UN / Austria / ESA Symposium
"Space Tools and Solutions for Monitoring the Atmosphere and Land Cover"

Integration of remotely sensed data into a GIS of soil resources

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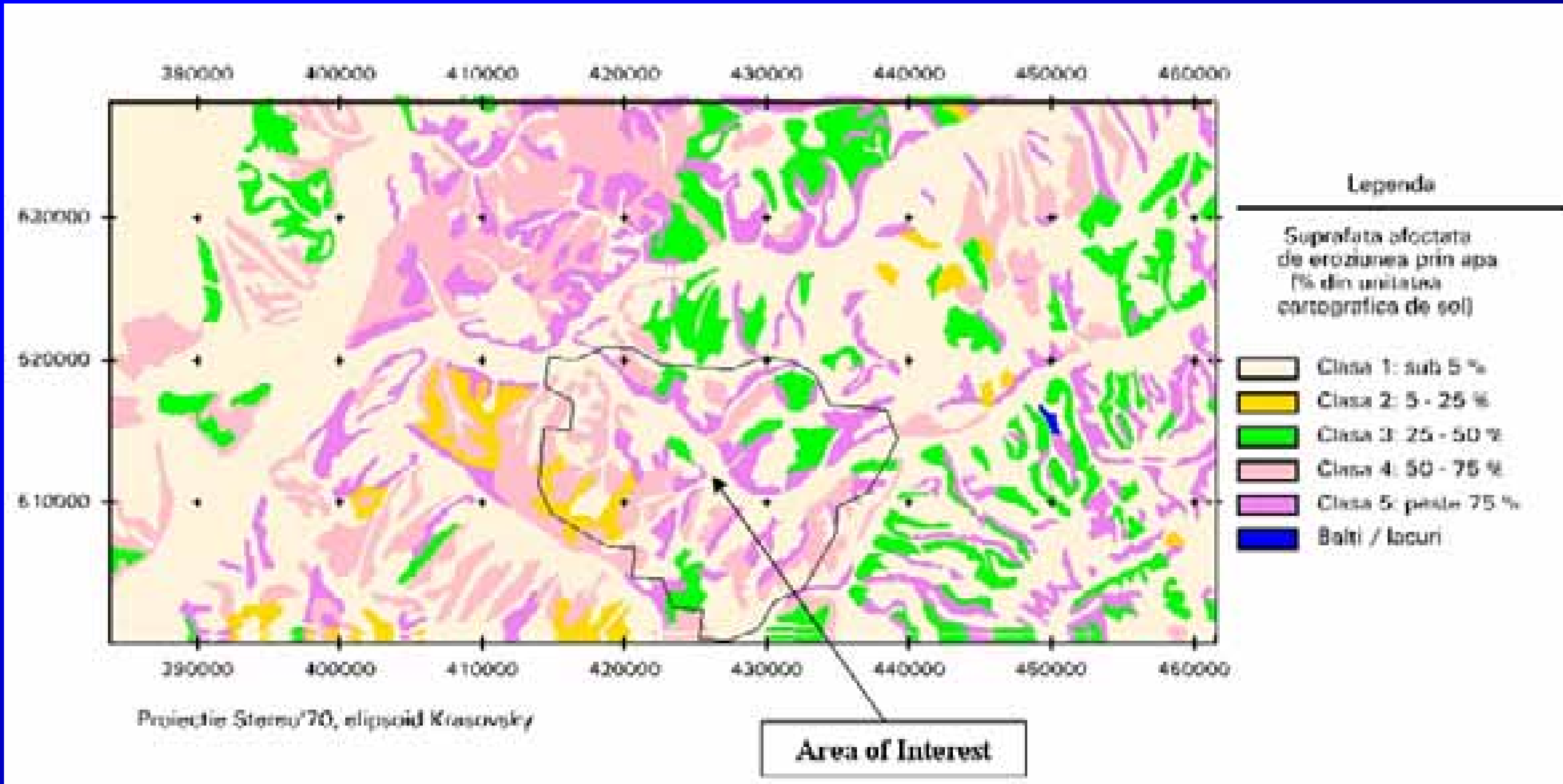
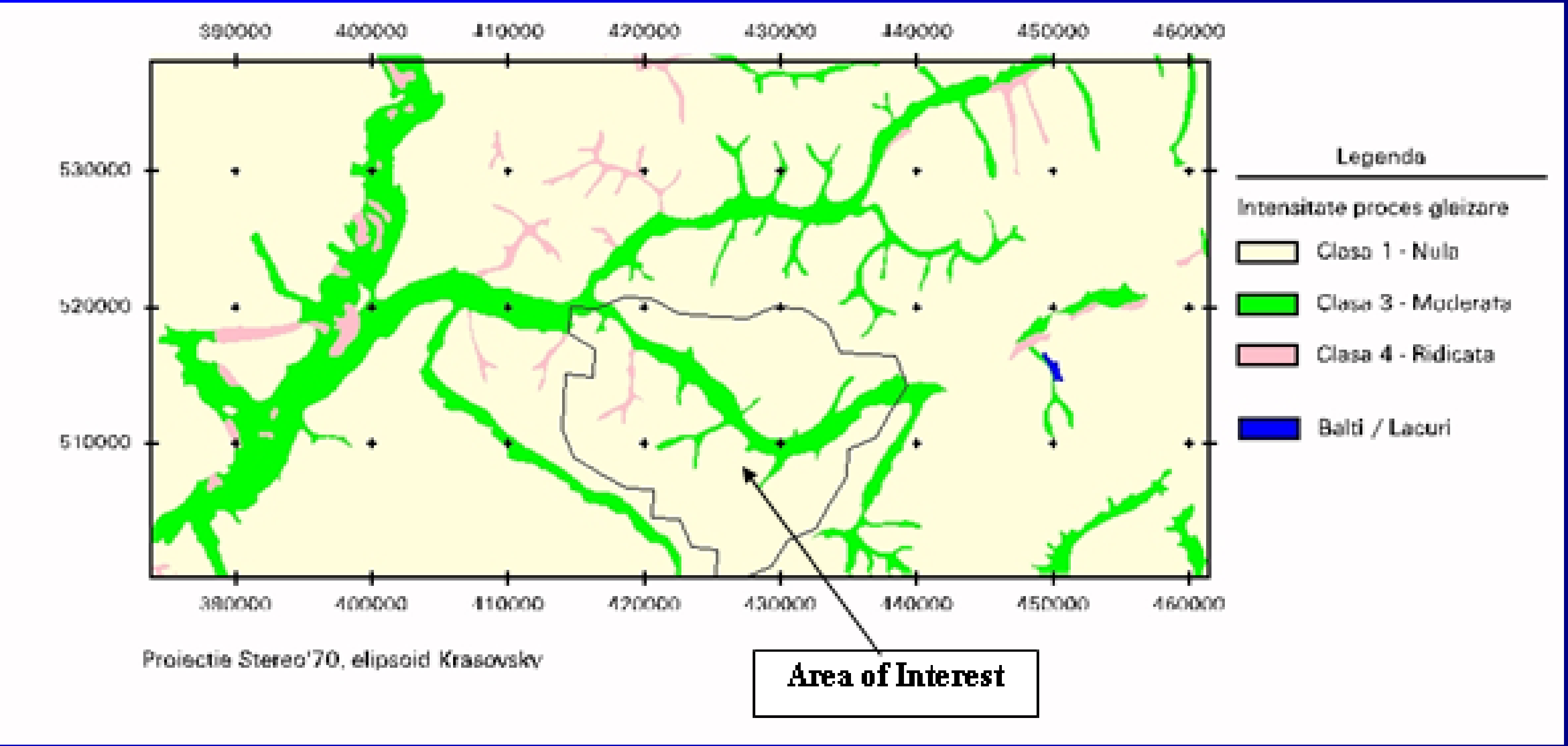


