(E76-10425) NATIONAL PROJECT FOR THE EVALUATION OF ERTS IMAGERY APPLICATIONS TO VARIOUS EARTH RESOURCES PROBLEMS OF TURKEY Progress Report, 1 Jan. - 1 Mar. 1976 (Maden Tetkik ve Arma Enstitusu, Ankara) 22 p G3/43

N76-28602
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NATIONAL PROJECT FOR THE EVALUATION OF ERTS IMAGERY APPLICATIONS TO VARIOUS EARTH RESOURCES PROBLEMS OF TURKEY

(PROJECT NUMBER 28320)

SECOND PROGRESS REPORT

January 1.1976-March 1.1976

PRINCIPLE INVESTIGATOR
Assoc Prof. Dr. Sadrettin ALPAN
MTA Enstitüsü-ANKARA

CONTENTS

INTRODUCTION

The first progress report has been submitted to NASA on April 7, 1976 with considerable delay, due to necessary organizational changes. Submitting of report dates, rescheduled and new schedule has been sent to Mr. Robert Price (Technical Monitor) on March 15, 1976 and was approved by NASA, letter dated April 27, 1976 Following progress reports will be sent at dates spesified.

In the project, eight research groups from eight different organizations, namely, Mineral Research and Exploration Institue, Karadeniz Technical University, Middle East Technical University, Ministry of Forestry Photogrammetry Department, ETİBANK, State Water Works, Ankara University Faculty of Agriculture and Turkish Petroleum Company are working in the following five disciplines Geology, Hydrogeology, Petroleum, Forestry and Agriculture. Thirty two investigators have contributed to this report. Because of winter season, within the first and second report period, all the studies has been carried out in the office. During summer season, between April-October period, studies will also be consentrated to field work for ground truth collections. This will further increase the number of the contributors to the number and capasity of field crews will be increased and selected problems will be examined in the field to bring outmore substantial results for the followihg reports. Organizational chart for project is atteched (Annex 1) Individuals assigned and their spesific subjects and their organizations are indicated in the appropriate sections in this report.

During this report period, generally visual analysis methods have been applied and existing geologic, geophysical maps and reports an larger scale panchromatic B/W aerial photos has been used. False color images were obtained by using 70 mm positive films on the viewer. In addition, 1/1.000.000 scale B/W images were enlarged where necessary to 1/500.000 and 1/250.000 scale to improve detectability successfully. Further-more an image analyser has been ordered for better and more accurate inter pretation.

Equipment List

- Pocket Steoroscope
- Mirror Steoroscope
- Aero-Sketch Master
- Double Reflecting Projector
- Additive Color Viewer
- Multispectral Camera
- Zoom Transfer Scope
- Light Tables
- Magnifiers

Existing Documents

A- Landsat Images:

