Applications of the Sampling Uncertainty (SU)

Bo Svensmark
Department of Plant and Environmental Sciences, University of Copenhagen, Faculty of Science, Thorvaldsensvej 40, DK-1871, Frederiksberg C, Denmark, E-mail: svensmark@plen.ku.dk

The Sampling Uncertainty (SU) recently proposed allows the estimation of the sampling uncertainty including the Grouping and Segregation Error (GSE), the Fundamental Sampling Error (FSE) or the Fundamental Sampling Uncertainty (FSU) and the long range sampling errors for 1-dimensional sampling. SU is calculated from the spatial distribution of the analyte in a manner similar to cyclic convolution. For 1-dimensional sampling SU is shown to be better than variogram integration in case of cyclic or non-stationary variations and by being independent of the nugget effect when the nugget effect is close to zero. Three cases will be treated in detail: The problems with a low nugget effect, the effect of autocorrelation on 1-dimensional sampling and the effect of cyclic variations. For the effect of cyclic variations discrete Fourier transform (DFT) analysis is included to explain the findings and to filter the data. Finally, it is shown that DFT and SU give similar results for the cyclic pattern in the data when SU is calculated for a sampling ratio mass(lot)/mass(sample) = 2. Even though SU itself can estimate the sampling uncertainty correctly, it is proposed always to include a variographic analysis and a DFT analysis to characterize the spatial heterogeneity of the data.

ORCID iDs

Bo Svensmark: https://orcid.org/0000-0003-0430-6181

References

1. Bo Svensmark, *Extensions to the Theory of Sampling 2. The Sampling Uncertainty (SU), and SU as alternative to variographic analysis*, Proceedings of the 10th World Conference of Sampling and Blending…
2. B. Svensmark, *Extensions to the Theory of Sampling 1. The extended Gy's formula, the segregation paradox and the fundamental sampling uncertainty (FSU)*, Analytica Chimica Acta **1187,** 339127 (2021). https://doi.org/10.1016/j.aca.2021.339127
3. R.Heikka) and P. Minkkinen, *Integration of the variogram using spline functions for sampling error estimation*, Chemometrics and Intelligent Laboratory Systems **44,** 205–211 (1998). https://doi.org/10.1016/S0169-7439(98)00187-7
4. B. Svensmark, *Toolbox for analytical chemistry*, www.bosvensmark.dk

doi: https://doi.org/10.1255/tosf.178