Generation of maps with affected areas by degradation processes (based on GIS information)

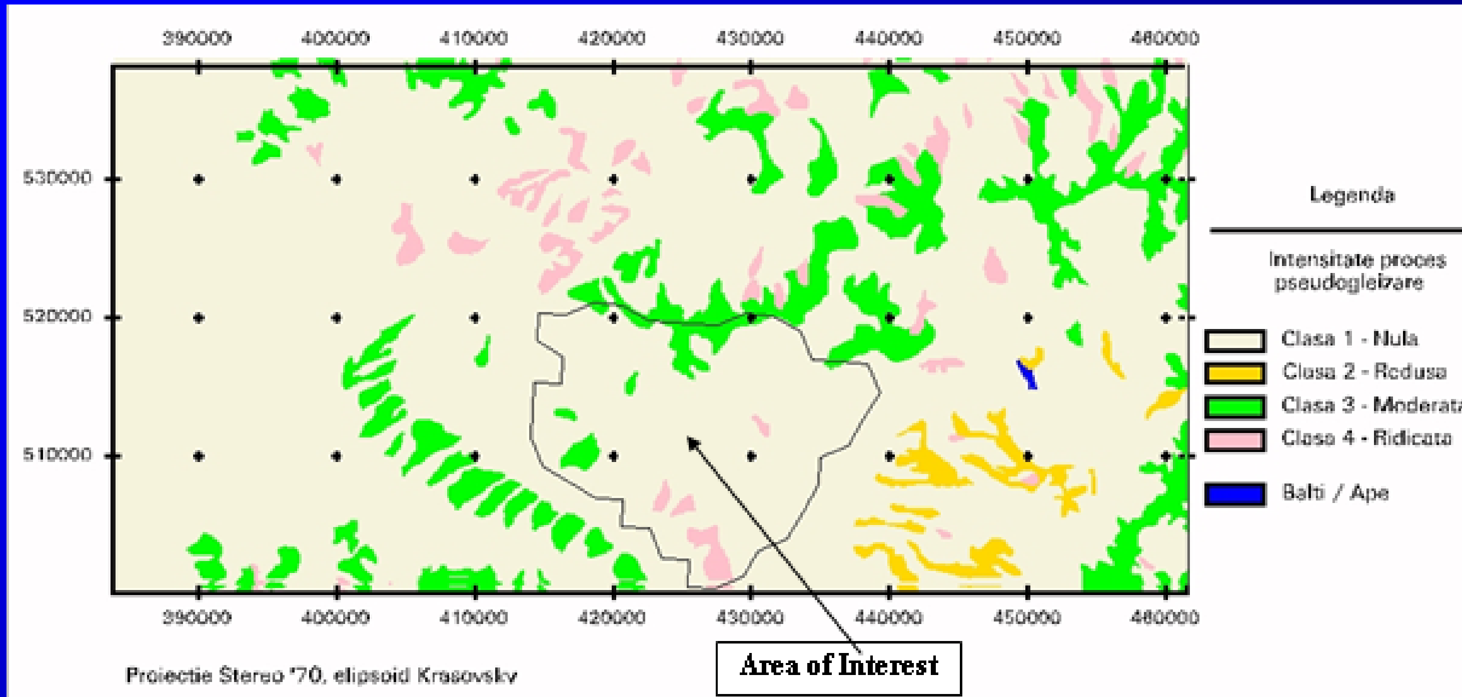
1. Map of the areas affected by water erosion

Class	Affected areas (% of the mapping unit)
1	< 5 %
2	5-25 %
3	25- 50 %
4	50-75 %
5	> 75 %



2. Map of the areas affected by gleyzation

Class	Intensity of process
1	Null (without risk of waterlogging)
2	Low (little risk of waterlogging in case of uncontrolled irrigation soils with groundwater table at small depth)
3	Moderate (risk of waterlogging in rainy years – gleyied soil subtypes)
4	High (risk of waterlogging, if there is no artificial drainage – hydromorphic soils with groundwater table at small depth)
5	Very high (quasi permanent waterlogging – swampy soil subtypes)



3. Map of the areas affected by pseudogleyzation

Class	Intensity of process
1	Null (without risk of waterlogging)
2	Low (little risk of waterlogging in rainy years: Chernozems in saucers; vertic subtypes of non-pseudogleyed soils)
3	Moderate (risk of waterlogging in rainy years: pseudogleyed soil subtypes, Vertisols)
4	High (frequent waterlogging: pseudogleyed soil subtypes, pseudogleyed soils, clinomorphic soils)
5	Very high (prolonged waterlogging each year: pseudogleyed swampy soils)

