(E72-10230) WATER SURVEY OF CANADA: APPLICATION FOR USE OF ERTS-A FOR RETRANSMISSION OF WATER RESOURCES R.A. Halliday (Water Survey of Canada, Ottawa, (Ontario).) 17 Nov. 1972 10 p CSCL 08H G3/13

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FIRST ERTS TYPE 1

PROGRESS REPORT

SR 9629

R. A. Halliday
Ottawa, Canada

November 17, 1972

FIRST ERTS - TYPE I PROGRESS REPORT

Title Of Investigation:

Water Survey of Canada: Application for use of ERTS - A for Retransmission of Water Resources Data. (Discipline - Water Resources; sub-discipline - River Monitoring)

SR Number:

SR - 9629, Principal Investigator: Mr. R.A. Halliday (replacing Mr. P.I. Campbell)

Major Problems Impeding Progress:

The greatest time loss occurred because of a faulty Field Test Set. Since our DCP's are deployed in remote areas, we wanted to check them with the FTS before installation. Eventually the DCP's were installed without the use of the FTS. Other problems that have arisen are:

(a) Long turn around time on an FTS and DCP that were returned for repairs (approximately three months)

(b) One DCP lost in shipment from Daytona Beach to Ottawa until October 17, 1972

(c) Another DCP lost in shipment from Calgary, Alberta to Fort Simpson, NWT from October 10 to 23, 1972.

(d) One stream gauging station (Kootenay River at Fort Steele) was destroyed by a flood prior to installation of the DCP. Deployment of that DCP has been delayed pending reconstruction of the station

(e) Delay time of 10 to 15 days in receiving data from Washington to users. This has now been resolved with the installation of the teletype line to the Canada Centre for Remote Sensing in Ottawa.

Accomplishments:

(a) DCP 6354 and water level encoder installed on Illecillewaet River at Greeley (Lat. 51°01 N - Long. 118° 05') and activated Sept. 6, 1972

(b) DCP 6150 and water level encoder installed on Lake Athabasca at Crackingstone Point (lat. 59° 23' N - Long 108° 53) and activated September 19, 1972

(c) DCP 6353 and water level encoder installed on Kazan River at outlet of Ennadai Lake (Lat. 61°15'N - Long 100°53) and activated September 19, 1972

(d) DCP 6366 and water level encoder installed on Mackenzie River at Norman Wells (Lat. 65°17'N - 126°51') and activated October 11, 1972

(e) DCP 6232 and water level encoder installed in Albany River above Nottick Island (Lat. 51°38'N - Long 86°24') and activated October 12, 1972

(f) DCP antenna and water level encoder installed on Winisk River below Asheweig River Tributary (Lat. 54°31' - Long 87°14') October 14, 1972. DCP 6137 will be installed in January 1973

(g) DCP 6125 and water level encoder installed on Duncan River below B.B. Creek (Lat. 50°38' - Long 117°03') and activated October 25, 1972

(h) DCP 6260 and water level encoder installed on Mackenzie River at Fort Simpson (Lat. 61°52' - Long 121°21') and activated October 31, 1972

(i) A computer programme that reads the DCP output cards and produces a printout of water levels has been prepared. Sample output is included at the end of this report.

(j) A manufacturer of plastic domes that could be used to protect the DCP antenna from snow build-up has been located but an order has not been placed.

(k) DCP data now being received at the Canada Centre for Remote Sensing in Ottawa via teletype on an almost real time basis.

Results:

All DCP's except those mentioned below are producing apparently good data. Because of the isolated locations of the platforms, the hard record at all sites is not available for quality checking of DCP data at present. Preliminary comparison checks of the data received from DCP 6354 indicate that transmissions are accurate. Quality checks will be conducted in the next reporting period.

Problem DCP's

(a) DCP 6353 - transmitted good data for approximately 24 hours after activation then started transmitting zeros. Site will not be accessible again until December 1972.

(b) DCP 6232 - activated but no transmissions received. Site will not be accessible again until January 1973.

Significance of Results:

Up to now the ERTS data have been used mainly as a check on the performance of the water level recorder at each gauging station. Data are now being received on an almost real-time basis and will be used for flow forecasting and for planning of hydrometric trips to the vicinity of the ERTS DCP.

The quantity of data received by the ground stations is far beyond our expectations. We are receiving data from three to seven orbits a day for each station, even the most northerly. As many as ten transmissions per orbit are received. All DCP's are now on the 180 second transmission rate although at the time of installation some were set to the 90 second rate. The quality of all transmissions has been 7.

Articles Or Papers:

None published or prepared.

