



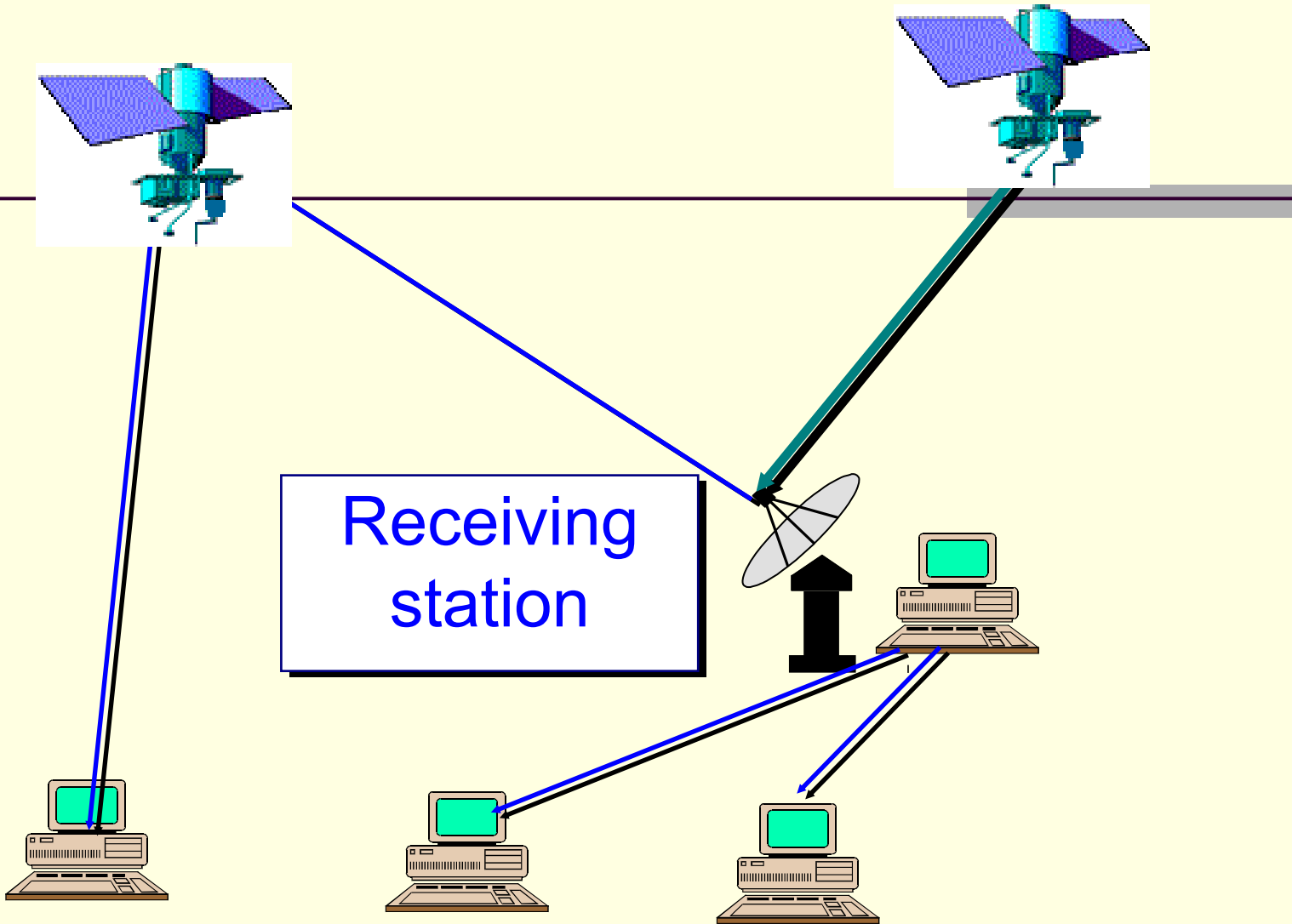
United Nations/Austria/European Space Agency
Symposium on Space Applications for Sustainable Development
to Support the Plan of Implementation of the
World Summit on Sustainable Development
“SPACE TOOLS AND SOLUTIONS FOR MONITORING THE
ATMOSPHERE AND LAND COVER”
9 – 12 September 2008, Graz, Austria

GIS Technology for Dynamic Monitoring Land Cover/Land Use Changes for all of Azerbaijan Using High Resolution Space Images



