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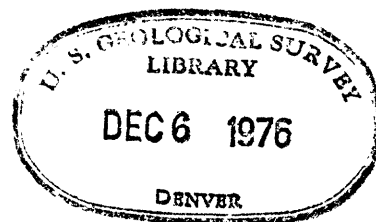
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PRELIMINARY GEOLOGIC MAP OF THE SAN'A, QA'TABAH, IBB, ZABIB, AND
BAHIL AREA, YEMEN ARAB REPUBLIC, LANDSAT-1 IMAGE NO. 1189-06561

By

M. J. Grolier and W. C. Overstreet

U. S. Geological Survey



This report is preliminary and
has not been edited or reviewed for
conformity with Geological Survey
standards or nomenclature

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various kinds of scientific, technical, or administrative studies.
Reports may be preliminary in scope, provide interim results in
advance of publication, or may be final documents.

PRELIMINARY GEOLOGIC MAPS OF THE
YEMEN ARAB REPUBLIC

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INTRODUCTION

Objectives of the project and scope of the mapping

This is one of nine separate preliminary geologic maps at 1:500,000 scale covering the entire Yemen Arab Republic (YAR). Each of the nine maps corresponds to an area of the Yemen Arab Republic covered by a Landsat (formerly ERTS) image. The respective Landsat images were used as the bases on which each of the maps was compiled, after stratigraphic and structural analysis in the office, and subsequent checking in the field. This work, in 1975, is one of the services called for under PASA ASIA (IC) YEM-925-22-74 between the U. S. Agency for International Development (USAID) and the U. S. Geological Survey (USGS) for a water and mineral survey in the Yemen Arab Republic, to be performed in cooperation with the Central Planning Organization, the Ministries of Agriculture and Economy, and the Mineral and Petroleum Authority of that country. Part of the program called for a Landsat survey of the country, and one of the goals of the sub-project was to produce a Landsat mosaic of the Yemen Arab Republic.

A substantial part of the imagery used in this study was provided by the National Aeronautics and Space Administration (NASA), Goddard Space Flight Center, under a Memorandum of Understanding between the USGS and NASA.

The intent in compiling these geologic maps was to bring together, at a convenient working scale, previously known and recently acquired geologic data. It is hoped that this set of maps can be used as a tool in hydrologic investigations, minerals exploration, in regional planning, economic and industrial development, highway engineering, and, also, as an aid in mapping the regional geology of the YAR at a larger scale, such as at the 1:100,000 scale.

Permission to release these geologic maps to the open file of the U. S. Geological Survey was given on March 2, 1976, by Dr. A. A. El-Eryani, Minister of Development, and Chairman of the Central Planning Organization, Yemen Arab Republic. The maps are being released in this limited preliminary version, prior to formal publication on a Landsat base. A geologic explanation on a separate sheet accompanies each of the nine geologic maps.

Reconnaissance field checking

Two field trips were made to the YAR in connection with this program. The first field trip, which included reconnaissance on the ground and from the air, was made between June 16 and July 13, 1975, jointly by Maurice J. Grolier and William C. Overstreet (USGS). During the trip it was possible to check an early version of the geologic map, to visit several mineral prospects, and to collect samples of rocks, ores, and slags. The samples were analysed in November 1975 at the laboratories of the USGS in Denver, Colorado. Description of the samples and results of the analyses were presented in a previous report (Overstreet and others, 1976). The second field trip for further checking on the ground was made by Grolier alone between February 1 and 29, 1976, in connection with a hydrologic reconnaissance of the country.

Acknowledgments

The authors are pleased to acknowledge the courtesies and interest of the officials who made possible the work that has led to the preparation and release of this geologic map. They were His Excellency, Dr. A. A. El-Eryani, Minister of Development; Hamoud Ahmid Daif Allah, President, Mineral and Petroleum Authority, Ministry of Economy, YAR, and Aldelmo Ruiz, Director, USAID Mission to the YAR. Without their aid, this work could not have been done.

The authors also wish to acknowledge help received from G. C. Tibbitts, Jr., USGS Project Chief, Water and Minerals Survey in the YAR, who made arrangements for both field trips in June-July 1975 and February 1976, and from their associate, Mohammad Mukred Ibrahim, Assistant Chief Minerals Geologist, Mineral and Petroleum Authority, who cleared all the trips through local authorities and who was a constant source of information on the geology, ore deposits, and geography of the YAR. The writers were also fortunate to be accompanied on the 1975 field trips by Mohammad Luft El-Eryani, a third-year undergraduate student in geology at the College of Science, Kuwait University. His careful observations and refreshing questions added greatly to the discussions at the outcrops.