Outline

1. Contribution of satellite remote sensing to soil science

2. The GIS of Soil Resources of Romania at 1:200.000 scale

3. The Land Cover Dynamics of Romania

4. Integration of Remotely Sensed Data into the GIS of Soil Resources of Romania - Case Study on a Vulnerable Area

5. Summary and Conclusions

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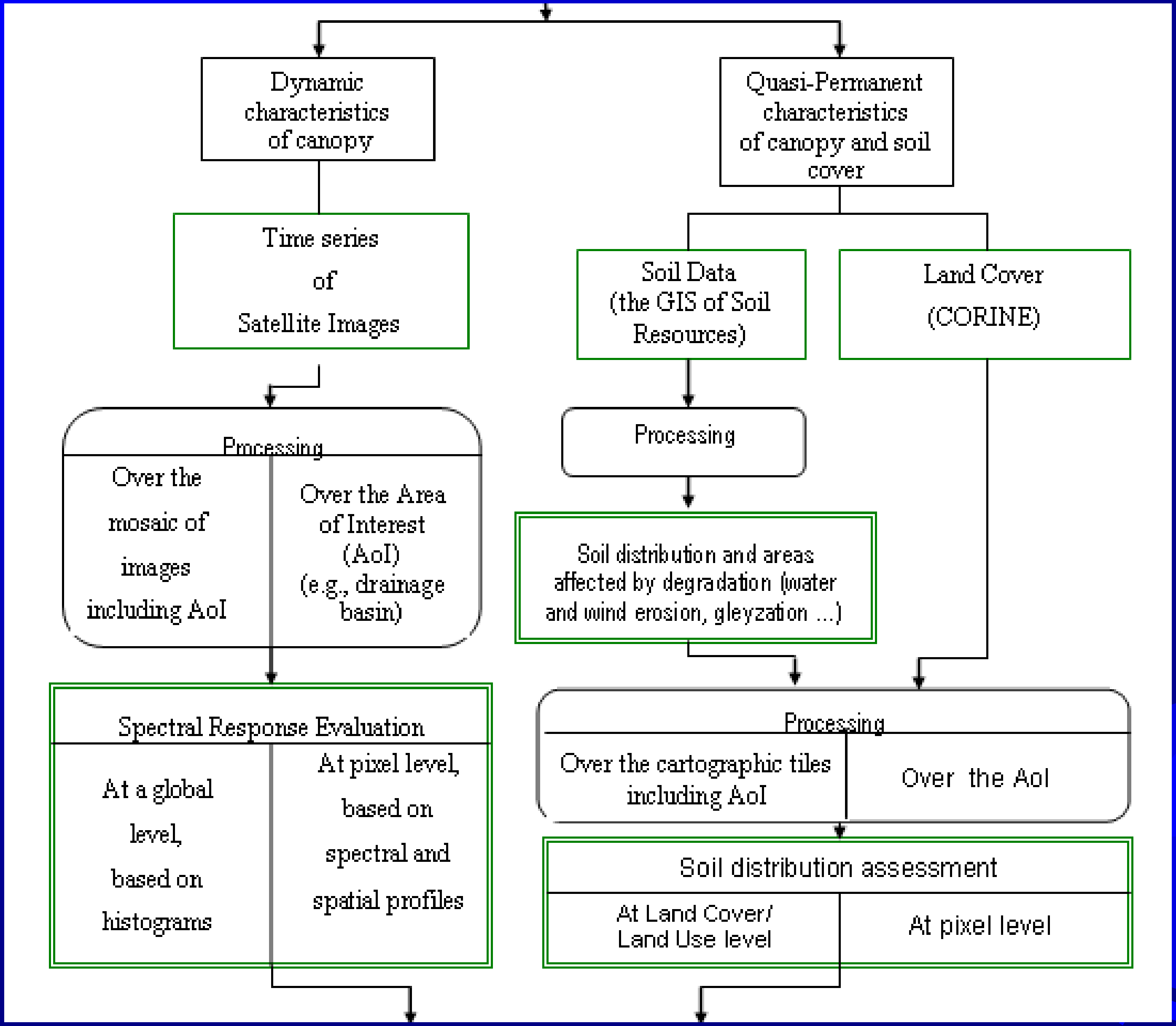
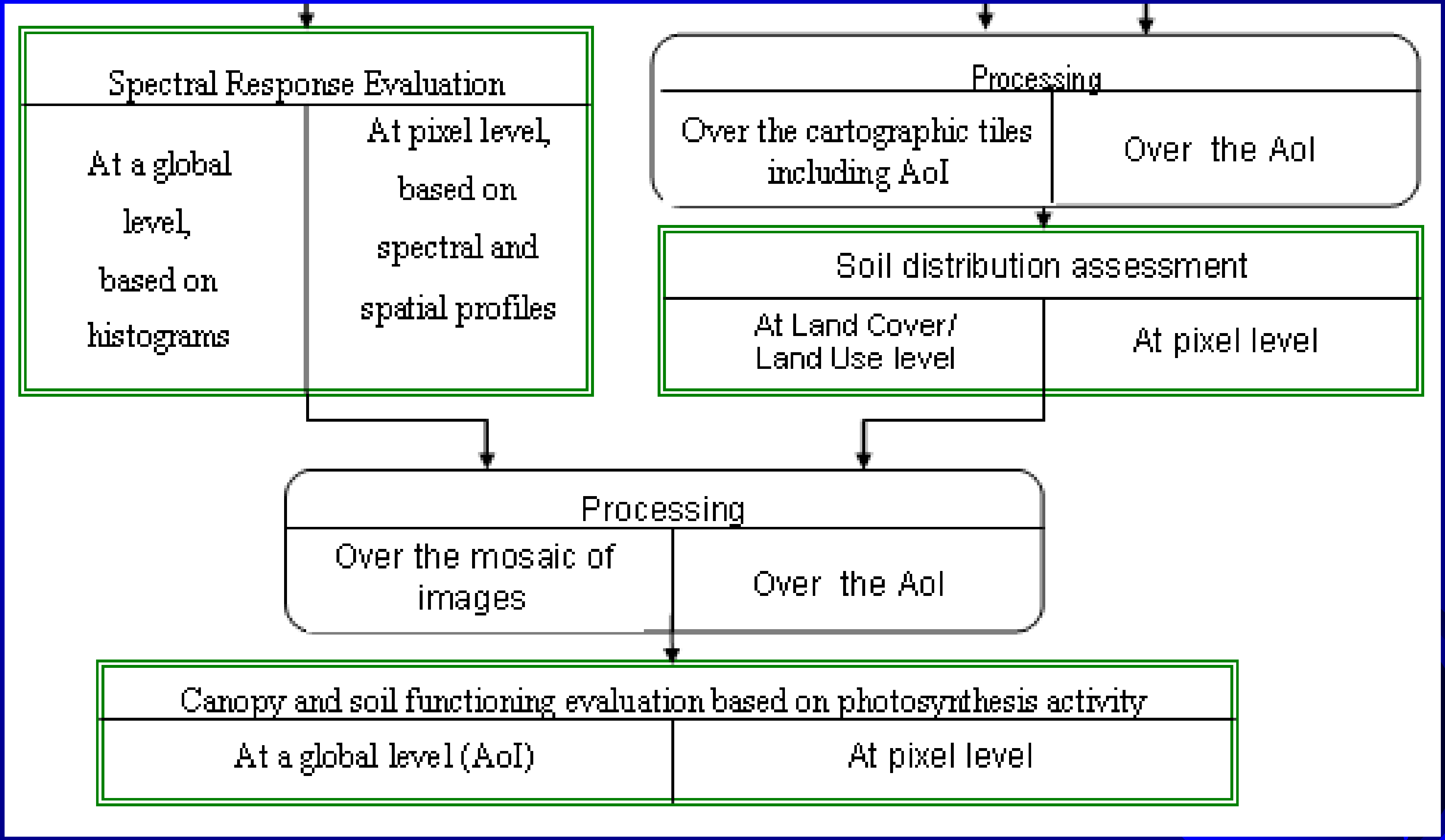


5. Summary and conclusions (cont.)



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1. Contribution of satellite remote sensing to soil science (1/2)

Benefits and limits of the use of spatial RS data in soil science

Approach	Soil paradigm	Satellite RS benefits / limits
Synthetic approach	Body	RS in visible, infrared and microwave can provide valuable information
Analytic approach	Soil seen in its constituents	RS can exploit some discernible elements (moisture, organic matter, etc.)
Taxonomical approach	Population that has to be classified	RS does not provide sufficient information
Agronomic approach	Topsoil, together with soil-plant-atmosphere exchanges and human influence	RS provides a lot of information, especially due to its diachronic characteristics
Holistic approach	Set of bodies related by chorological links and distributed in landscape in a non random manner	RS provides valuable information, due to its capability to acquire spatially continuous and temporally systematic data

1. Contribution of satellite remote sensing to soil science (2/2)

Retrievable parameters by RS involved in the functioning of the "soil-canopy" system

Evapotranspiration, Photosynthesis	Spectral Domains		
	Optical domain	Thermal Infrared	Microwave
Hydric functioning	• Reflectance	• Surface temperature	• Surface moisture
	• Albedo	• Hydric stress	
	• Canopy structure: cover fraction (fCover)	• Evapo-transpiration	
Carbon and Nitrogen Assimilation	• Canopy structure: leaf area index (LAI) and angles of leaves		
	• Leaf Chlorophyll Content (Ca+b)		
	• Fraction of photo-synthetically active radiation absorbed by canopy (fAPAR)		