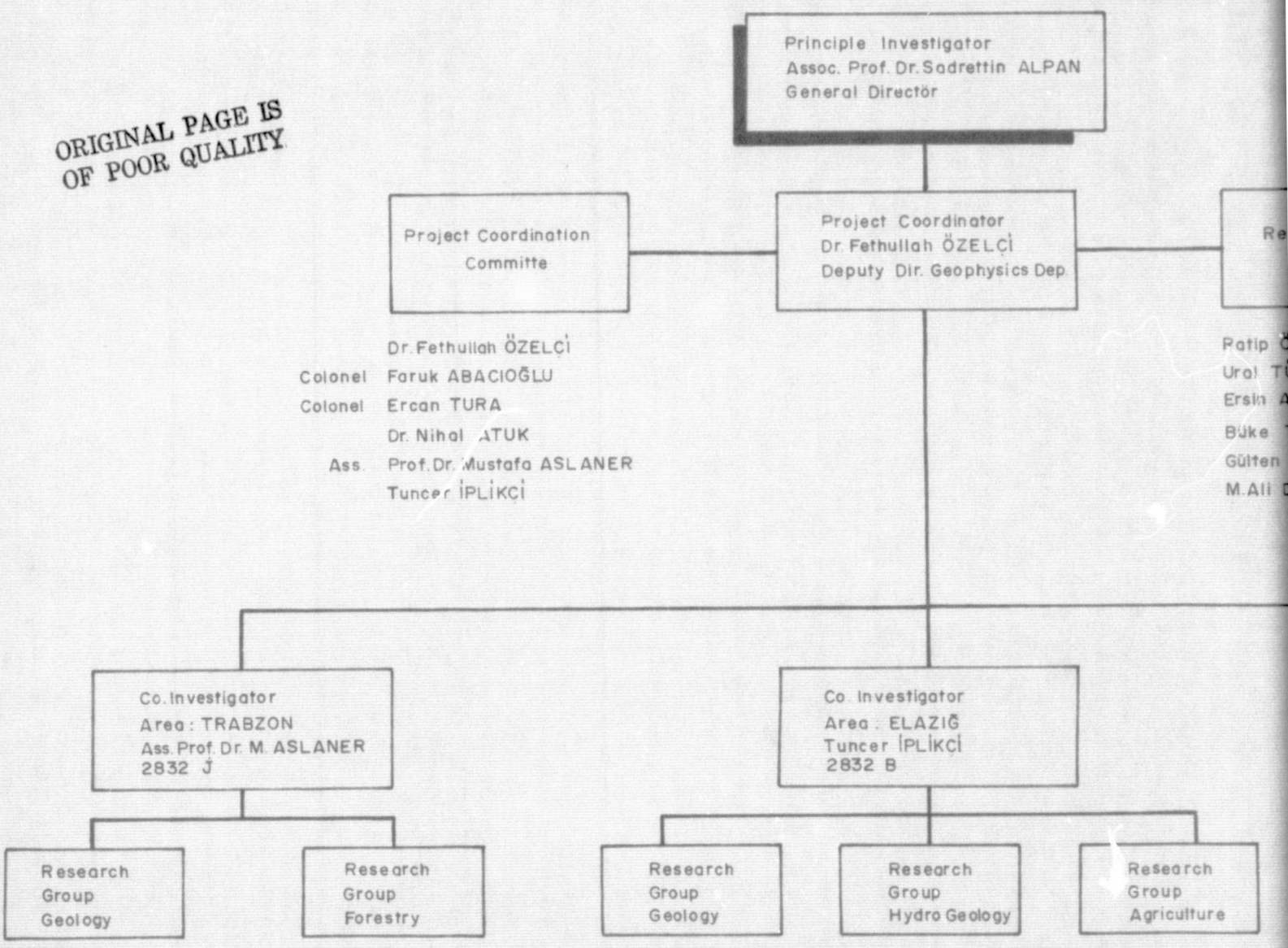
M Bulk B/W 70 mm (-) Transparent
S Bulk B/W 70 mm (+) Transparent
T Bulk B/W 9,5" (+) Transparent
P Bulk B/W 9,5" Paper Print

B- Geologic and Hydrogeologic Maps and Reports

C- Drill hole Loggs

D- Geophysical Survey Reports

ORGANIZATIONAL CHART FOR PROJECT (28



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AL CHART FOR PROJECT (28320)