James W. Aubel, a United States Peace Corps Volunteer and geologist working with G. C. Tibbitts, Jr., on the USAID water supply project in Yemen, had discovered several fossil localities in the Amran Series. He kindly led the writers to these localities and helped in making collections of fossils. In many other ways he contributed to the field work. Help was most generously given by Roy O. Jackson, USGS, in planning the work and in interpreting the results.

Discussions in Sana'a with Dr. Joachim Thiele, Party Chief, Mission to Yemen of the Bundesanstalt für Geowissenschaften und Rohstoffe of the Federal Republic of Germany, and Dr. Karl-Heinz Schultze, Chief (in replacement of Dr. Thiele), and members of their staff, particularly Dr. Norbert W. Roland and Dr. von Prosch, were enlightening. Michael Glase, hydrologist, Tipton and Kalmbach, Inc., Denver, Colorado, and Peter S. Walczak, Resident-Oceanographer at Al Hydaydah, U.N. Food and Agricultural Organization, also supplied valuable geologic information.

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Compiled by Maurice J. Grolier and
William C. Overstreet, U. S.
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images, supplemented by reconnaissance
airborne and field surveys in June
and July 1975.

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NOTES

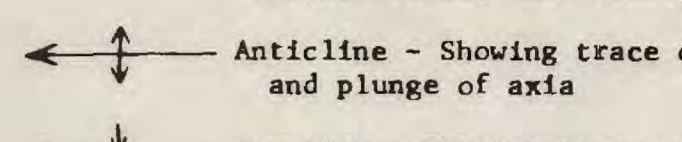
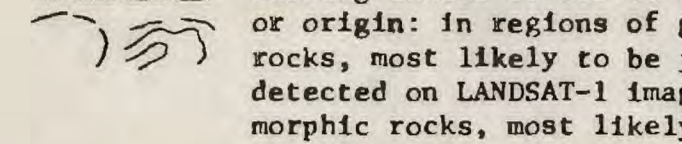
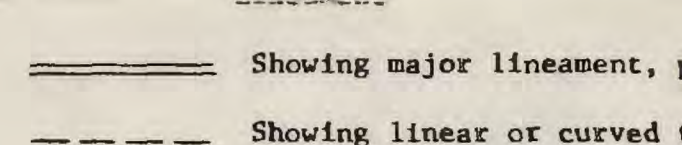
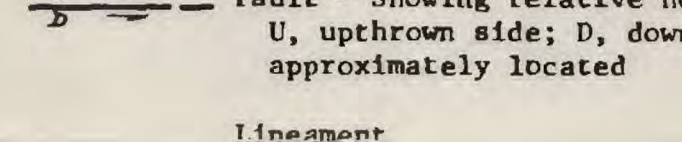
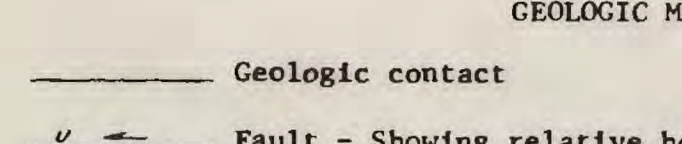
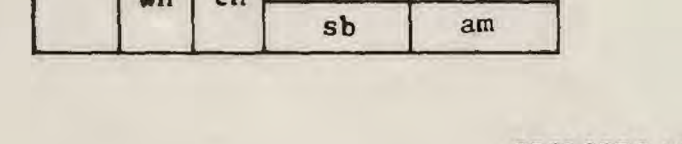
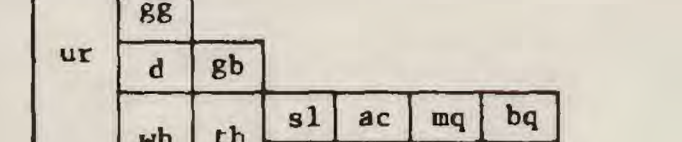