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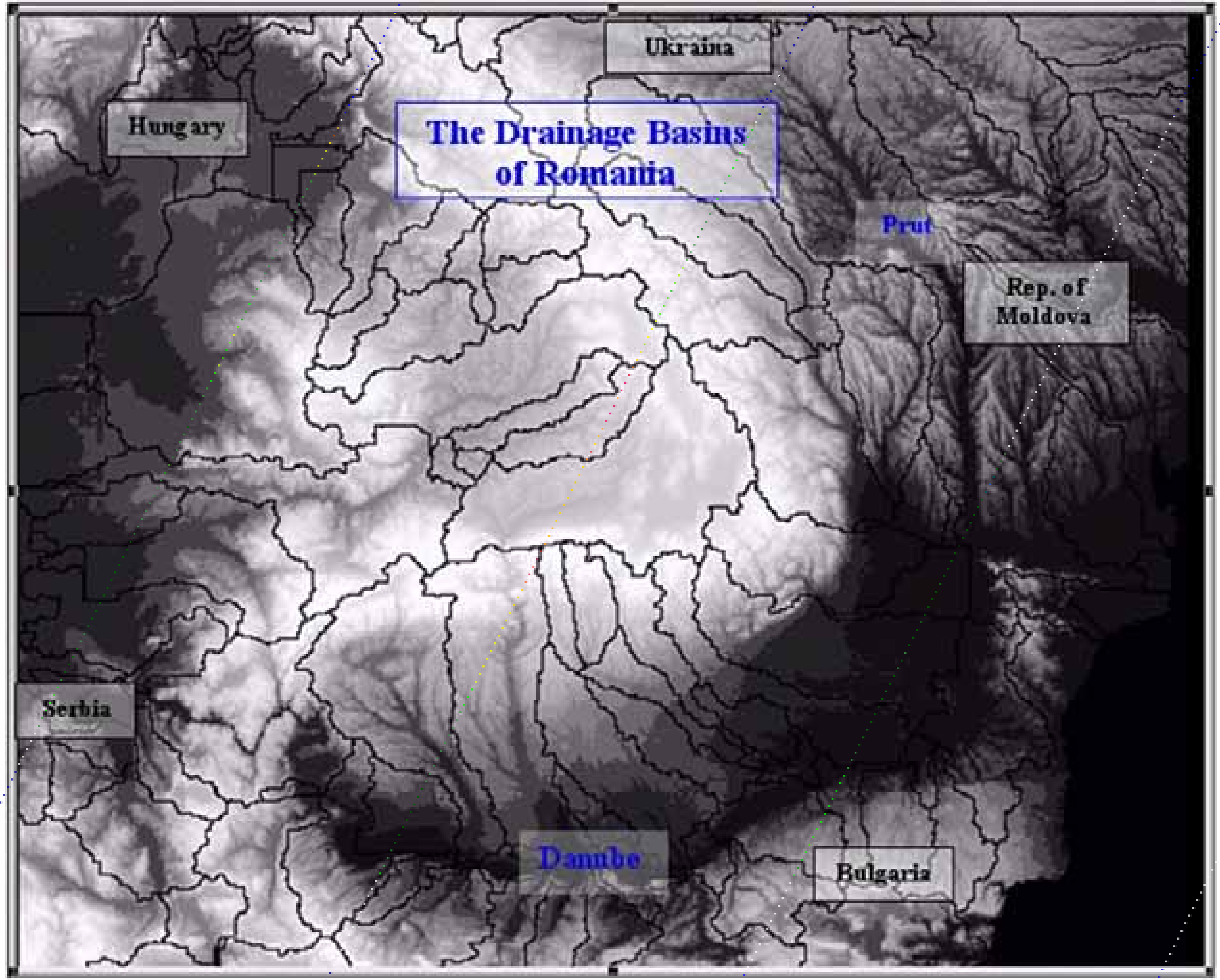
The Drainage Basins
of Romania
Ukraina
Hungary
Prut
Rep. of
Moldova
Serbia
Danube
Bulgaria

2. The GIS of Soil Resources of Romania at 1:200,000 scale (2/2)

Polygons and Attributes

The Soil Map of Romania at 1:200.000 scale has 50 tiles and about 80.000 delineations

For each soil delineation ("polygon"), the GIS manages:

- Four attributes ("characteristics") existing on the map:

- Mapping unit
- Topsoil texture
- Skeleton
- Land slide risk

- Six attributes inferred by expert rules:

- Water erosion
- Wind erosion
- Gleyzation
- Pseudogleyzation
- Salinisation
- Alkalization

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3. The Land Cover Dynamics of Romania

Information from the CORINE Land Cover Project funded by the EC:

- "CLC 90":

Satellite image acquisitions over Romania during in 1993 and 1994 years
LC information available in 1997

- "CLC 2000":

Satellite image acquisitions during 2000;
LC information, including LC changes, available in 2004

- "CLC 2006":

Satellite image acquisitions during 2006;
LC information, including LC changes, available in 2008