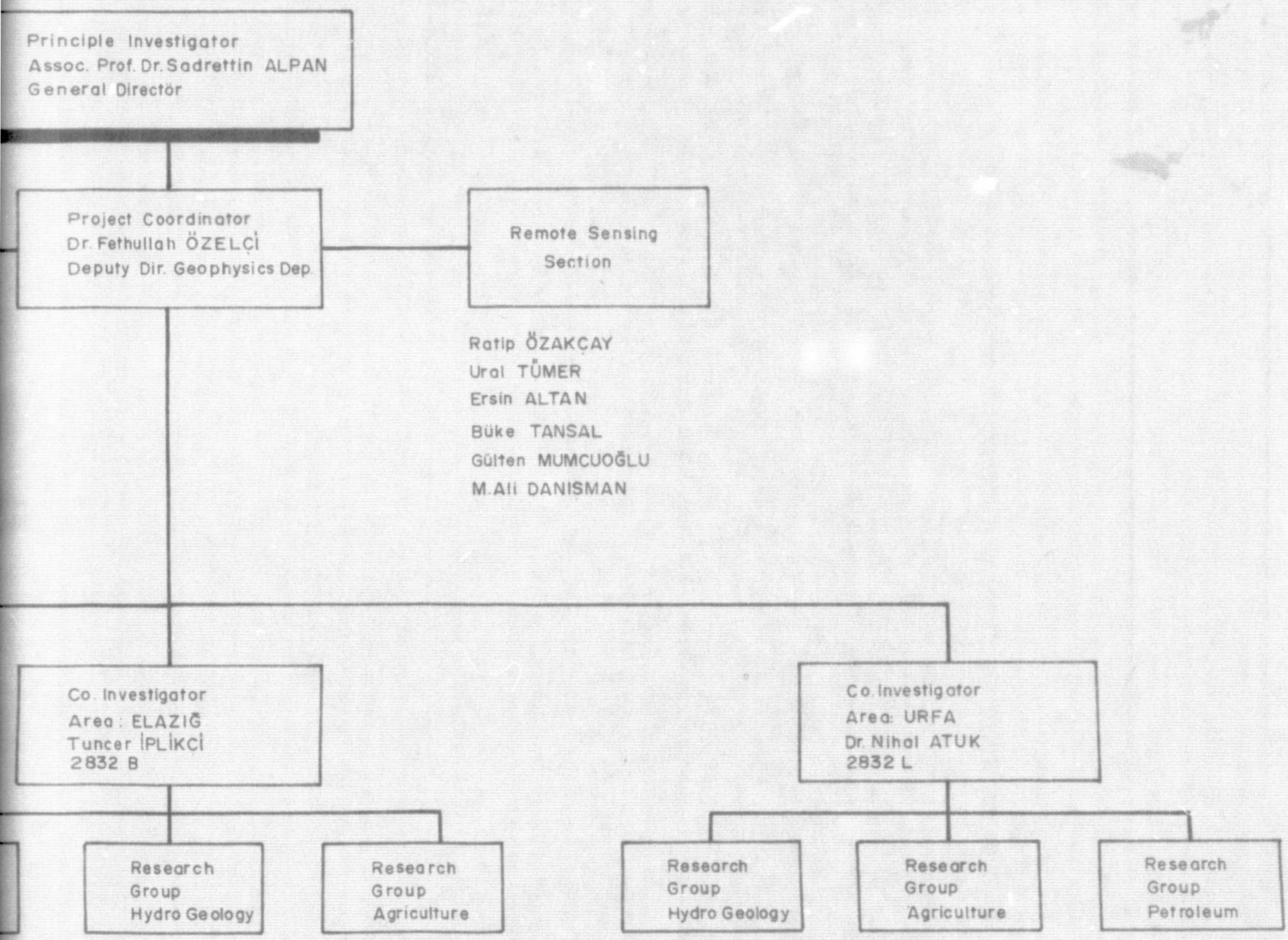

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Figure : 1

Co-Investigator: Tuncer İPLİKÇİ (ETİBANK)[1]

Research Groups:

I- GEOLOGY

: Nurettin Büyükyanbolu (ETİBANK)[1]

GEOLOGY 1: Muhterem Bolgün "

: Orhan UZLUK "

GEOLOGY 2: Assoc. Prof. Dr.Teoman NORMAN (O.D.T.Ü)[2]

: Dr. Vedat DOYURAN "

Dr. İsmail ÖZKAYA "

: Ural Tümer (MTA)[3]

GEOLOGY 3: Gülten MUMCUOĞLU "

GEOLOGY 4: Dr. Selçuk TOKEL (KTÜ) [4]

Fikret İÇLER "

II-HYDROGEOLOGY: Dr. Nihal ATUK (DSİ) [5]

: Erhan KÖKÜOZ "

III-AGRICULTURE : Prof Nuri MUNSUZ (A ÜZ F)[6]

1. Minerals Exploration Section-ETİBANK
2. Middle East Technical University
3. Mineral Research and Exploration Institute
4. Karadeniz Technical University
5. State Water Works
6. Ankara University, Faculty of Agriculture

General

The purpose of the project, equipment and tecnique used have been explained in the first progress report and in the "Introduction" section of this report.

In this project area, geological, Hydrogeological and Agricultural subjects are investigated.

Geology

For these studies, following black and white images has been used in four seperate bands= 2140-7290,2103-7231,2156-7173,2193-7224,2211-7221,2229-7220. Furthermore, false color images were obtained by using 70 mm positive films of the above numbered images in the viewer. Studies were consantrated mainly on tectonic lineaments, fault systems and lithologic identification. Definite fault zones, joint systems were plotted on a map. In order to correlate findings with adjescent regions images to the east and west of the area, were also used. The faults clearly detectable on the images are in north-east-south west direction. Some of these faults could be followed to extend to the Middle Taurous to the Dead Sea through over Amanos Mountains in the south. It can generally be said that all these systems intersects with North Anatolian fault zone in the North. Some fault systems which could not be related on aerial photos and with ground work could easily be related on these images. Besides theNE-SW trending faults, many secondary faults of minor importance could be detected on the images (Anne x 2)

Using color tone variations and variable drainage patterns, the formation boundaries were detected. Ground truth work and further studies will continue during the period May-October in this area.

Hydrogeology

Attampt is made to collect available data on joint and fracture systems and fault systems along Keban Dam area and known springs related to these systems. It is planed and hoped that from LANDSAT data, additional fault zones and related springs will belccated and their relation will be-located and their relation will be studied with a view to eliminate water losses through such fault, joint and fissure systems. Already ground water data in calcereous areas have been collected. A photo mosaic of the KEBAN area from LANDSAT 9,5" images was made and major faults and geological structure of the sight were delinated from the mosaic.

Future work plan includes, ground truth work, to check findings in the field, compare repeadet LANDSAT 1- LANDSAT 2 images with lake level readings and spring yield readings with a view to develop or understanding of the possiole relation with faults, fissions faults and related spring and loss of water from lake.

