

WOLF RESEARCH AND DEVELOPMENT CORPORATION
ERTS 1

Type I Progress Report

- a. Title. The Interdependence of Lake Ice and Climate in Central North America.
- b. Proposal Number. 113
- c. GSFC ID Number. PR506
- d. Problem Areas. During the last reporting period the Programmer assigned to this project terminated his job with WOLF. As a result, the software development portion of this investigation has slipped approximately one month. The subsequent delay in completion of the software package is not expected to adversely impact image analysis, because the majority of data processing routines have been tested and debugged.
- e. Accomplishments. The final selection of 233 study lakes has been made; their geographical distribution is indicated in Table 1. Each lake was assigned a unique identification code number which in turn was plotted on an Operational Navigation Chart (scale 1:1,000,000). During image analysis, the identification code accompanied by the lake freeze/thaw code will facilitate updating of the data base. The primary data base is stored on magnetic tape and consists of the following information for each lake: name, identification code, latitude, longitude, political subdivision, area (sq. km.), mean depth (meters), maximum depth (meters), and freeze date/thaw date for each winter season. Details of all operational aspects of the study will be presented in the Data Analysis Plan and Type II Progress Report.

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for any use made thereof."**

Arrangements have been made with NASA/GSFC, Meteorology Branch, to borrow North American Surface Charts (1200Z) on a weekly basis beginning October 6, 1972. These weather data will be supplemented by a subscription to the Weekly Series of Daily Weather Maps published by NOAA.

To date imagery of the swaths shown on Figure 1 have been received. These were catalogued by date and image sequence number and reviewed for applicability to this study, image descriptor content, or unusual natural phenomena. One such phenomenon is reported on below.

(E72-10121) THE INTERDEPENDENCE OF LAKE
ICE AND CLIMATE IN CENTRAL NORTH AMERICA
Progress Report A. Jelacic (Wolf Research
and Development Corp.) 4 Oct. 1972 7 p