Recommendations:

(a) It would aid installation considerably if the standard length of antenna lead-in wire was 15 feet rather than 10 feet. Also, we have found it impossible to obtain the end fittings in Canada. A more common fitting should be used.

Questions

(a) For what application have the DCP's been found most useful?

The only use to date has been for monitoring performance of on-site sensors. Applications will increase as we move out of the installation phase and into an operational mode.

(b) What sensors were employed and which have been found most useful?

Two types of water level sensors are in use. One is a float and pulley; the other is a pressure activated servo-manometer. The analog output from these sensors is encoded into parallel digital form by a Leupold and Stevens Memomark II.

Other sensors that will be used are precipitation, temperature, ice movement, velocity and equipment monitoring sensors such as battery voltage.

(c) What has been the experience with the DCP hardware from the standpoint of reliability, maintainability, etc. What improvements are recommended, if any?

Our experience with the Field Test Set has not been good. The FTS is equipped with a Mickey Mouse battery pack that will not withstand normal shipping. Our battery pack was damaged in shipment from the factory, and when this was repaired we found that the FTS could not check itself out nor would it check out a DCP.

The FTS was returned to the factory for repairs eventually and our DCP's were checked out by installing them in town for twenty-four hours then telephoning the ERTS Control Center to see if transmissions had been picked up. One of nine DCP's failed this test.

General Electric personnel have been extremely helpful in discussing problems and suggesting solutions. However the turn-around time on repairs is extremely long.

Additional Information:

Heating of Installations

Since some of our DCP's are installed in areas where temperatures of - 60°F can occur and where temperatures of - 50°F will occur each winter, we have decided to heat some of the shelters housing the DCP's and sensors. Two other shelters will not be heated in order to provide a comparison. Our method of heating is as follows:

(a) Construct an insultated enclosure using one quarter inch plywood and 2 to 4 inches of styrofoam block. The styrofoam is glued to the plywood. Access doors should be provided in order to service the equipment. In some instances we insulate our entire instrument shelter which is normally a prefabricated steel building five feet by five feet by seven feet high.

(b) Heat the enclosure using a Cata-Dyne catalytic propane heater equipped with a 600 BTU orifice. One tank (100 lbs) of propane is sufficient to last three or four months. The Cata-Dyne heaters are available from CIS CAN Chemical and Industrial Sales Ltd, 4846 Yonge Street, Willowdale, Ontario, Canada.

A twelve volt power source is required to start the heater. Since we are using heavy duty car batteries as our DCP power source, this present no problem.

Data Analysis Plan

Although we have not yet received two months data from most of our platforms, we expect that our original data analysis plan will be unchanged.

Photographs

A selection of photographs taken at the time of the installation of a DCP on the Kazan River at the outlet of Ennadai Lake in the Canadian barrenlands is included on the following pages. The individual in some of the photographs is Mr. Ron Coté, Officer-in-Charge of the Baker Lake, Northwest Territories Sub-Office of the Water Survey of Canada.

Future Progress Reports

In order to complete future progress reports in the proper manner, I would appreciate receiving a copy of the Attachment D mentioned in the Provisions for Participation.

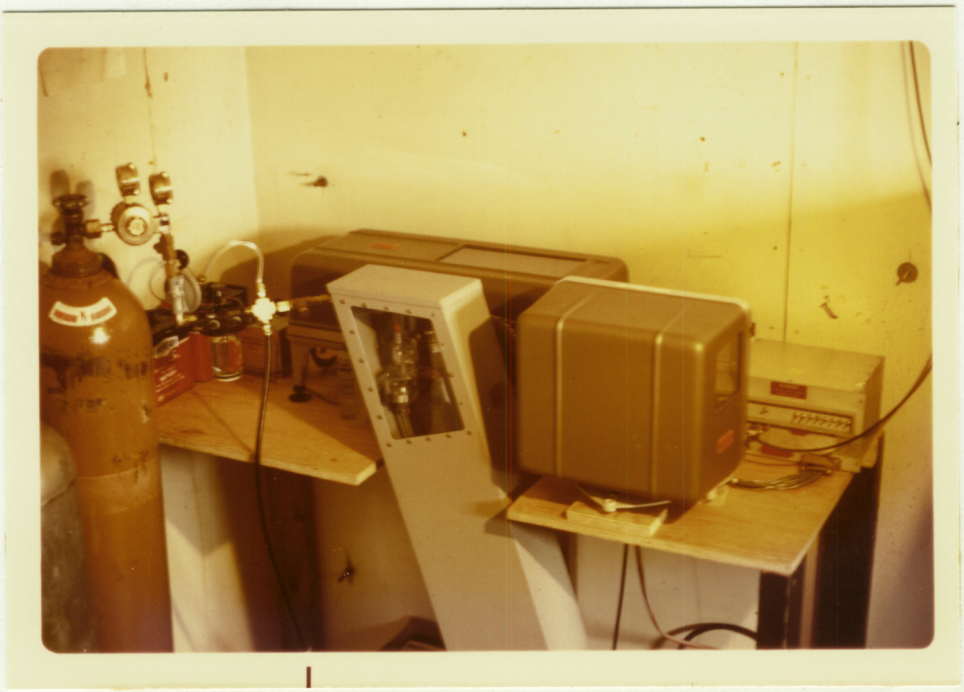
Attaching mounting brackets for antenna mast to wall of 12 foot by 16 foot personnel shelter.

