Sally K. Ride Papers - Climate Change Committees /Speeches [including a few by Ride]

Global Information System Test

For NASA, 1992 will be a critical period in the development of the Earth Observing System to be launched aboard the polar platforms later in the 1990's as the centerpiece of an evolving international Earth system observing program. The TOPEX/Poseidon and Upper Atmosphere Research Satellite (UARS) should be ready for launch as a major contribution to the study of ocean dynamics and the ozone layer. The European Space Agency Earth Resources Satellite (ERS-1) and possibly the Japanese JERS-1 should be beginning to make major contributions to the study of the earth, in addition to the meteorological, land and ocean systems in various countries which are already in place and expected to continue.

The benefits of that already planned activity in space would be greatly enhanced if the International Space Year were dedicated to the Global Information System Test, that would make selected nationally available data streams truly accessible to scientists worldwide, and complete in-depth evaluations of the information content of the routinely available analyses and data products, including intercomparisons with in situ measurements and other satellite instruments. The experience gained in such a pilot program would be of inestimable value in the development of the much more ambitious plans for the data and information system associated with the Polar Platforms.

Demonstration projects for data access and evaluation should be carefully chosen for their probable utility to a broad group of international scientific users, and preferable in the context of established research projects expected to be then underway, such as Tropical Oceans Global Atmosphere Program (TOGA). They should be limited in scope but truly end-to-end tests of the conversion of data to useful information. They should draw upon developments in networking and electronic communications worldwide, starting in development mode but where appropriate building to near real time processing and distribution. Consideration should also be given to new techniques of digital publishing such as CD-ROM, and to providing proper attribution in scientific literature to creative contributions in the preparation and evaluation of data sets and derived information. It is important to establish patterns of interaction between the research community and data management and instrument professionals that develop the full potential of the entire ongoing observing system, both space and in situ.

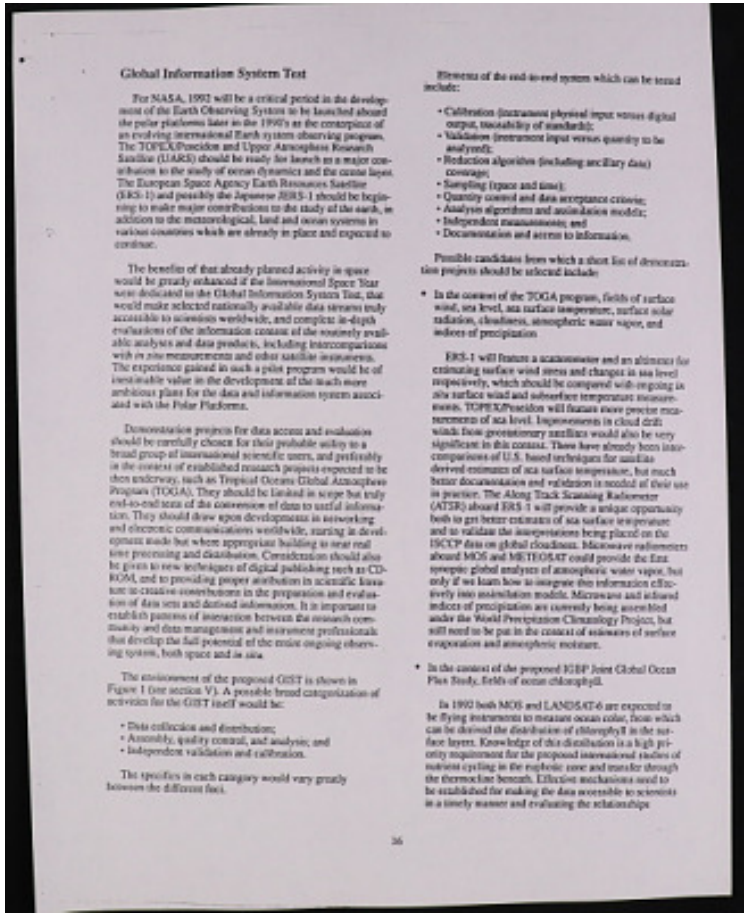
The environment of the proposed GIST is shown in Figure 1 (see section V). A possible broad categorization of activities for the GIST itself would be:

• Data collection and distribution;
• Assembly, quality control, and analysis; and
• Independent validation and calibration.

The specifics in each category would vary greatly between the different foci.

Elements of the end-to-end system which can be tested include:

• Calibration (instrument physical input versus digital output, traceability of standards);



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Elements of the end-to-end system which can be tested include:

• Calibration (instrument physical input versus digital output, traceability of standards);
• Validation (instrument input versus quantity to be analyzed);
• Reduction algorithm (including ancillary data) coverage;
• Sampling (space and time);
• Quantity control and data acceptance criteria;
• Analysis algorithms and assimilation models;
• Independent measurements; and
• Documentation and access to information.

Possible candidates from which a short list of demonstration projects should be selected include:

• In the context of the TOGA program, fields of surface wind, sea level, sea surface temperature, surface solar radiation, cloudiness, atmospheric water vapor, and indices of precipitation.

ERS-1 will feature a scatterometer and an altimeter for estimating surface wind stress and changes in sea level respectively, which should be compared with ongoing in situ surface wind and subsurface temperature measurements. TOPEX/Poseidon will feature more precise measurements of sea level. Improvements in cloud drift winds from geostationary satellites would also be very significant in this context. There have already been intercomparisons of U.S. based techniques for satellite derived estimates of sea surface temperature, but much better documentation and validation is needed of their use in practice. The Along Track Scanning Radiometer (ATSR) aboard ERS-1 will provide a unique opportunity both to get better estimates of sea surface temperature and to validate the interpolations being placed on the ISCCP data on global cloudiness. Microwave radiometers aboard MOS and METEOSAT could provide the first synoptic global analyses of atmospheric water vapor, but only if we learn how to integrate this information effectively into assimilation models. Microwave and infrared indices of precipitation are currently being assembled under the World Precipitation Climatology Project, but still need to be put in the context of estimates of surface evaporation and atmospheric moisture.

• In the context of the proposed IGBP Joint Global Ocean Flux Study, fields of ocean chlorophyll.

In 1992 both MOS and LANDSAT-6 are expected to be flying instruments to measure ocean color, from which can be derived the distribution of chlorophyll in the surface layers. Knowledge of this distribution is a high priority requirement for the proposed international studies of nutrient cycling in the euphotic zone and transfer through the thermocline beneath. Effective mechanisms need to be established for making the data accessible to scientists in a timely manner and evaluating the relationships

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