Agriculture

Attempt was made to study agricultural land distribution, land use, soil characteristics, soil-water relations, drainage patterns, natural vegetation cover, planted and fallow fields distribution, irrigated and nonirrigated land areas, vegetation pattern, pest and disease control using LANDSAT images The studies are carried out in parallel with the agricultural practice in Urfa region. With the aid of a viewer, alluvial, colluvial soil groups, soil texture, vegetation pattern, irrigated and non irrigated land areas, fallow and planted fields were detected. This work will be supple mented with the color composit images expected to arrive from NASA and also with ground truth studies to be carried out during the period of May-October.

2832 B

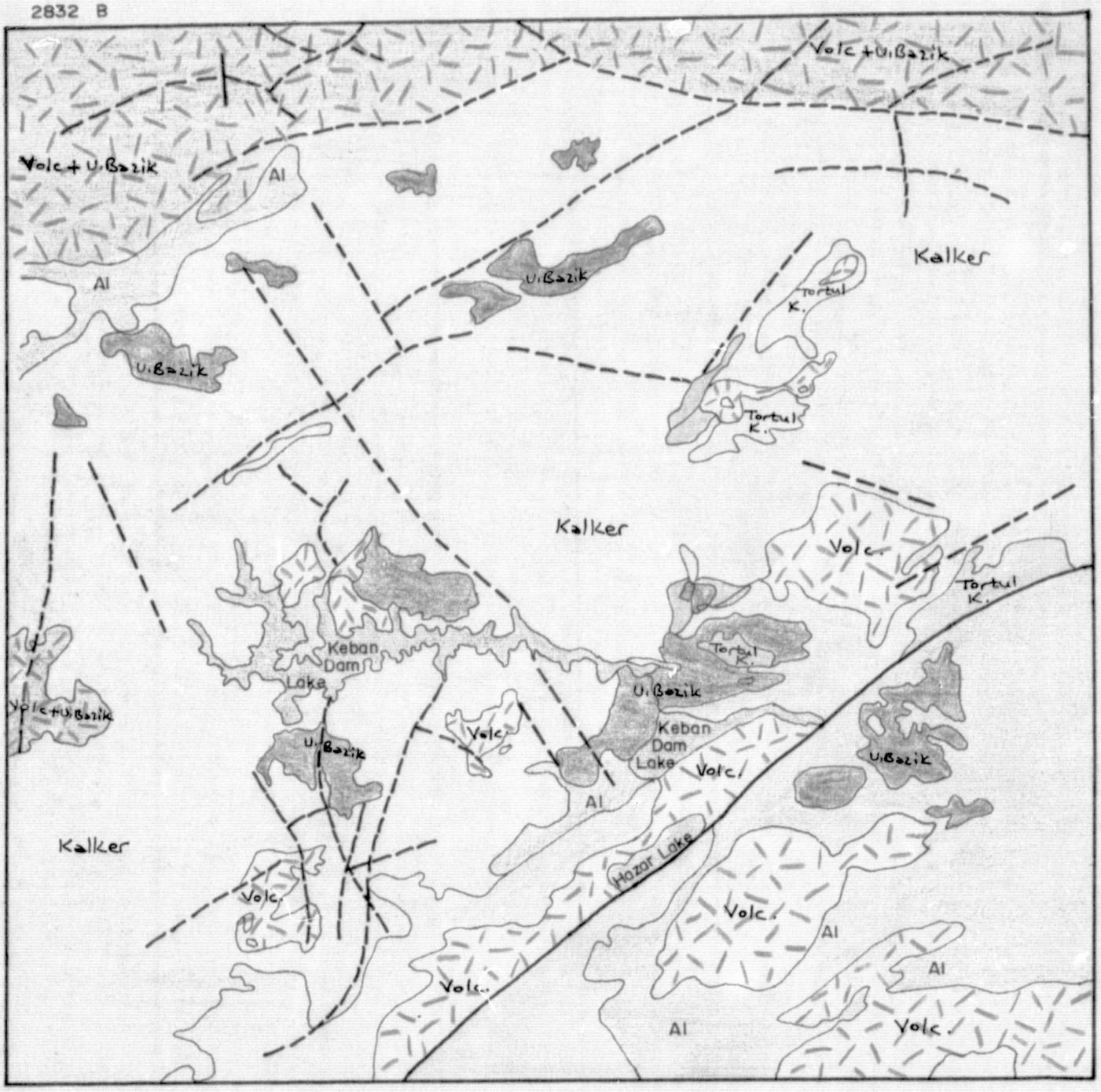


FIGURE 2. 3th August 1975 LANDSAT (ERTS)

2193-07224

2211-07221

2229-07220

EXPLANTION

- Fault
- Probable Fault
- Probable Formation Contact
- Al — Alluvium

Co-Investigator= Assoc. Prof. Dr. Mustafa ASLANER (KTÜ)[4]

Research Groups:

I. GEOLOGY

GEOLOGY-1	: Dr. Atasever GEDİKOĞLU	(KTÜ)[4]
	: Dr. Rıfat BOZKURT	"
	: Erdoğan TÜLÜMEN	"
GEOLOGY-2	: Nurettin BÜYÜKYANBOLU	(ETİBANK)[1]
	: Muhterem BOLGÜN	"
	: Orhan ÖZLÜK	"
GEOLOGY-3	: Ural TÜMER	(MTA)[3]
	: Büke TANSEL	"
	: Gülten MUMCUOĞLU	"
GEOLOGY-4	: Dr. Teoman NORMAN	(ODTÜ)[2]
	: Dr. Vedat DOYURAN	"
	: Dr. İsmail ÖZKAYA	"

II-FORESTRY

FORESTRY-1	: Mehmet SÜMER	(ORMAN BAK)[8]
FORESTRY-2	: Dr. Burhan SOYKAN	(KTÜ)[4]
	: Yılmaz ÖZTAN	"
	: Rahim ANÇİN	

1. ETİBANK
2. Middle East Technical University
3. Mineral Research and Exploration Institute
4. Karadeniz Technical University
8. Ministry Of Forestry

General

The purpose of the project, equipment and technique used have been explained in the first progress report and in the "Introduction" section of this report.

In this project area, geological and forestry subjects are investigated.

Geology

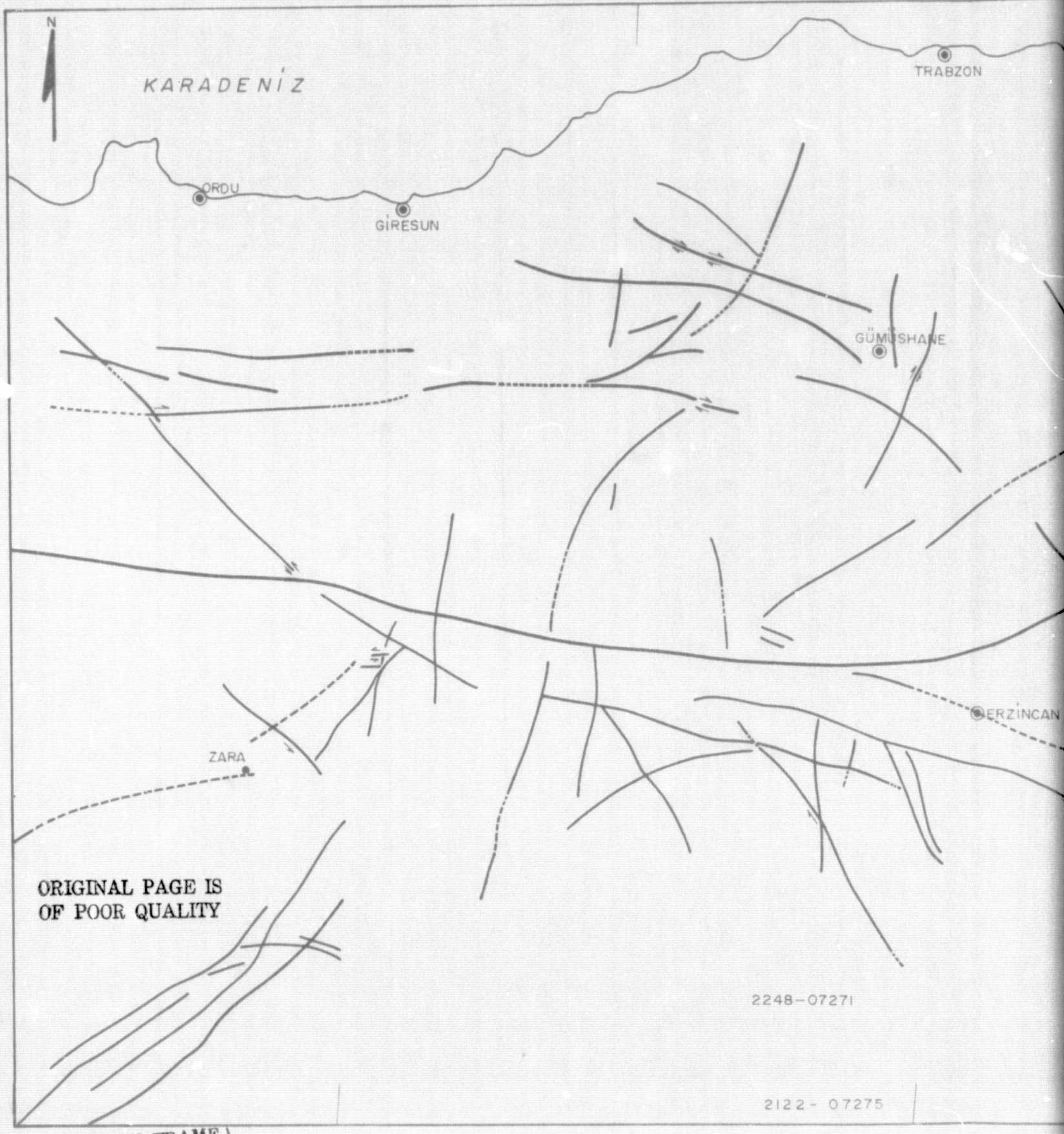
Studies were carried out on a photo mosaic prepared with band 7 images and utilizing all four bands. Attempt was made to delinate faults and fault systems and formation boundaries.