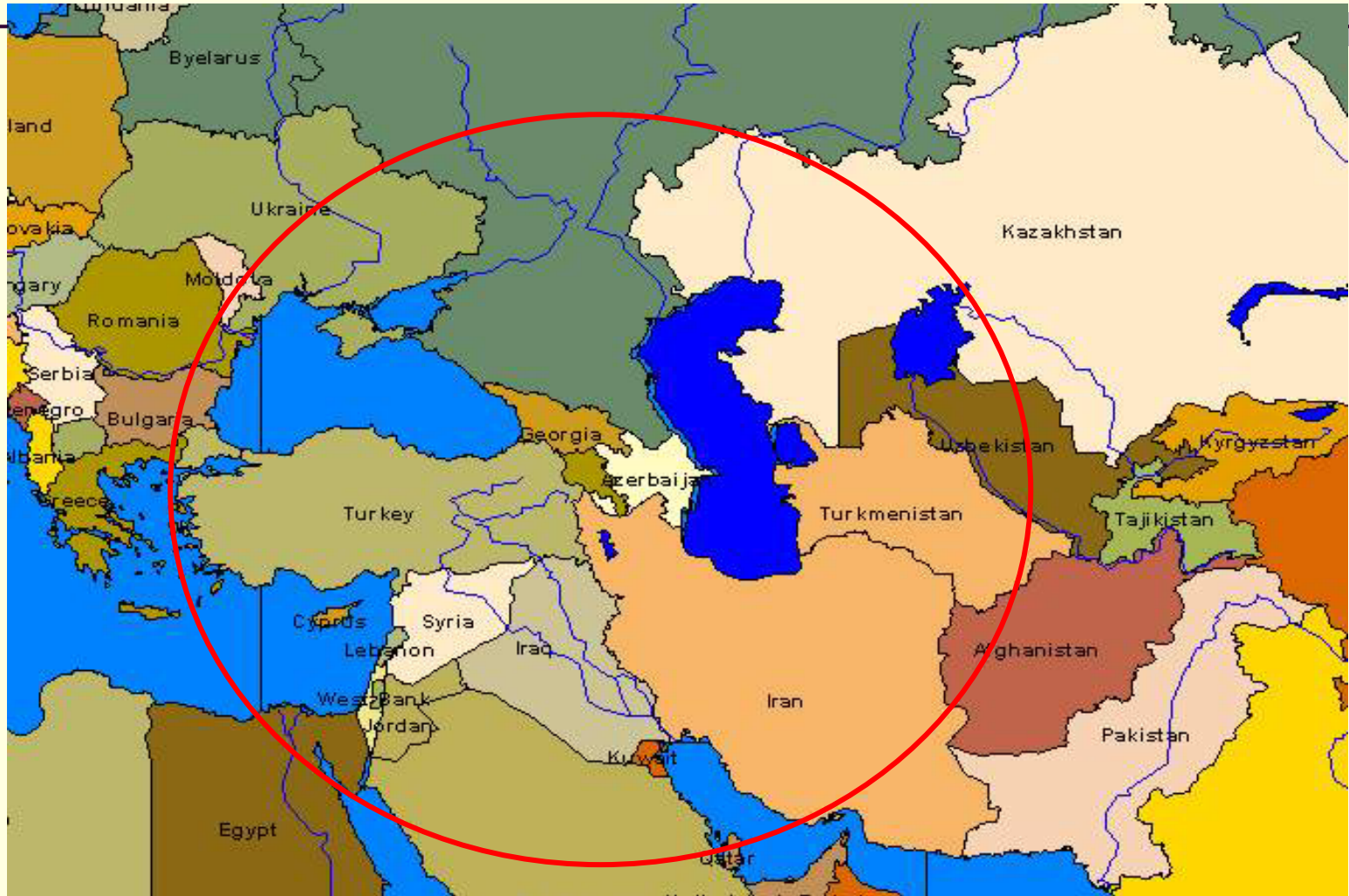
Dr. Sevda R. Ibrahimova

National Aerospace Agency of Azerbaijan



Receiving station

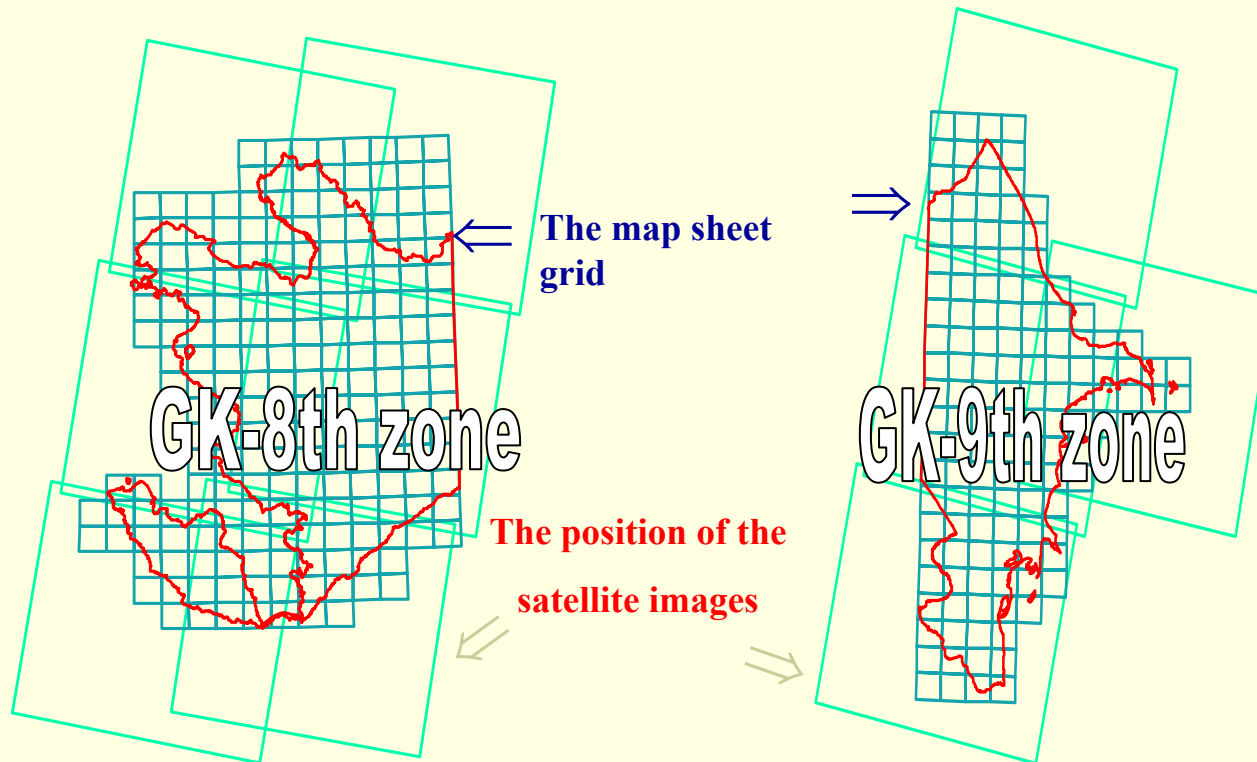
Ground Receiving space Information

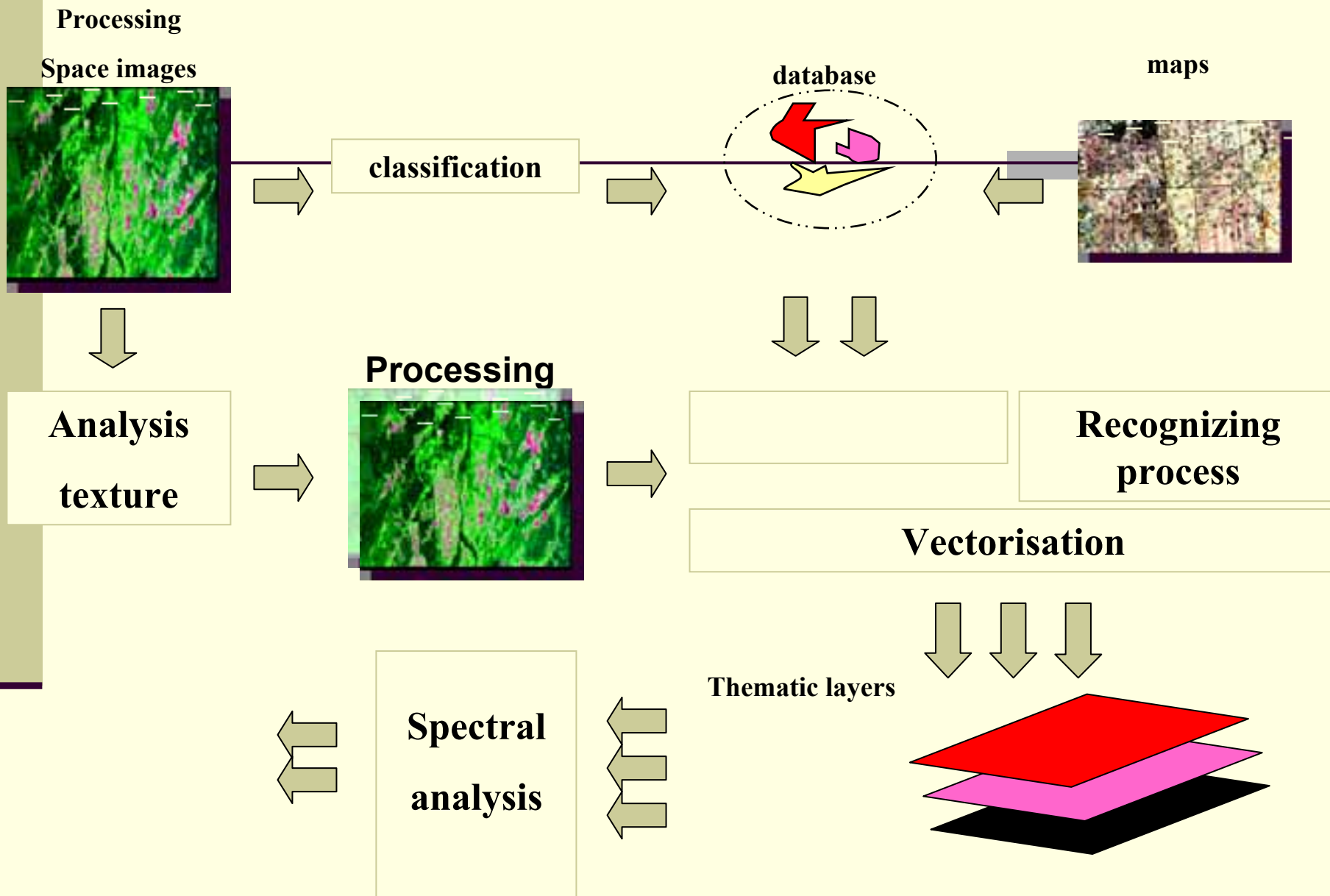


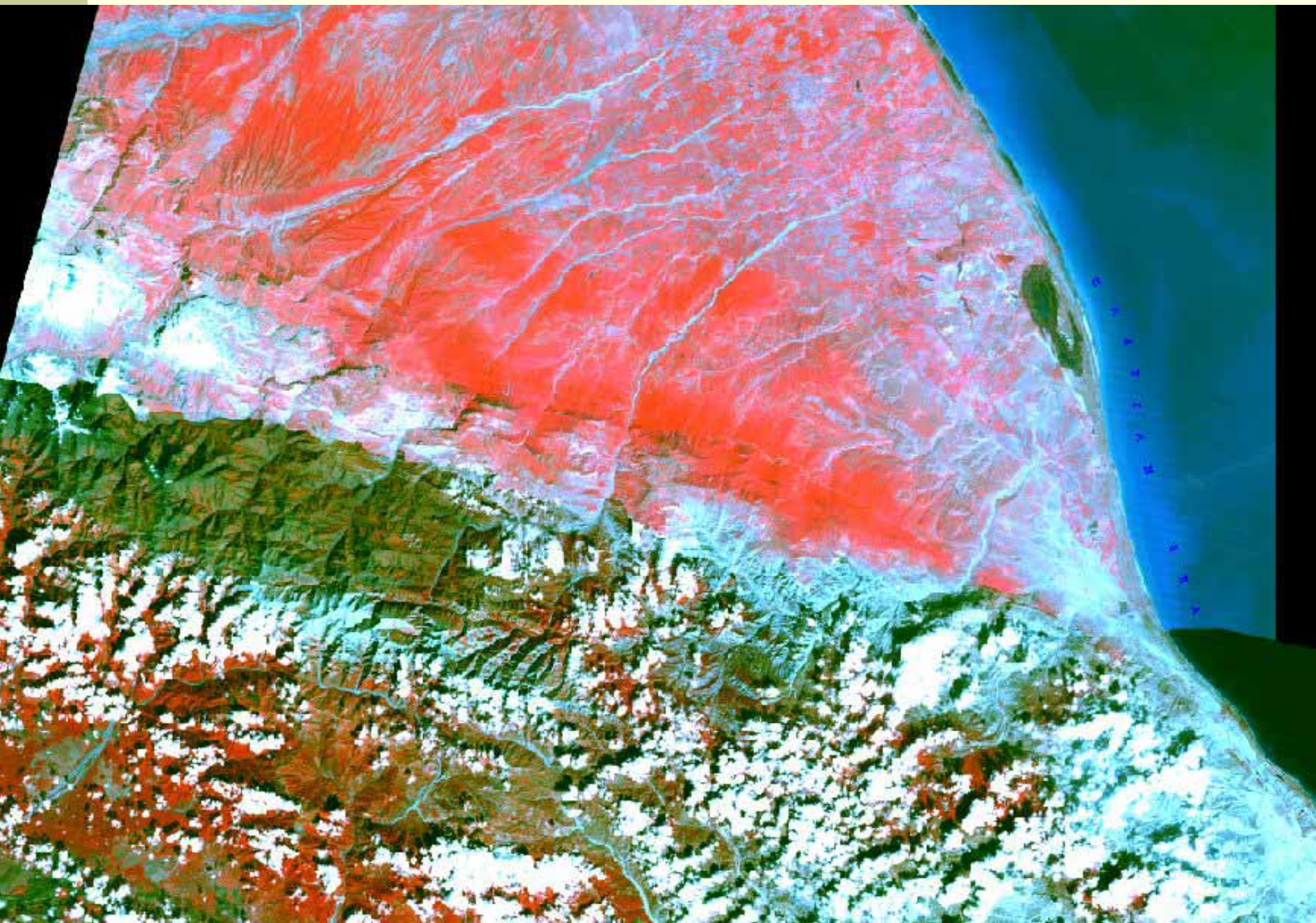
THE GIS PROCESSING PHASE

THE VECTOR DATA - GIS AND DATA BASE REALIZATION

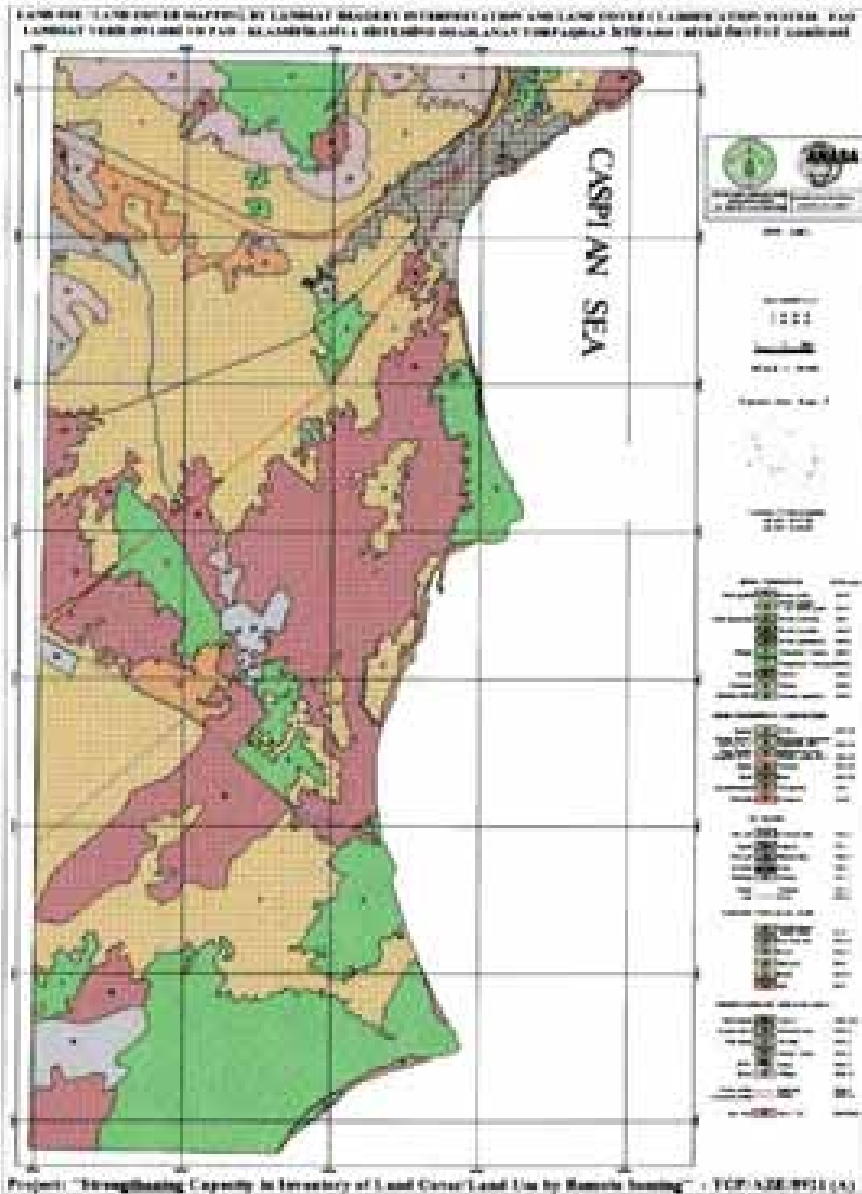
- Digitization of the thematic layers (Vegetation, Climatic, Administrative, Physical, Geomorphology, General) ;
- Creation of the general sketch of the project (topographical sheets and satellite images)
- Visual interpretation and manual digitization, creation of the attribute data base according to the legend**











Printing of results

The results of the project for whole territory of republic were printed as separate sheets (841x 594 mm). The total number of the printed sheets are 148 pieces. Besides the sheets in all 76 administrative areas of republic were prepared. In these sheets were submitted:

- Name of the project;
- Logos of ANASA and FAO;
- Scale of map (1:50.000);
- Legends of map;
- Current number of map in the project;
- Section of appropriate topographical map;
- Code of project.

Results of project

The digital map of Land Cover / Land Use for whole territory of republic in scale 1:50000 using the base of LANDSAT TM 1998-1999 interpretation of space images was created ;

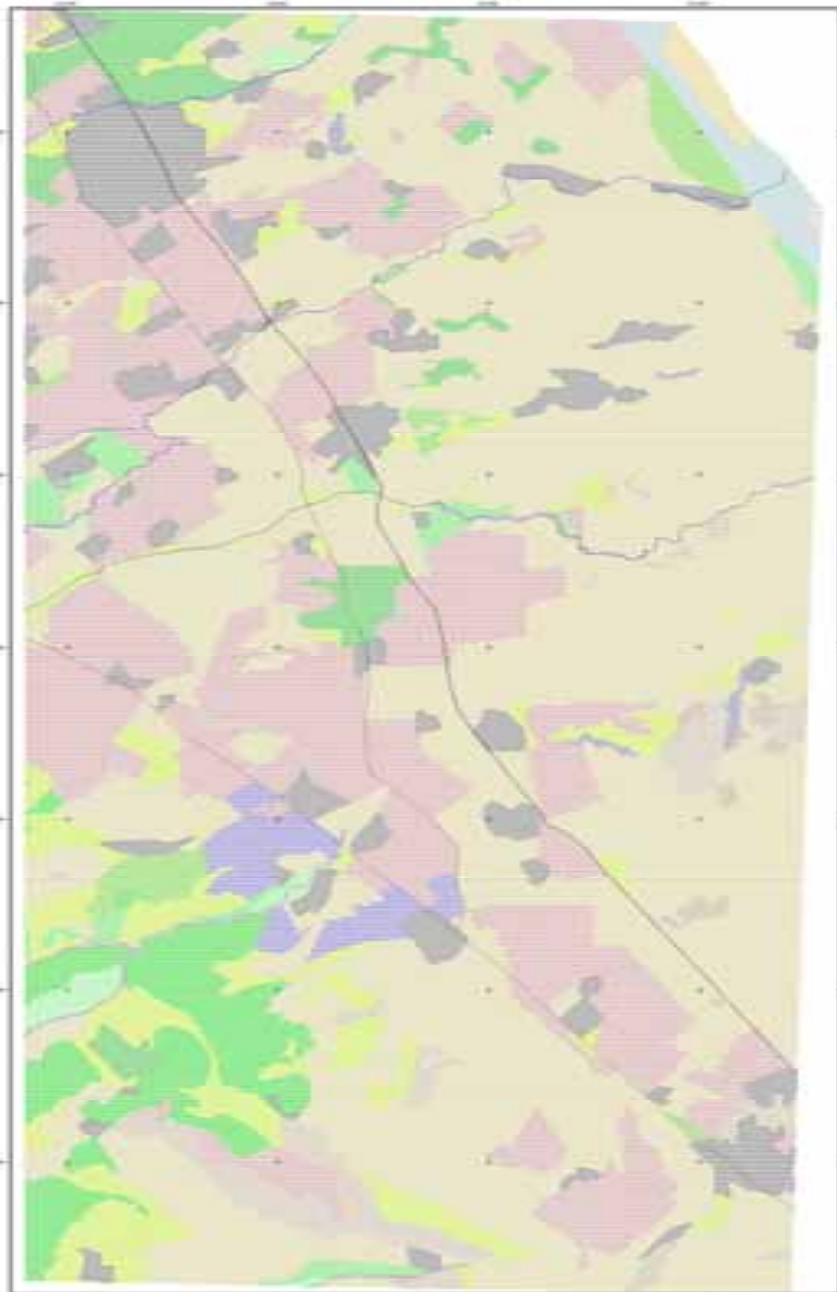
- The database of raster and cartographical data was created in uniform base projection which includes:
 - a) thematic maps of district in scale 1:500 000;
 - b) topographical maps of whole territory of republic in scale 1: 100 000;
 - c) the legends of Land Cover / Land Use responding the LCCS standards, showing the most specific for region representative classes with the number of 38 pieces were developed.

- The digital map of water resources of internal reservoirs was created: the rivers, lakes, reservoirs, ponds, lagoons, dams, network of channels and drainage systems;

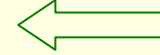
- The map of highways and railways network was developed;

In practice the theoretical aspects of the new approaches to modern cartography with attraction of expert systems were checked.

