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Title of Investigation: Design Data Collection with Skylab/EREP Microwave Instrument S-193

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**DESIGN DATA COLLECTION WITH  
SKYLAB/EREP MICROWAVE INSTRUMENT S-193**

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DESIGN DATA COLLECTION WITH  
SKYLAB/EREP MICROWAVE INSTRUMENT S-193

The University of Kansas, Center for Research, Inc. reports the following work performed during the period 1 August 1974 to 31 August 1974.

1.0 CONTINUING STUDIES

1.1 (Task 2.1.1.2, 2.1.3.1, 2.1.3.2) Development of Catalogue for Radiometer Temperature Measurements Performed to Date.

Work has begun again on compilation of the catalogue. Progress is satisfactory.

1.2 (Task 2.1.3.3) Study of Effects of Atmosphere Upon S193 Rad/Scat Measurements.

Further computations have been performed for atmospheric effects on measurements made by the S193 sensors. Particular effort for the month of August has been devoted to the gathering of "best" input data to the program. For example, water content, ceiling and thickness of clouds have been obtained from recorded climatological data. The data derived is being applied to the Texas Specific Site Studies (see 1.3-b below) to determine its relevance. Presently, two cloud conditions are being considered: thin clouds at 0.6 grams/meter<sup>3</sup> of water and heavy clouds at 1.0 grams/meter<sup>3</sup> of water.

1.3 (Task 2.1.1.5, 2.1.3.1, 2.1.3.2) Ground Truth Collection and Data Catalogue.

Ground truth collection and data cataloging have now evolved into a more systematic procedure. The progress that has been made is satisfactory and should now continue at a better pace. Some of the more noteworthy achievements are mentioned below.

(a) Cataloging of the Data Base:

S193 data received in tape form has till now only been decommutated on an "as needed" basis, but generally restricted to data being used for specific

site studies or single pass, single mode analysis. In anticipation of the need for an expanded S-193 data base, effort has been directed toward decommuting all tape data and to provide it in forms (either magnetic tape or tabloid) suitable for use by all researchers on the project. Initial effort has been directed toward decomming all data within the continental United States. Data in these forms should experience a much wider usage among the various tasks of this project.

b). Specific Site Studies:

Work on the specific site studies, Texas and Utah, is continuing with the intention of identifying the most relevant factors to be considered for analysis and cataloging of S-193 data.

Maps have been plotted for all Skylab photography received for this project indicating its spatial location and extent and the amount of cloud cover. Three categories of cloud covered have been indicated: less than 25 percent, 25 to 50 percent, and greater than 50 percent. This information is critical since the amount of cloud cover for the various passes is generally extensive. For example, for all photography received for SL-3, thirty-six percent of it has greater than 50 percent cloud cover. Sixty percent of the SL-3 photography has varying degrees of cloud cover, but less than 25 percent cover overall. As mentioned in 1.2 above, refinements as to the effects of cloud cover on the data from the S-193 instruments are being performed. Since the dynamic range of the values measured by both the radiometer and scatterometer over the Texas site is relatively small, the effects of cloud cover are even more significant. Considering that a majority of the passes being analyzed for the Catalogue have notable amounts of cloud cover, this factor becomes even more relevant. Other factors that have been studied for their effects on S-193 measurements have been soil moisture, ground temperature, topography and land use.

Cloud free ERTS imagery has been received for the Utah Test site. Preliminary analysis indicates good correlation of S-103 Rad/Scat data to the areal distribution of the Great Salt Lake Desert, the Salt Lake and Utah Lake. Investigations as to the factors causing the wide variations in measured signals are continuing and will include a comparison of data from the SL-3 pass over the area to the SL-2 pass presently being analyzed.

c). Computer Data Analysis:

Histograms are being produced for various sets and subsets of the S-193 data. For example, histograms of sets of data consisting of the radiometer and scatterometer measurements for one mode in a particular pass are generated. Subset histograms within this context then might consist of the scatterometer and radiometer measurements obtained within particular ranges of incidence angles. Composite histograms are also being compiled for the various modes of S-193 operation in addition to overall (all data takes) histograms for indications of expected dynamic ranges of the earth's scene when measured by the S-193 radiometer and scatterometer.

Computer analysis has also begun on identifying those portions of various passes within which the measured (both radiometer and scatterometer) scene appears homogeneous to the S-193 instrument. This information is to be compared to that which is obtained by the studies discussed in 1.3-d which follows.

d). S-193 Footprint Analysis:

Cataloging of land use, climatological data and other relevant information on a "by footprint" basis is continuing. Footprints within areas that are expected to exhibit a reasonable amount of homogeneity to the S-193 instrument are being catalogued. Anomalies from the expected norm are being noted and given particular attention. It is expected that this method of data analysis will logically merge with the computer approach discussed in 1.3-c above.

e). Secondary Effect Corrections to S-193 Radiometer/Scatterometer Signals.

Efforts have continued on this task with reasonable satisfaction. Cross-polarization effects for the scatterometer have been modeled and work is now continuing to extend this model to cover the effects on the radiometer also.

## 2.0 REPORTS COMPLETED

No reports were completed this month.

### 3.0 SPECIAL ANALYSES

No special analyses were requested of us this month.

### 4.0 DATA RECEIVED

No data was received in August.

### 5.0 COMMENT

Because of cloud cover, it is anticipated that some difficulty will be encountered in obtaining land use information for our analysis. Concurrent Skylab photography was anticipated to be our primary source of land use information but now this appears to be too incomplete because of cloud cover. Thus, in this context, efforts are being made to obtain ERTS imagery for those Skylab passes where cloud cover is excessive. It is anticipated that the time it takes to receive such imagery may somewhat limit us on gathering of the necessary land use information.

JB:rh