

Data Quality Explorations Using Duplicate Measurements

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Environmental measurements are subject to uncontrolled natural variations that are difficult to reproduce in the laboratory. Collocated measurements are the most direct and comprehensive approach to characterizing measurement quality because the observed differences reflect the actual measurement performance under the natural environmental variability. Collocated data have been used extensively to estimate measurement precision, but these rich data sets can be used to explore several additional data characteristics. This presentation uses collocated measurements from the Interagency Monitoring of PROtected Visual Environments (IMPROVE) network to explore relationships between measurement precision and concentration, the existing model of precision, measurement distributions, detection limits, and relationships among measurement errors in different species. Figures 1 and 2 illustrate a few of these features.

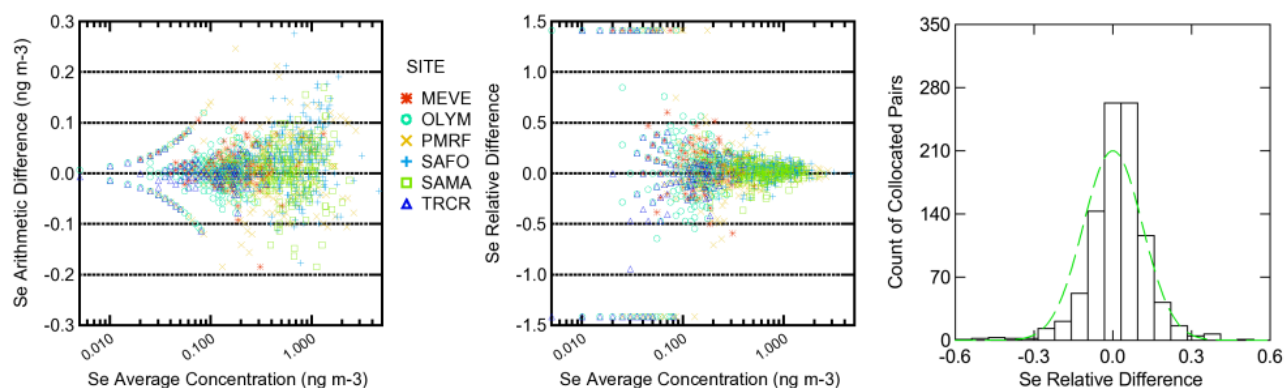


Figure 1. Differences between collocated measurements of selenium at several sites in the IMPROVE network.

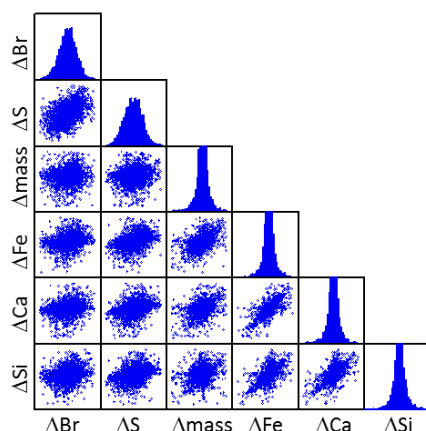


Figure 2. Scatterplot matrix of observed differences, Δx , between the collocated measurements, where $x = Br, S, mass, Fe, Ca,$ and Si . Along the diagonal are histograms of the observed differences for each species. Off the diagonal are scatterplots of the observed differences in one species versus the observed differences for another species. For example a point in the lower left graph represents the observed difference in duplicate Si measurements versus the observed difference in the duplicate Br measurements from a single day.