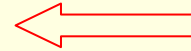
THE EDITING/PRINTING PHASE



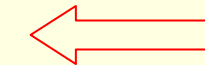
Logo of FAO



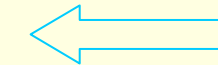
Logo of ANASA



Map sheets sketch



Legend



Sheet number



SCALE
1:50000



Map scale



FIELD ACTIVITIES





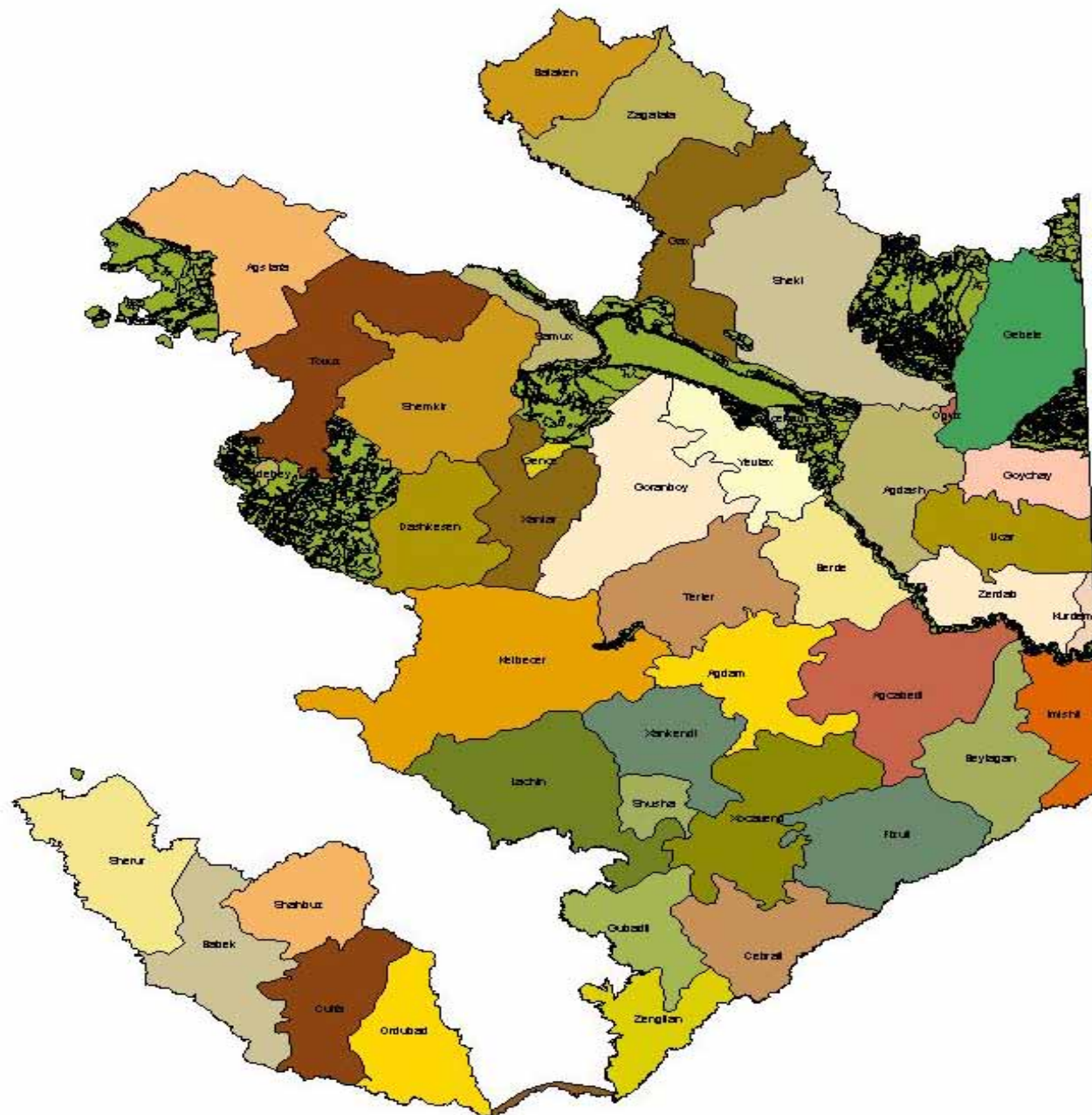
IKONOS 2007

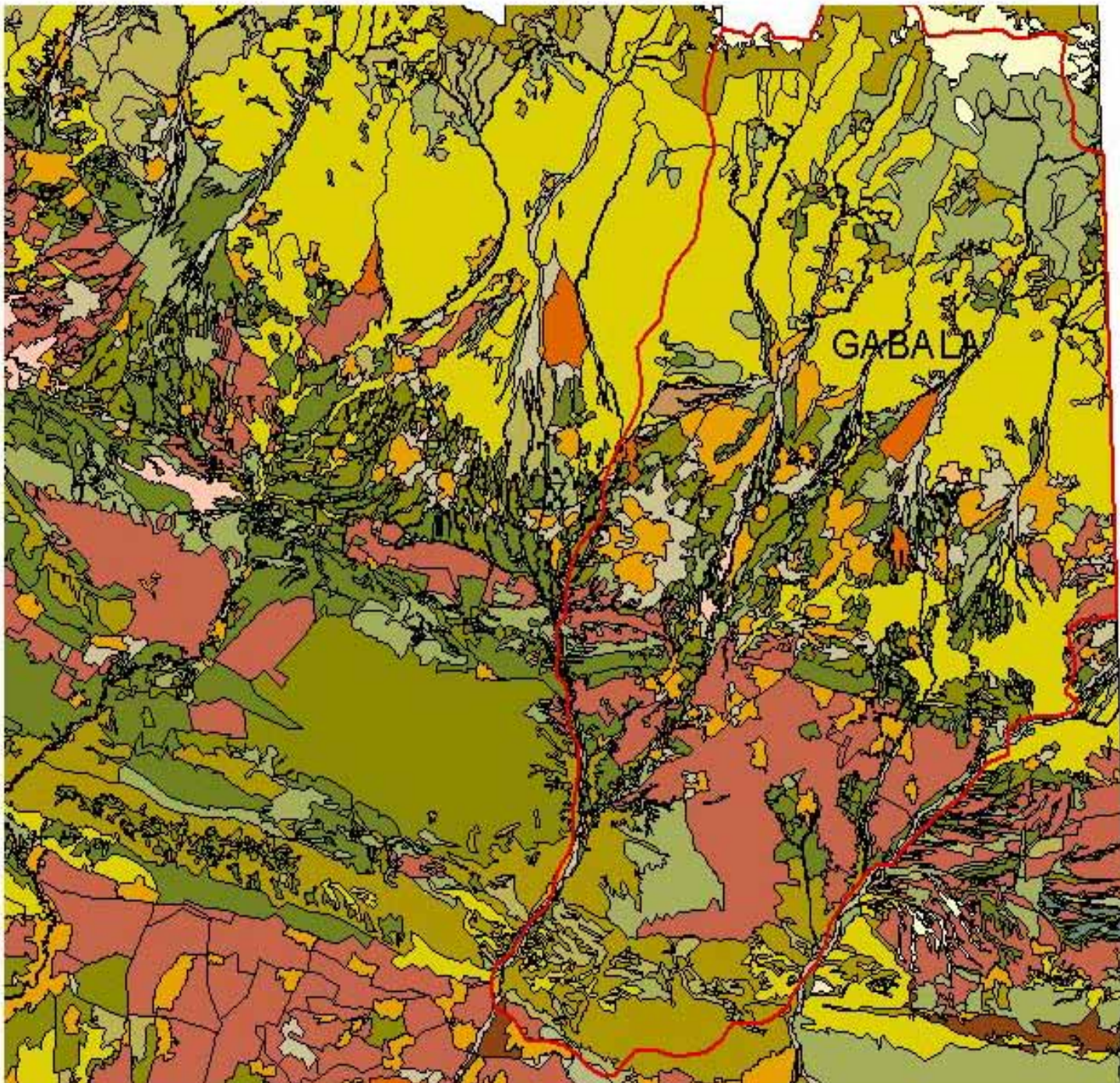


LANDSAT 1999

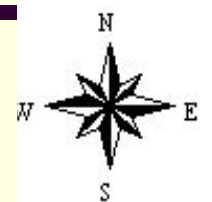
Map for area

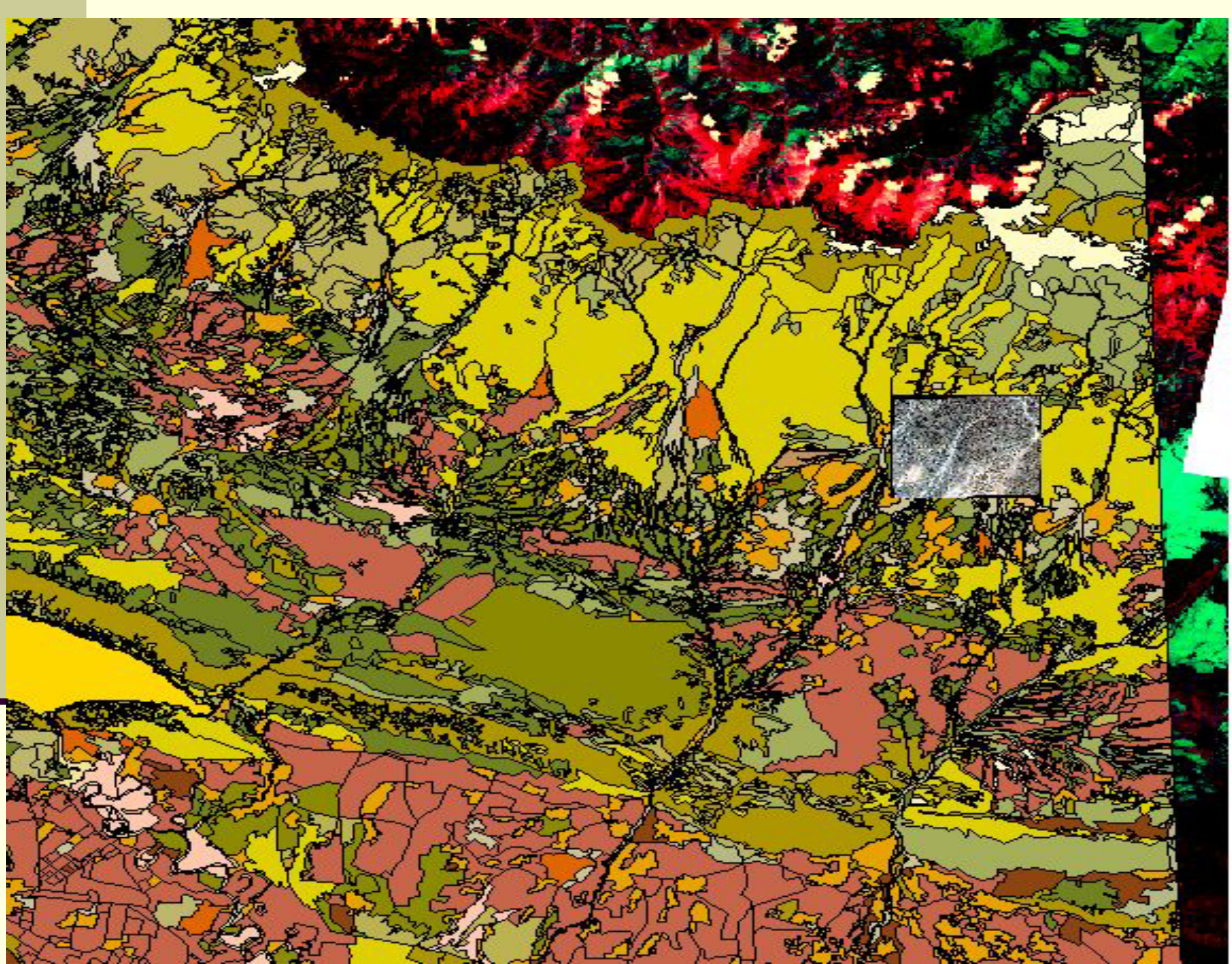


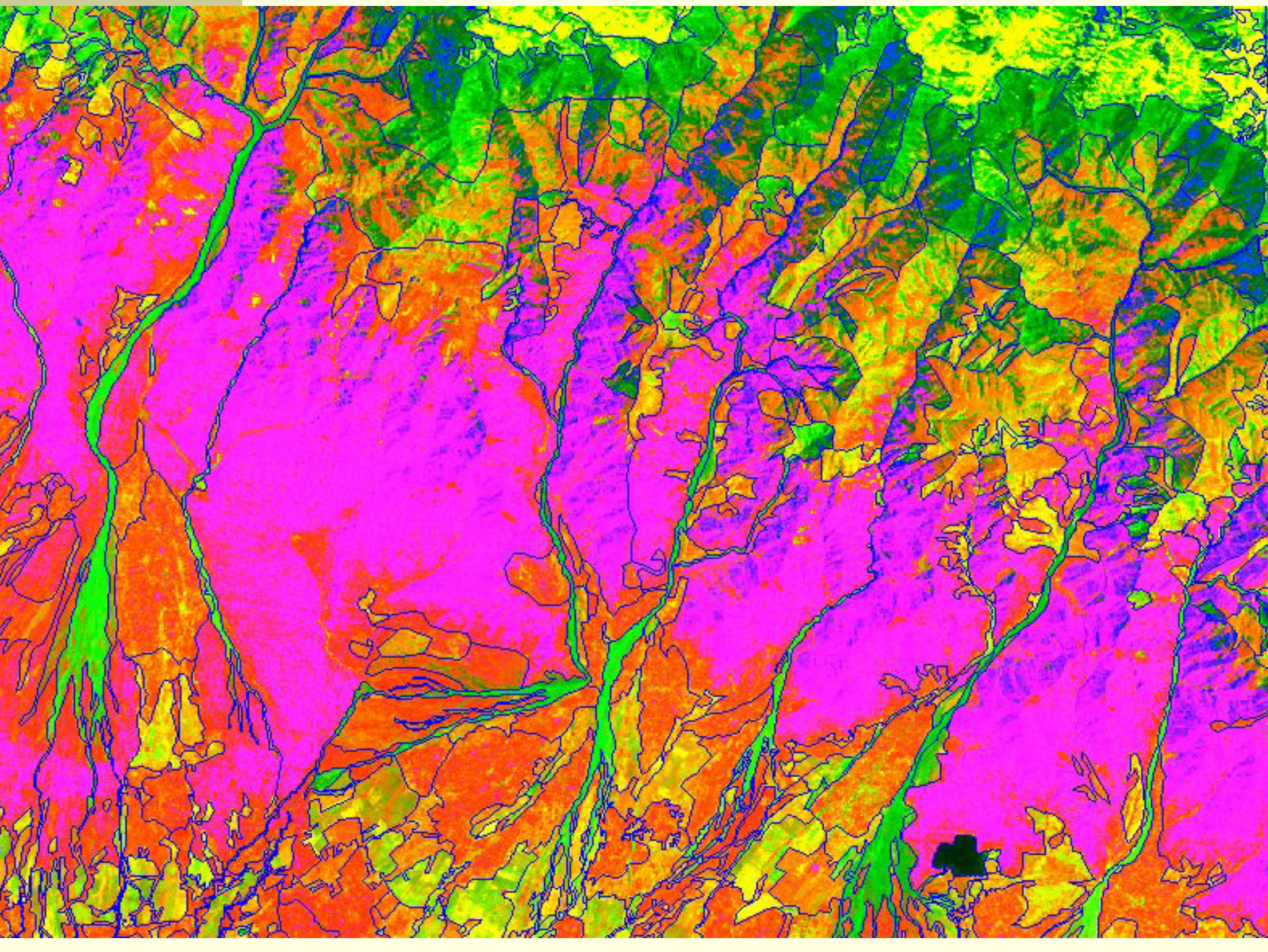


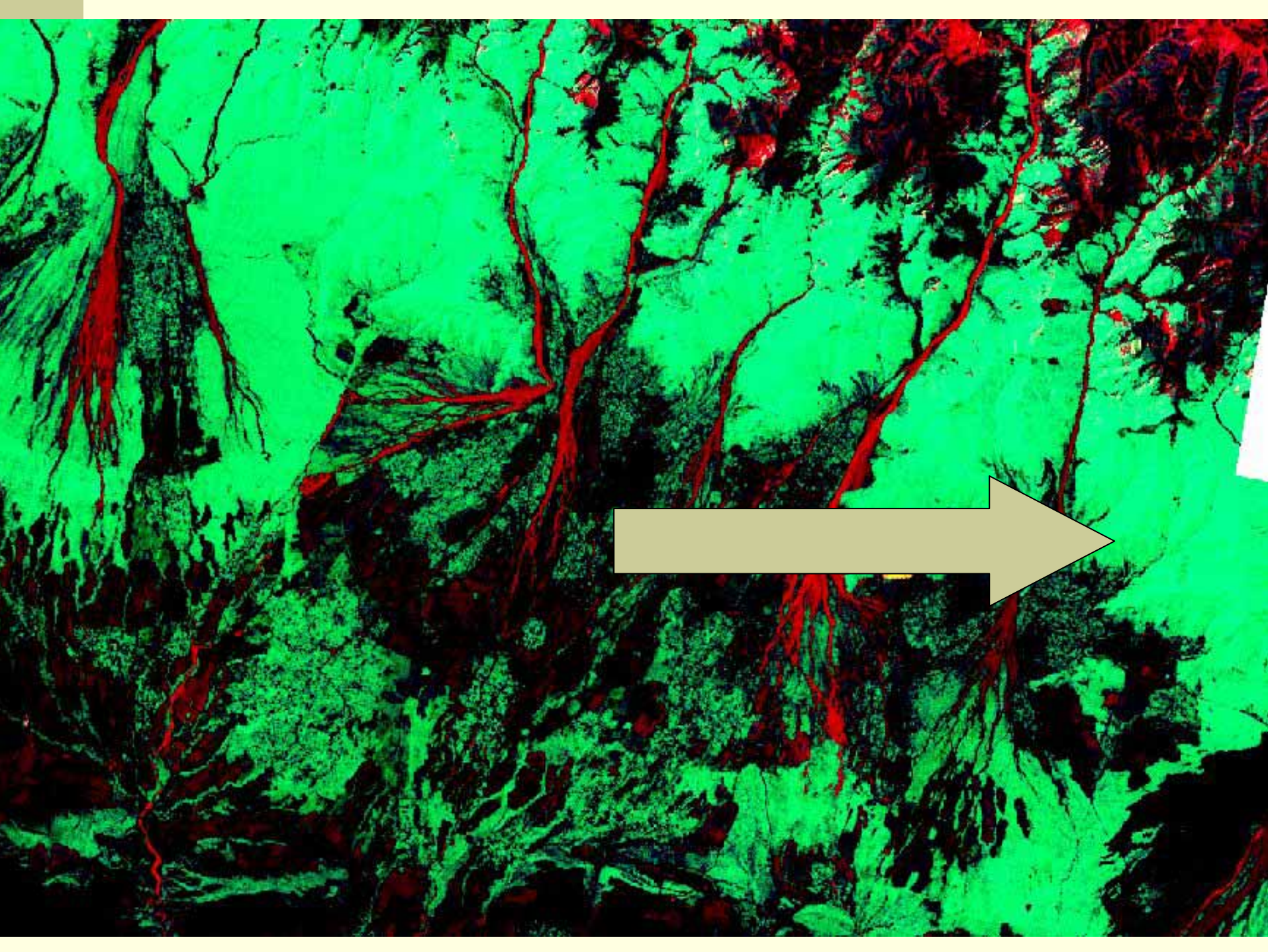


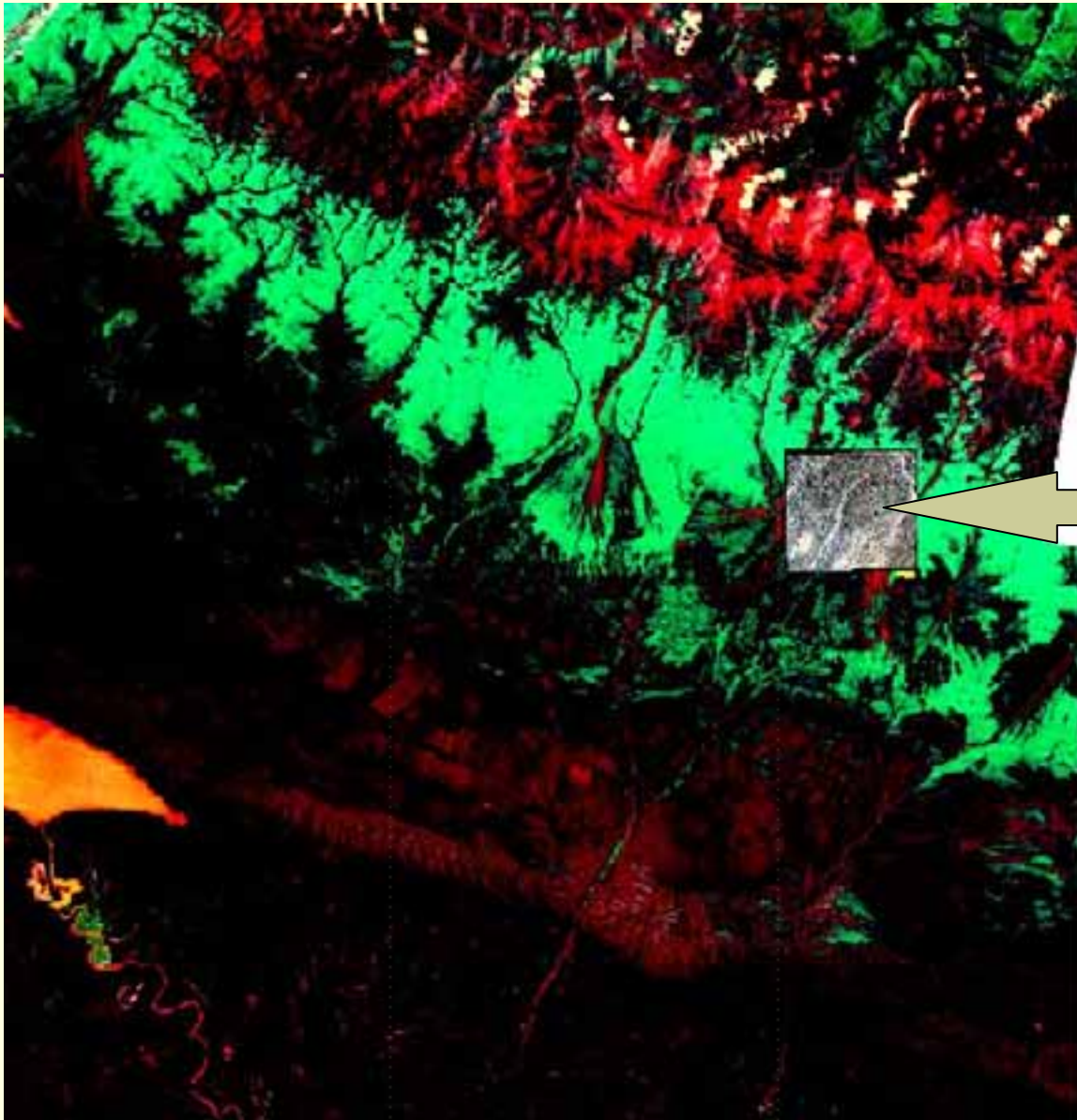
- Dry river bed
- Dry river bed - Araz
- Dry river bed (KUR/4)
- Dry river bed +
- Forest (riverine)
- Food crops (potatoes, vegetable, etc)
- Food crops (potatoes, vegetable, etc) v
- Food crops (potatoes, vegetable, etc)
- Food crops (potatoes, vegetable, etc)
- Food crops (potatoes, vegetable, etc)
- Forest (conifer)
- Forest (mixed: oak, beech, gnab)
- Forest (mixed: oak, beech, gnab)
- Forest (mixed: oak, beech, gnab) Forest (mixed: oak)
- Forest (oak)
- Forest (plantation)
- Forest (plantation)
- Forest (riverine)
- Forest (riverine)
- Grassland / pasture
- Herbaceous crops (wheat, maize, cereals)
- Herbaceous crops (wheat, maize, etc)
- Industrial area
- Industrial area
- Natural lake
- Orchard
- Pond
- Quarry / Mine
- Rangeland / grassland
- Rangeland / grassland
- Rice
- Rocks
- Salt crust
- Sandy beach
- Shrubs
- Snow/ ice
- Soil
- Steppe
- Swamp
- Swamp vegetation
- Swamp vegetation