On the images North Anatolian fault was very well detected. Predominant E-W trending faults were clearly visible. A map prepared from the images is enclosed here with.(Annex 3). It was observed with interest that one of the major E-W trending faults bifurcates near Erzincan and extends in SW-NE and NW-SE direction. Other fault systems trending in various directions could also be detected on the images. Findings on the images are controlled by large scale pancromatic aerial photographs. New faults, non previously mapped were detected which are clearly related to the North Anatolian fault zone. Parallel fault swarms detected near Erzincan-Karliova, outside the map area, is being studied. Further, by aerial photogrophs and will be checked from the ground. These faults were not mapped before. Because of thick vegetation cover along the coastal stretchs of Black Sea, deliniation of formation boundries in this zone was not successful. It is hoped that color composite images for this zone would help. However, where formation boundries could be deliniated, it was possible to add new geological information to the available 1/500.000 scale geological map.

Future studies would be directed to compare findings with available geological and geophysical data and known mineral deposits with a view to develop a systematic relation with known minerals and detected lineaments and formations boundries and possible potential areas for mineral occurances.

Forestry

In this area cloud cover hinders productive work in this discipline. In this period, approximately 10.000 sq.km area could be studied. Attempt was made to compare known data with the image. It was observed that types of forests may well be deliniated. However false color and larger scale images would be desirable for such studies. First attempts to stratify forest areas and compara results with known information indicated that results could be encouraging. With false color imagery, attempt will be made to differentiate coniferes and trees with leaves.



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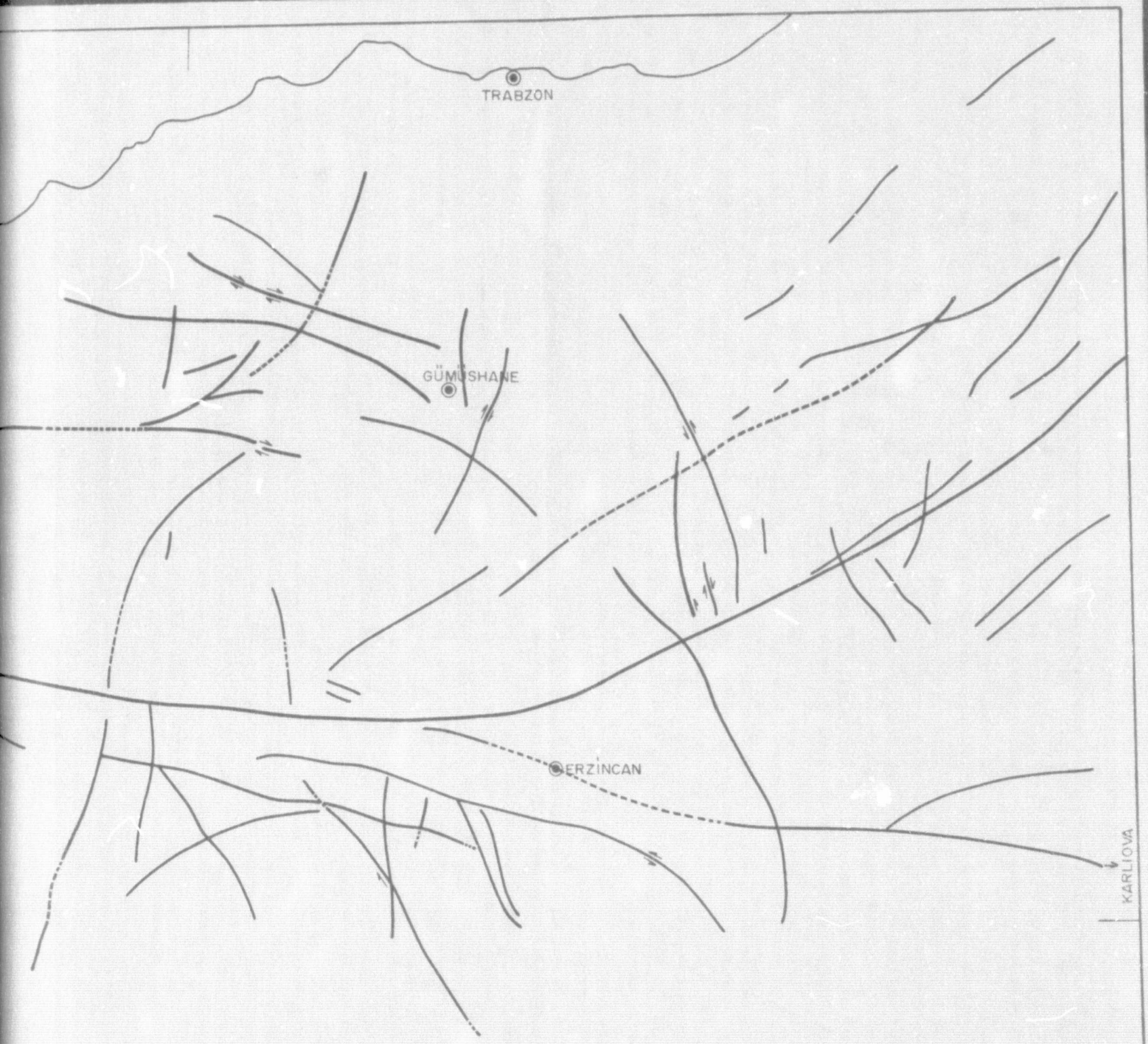

