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Using geostatistical methods in the study of territorial systems

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Core Concepts

Concept	Ecology	Geography
System	Ecological	Territorial
Components	Structure, functions	Components, processes
Hierarchy of systems	Ecosystem–complex of ecosystems (landscape) – ecosphere	Theory of fractals– systems replicated at different scales
Dynamics	Succession vs. adaptive cycles	Territorial dynamics: urbani-zation – peri- & suburbani-zation–gentrification; spiral
Objective of dynamics	Natural: maximize energy entry	Satisfy human needs
Collapse	Carrying capacity	Natural resources/eco-energy
Key properties of systems	Historical, integral, non-linear, fractal geometry, information, self-regula-tion, diverse, dynamic, anti-entropic behavior, regeneration, programs	Complex, integral, open (thermodynamic and informational), resistant to change, coherent, synergism, dissipative, variable geometry, global

Correspondence of system hierarchies

Ecological	Territorial	Socio-spatial (NUTS)	Diversity
Components of ecosystem	Micro- and nanostructures	-	α, ω
Ecosystem	Geosystem, geo-facies, geotope	V	α, ω
Regional complex of ecosystems	Natural region, geographical region, regional system	III	β, γ, ω
Macro-regional complex of ecosystems	Domain, zone, national system, supra-national system, contin-ental system	II, national territory, continent	γ, δ, ε, ω
Ecosphere	Planetary system	Globe	

Current methods and instruments used to analyze territorial systems

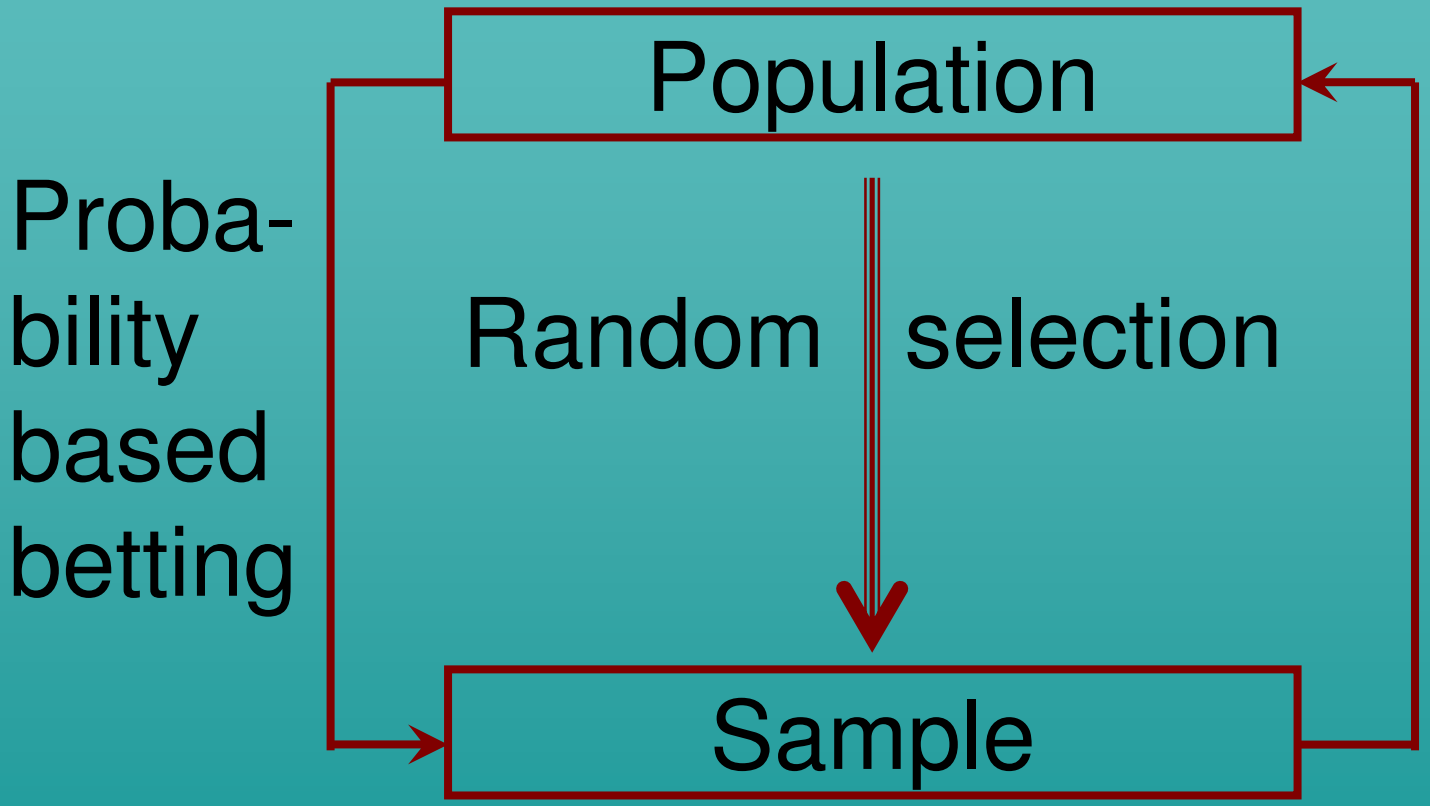
- Instruments
  - Field studies
  - Mapping
  - Multi-scale analysis
- Methods
  - Description
  - Typology
  - Way-finding choremes
  - Tegeo (***t***h***e***ory of ***geo***graphy)
  - Organizational analysis
  - Logical Framework Approach
  - SWOT Analysis