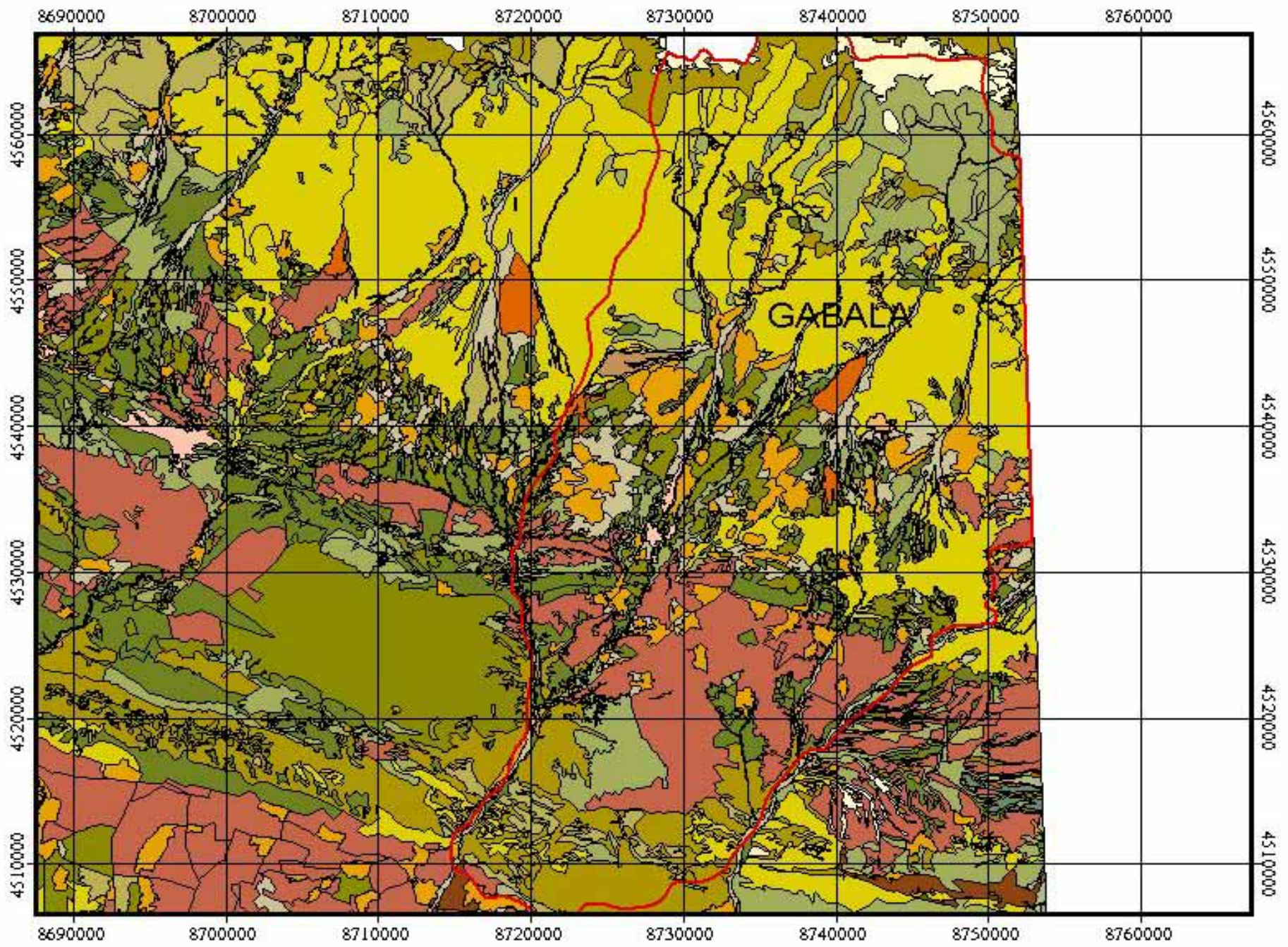






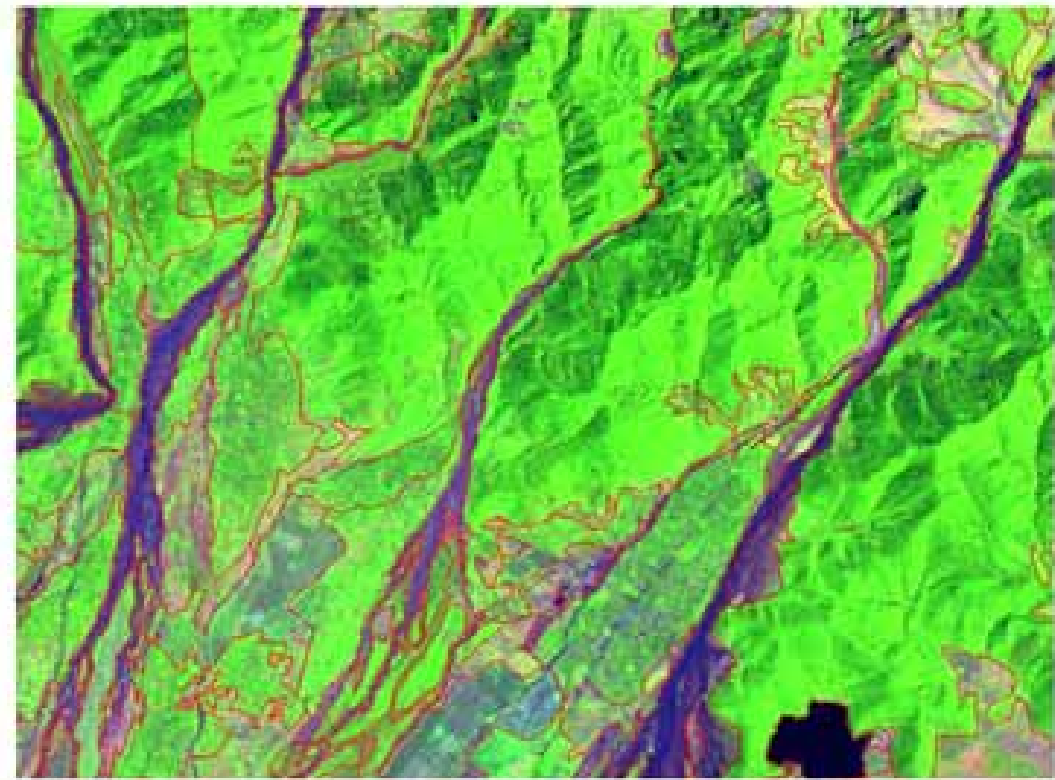
04/30/2006 9:21 am



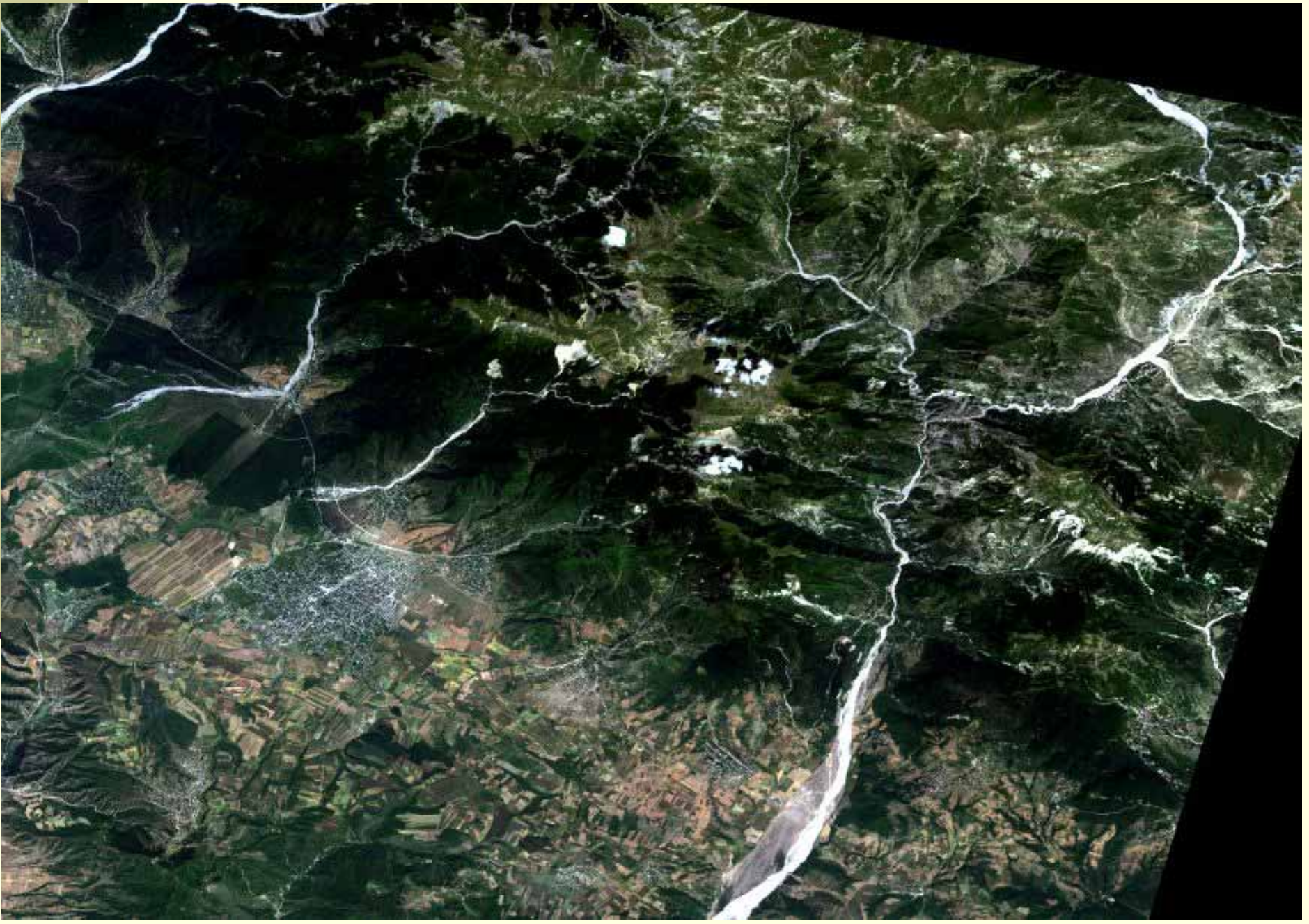


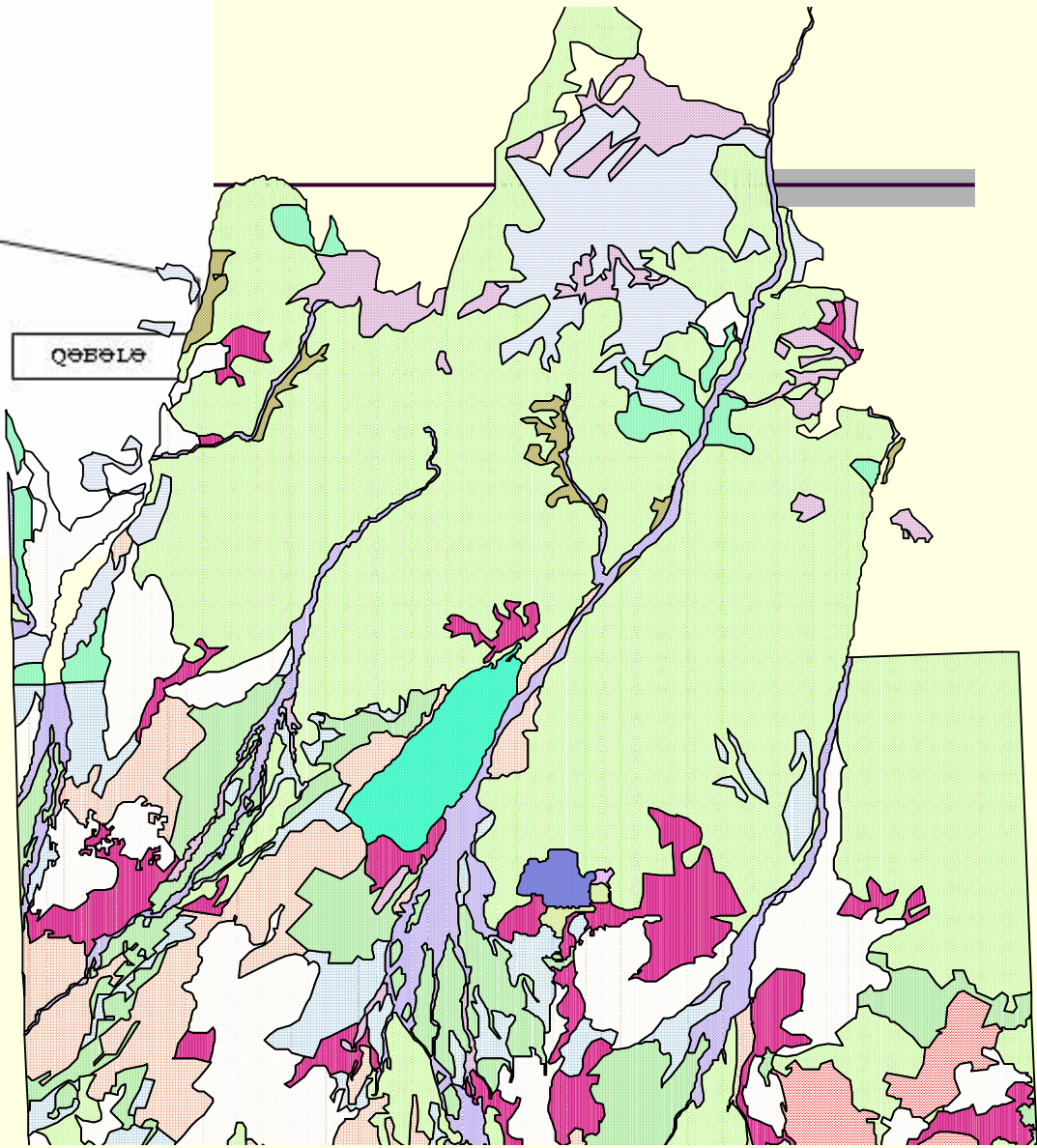


SPOT 2007

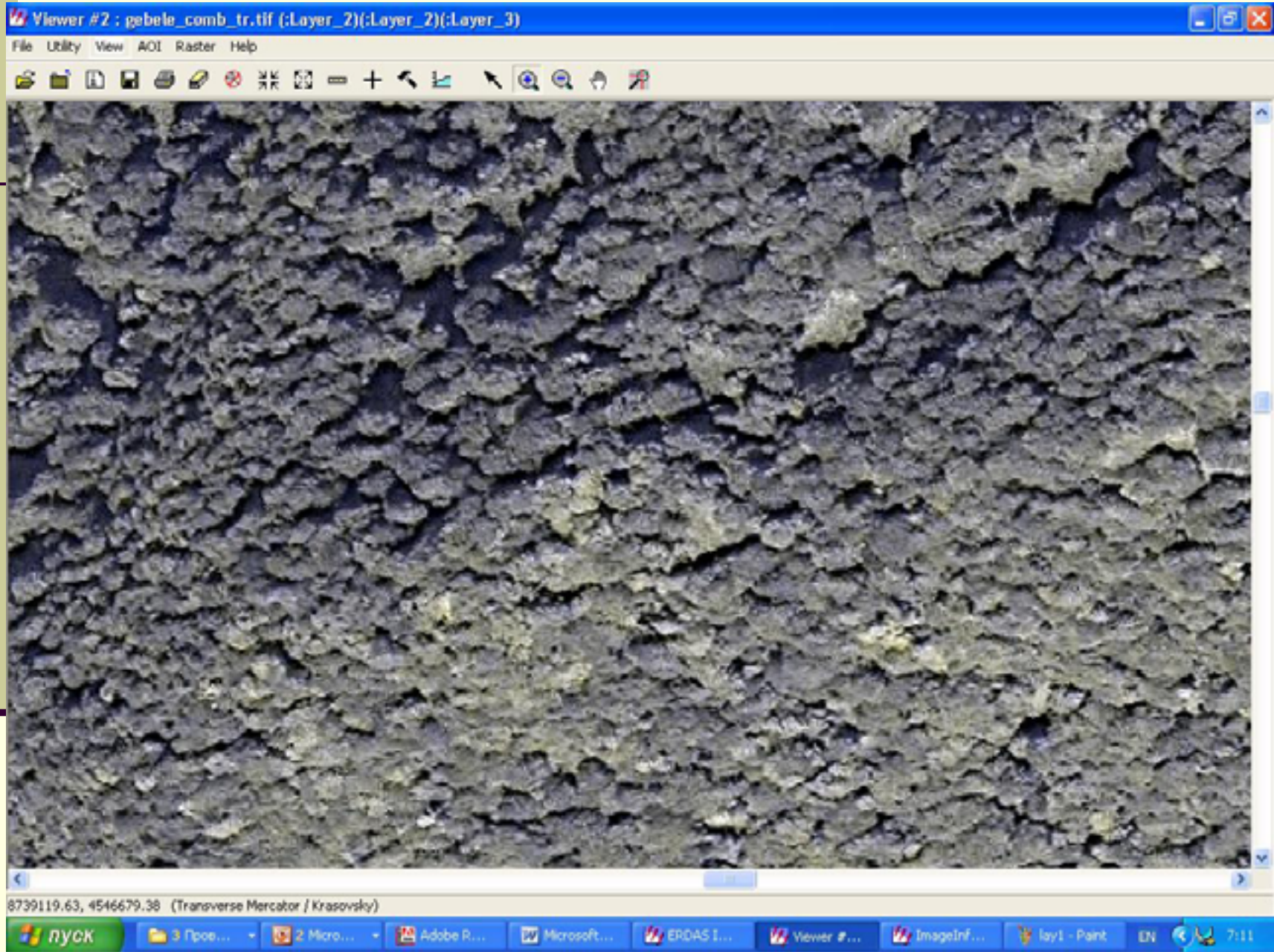


ALOS-2006



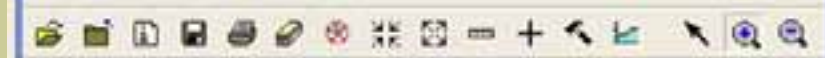








Viewer #2: gebele_comb_tr.tif (Layer_2) | Layer_2 | Lay...



8739217.13, 4546687.88 (Transverse Mercator [Krasovsky])

ImageInfo (gebele_comb_tr.tif)



General | Projection | Histogram | Pixel data |

Projection Type: Transverse Mercator

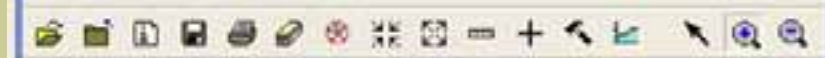
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Datum Name:	Undefined
Scale factor at central meridian:	1.000000
Longitude of central meridian:	48 00 00.000000 E
Latitude of origin of projector:	0 00 00.000000 N
False easting:	950000.000000 meters
False northing:	0.000000 meters

Example of canopy cover measurement using the NDVI





Viewer #2: gebele_comb_tr.tif (Layer_2)(Layer_2)(Lay...



8739217.13; 4546687.88 (Transverse Mercator [Krasovsky])

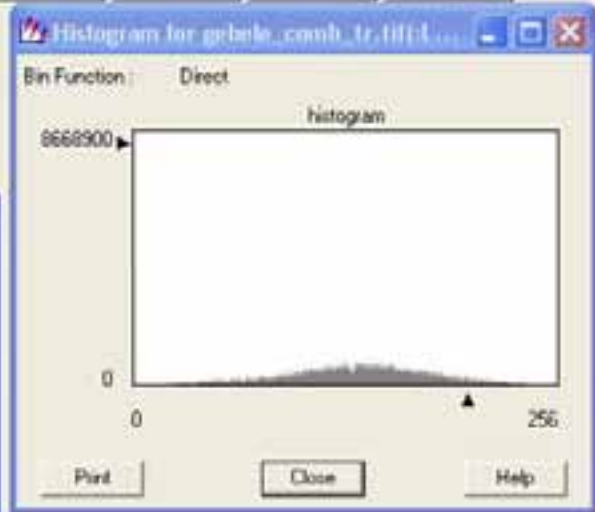
ImageInfo (gebele_comb_tr.tif)



General | Projection | Histogram | Pixel data |

Projection Type: Transverse Mercator

Spheroid Name:	Krasovsky
Datum Name:	Undefined