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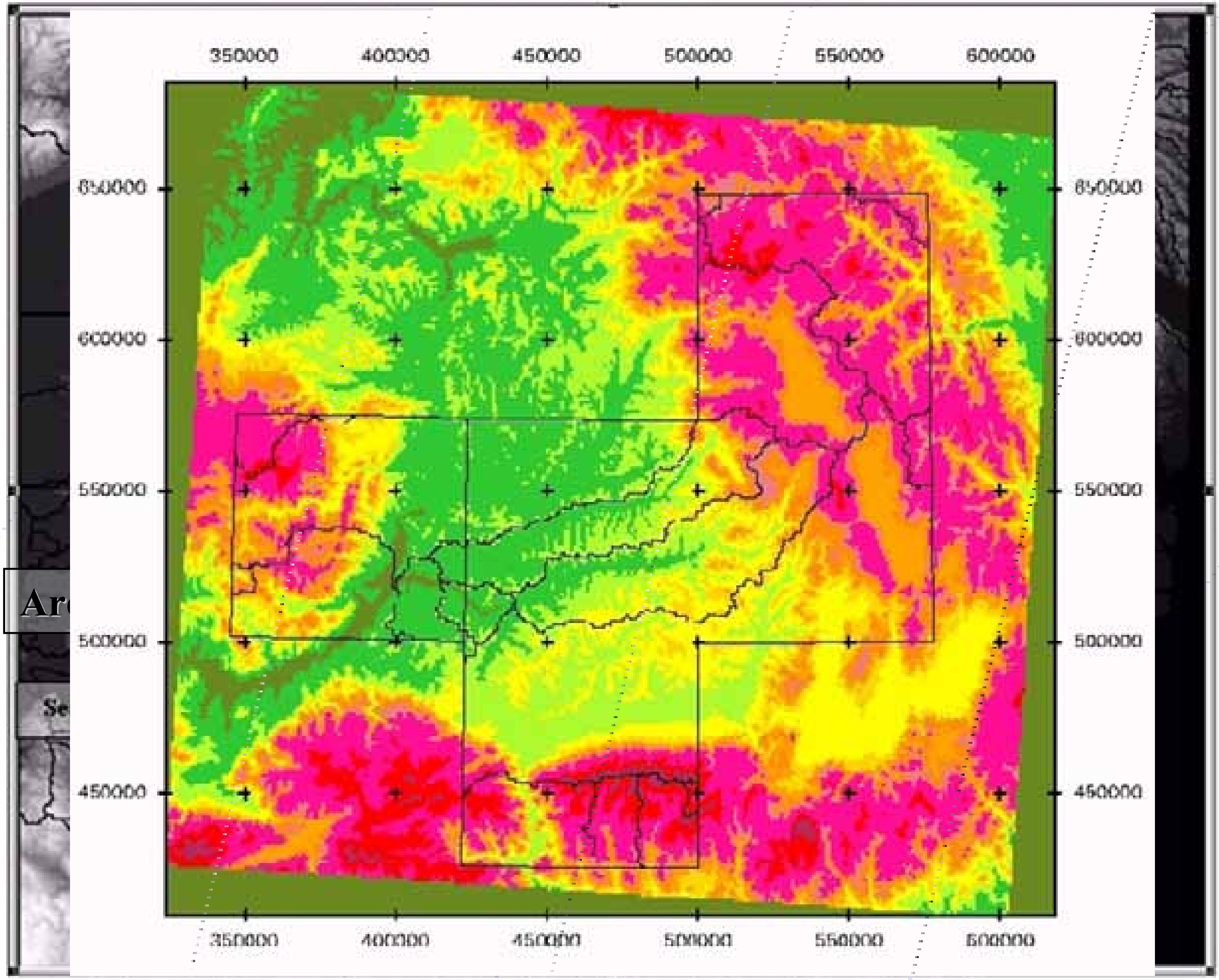
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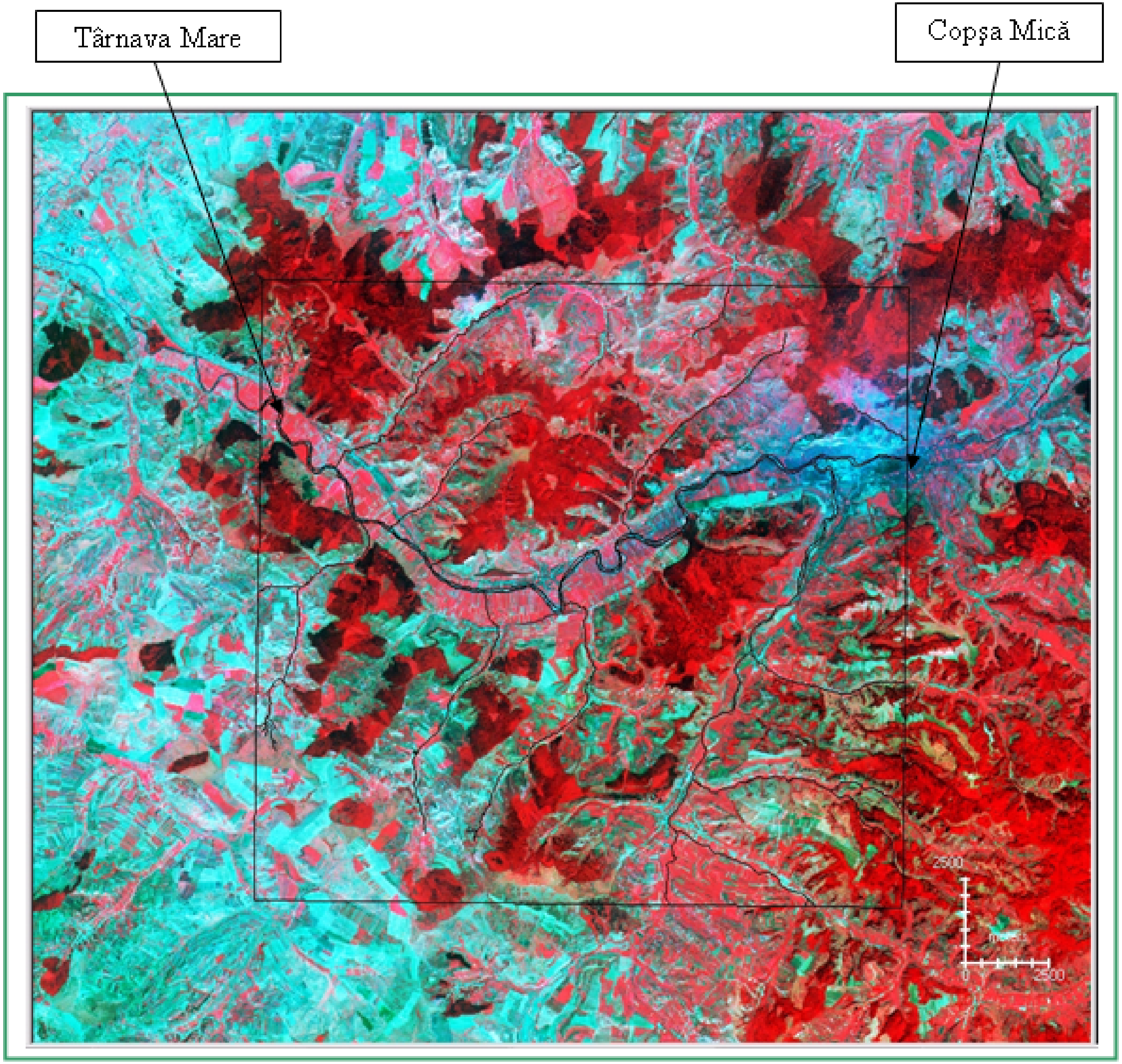
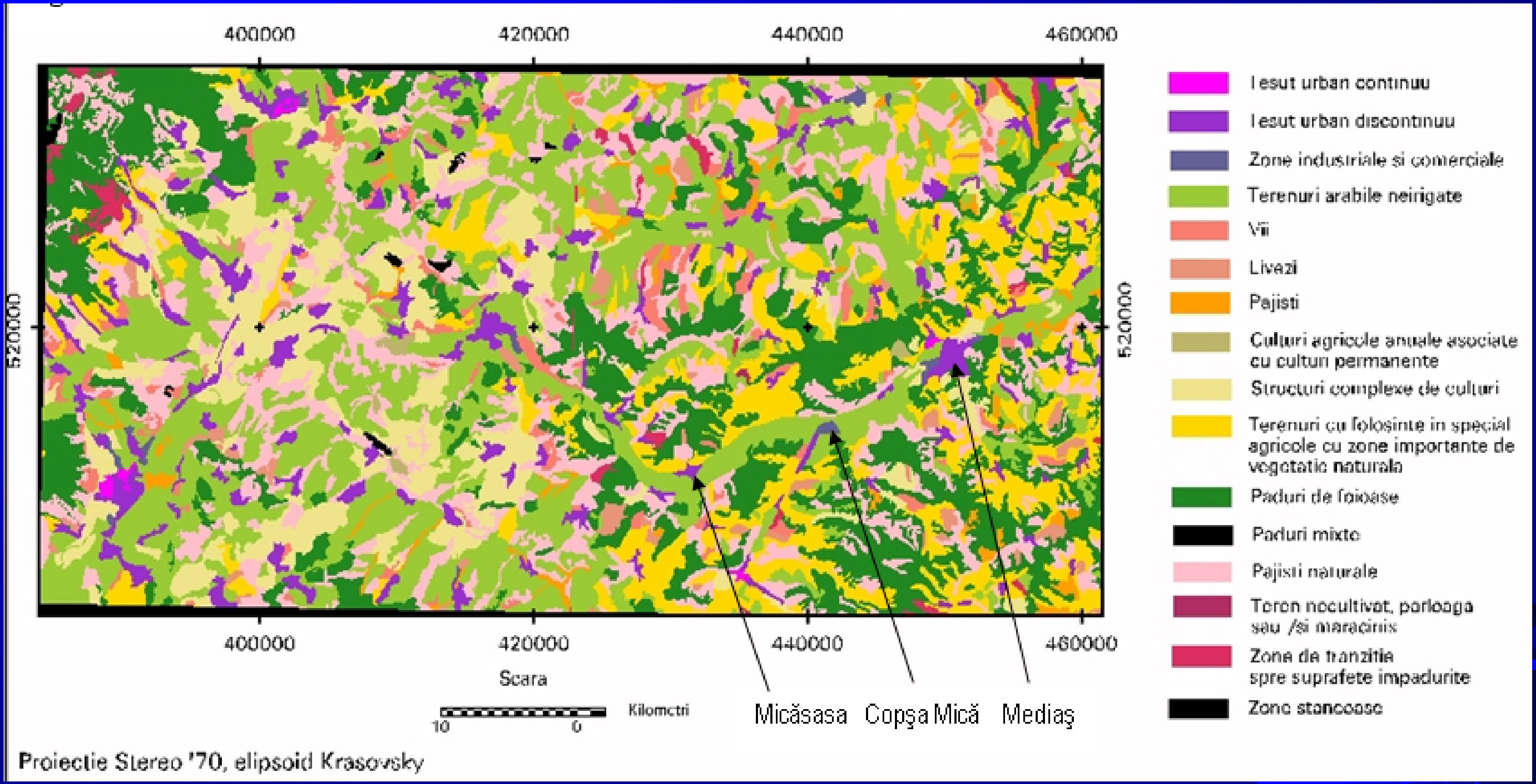


