with the mesoscale research community, and approved by the SAR interagency working group. Field experiments of the CME-type will depend crucially on the following factors:

- Successful budget initiatives in FY95 and beyond by NOAA and the other SAR agencies
- The modernization deployment schedules for the new observing systems
- Linkage and optimization of field systems with those of other related programs, such as ARM, GEWEX, and AWP.

There are common objectives and database requirements between the USWRP and other programs (as discussed below), so *non-competitive synergism between the various programs must be established.* It is also incumbent upon the mesoscale modelling community to closely examine their observing system requirements for future field experiments. We must perform OSSE-type experiments to see if the large number of special balloon-borne soundings required in previous field programs such as STORM-FEST, *a major cost driver,* can be relaxed by incorporating the higher spatial and temporal resolution inherent in the new operational observing systems like NEXRAD, wind profilers (some with RASS sounders), and ASOS.

2.2 GEWEX Continental-scale International Project (GCIP)

Paul Try

The Global Energy and Water Cycle Experiment (GEWEX) represents the World Climate Research Program activities on clouds, radiation, and land-surface processes. The goal of the program is to reproduce and predict, by means of suitable models, the variations of the global hydrological regime and its impact on atmospheric and oceanic dynamics.