# USE OF THE LANDSAT-2 DATA COLLECTION SYSTEM IN THE COLORADO RIVER BASIN WEATHER MODIFICATION PROGRAM



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16. ABSTRACT

This report describes the progress made during the third quarter of the Bureau of Reclamation's investigation into the operational use of the LANDSAT Data Collection System to aid in the forecasting and control of weather modification operations as part of the Colorado River Basin Pilot Project. As there were no weather modification operations conducted in the field during the present reporting period, the work performed was concentrated on the development and testing of an electronic wind averaging system which can be used operationally with the LANDSAT DCS to provide quality wind data in near real-time. Tests of two prototype wind averaging systems have demonstrated that wind data can be averaged and stored on-site for eight hours prior to transmission.



17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS--
Satellite Data Collection System, Weather Modification, Hydrometeorology, Electronic Wind Data Averaging.

b. IDENTIFIERS--
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a. Title: Use of the LANDSAT-2 Data Collection System in the Colorado River Basin Weather Modification Program

LANDSAT Follow-on Investigation No.: 23030

b. GSFC ID No. of P.I.: IN024

c. Problems:

During the period July 1, 1975 through September 30, 1975, problems were encountered with the Bureau of Reclamation's computer system located at the Denver Federal Center which effected the schedule of the work.

In early July the computer charge number for Western Scientific Services, Inc. (WSSI), the subcontractor charged with developing the wind averaging system, was erroneously terminated. This problem was identified on July 21, 1975 and corrected by assigning WSSI an alternate charge number, allowing them to access the computer.

Data from the electronics wind averaging system are received in binary numbers. Since a software program was not available to automatically convert the binary numbers to familiar values, the data obtained from the Jersey Jim field site during July and August will require manual conversion and tabulation for analysis and reporting. Work was begun on developing a computer program to handle these data but as of the end of this reporting period problems still existed with data format and time computations.

d. Accomplishments:

This section of the Progress Report discusses the accomplishments during the present reporting period and those planned for the October 1, 1975 through December 30, 1975 period.

I. Work Accomplished

A. Hydrometeorological Data Collection Systems

The five LANDSAT data collection platforms which comprised the LANDSAT network during the 1974-75 winter season were removed from the field sites in the San Juan Mountains early in the present reporting period. No data intended for operational use were collected from these sites after June 30, 1975.

B. Wind Averaging System Development and Testing

After development of the wind averaging circuitry was completed, two systems were constructed for testing. The #1 wind averaging system was operated at WSSI's facilities in Fort Collins, Colorado from mid-July through September, 1975. Averaged wind data have been received in the form of binary numbers and the system appears to be operating properly.

The #2 wind averaging system was installed at the Jersey Jim field site during late June. Field testing of the #2 system was terminated in early August when the battery voltage dropped too low for the electronics to operate properly. The system was subsequently removed and transported to Fort Collins, Colorado. This test demonstrated the feasibility of transmitting averaged wind data, stored over a period of several hours, from a remote site.

C. Relative Humidity Sensor Evaluation

Comparison data for different types of relative humidity sensors were obtained over a 30-day period during tests conducted at WSSI facilities in Fort Collins, Colorado. The following sensors were selected for comparison:

1. Sling psychrometer
2. Hygrothermograph
3. PCRC-11
4. Hygrometrix Model 8501

The sensors were installed in an instrument shelter located near WSSI's electronics laboratory and relative humidity readings were obtained at various times (day and night) over the test period. These data are currently being evaluated and compared. Preliminary review of the data indicates that the Hygrometrix unit may offer the best performance for remote systems.

II. Progress Planned for Next Reporting Period

Work items planned for the October 1 through December 30, 1975 period include the following:

A. Modify the signal conditioner boards on the two wind averaging systems to allow the operation of analog channels for transmitting precipitation accumulation, temperature, relative humidity, and solar radiation data in addition to averaged wind data.

B. Conduct tests on the two data collection platforms at WSSI facilities in Fort Collins, Colorado.

C. Develop the computer software to handle the averaged wind data together with the data from the additional sensors to provide a computer data printout of familiar values which is suitable for use in near real-time operations.

D. Complete the evaluation of comparison data obtained from various relative humidity sensors.

E. Compare averaged wind data obtained through the LANDSAT network with wind data from a continuously recording conventional system.

F. Prepare preliminary operational and maintenance standards for each type of instrument-transmitter unit.

G. Update the analysis for cost and effectiveness comparisons between the LANDSAT data collection system and alternate data collection techniques.

e. **Significant Results:**

The operation of the LANDSAT Data Collection System on the Colorado River Basin Pilot Project during the 1974-75 winter season demonstrated that it is a practical means to obtain accurate data in near real-time to aid in forecasting and control of weather modification operations.

Tests of the two prototype wind averaging systems developed by WSSI have shown that wind data can be averaged and stored on-site for a period of eight hours prior to transmission through the LANDSAT DCS. These averaged wind data will be much more useful in operational programs than instantaneous values.

f. **Publications:**

There were no published articles, and/or papers, pre-prints, inhouse reports, or abstracts of talks that were released during the reporting period.

g. **Recommendations:** None

h. **Funds Expended:**

Total expenditure on this investigation through September 30, 1975 is $20,159.

i. **Data use:** N/A

j. Aircraft Data: N/A