



# ■ Geostatistics and RGeostats

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## o Principles (1/2)

### ➤ Basic principles of Geostatistics:

- Statistics & Spatial characteristics:
  - Experimental variogram
  - Variogram model
- Estimation:
  - Various interpolations
  - Kriging (Simple vs. Ordinary)
- Multivariate framework
  - Scatter plots, joint spatial characteristic, simple and cross-variograms
  - Joint estimations: Cokriging
  - Extensions: Collocated Cokriging, External Drift
- Simulations
  - Continuous variables (Turning bands method)
  - Conditioning to information
  - Categorical variables (PluriGaussian)

## o Principles (2/2)

### ➤ RGeostats

- Introduction to RGeostats:
  - Download
  - License
  - Basic concepts
- Exercise: RGeostats is used as a pocket calculator for basic
- Demonstrations:
  - Provided data sets
  - Main scripts are described extensively
  - Auxiliary scripts are provided for training

### ➤ More extensive courses in Geostatistics are available:

- *Automnales* (in French): October 6<sup>th</sup> to 24<sup>th</sup> 2014 in Fontainebleau
- *C.F.S.G.* (in English) : ten months from September 8<sup>th</sup>,2014 to July 10<sup>th</sup>,2015
- *Mining professional training* (during academic year in English)

More information from: [nathalie.dietrich@mines-paristech.fr](mailto:nathalie.dietrich@mines-paristech.fr)

## o History

- First steps in South Africa in 1950 with Dr. Danie Krige (gold mining)
- Work of Lev Gandin in meteorology (1965)
- 1965: Georges Matheron (and Philippe Formery) write “La théorie des variables régionalisées” Ecole des Mines de Paris
- 1968: Centre de Géostatistique et de Morphologie Mathématique” in Fontainebleau
  
- Domains of application:
  - Topography, Geology, Soil Science, Mining, Petroleum
  - Forestry, Fishing, Agronomy
  - Geophysics
  - Biology, Epidemiology, Health, Ecology
  - Any discipline with spatial data...

## o Aims of Geostatistics

- Describe the spatial characteristics of the variable: classification, spatial correlation
- Estimation, interpolation
- Simulations: possible alternative to estimation / interpolation
- Appraisal of uncertainty
- Risk assessment

## o History

- Created in Centre de Geostatistics
- Initiated for Fish Industry within a European: GEFA project (2001)
- Named RGeoS and expanded possibilities:
  - Based on a separate commercial library Geoslib (written in C)
  - Mapping its functions in R language (using Rcpp layer)
- Renamed into RGeostats in 2014

## o Principles

- RGeostats is used as a development platform for testing new methodologies
- Can be used for teaching and for non-commercial purposes
- Download from:

*rgeostats.free.fr*

- Use demonstration scripts
- Must establish a per-machine license generated automatically on the download platform
- Register to the forum for posting questions, asking for help and benefiting from users experiences