Background Estimation

Background concentrations are typically first explored by plotting data values on a map that also includes historical land use and geological features that have contributed to soil genesis or groundwater character. A simple visual presentation of the data may identify areas of low concentration, as well as areas of high concentration (hot spots). EDA may be used to examine a data set to determine if it is consistent with the expected background levels. Box plots, histograms, and normal probability plots (see GSMC-1, Section 5.1) may provide objective standards against which may be used to identify extreme values or areas that may be tentatively identified as consistent with background due to low or consistent variability.

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Simple geospatial methods can be used to create interpolated concentration grids to quantify metrics such as average concentration in an area. More complex methods such as regression can be used to create interpolated maps and can also be used to statistically evaluate sample points that are greater or lesser than standards such as confidence limits.

Advanced methods such as kriging involve fitting a model of spatial correlation to the data. If more than one spatial correlation scale is included in the model, factorial kriging can be used to reduce the total spatial correlation into different components, related to the scale over which a contaminant concentration varies. By examining the data on different scales, short-range variability from contamination can be distinguished from long-range variability related to background. The short-range variability may be contributed to by contamination or insignificant differences between short and long-range variability. The factorial kriging process can identify a data set as consistent with background (Goovaerts 1997).