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2229-07214

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Co-Investigator	: Dr. Nihal Atuk	(DSİ)[5]
Research Groups		
I- HYDROGEOLOGY	: Dr. Nihal ATUK	(DSİ)[5]
II- AGRICULTURE	: Prof. Nuri MUNSUZ	(AÜZF)[6]
III- PETROLEUM	: Özcan [illegible] ÖZMUMCU	(TPAO)[7]

5- State Water Works

6- Ankara University, Faculty of Agriculture

7- Turkish Petroleum Company

General

The purpose of the project, equipment and technique used have been explained in the first progress report and in the "Introduction" section of this report.

In this project area, Hydrogeological, Agricultural and Petroleum subjects are investigated.

Hydrogeology

70 mm images from LANDSAT-2, covering the study area and surrounding were used to produce color composits on the viewer and color composits were studied to derive fallowing results.

Repeated images ID Number 2228-07165 were studied for geology and hydrogeology. A map in 1/1.000.000 scale was prepared (Annex 4). It was found that formation boundries, lithologic units were detectable on the images. Furthermore large foults and origine of springs could be illusidated. Comporison of prepared map with existing 1/500.000 scale geological map indicated that the accuracy of map prepared was superior to the existing one. A large number of faults marked on existing 1/25.000 scale geological map could not be seen on the images. For this season a comparison of faults detected on aerial photos and LANDSAT images was not possible.

Future work program:

1- Formation boundries, faults and springs detected on the images will be checked from the ground.

2- New finding and previously not mapped features on the images will be checked from the ground.

Agriculture

The studies were carried out on B/W images and color composits on the available viewer as color composits were not received from NASA.

Following studies were carried out:

1- Available geological, soil maps and meteorological data were studied. Available data were compared with the repeated LANDSAT-2 imagery.

2- False color images from 70 mm LANDSAT-2 images were made and studied on the available viewer.

3- A mosaic was prepared from the available 9,5" LANDSAT B/W prints.

4- With various color combinations on the viewer, it was possible to seperate alluvial, colluvial soil groups to detect soil texture, vegetation pattern, to deliniate irrigated and non irrigated land areas, fallow and planted fields.

5- It is planned to utilize color composit images for May and following summer months and with ground truth studies, to study water holding capability of soil, internal and external drainage, soil texture, organic content

of soil, vegetation pattern, irrigated and non irrigated land, fallow and planted fields to determine the applicability of landsat imagery for such studies.

Petroleum:

On LANDSAT images, general tectonic and structural trends were determined over the photomosaic prepared. Generally only large regional trends are detectable. Lithologic analysis not successful.