N72-32371

Unclas

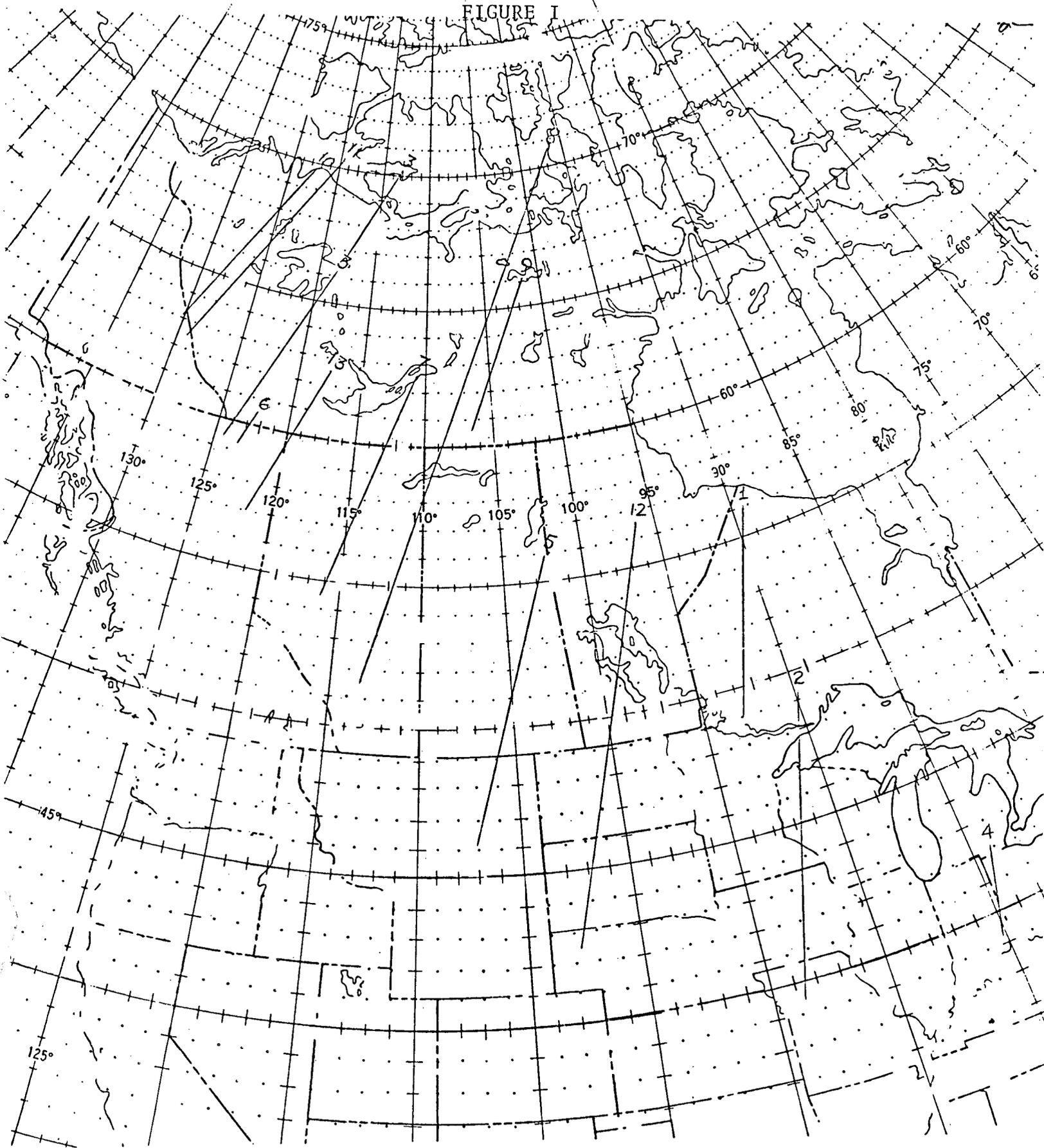
CSCL 08L G3/13 00121

- f. Projected Work. During the next bi-monthly reporting period, the following tasks are planned:
- Software Package Completion. Final coding, testing, and debugging of data analysis and data display computer programs will be carried out.
 - Image Analysis. Operational image analysis is expected to begin upon the receipt of imagery taken in mid-September.
- g. Results. The imagery received thus far do not contain information pertinent to this investigation. Therefore, no results concerning lake ice are available this reporting period. A brief description of an unusual hydrologic process unrelated to lake ice is presented in the attached report.
- h. Publications. None.
- i. Recommendations. None.
- j. Standing Order Form Changes. None.
- k. Data Request Forms. Data Request Forms were submitted on the following dates:
1. August 11, 1972
 2. October 2, 1972.
- l. Image Descriptor Forms. Attached.

Table 1. Geographical Breakdown of Candidate Lakes
 To Be Used in The Lake Ice Investigation And
 Those Lakes Selected For Intensive Study

| <u>COUNTRY</u> | <u>PROVINCE/STATE</u> | <u>CANDIDATE LAKES</u> | <u>STUDY LAKES</u> |
|----------------|-----------------------|----------------------------|------------------------|
| CANADA | Northwest Territories | 33 | 19 |
| | Alberta | 10 | 8 |
| | Saskatchewan | 50 | 24 |
| | Manitoba | 41 | 28 |
| | Ontario | 24 | 7 |
| | Sub-Total | 158 | 86 |
| UNITED STATES | Illinois | 15 | 15 |
| | Indiana | 6 | 4 |
| | Iowa | 8 | 4 |
| | Michigan | 21 | 3 |
| | Minnesota | 5 | 3 |
| | Nebraska | 30 | 0 |
| | North Dakota | 6 | 5 |
| | South Dakota | 11 | 11 |
| | Wisconsin | 151 | 102 |
| Sub-Total | 253 | 147 | |
| TOTAL | | 411 | 233 |