Scale factor at central meridian:	1.000000
Longitude of central meridian:	48 00 00.000000 E
Latitude of origin of projector:	0 00 00.000000 N
False easting:	950000.000000 meters
False northing:	0.000000 meters



ImageInfo (gebele_comb_tr.tif)

File Edit View Help

1 Layer_1

General Projection Histogram Pixel data

File Info:

Layer Name:	Layer_1	
Last Modified:	Mon Sep 25 12:16:54 2006	Number of Layers: 3

Layer Info:

Width:	11031	Height:	10222	Type:	Continuous
Block Width:	5516	Block Height:	1	Data Type:	Unsigned 8-bit
Compression:	None	Pyramid Layers:	Present		

Statistics Info:

Min:	0	Max:	255	Mean:	124.717
Median:	130	Mode:	0	Std. Dev.:	64.431
		Skip Factor X:	10	Skip Factor Y:	10
Last Modified:	Thu Jun 21 07:09:03 2007				

Map Info:

Upper Left X:	8732818.0	Upper Left Y:	4550556.0
Lower Right X:	8743848.0	Lower Right Y:	4540335.0
Pixel Size X:	1.0	Pixel Size Y:	1.0
Unit: meters		Geo. Model: Map Info	

Projection Info:

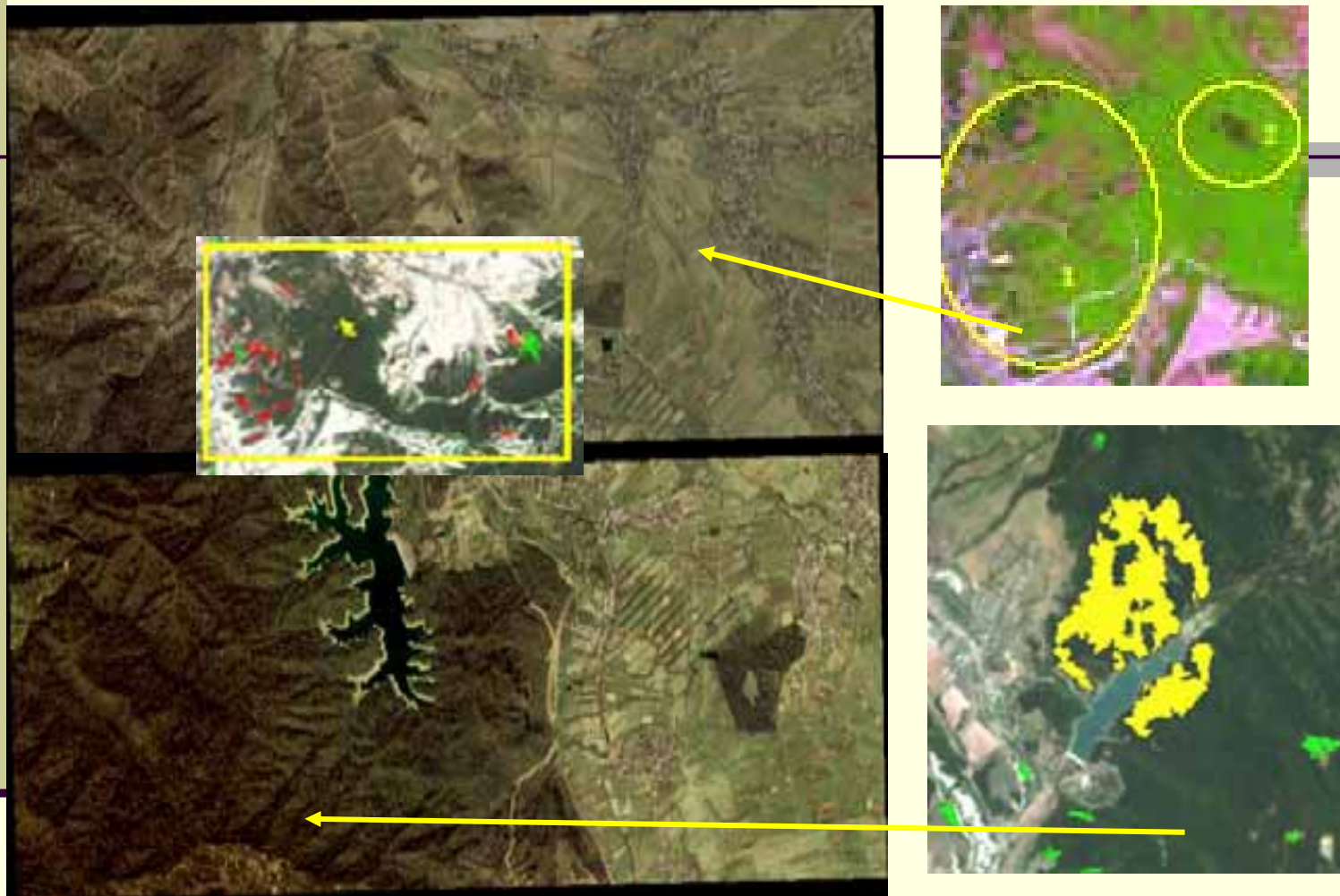
Projection: Transverse Mercator
Spheroid: Krasovsky
Datum: Undefined

Pixel data for gebele_comb_tr.tif(:Layer_3)

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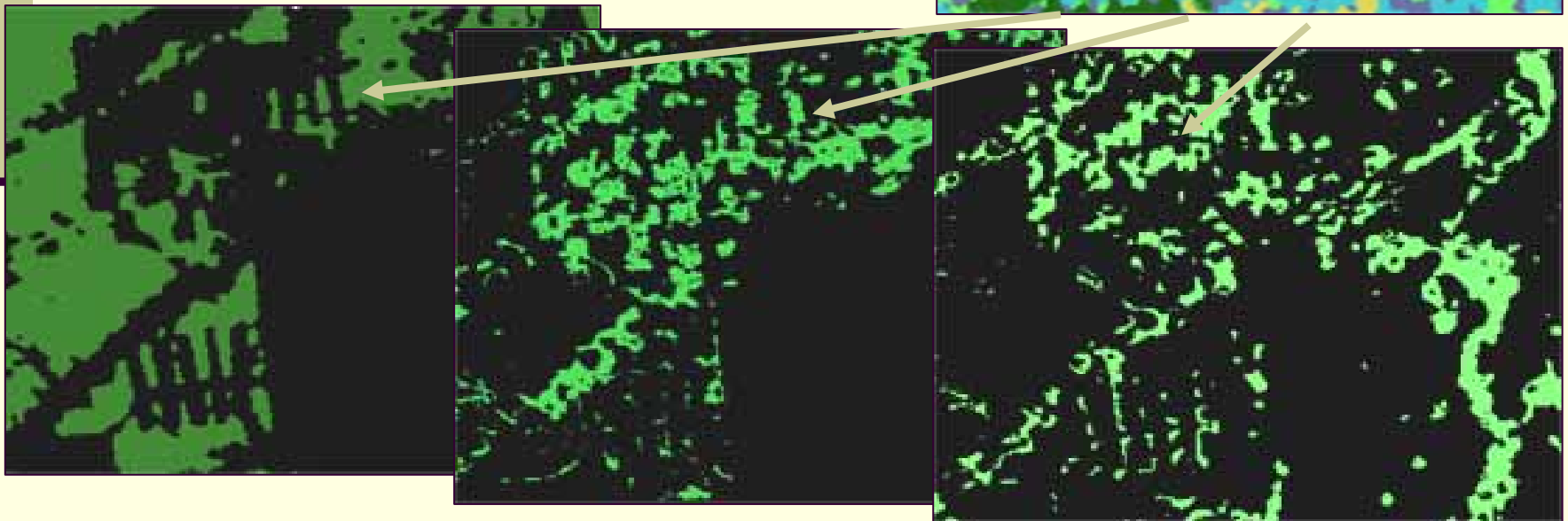
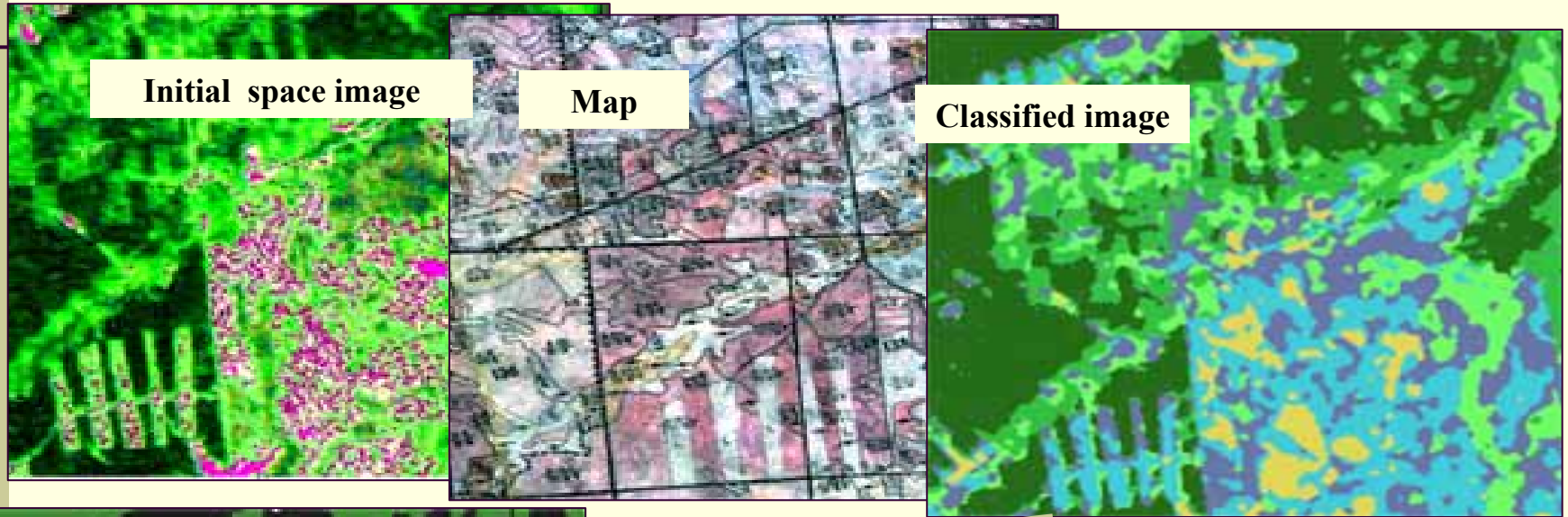
Close