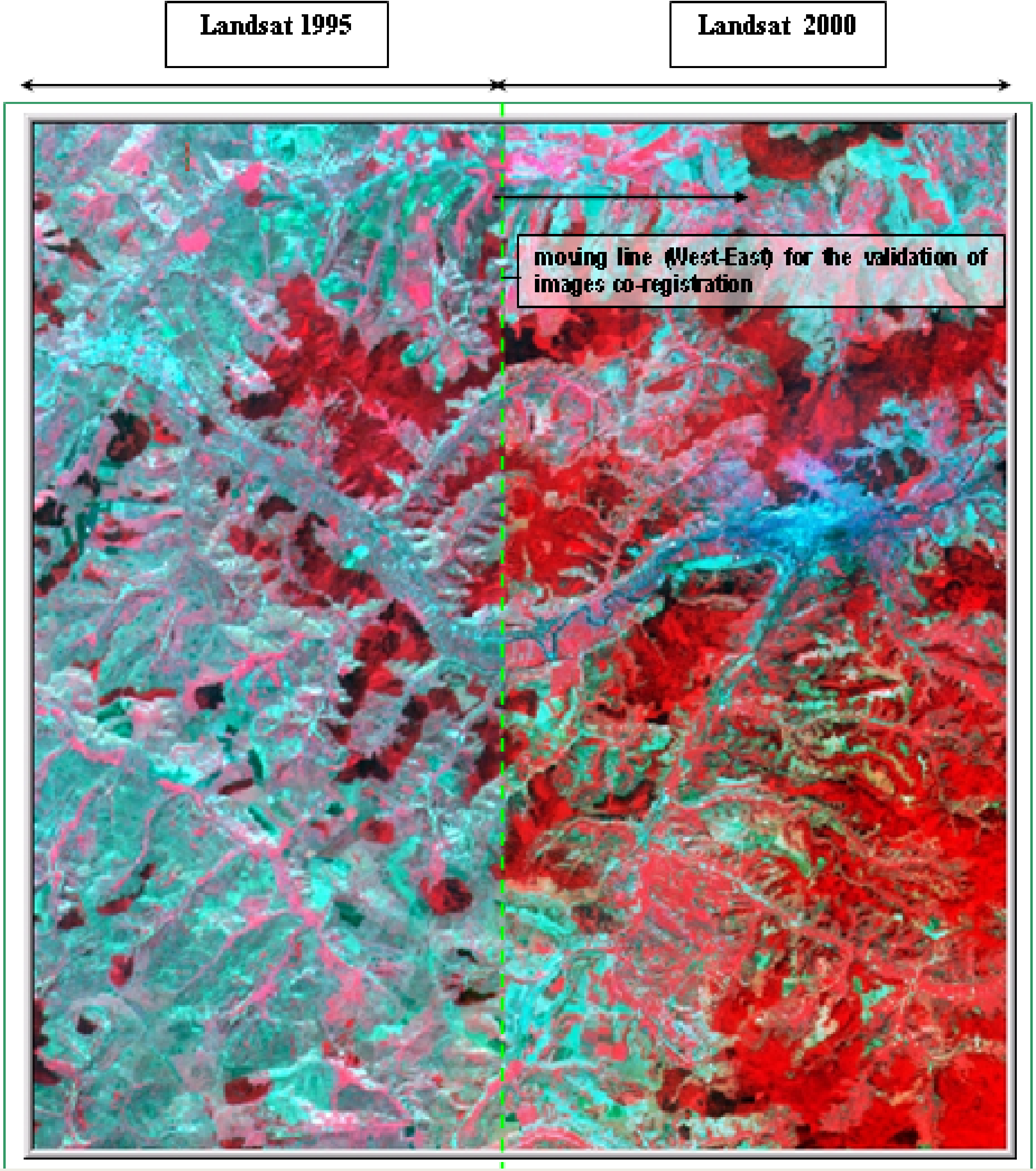
Generation of LC by satelllite image photointerpretation

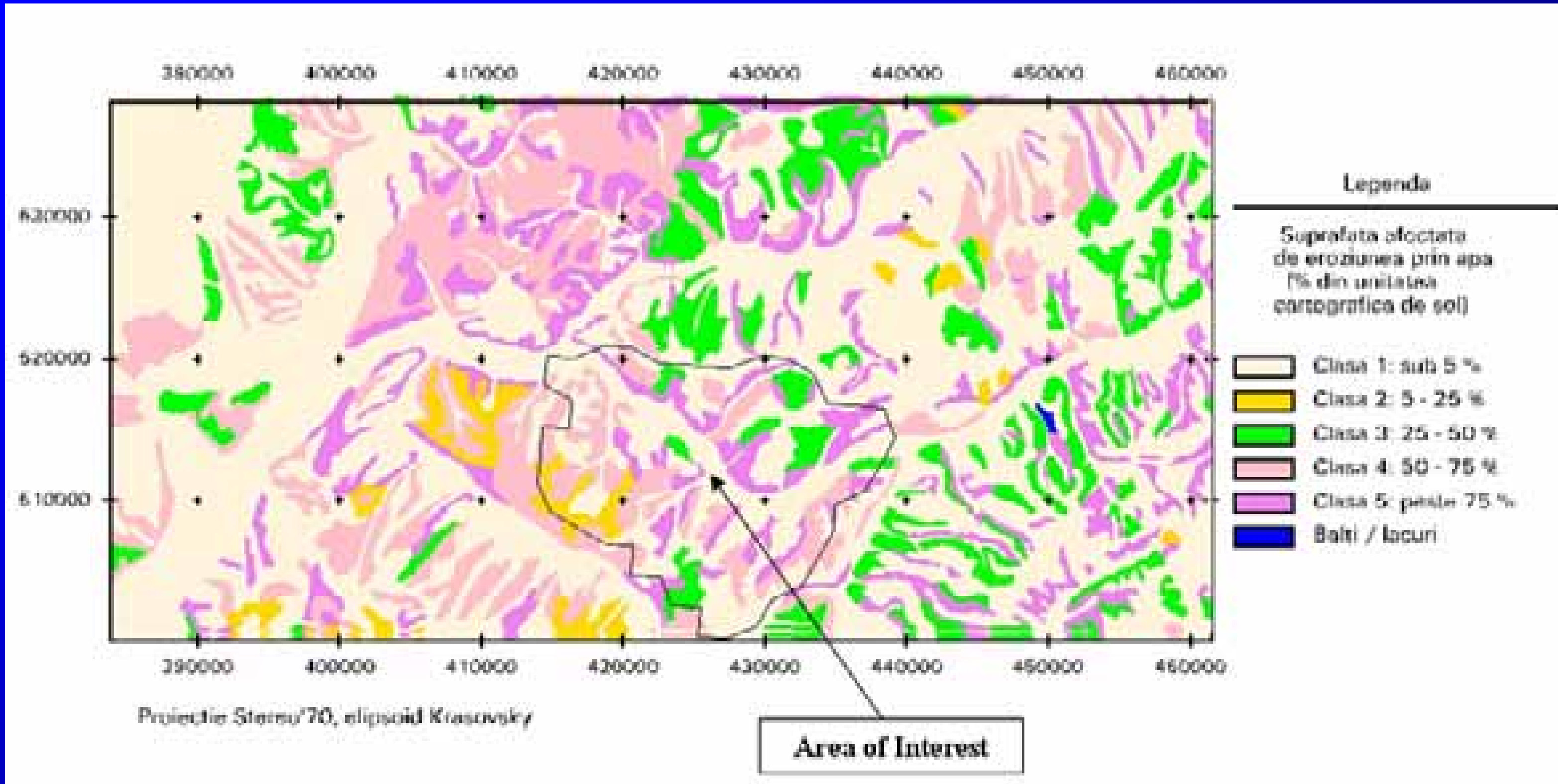
1. Validation of the Landsat TM image orthorectification (based on hydro-graphic cover 1:25,000)