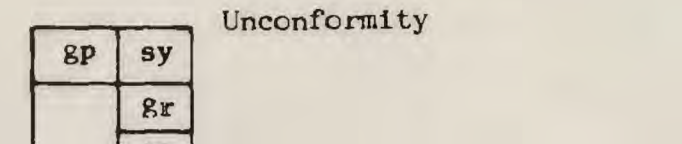
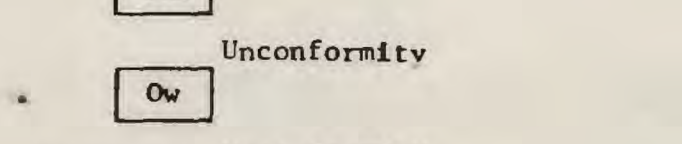
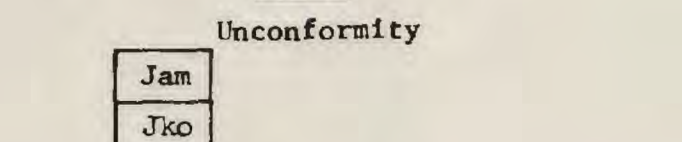
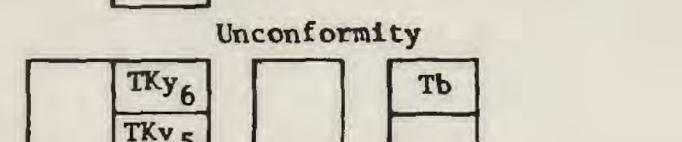
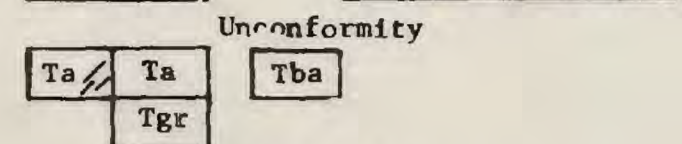
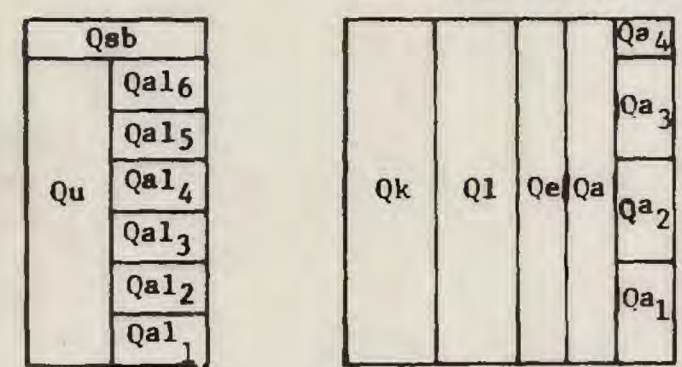
Copies of this map are available at the Ministry
of Economic Development, Minerals and Petroleum
Authority, San'a, Yemen Arab Republic, and at the
U. S. Geological Survey, Washington, D. C.,
U. S. A. The base for this map is a two-, or
three-band (5,7; or 4,5,7) false-color composite
of the LANDSAT-1 image indexed hereby, and is
available in a black and white positive print at
the same places.

Indicated positions of boundary lines not de-
marcated on the ground are not necessarily
definitive. Abbreviations: YAR - Yemen Arab
Republic; PDYR - Peoples' Democratic Republic of
Yemen.

GEOLOGIC EXPLANATION

Double or fractional symbols indicate grouped
formations: Symbols queried where identification
doubtful.

CORRELATION OF MAP UNITS



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DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

Prepared in cooperation with the Yemen Arab Republic Ministry of Economic
Development, Minerals and Petroleum Authority and under the sponsorship
of the Agency for International Development, U.S. Department of State.

PROJECT REPORT (IR)Y-6
OPEN FILE REPORT
(SHEET 1 of 2)



Base: Landsat-1, 1189-06561 (Jan. 1973)
Geographic coordinates developed by NASA
This geologic map is preliminary and has
not been edited for review for conformity
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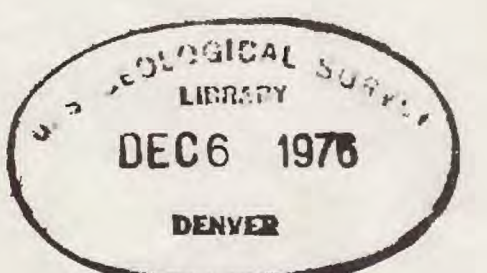
Note: Country boundaries indefinite