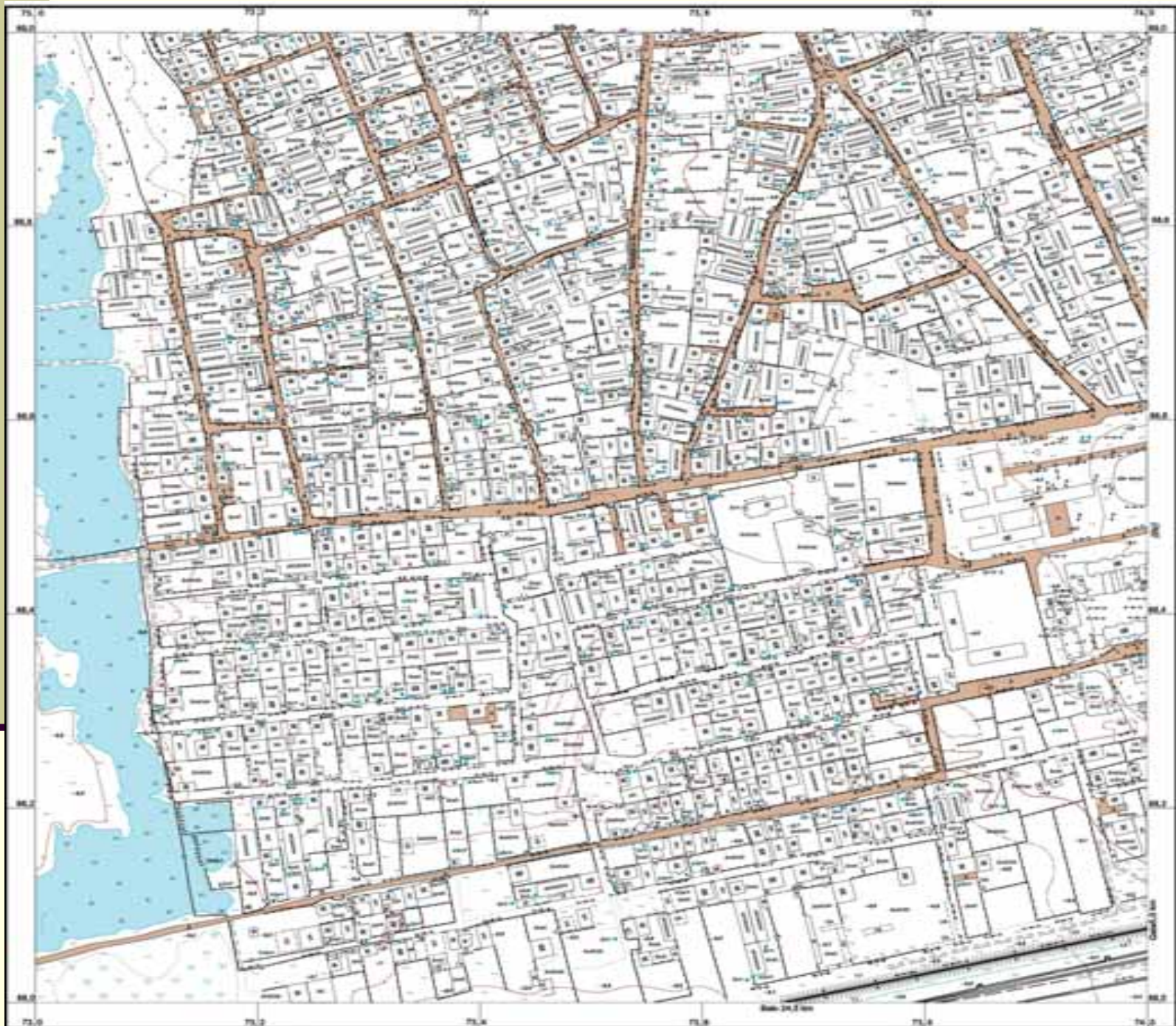
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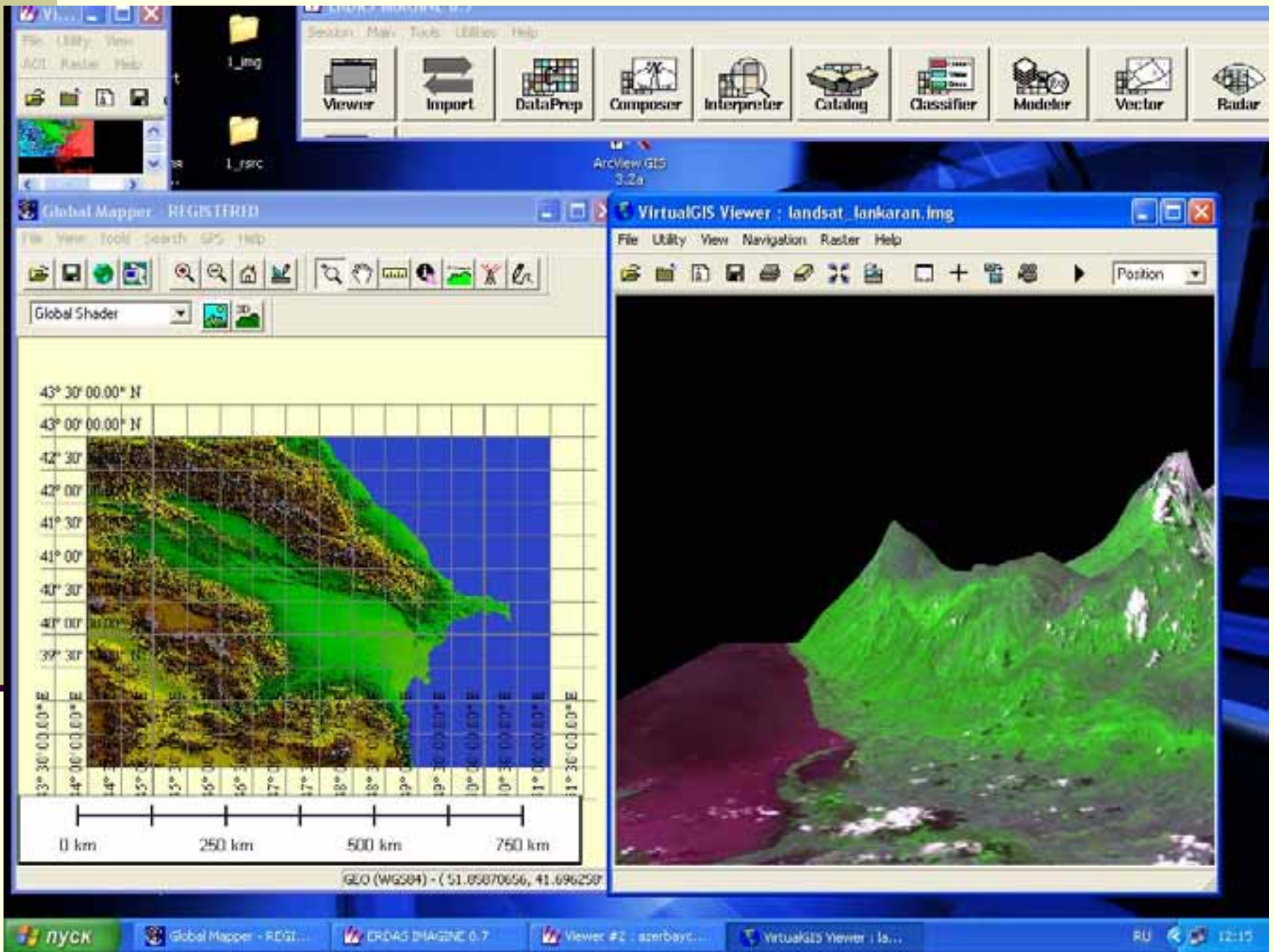


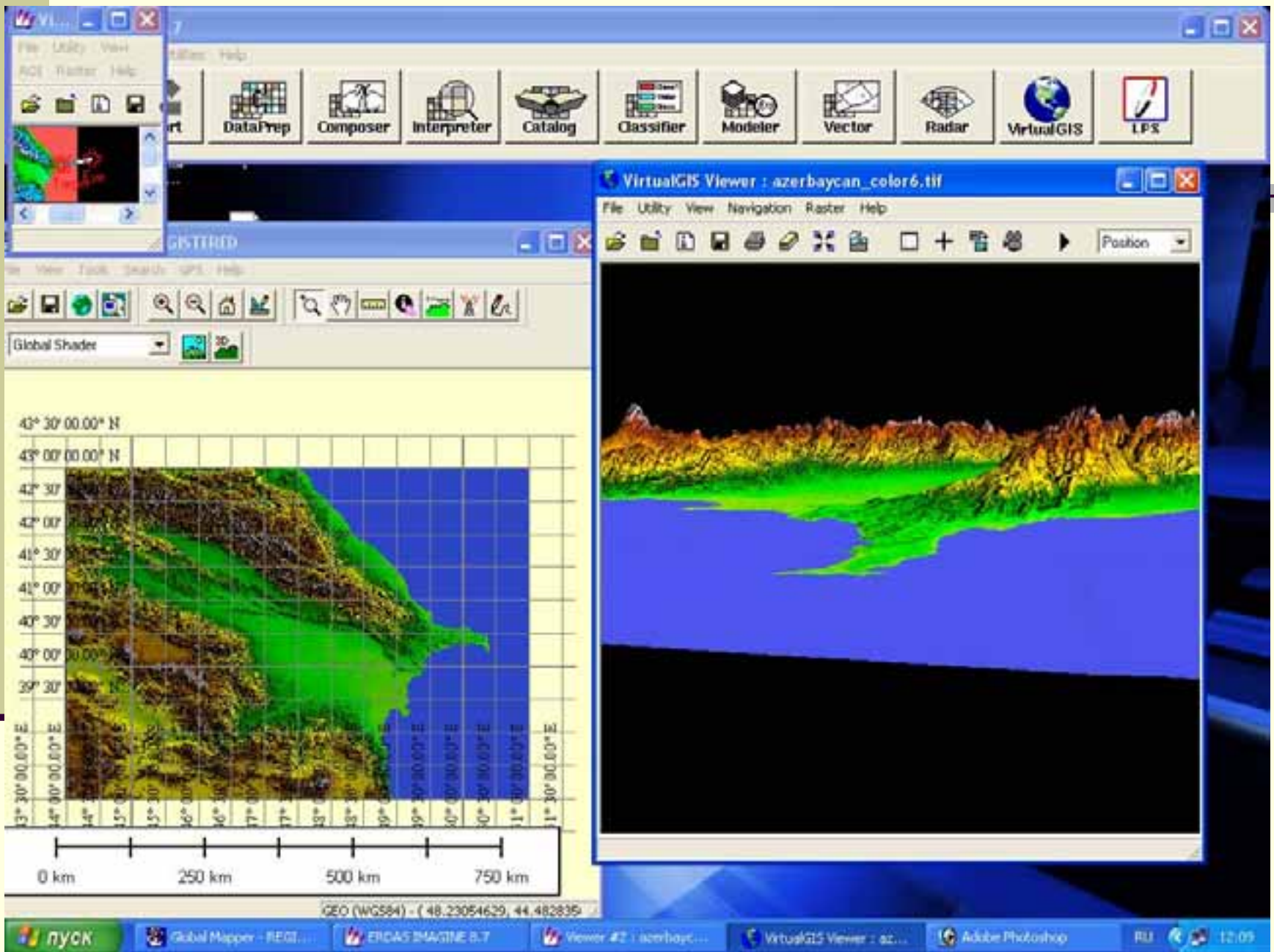
Different resolution images for area of interest

Mapping forest types classes with GIS (IKONOS)