- Characteristics
  - Subjective (even when quantitative)
  - Qualitative – do not allow for comparisons
  - Do not allow for estimating the uncertainty especially when predicting the behavior

Lies, damn lies, and... statistics

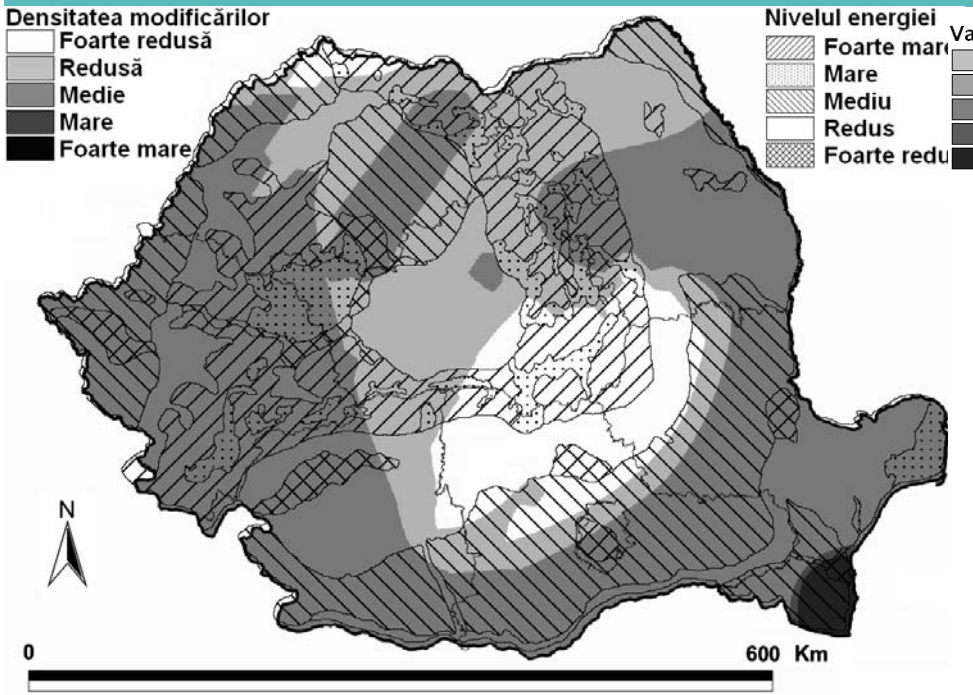
- What does "statistics" mean?
  - **Fundamental <u>science</u>** (many place here mathematical statistics, governing its applied branches) or **applied** (clinical statistics, biostatistics – understood as statistics applied to biology, but also in medical sciences, environmental statistics, economic statistics, social statistics etc.); the second category includes statistics seen as a way of reasoning and instrument.
  - **<u>Activity</u>** of applying statistical tools to collect, process and valorize the results of data analysis.
  - **<u>Result</u>** of the activity of applying statistical methods (graphic or numeric synthesis), or final results of simple classifications (understood here as identifying and assigning entities to already defined categories), *i.e.*, counts.

