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# F I N A L  T E C H N I C A L  R E P O R T

# ASSESSMENT OF THE SOLAR-TERRESTRIAL DATA BASE MANAGEMENT SYSTEM

Contract NAS8-34534

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by

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The purpose of this effort was to: 1) involve members of the space science community in using the present MSFC NEEDS network to accomplish science, and 2) to discuss, in the context of existing network systems, the design and development of improvements and extension of the NEEDS network. Toward these ends, we supported two workshops. One was held in held in August 19 - 20, 1982, and the second was held October 11 - 13, 1982.

In the first workshop, Dr. Joe Doupnik representing Utah State University (USU) and Dr. Rod Heelis representing University of Texas at Dallas (UTD) visited MSFC and used the NEEDS network in collaboration with MSFC and UAH scientists to intercompare data from three instruments: Chatanika radar (supplied by USU), DE-2 RPA/Drift Meter (UTD) and DE-1 RIMS (MSFC/UAH). These data sets mostly reside on the VAX 11/780 system for the NEEDS network and may be accessed at the nodes located at USU and UTD; one of the primary purposes of this workshop was for the participants to achieve the requisite facility and enthusiasm for the network so that ongoing science could be accomplished more easily in the future by users staying at their remote sites. We believe that the beginnings of good science interactions on important topics were achieved by the workshop, and this will continue through remote site data analysis in the future. In particular, through the efforts of Dr. J. L. Green, it was possible to align the Chatanika and DE-1 RIMS data (as functions of L-shell) to look for structural changes, such as plasmapause features, in the plasma sampled at different points along the same L-shell, and this holds great promise for further correlative investigations (which continues today). The contract funded expenses for Drs. Doupnik and Heelis to attend and participate.

The second meeting, attended by approximately 36 scientists making up what has come to be termed the Data Systems Users Working Group (DSUWG), focused around a series of presentations on large scale network systems and data systems associated with currently founded NASA projects. Specifically, these presentations highlighted the current status of the Los Alamos and ARPANET computer-based network work systems, and the data-based systems for the following projects: GEOS, SME, CDAW, NEEDS, and AMPTE.

A general feeling which emerged from the second meeting was that workable Computer Network Systems are now operational and that the technology necessary to build a network exists today. The recent establishment of a network based on the NEEDS project at MSFC illustrates the relative ease of constructing an electronic network once money is available.

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The discussion of various current NASA projects (e.g., SME and AMPTE) illustrated the point that each individual project designs a workable data system within the context of its own project with very little thought given to its scientific usability and compatibility with existing data bases obtained from other projects. Of course, individual projects are not required to consider a universal standard in designing a data system, since one does not exist.

However, it was concluded that what is needed is the establishment of an electronic network that links together computers used by scientists encompassing a wide range of interests within the NASA community. For convenience we shall use the acronym SPAN (Space Physics Analysis Network) to imply such an electronic network.

Just how could SPAN help the beleaguered scientist? The primary use of SPAN would be to facilitate data exchange and acquisition involving

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collaborative research projects. The principal advantage of electronic data acquisition is that the scientist after requesting a particular subset of data can acquire the data by signing onto the appropriate computer via SPAN and shipping it back himself. Under such a system, the investigator controlling the requested data need only place the data in an accessible file and can leave the shipping to the requestor. Often requested data would save the investigator considerable time since the data need only be placed once in an accessible file.

The SPAN system could encompass many of the general recommendations given in the CODMAC report. For example, the concept of regional data centers would be a natural part of any fully developed SPAN system. The inclusion of regional data centers as well as local small computers in SPAN would force the scientists into developing common standards for distributed data. In addition, the probability for scientists to attain access to larger computational facilities increases.

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Further advantages of SPAN system are easy to find. For example, new projects within NASA, such as OPEN, could easily be placed within the existing framework. This would mean that new spacecraft missions would be able to start building their required data systems with a network already available and thus reduce duplication of effort in design and materials.

One requirements of a viable SPAN system would be independent funding. SPAN should not depend upon a single mission (e.g., such as OPEN) to justify its survival. Since NASA missions today often face a rocky funding future, data systems design usually suffers in the "descoping" process compared to the hardware phase of a mission. The research interests of the Space Physics community often encompass data collected by more than one

NASA mission. And hence, no single mission should be responsible for a SPAN system.

All of these discussions were very fruitful and encouraging toward the further development and utilization of the NEEDS network. The contract funded the necessary expenses for most of the participating scientists to attend.

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