FIGURE I



ERTS FLIGHT PATHS

- | | | | |
|--------------|--------------|---------------|---------------|
| 1. 27 JUL 72 | 5. 23 AUG 72 | 9. 28 AUG 72 | 13. 19 AUG 72 |
| 2. 30 AUG 72 | 6. 21 AUG 72 | 10. 28 AUG 72 | 14. |
| 3. 22 AUG 72 | 7. 01 SEP 72 | 11. 27 AUG 72 | 15. |
| 4. 24 AUG 72 | 8. 29 AUG 72 | 12. 19 AUG 72 | 16. |

Title: Mackenzie River Flow Pattern

Discipline: Water Resources (River Monitoring)

Summary: ERTS 1 imagery of August 22, 1972, scene number E-1030-19014, covers a portion of the Mackenzie River, Northwest Territories, Canada, from just east of Fort Simpson to a point near Wrigley. MSS bands 5(0.6-0.7 μ) and 6(0.7-0.8 μ) show a visible difference in image density from bank to bank across the river. The density contrast is less apparent on MSS bands 4(0.5-0.6 μ) and 7(0.8-1.1 μ). Geographically the phenomena is detectable from the intersection of the Liard River with the Mackenzie, downstream to the edge of the scene, a distance in excess of 200 km.

Examination of the imagery indicates that the density contrast is real and probably due to the association of two greatly different water types. The source of the Mackenzie River is Great Slave Lake, whereas the Liard River rises in the Pelly Mountains (Rocky Mountain chain) and is fed by numerous mountain tributaries. Consequently, in view of the time of year, the Mackenzie River is probably carrying relatively clear, sediment-free water out of Great Slave Lake while the Liard River is transporting a considerable amount of suspended sediment produced by stream erosion. This interpretation is borne out by the fact that the Liard is more reflective than the Mackenzie in the red and near-IR part of the spectrum, as would be expected from a sediment-laden stream.

The fact that two contrasting water types meet at a confluence and maintain their identity downstream (i.e., fail to initially mix) is not unusual. What is unusual in this case is the distance over which separate identities are apparently maintained: more than 200 km. Natural turbulent flow, even in a sluggish stream, should produce complete mixing within a relatively short distance. The small degree of lateral mixing in the Mackenzie River, as indicated by ERTS 1 imagery, should offer many interesting problems for hydrologists and hydrodynamicists.

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

DATE 10/6/72
 PRINCIPAL INVESTIGATOR Allan Jelacic
 GSFC P506
 ORGANIZATION Wolf R & D Corp

NDPF USE ONLY

D _____
 N _____
 ID _____

| PRODUCT ID (INCLUDE BAND AND PRODUCT) | FREQUENTLY USED DESCRIPTORS* | | | DESCRIPTORS |
|--|------------------------------|-----------------|-------------------|-------------------------------|
| | LAKE CLUSTER | LINEA- MENTS | LUMBERING AREA | |
| 100416351X | ✓ | | | lake chain |
| 100416360X | | | | |
| 1029185625 | | | | river bars; natural levees |
| 103019011M | ✓ | ✓ | | river bars; natural levees |
| 1030190205 | | | | |
| 103117262M | | | ✓ | dam; reservoir |
| 103117265M | | | | |
| 1031172805 | | | | dendritic drainage |
| 1031172606 | ✓ | ✓ | | city; airfield |
| 1031172735 | | | | |
| 103117283M | | | | dam; reservoir |
| 1038162455 | | | ✓ | city |
| 1040181745 | | | ✓? | network |
| 1040181815 | | | ✓? | network |

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO ERTS USER SERVICES
 CODE 563
 BLDG 23 ROOM E413
 NASA GSFC
 GREENBELT, MD. 20771
 301-982-5406

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

DATE 10/6/72
 PRINCIPAL INVESTIGATOR Allan Jelacic
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NDPF USE ONLY
 D _____
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| PRODUCT ID (INCLUDE BAND AND PRODUCT) | FREQUENTLY USED DESCRIPTORS* | | | DESCRIPTORS |
|--|------------------------------|--|--|--|
| | | | | |
| 103717555M | | | | sea ice lineaments eskers eskers city dunes |
| 103717580M | | | | |
| 103717582M | | | | |
| 1037180125 | | | | |
| 1027170705 | | | | |



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