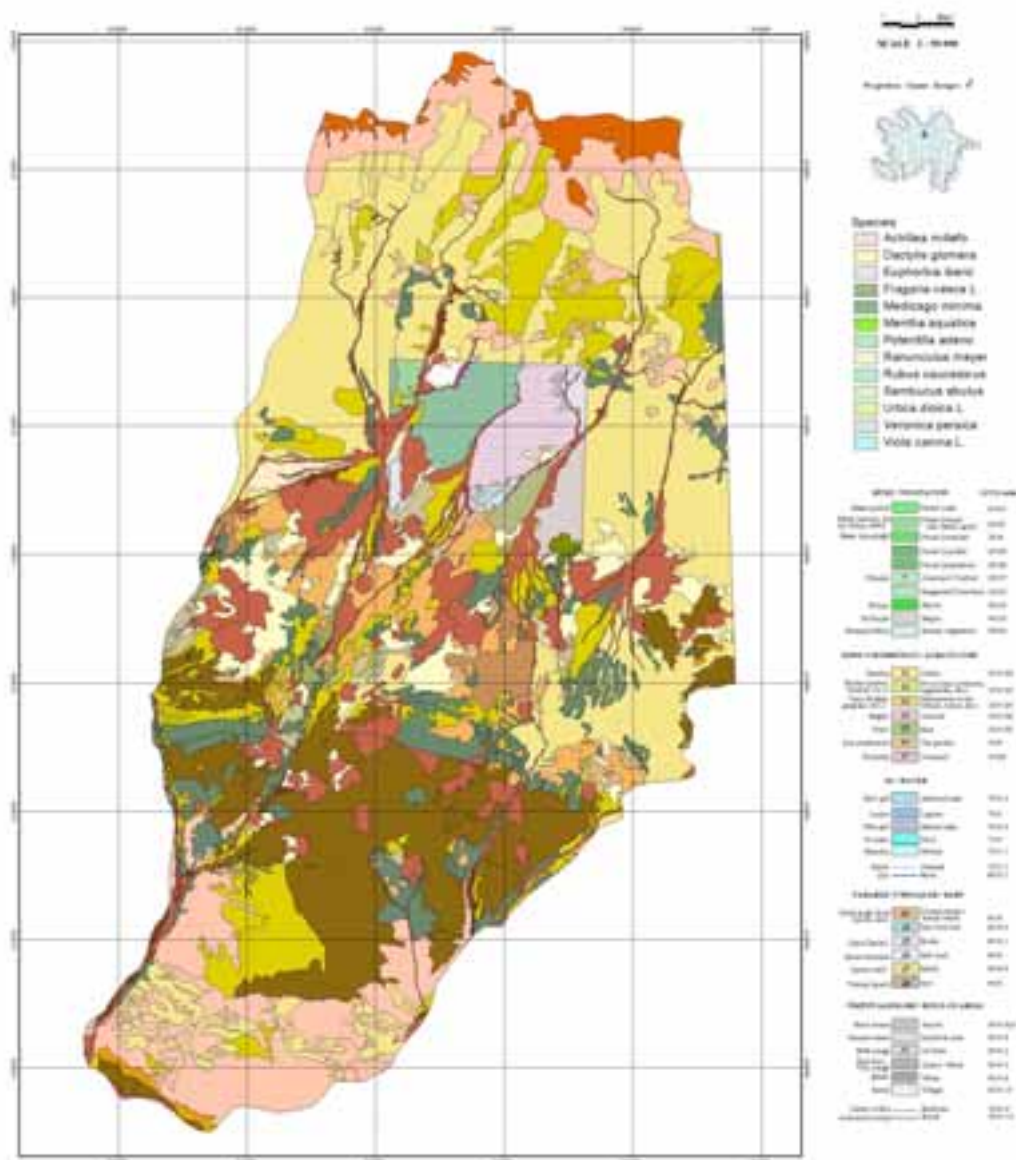




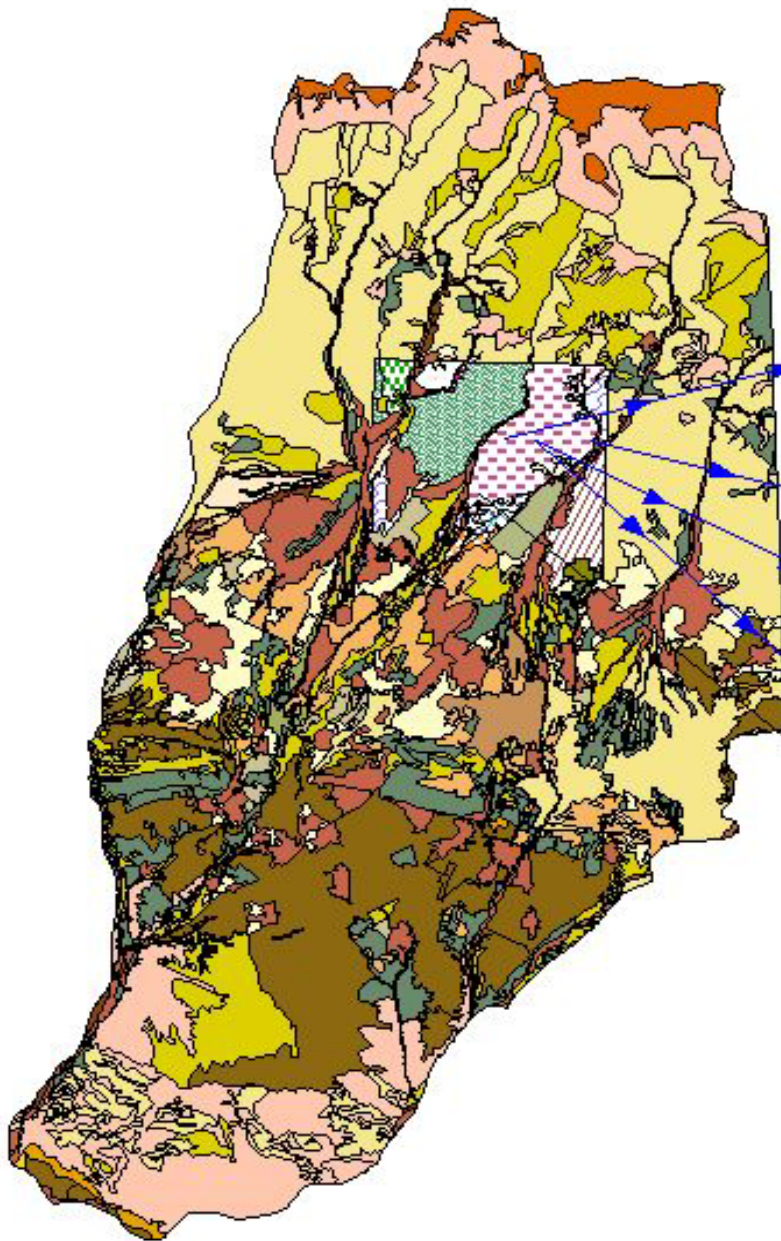




Classification map for Gabala



Map of *Castanea sativa* forest



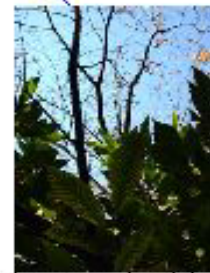
planted *Castanea sativa* forest



infected and uninfected fruits of *Castanea sativa*



Castanea sativa



re-vegetated sampled tree

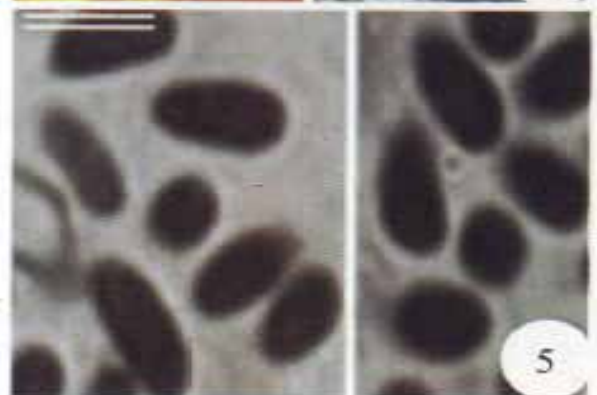
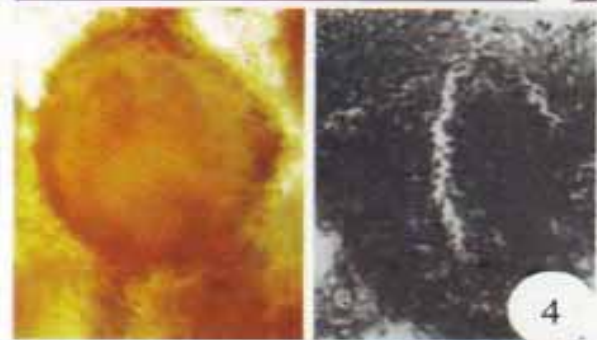


fruit of the uninfected *Castanea sativa* tree

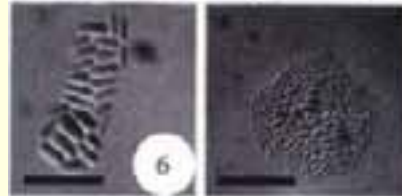
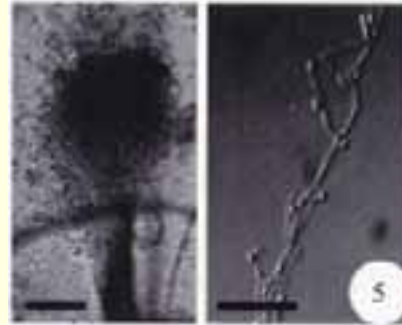
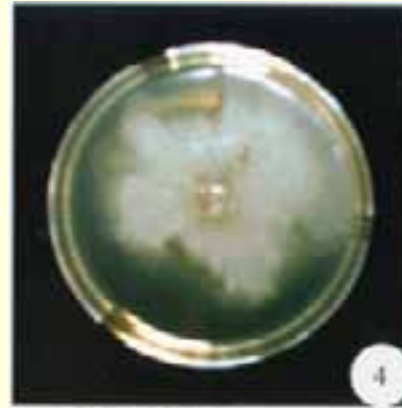
species



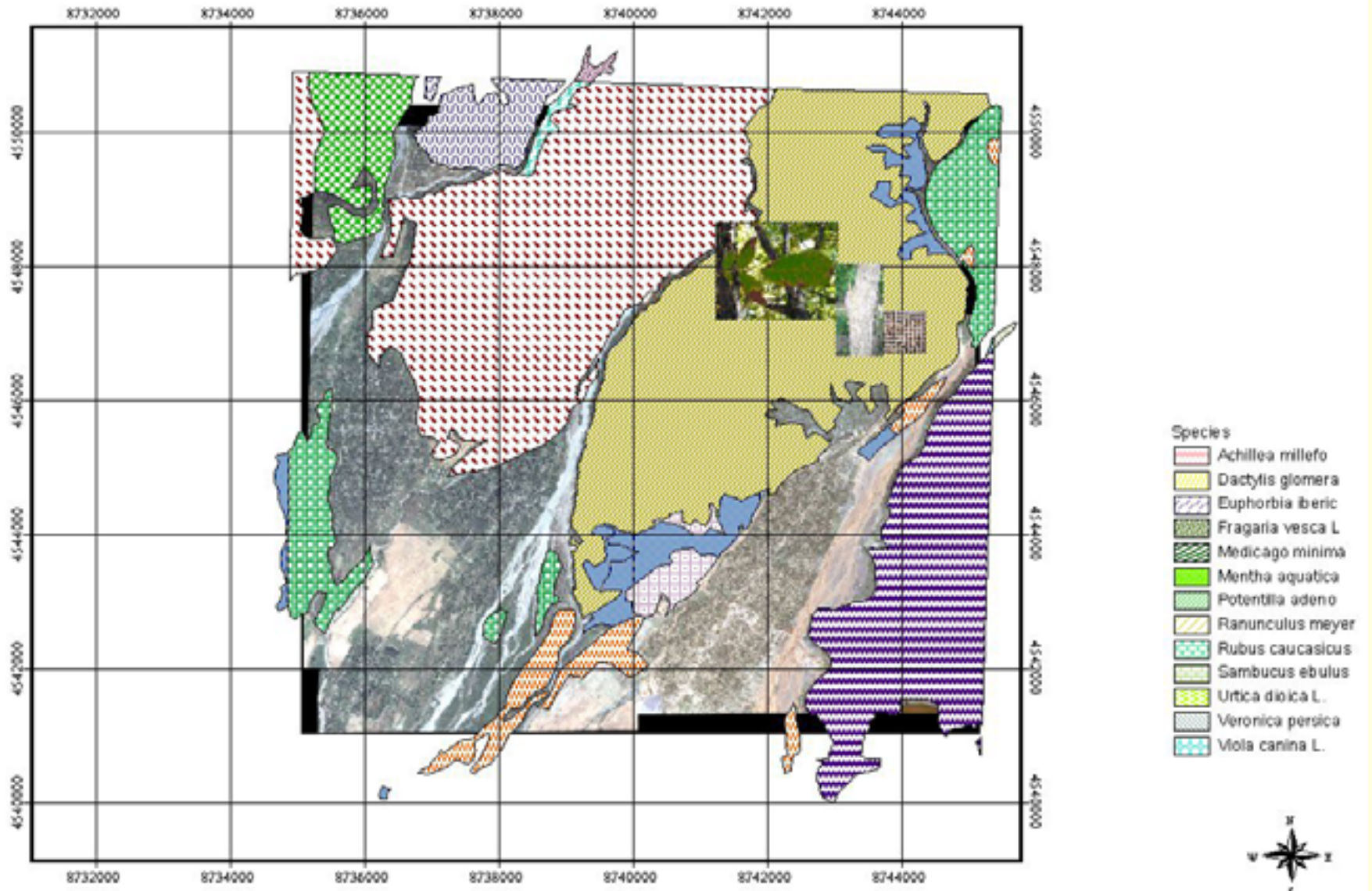
species



species



Species map for GABALA



CONCLUSION

On the basis of performed research and work experience a conclusion is made: the offered technology allow us to perform the whole class of tasks of on-line quantitative assessment of damage (changes) to the environment; but one thing becomes a necessary conditions (with availability of direct access to remote sensing materials), this is the implementation of high volume and complex activities on creation and maintenance of regional information systems (of different scope and scale dictated by a spectrum of tasks) about ground objects of research based on modern information technologies.