2. Land Cover (according CORINE classification)



3. Validation of the Landsat images co-registration (for LC changes)





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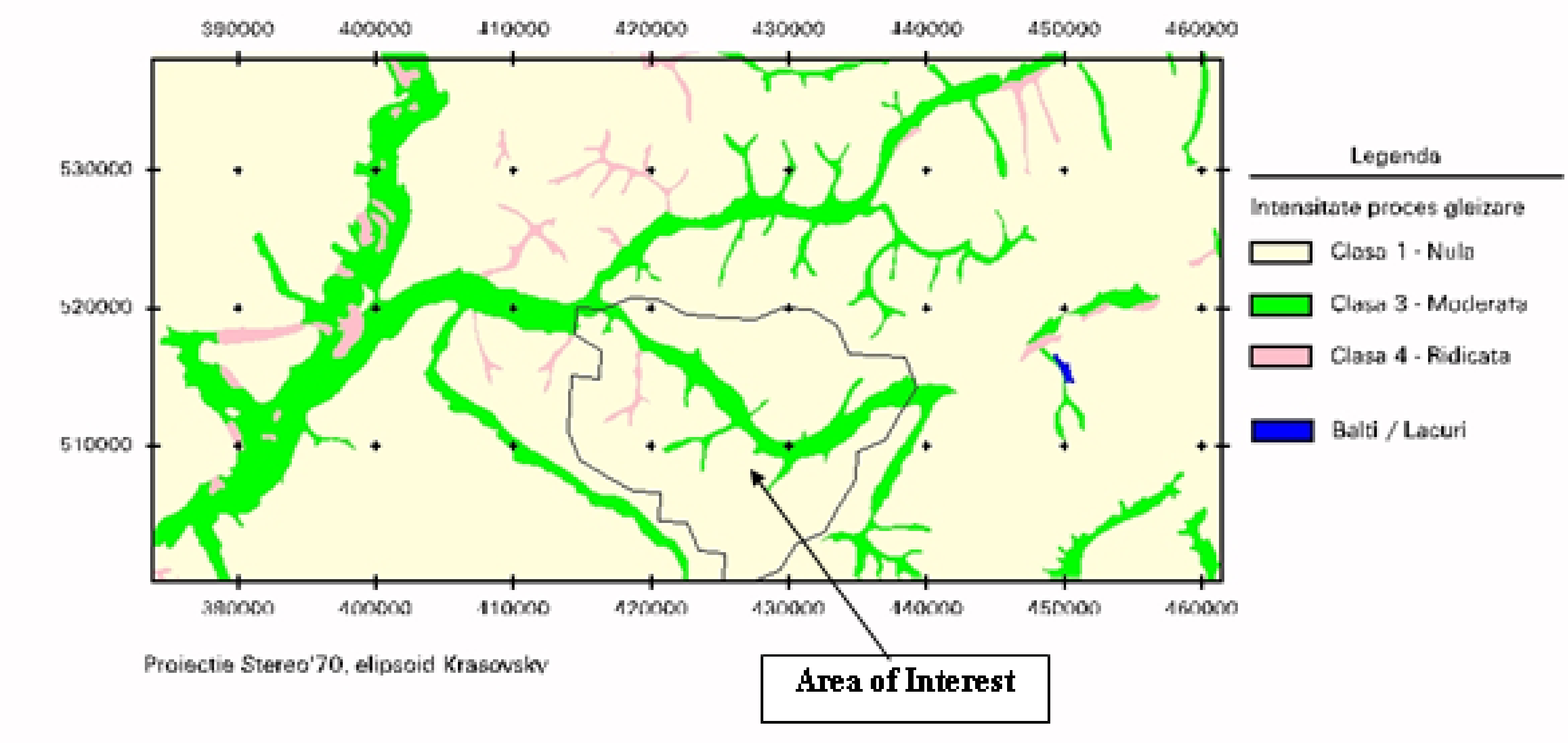

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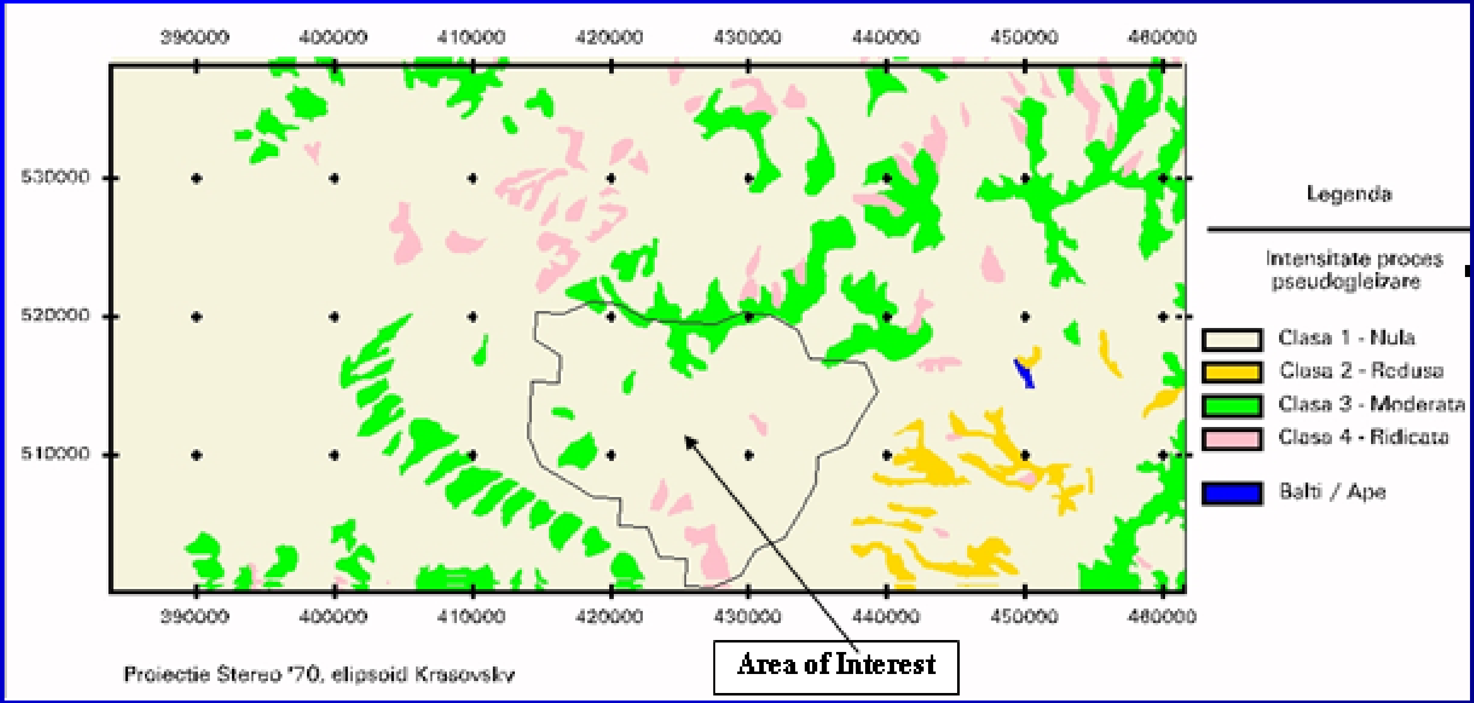

