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Planning a geostatistical survey for mapping soil micronutrients: eliciting sampling densities

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When planning a geochemical survey, it is necessary to make decisions about the sampling density. Sampling density determines both the quality of predictions and the cost of field work. In geostatistical surveys, the relationship between sampling density and map quality, as measured by the kriging variance (mean square error of the prediction) can be computed. When the variogram is known, then the kriging variance at an unsampled site depends only on the spatial distribution of sampling points around that site. It is therefore possible to find the sample density such that the kriging variance is limited to acceptable values. However, the implications of kriging variances are not always straightforward for decision makers or sponsors of survey to understand. Here we present an alternative method to help end-users assess the implications of uncertainty in spatial prediction in so far as this is controlled by sampling. It is called the offset correlation and is a measure of how far the mapped spatial variation depends on the positioning of a requlr square sampling grid. The offset correlation increases as the uncertainty in the map, attributable to sample density, decreases. It is bounded on the interval [0,1], which makes it intuitively easy to interpret as an uncertainty measure. In this presentation we shall explain the offset correlation concept, illustrate it with some test cases, and provide session participants with an opportunity to join an elicitation of sampling density for a hypothetical survey of soil micronutrient status.

The offset correlation is an intuitive measure of the precision of a geostatistical mapping process because people can more easily grasp bounded measures like a correlation than unbounded ones like a variance.