

USE OF TRANSGAUSSIAN KRIGGING FOR SOIL AND WATER GEOCHEMICAL MAPPING IN AN AGRICULTURAL CATCHMENT SOUTH PORTUGAL

Yevenes Mariela
International Institute for Geoinformation Science and Earth Observation
yevenesburgos@itc.nl
Holanda

Many countries nowadays, are implementing geochemical databases with the aim to produce high quality geochemical maps as a tool for environmental assessment in land-use change impact assessment, as a support for policy makers and regulatory decisions.

Geochemical mapping can be conducted at widely varying scales in order to document natural and human-induced geochemical variations in media such as soils, stream sediments, vegetation, ground water and surface water.

The objective of this study is to produce high quality geochemical maps from surface water and groundwater sources (wells) in a small agricultural catchment in South Portugal to understand geochemical variability of nutrients of this area.

The study area of this research is the Pisos catchment, an agricultural zone in the Alentejo region, South Portugal. The total sampled area covered 19 km², 38 surface water and 23 well samples. The spatial distribution of nutrients was studied by using the trans-gaussian krigging.

Log-transformation was applied to achieve approximate normality (symmetry) of data sets prior to geostatistical analyses. Variogram surfaces were produced to identify the anisotropic feature of variograms. Nutrients (NO₂, NO₃, NH₄, PO₄ and SO₄) concentrations in surface water ranged from 0 to 1.38 mg/L, 0 to 103 mg/L, 0.02 to 58 mg/L, 0.01 to 10.7 mg/L and 39-126 mg/L, respectively. Nutrients in wells (NO₂, NO₃, NH₄, PO₄ and SO₄) ranged from 0.01 to 0.89 mg/L, 18-54 mg/L, 0 to 0.26 mg/L, 0.03 to 0.35 mg/L and 28 to 78 mg/L, respectively.

The total area characterized by NO₃ concentrations over 50 mg/L was estimated to be 35% of the total by interpolation method and a spatial pattern showing a NO₃ concentration decrease as increasing distance from sewage Treatment Plant. Finally, geochemical maps were created using ArcGIS 9.2.

Spatial trends are more evident when the kriging geostatistical method is used, producing a smooth interpolated surface over the total study area. Finally the spatial distribution patterns for available nutrients (NO₂, NO₃, NH₄, PO₄ and SO₄) appeared to be most affected by agricultural activities.