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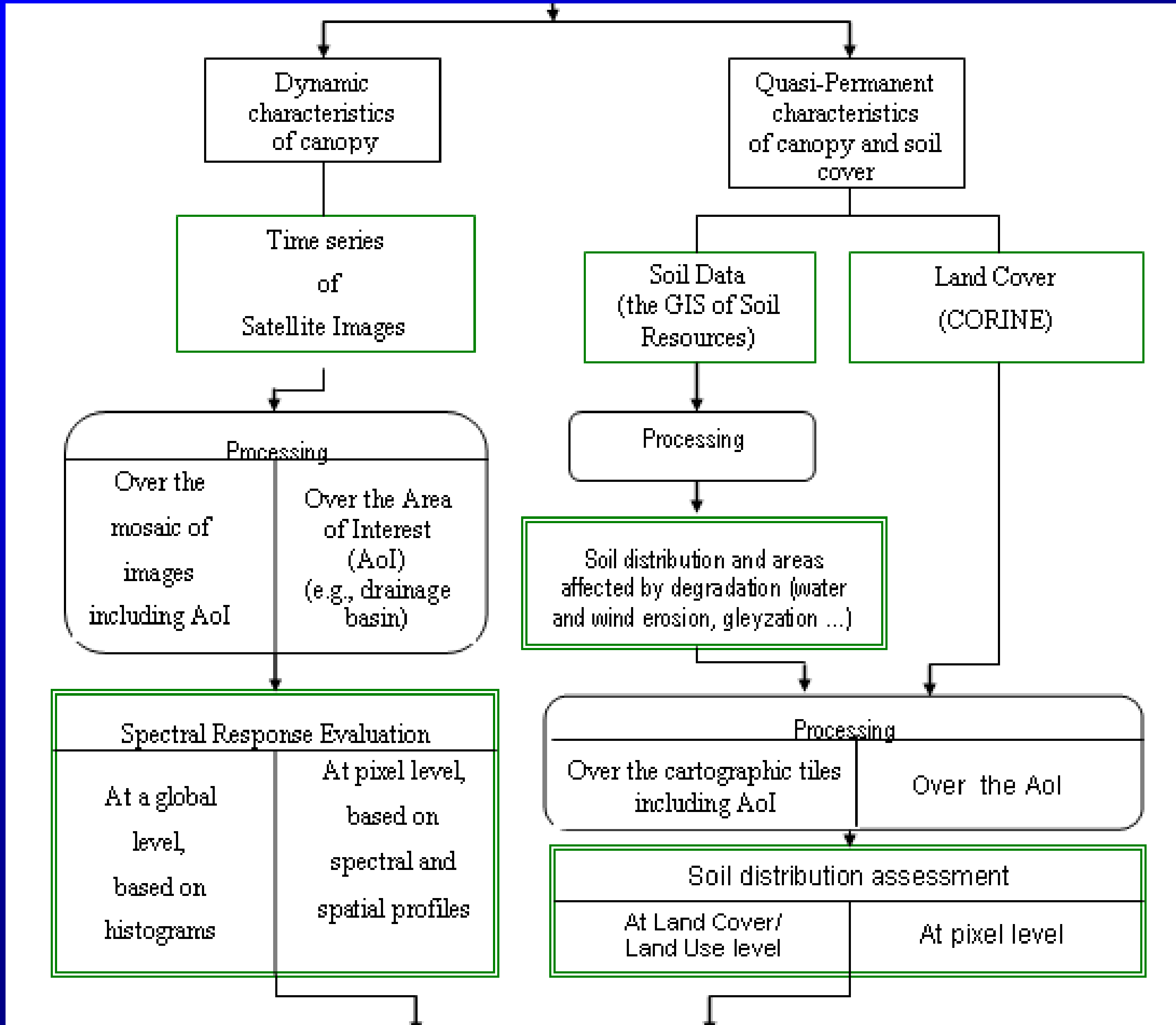

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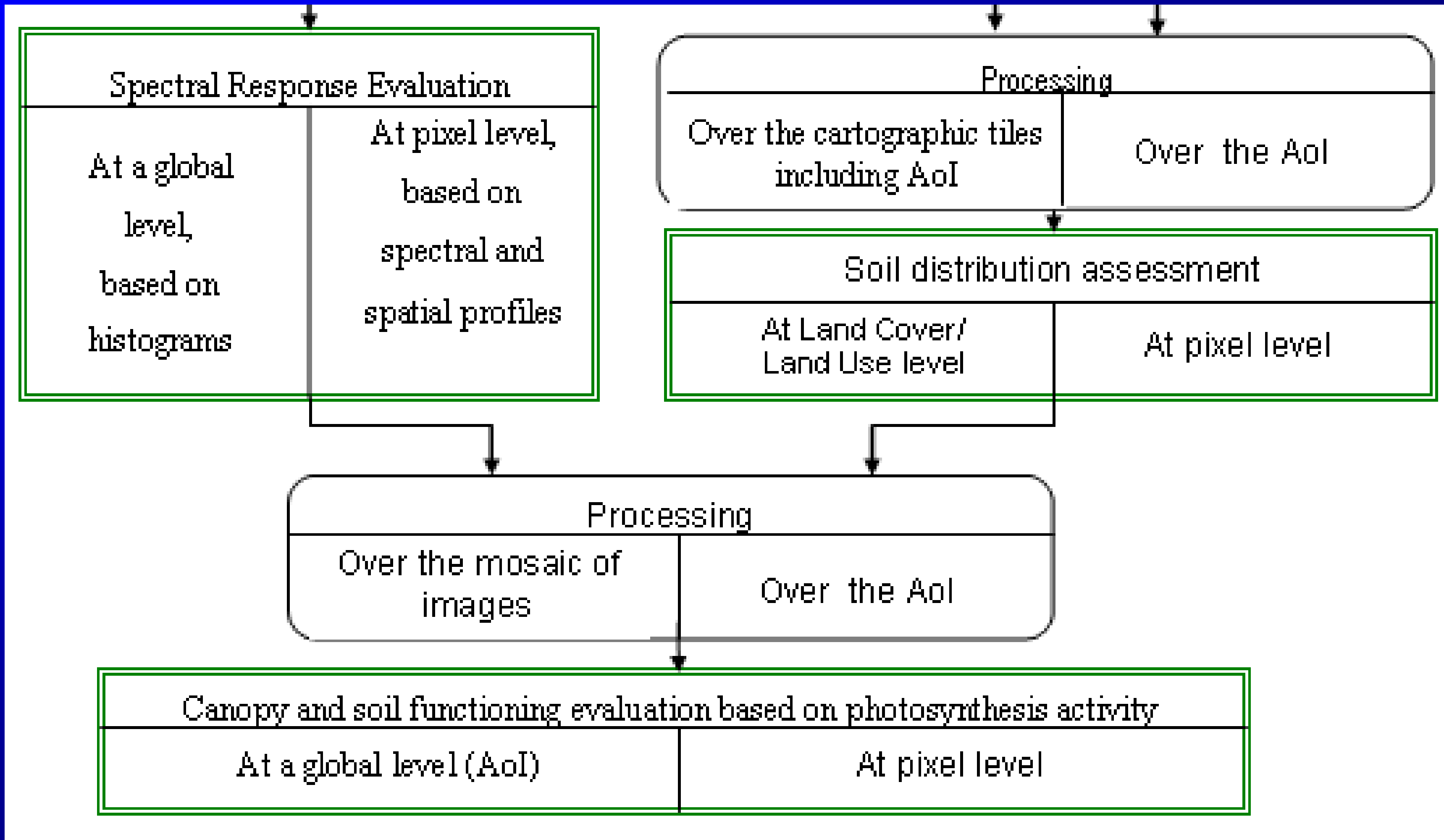

Thank you for your attention !