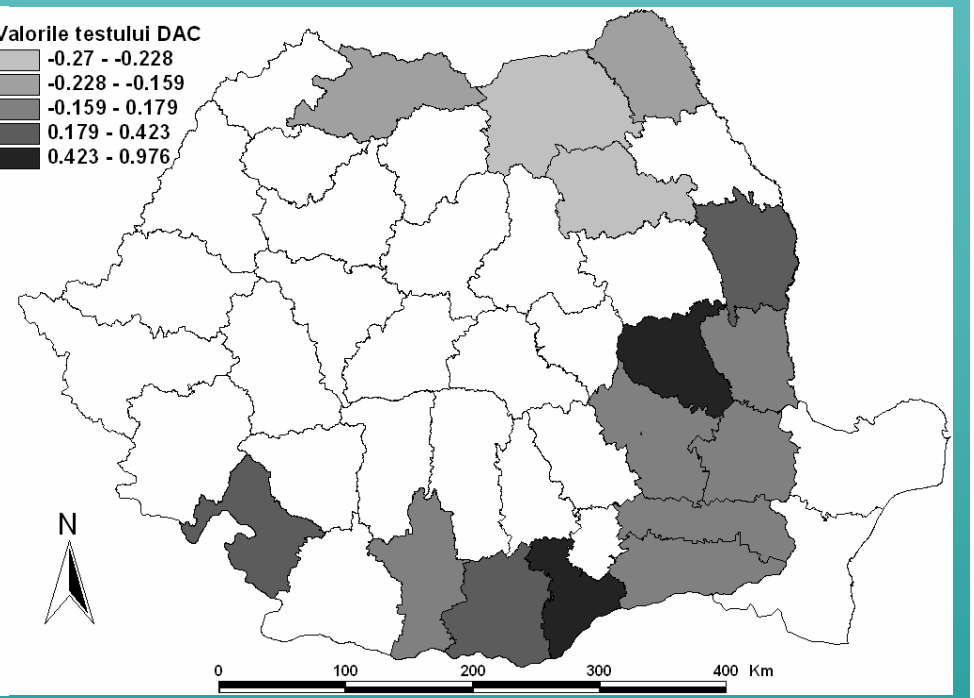
The essentials of statistics



- Statistics allow for generalizing the results by measuring the uncertainty and comparing the results obtained by different studies