Antenna mast installed - end is buried in ground and rocks piled up to give additional support.

Attaching ground plane to mast

Attaching guy wires to ground plane. Note water level sensor line leading up to shelter is left side of photograph.

Antenna installation complete - note boulder anchorages of guy wires



Interior of shelter (prior to construction of insulated compartment) showing tank of propane for heater, tank of nitrogen for water level sensor, Leupold and Stevens Type A-71 water stage recorder, CAE Aircraft water stage servo-mamometer, Leupold and Stevens water level encoder and General Electric Data Collection Platform.

SUMMARY OF RETRANSMITTED DATA VIA ERTS SATELLITES

WATER RESOURCES BRANCH — ILLECILLEWAET RIVER AT GREELEY — STATION NO. 08ND013

DATE OCT 20 1972 PAGE 7 — PLATFORM NO. 6354

OTTAWA, ONT.

DATE	TIME(PST)	GAUGE READING	ERROR FLAG	MESSAGE QUALITY	DATA QUALITY	SATELLITE ID.	RECEIVING STATION
OCT 07,72	10 17 34	04.95	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 07,72	10 21 02	04.95	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 07,72	18 34 39	05.07	0	7	77777777777777777774	ERTS I	GREENBELT, MD
OCT 07,72	20 15 25	05.14	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 07,72	20 18 48	05.14	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 07,72	21 56 58	05.24	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 07,72	22 00 22	05.24	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 08,72	08 38 54	05.44	0	7	77777777777777777774	ERTS I	GREENBELT, MD
OCT 08,72	08 42 20	05.44	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 08,72	08 42 20	05.44	0	7	77777777777777777774	ERTS I	GREENBELT, MD
OCT 08,72	10 24 58	05.44	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 08,72	10 28 22	05.44	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 08,72	12 09 54	05.43	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 08,72	20 22 28	05.47	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 08,72	20 25 50	05.47	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 08,72	22 03 55	05.52	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 08,72	22 07 19	05.52	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 09,72	08 46 07	05.67	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 09,72	08 46 07	05.67	0	7	77777777777777777774	ERTS I	GREENBELT, MD
OCT 09,72	08 49 32	05.67	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 09,72	08 49 32	05.67	0	7	77777777777777777774	ERTS I	GREENBELT, MD
OCT 09,72	10 28 21	05.68	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 09,72	10 31 45	05.68	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 09,72	20 25 33	05.99	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 09,72	20 28 59	05.99	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 09,72	22 08 43	05.92	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 09,72	22 12 10	05.92	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 10,72	08 51 06	05.54	0	7	77777777777777777774	ERTS I	GREENBELT, MD
OCT 10,72	08 54 36	05.54	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 10,72	08 54 36	05.54	0	7	77777777777777777774	ERTS I	GREENBELT, MD
OCT 10,72	10 35 03	05.50	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 10,72	10 38 29	05.50	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 10,72	18 50 26	05.41	0	7	77777777777777777774	ERTS I	GREENBELT, MD
OCT 10,72	18 53 51	05.41	0	7	77777777777777777774	ERTS I	GREENBELT, MD
OCT 10,72	20 33 55	05.41	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 10,72	20 37 23	05.41	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 10,72	22 14 54	05.39	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 10,72	22 18 24	05.39	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 11,72	08 57 45	05.18	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 11,72	08 57 45	05.18	0	7	77777777777777777774	ERTS I	GREENBELT, MD
OCT 11,72	09 01 20	05.18	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 11,72	09 01 20	05.18	0	7	77777777777777777774	ERTS I	GREENBELT, MD
OCT 11,72	10 40 51	05.16	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 11,72	10 44 22	05.16	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 11,72	18 57 36	05.16	0	7	77777777777777777774	ERTS I	GREENBELT, MD
OCT 11,72	20 38 48	05.20	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA
OCT 11,72	20 42 19	05.20	0	7	77777777777777777774	ERTS I	GOLDSTONE, CA