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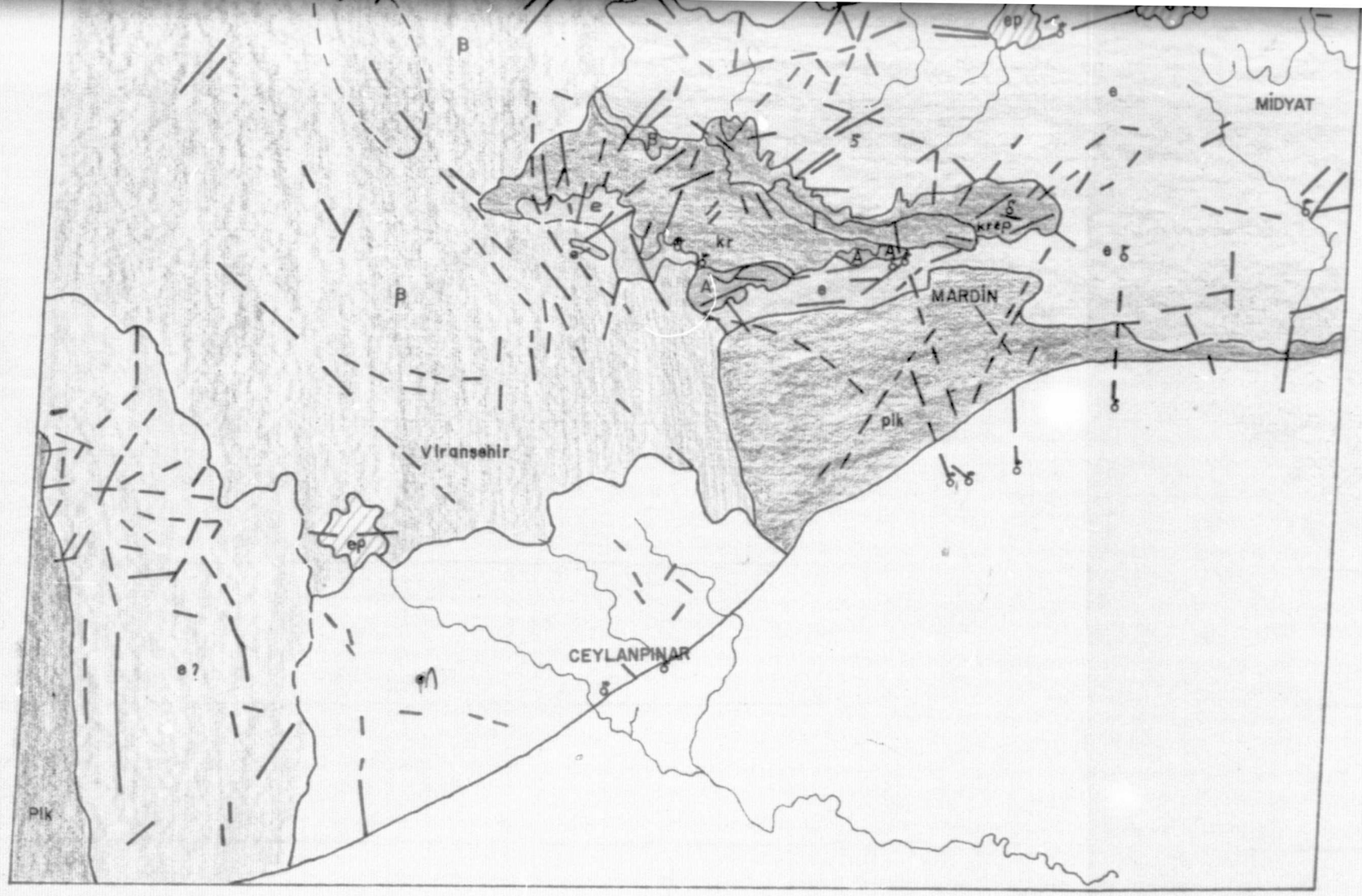

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m	Miosen..... Marn, kil, kalker		Kırık
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Figure: 4

DEVLET SU İŞLERİ GENEL MÜDÜRLÜĞÜ
JEOTEKNİK HİZMETLER VE YERALTISULARI DAİRESİ BAŞKANLIĞI
Hava Foto. ve Uzak. Algı. Fen Hey. Mdlğ.
ANKARA

CEYLANPINAR VE ÇEVRESİNE AİT UZAY GÖRÜNTÜSÜ
JEOLOJİ HARİTASI

Yapan: N. Atuk	Kontrol:	Tastik Olunus
Çizen: S. Gülsatan	Tasvip:	
Ölçek:	Proje No:	Tarih:

GENERAL PROBLEMS

Especially for agricultural and forestry studies, repeated LANDSAT images for the period April-December in black and white and false color is essential.

Lithologic analysis are only limited successful with black and white images. Color composite images appear to increase the success especially in vegatated areas. These studies also require color composite images.

SOME IMPORTANT FINDINGS

New formations that were not mapped before were detected on LANDSAT images in Trabzon area.

Some faults that are detected on LANDSAT images in the Trabzon and Elazig areas could not be seen on available 1/35.000 scale aerial photos.

CONCLUSIONS

1- It is observed that LANDSAT images can be used in preparing an accurate tectonic maps of the study areas.

2- Landsat images are most useful in geological mapping in areas where vegetation cover is sparce.

3- Landsat images can be used to identify and seperate evergreens and trees with leaves and they can be used succesfully to deliniate boundries of forestry areas.

4- LANDSAT images can be used to study following agricultural subjects.

a- Water holding capasity of soil
b- Internal and external drainage
c- Vegetation pattern
d- Irrigated land and non irrigated land detection.
e- Fallow and planted field detection.