Six case studies

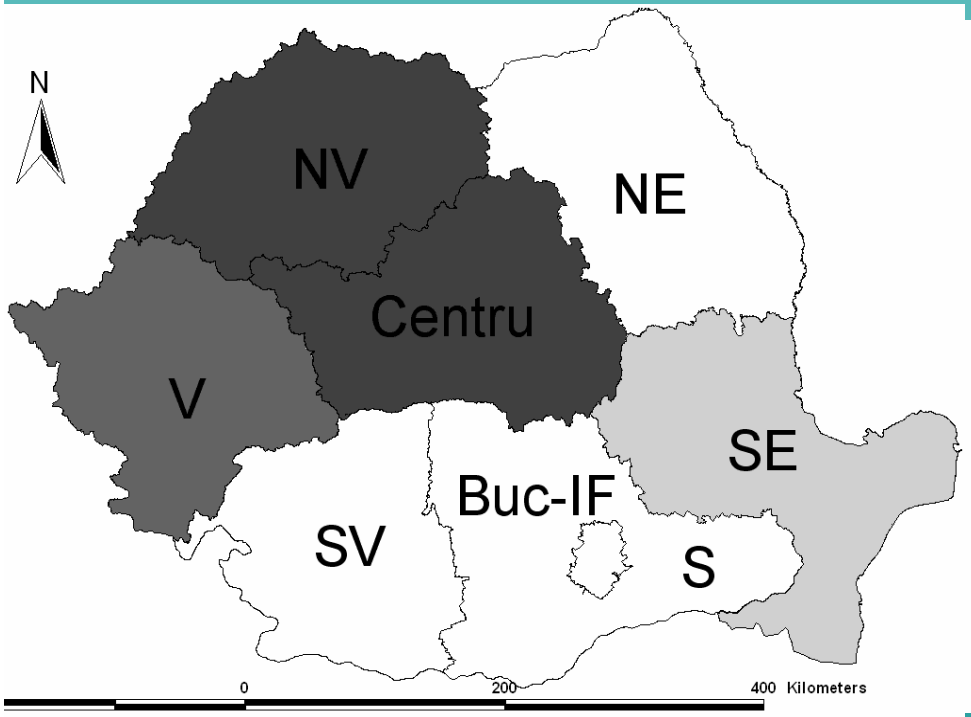


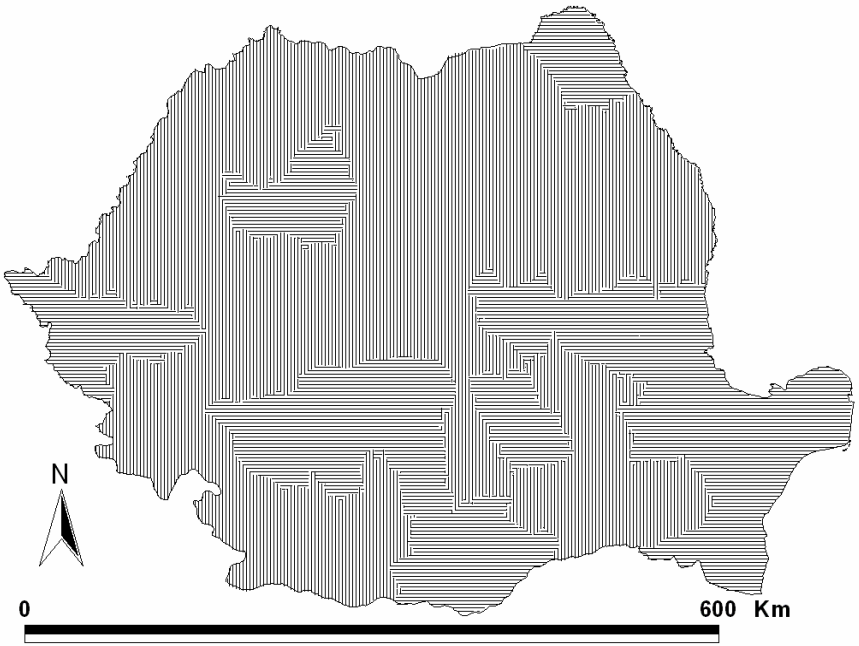


Urban restructuring & land use changes

Underdeveloped areas & the DAC test

Six case studies

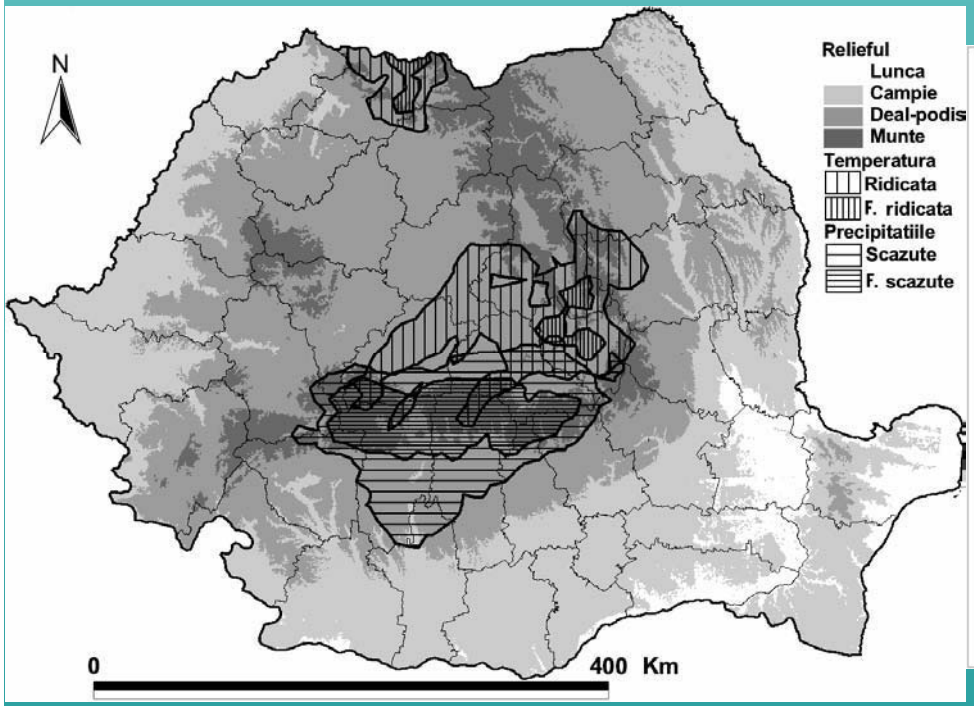




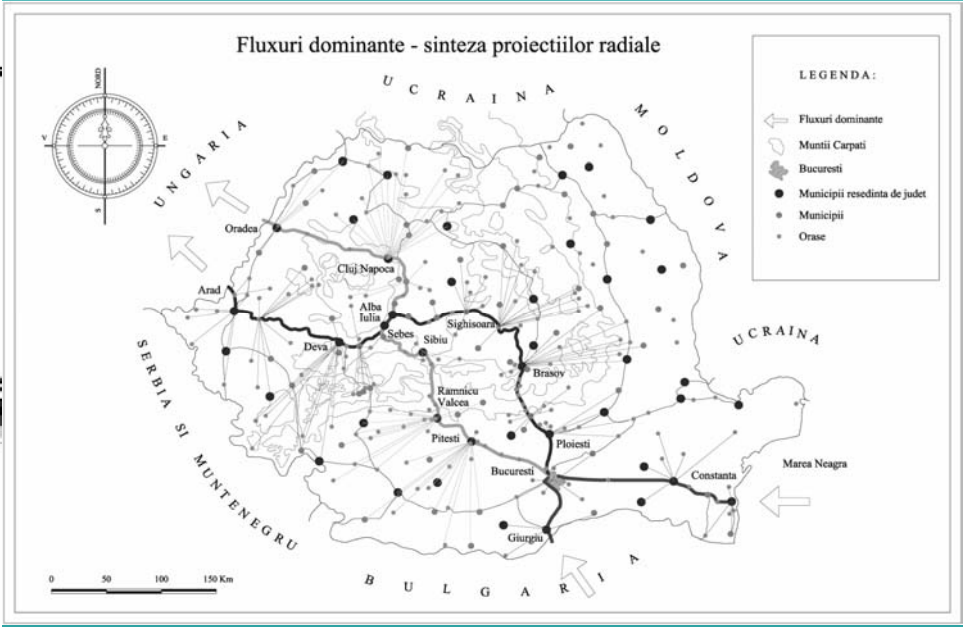
Distribution of ethnic diversity

Orientation of railroads and accessibility

Six case studies

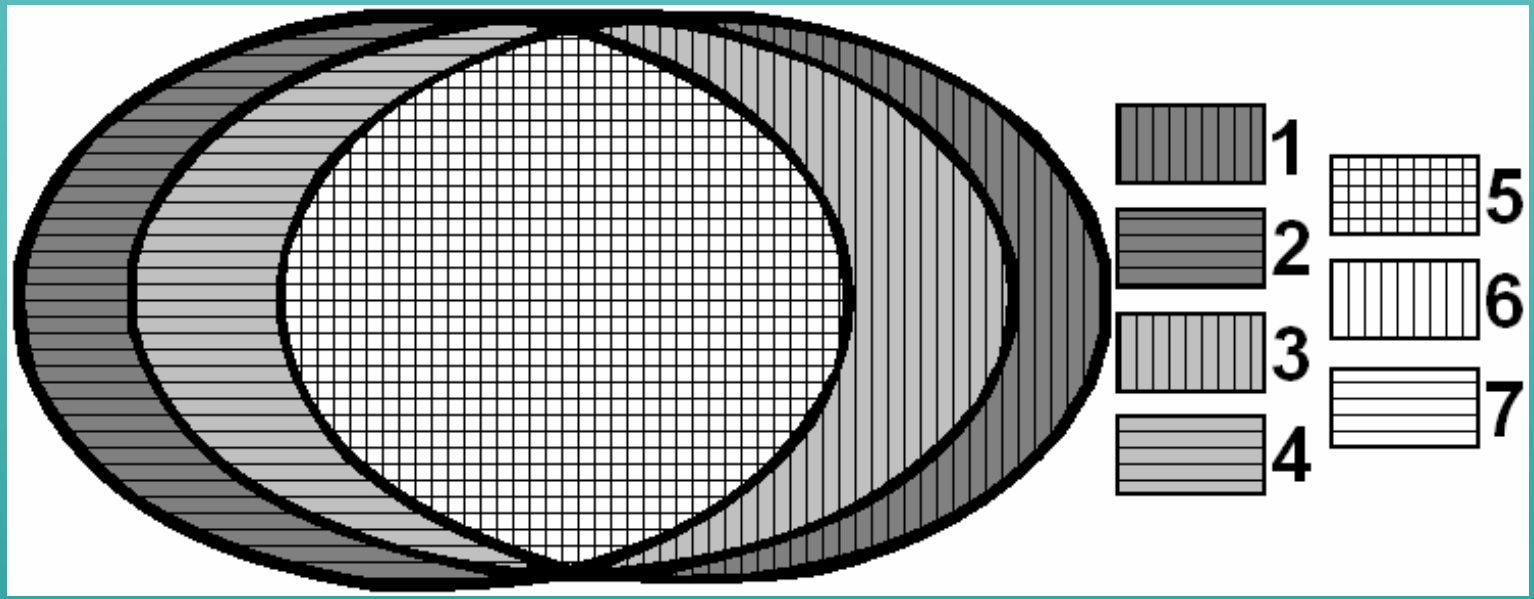


Prediction of clime change hotspots

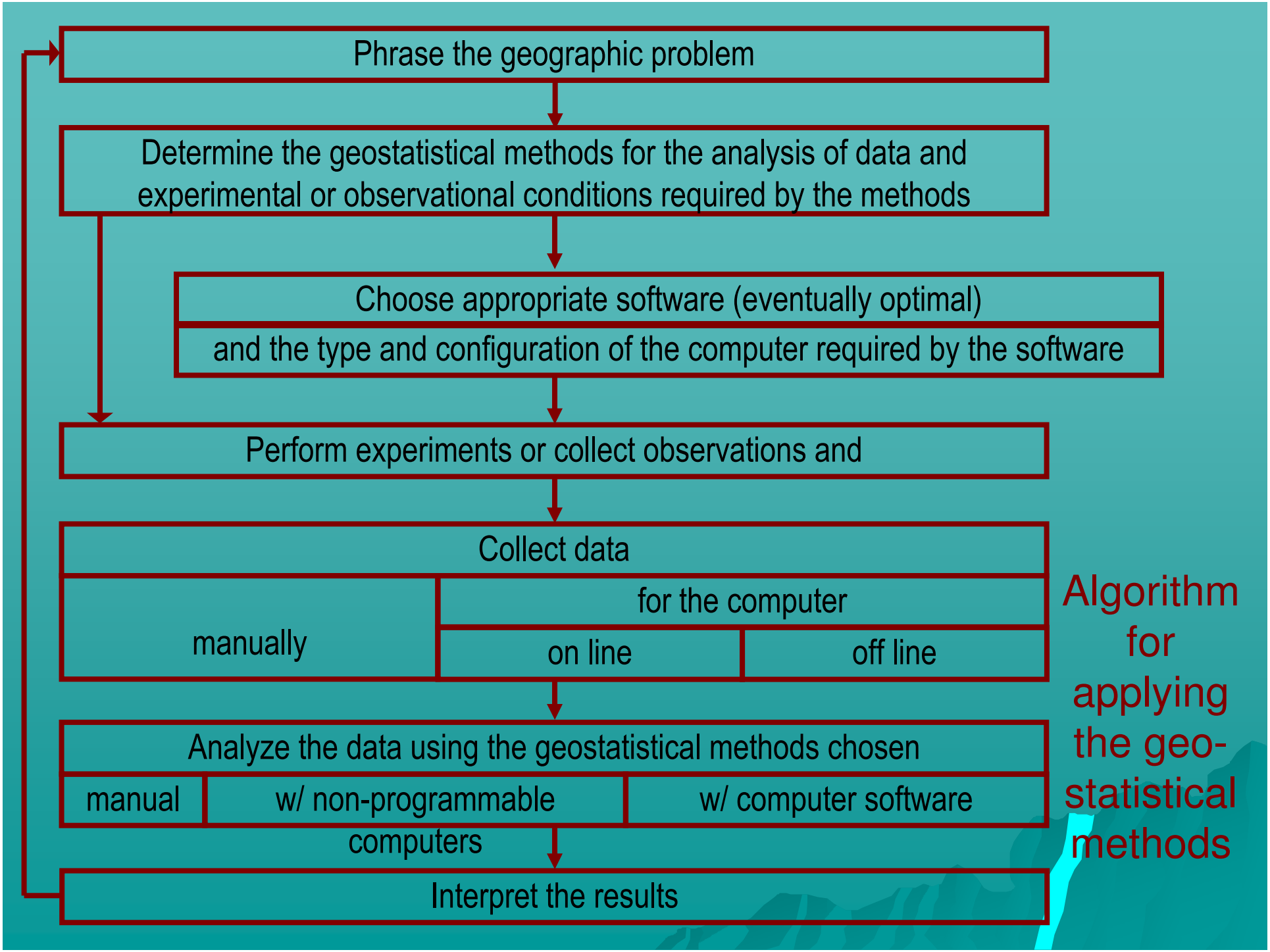


Potential acces-sibility and the national security corridor

Crossing the border between statistics and geography



- Hierarchy of geographic, statistical and geostatistical methods: (1) "pure" statistical and mathematical methods; (2) purely geographical methods; (3) very abstract geostatistical methods, belonging more to the statistical and mathematical domain; (4) less abstract geostatistical methods, more characteristic to geography; (5) geostatistical methods situated at the confluence between geography and statistical and mathematical disciplines – domain of interference; (6) statistical and mathematical methods; (7) geographical methods


Phrase the geographic problem
Determine the geostatistical methods for the analysis of data and experimental or observational conditions required by the methods
Choose appropriate software (eventually optimal)
and the type and configuration of the computer required by the software
Perform experiments or collect observations and
Collect data
manually
for the computer
on line
off line
Analyze the data using the geostatistical methods chosen
manual
w/ non-programmable computers
w/ computer software
Interpret the results
Algorithm for applying the geo-statistical methods

Conclusion

- The transfer of statistical methods from ecology to human geography is possible and beneficial for the objective in-depth knowledge of territorial systems.

Thank you for your attention.

Any questions are welcome.