Scale 1:50,000
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1975

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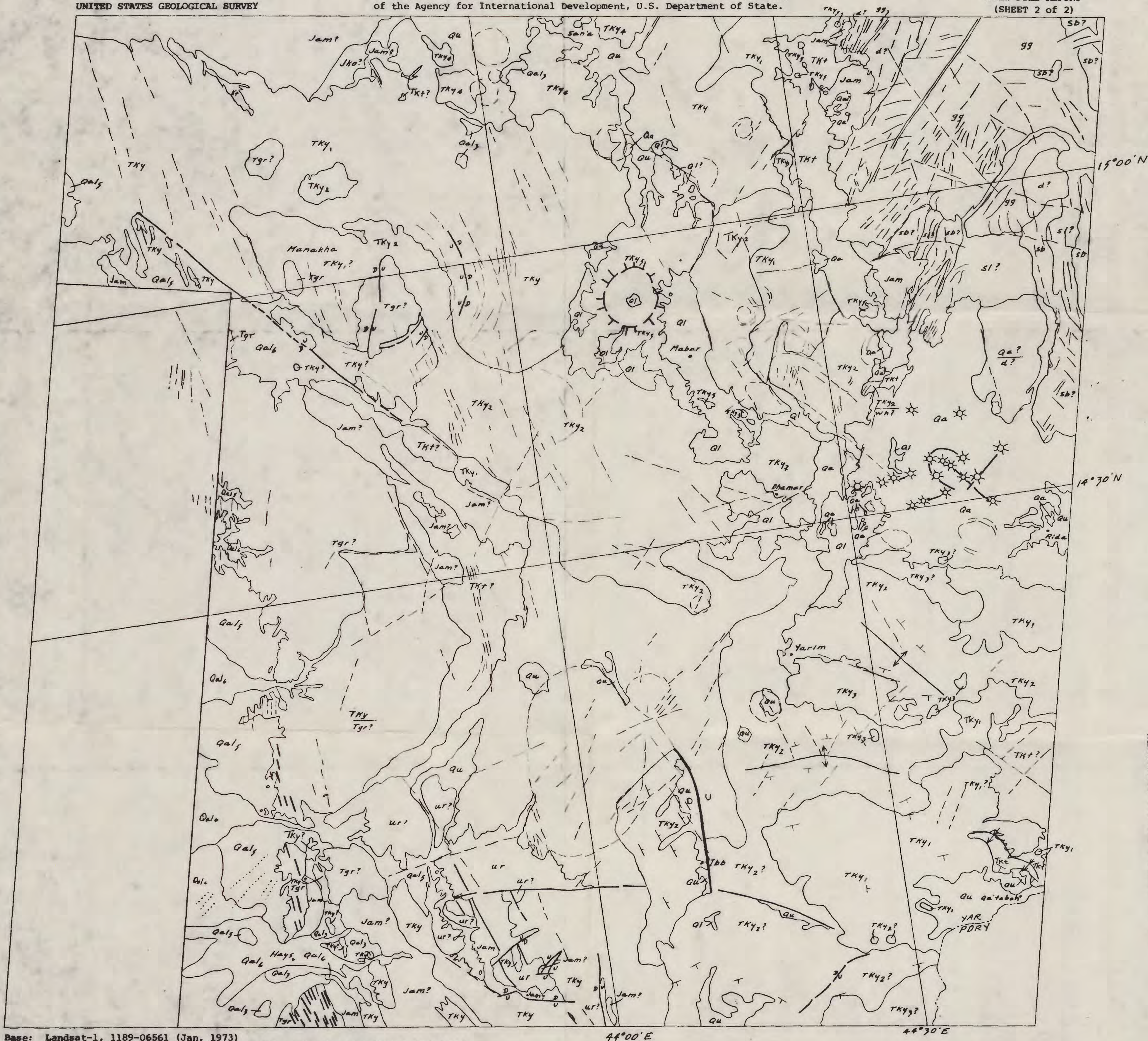


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PROJECT REPORT (IR)Y-6
OPEN FILE REPORT
(SHEET 2 of 2)



Base: Landsat-1, 1189-06561 (Jan. 1973)
LINEAMENT SHEET

Note: Country boundaries indefinite

Scale 1:500,000

5 0 5 10 15 20 25 KILOMETRES

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