Publicacions més rellevants de la línia de recerca:

Geoestadística composicional: dades amb dependència espacial

Referència: Pawlowsky-Glahn, V., Tolosana-Delgado, R. and Egozcue, J.J. Scale effect in hazard assessment - application to daily rainfall. *Advances in Geosciences*, **2** (2005), pp. 117–121.

Abstract: Daily precipitation is recorded as the total amount of water collected by a rain-gauge in 24 h. Events are modelled as a Poisson process and the 24 h precipitation by a Generalized Pareto Distribution (GPD) of excesses. Hazard assessment is complete when estimates of the Poisson rate and the distribution parameters, together with a measure of their uncertainty, are obtained. The shape parameter of the GPD determines the support of the variable: Weibull domain of attraction (DA) corresponds to finite support variables, as should be for natural phenomena. However, Fréchet DA has been reported for daily precipitation, which implies an infinite support and a heavy-tailed distribution. We use the fact that a log-scale is better suited to the type of variable analyzed to overcome this inconsistency, thus showing that using the appropriate natural scale can be extremely important for proper hazard assessment. The approach is illustrated with precipitation data from the Eastern coast of the Iberian Peninsula affected by severe convective precipitation. The estimation is carried out by using Bayesian techniques.

Referència: Tolosana-Delgado, R. and Pawlowsky-Glahn, V. Kriging Regionalized Positive Variables Revisited: Sample Space and Scale Considerations. *Mathematical Geology*, **39(6)** (2007), pp. 529–558.

Abstract: Frequently, regionalized positive variables are treated by preliminarily applying a logarithm, and kriging estimates are back-transformed using classical formulae for the expectation of a lognormal random variable. This practice has several problems (lack of robustness, non-optimal confidence intervals, etc.), particularly when estimating block averages. Therefore, many practitioners take exponentials of the kriging estimates, although the final estimations are deemed as non-optimal. Another approach arises when the nature of the sample space and the scale of the data are considered. Since these concepts can be suitably captured by an Euclidean space structure, we may define an optimal kriging estimator for positive variables, with all properties analogous to those of linear geostatistical techniques, even for the estimation of block averages. In this particular case, no assumption on preservation of lognormality is needed. From a practical point of view, the proposed method coincides with the median estimator and offers theoretical

ground to this extended practice. Thus, existing software and routines remain fully applicable.

Referència: Tolosana-Delgado, R., Pawlowsky-Glahn, V. and Egozcue, JJ. Indicator kriging without order relation violations. *Mathematical Geosciences*, **40(3)** (2008), pp. 327–347.

Abstract: Indicator kriging (IK) is a spatial interpolation technique aimed at estimating the conditional cumulative distribution function (ccdf) of a variable at an unsampled location. Obtained results form a discrete approximation to this ccdf, and its corresponding discrete probability density function (cpdf) should be a vector, where each component gives the probability of an occurrence of a class. Therefore, this vector must have positive components summing up to one, like in a composition in the simplex. This suggests a simplicial approach to IK, based on the algebraic-geometric structure of this sample space: simplicial IK actually works with log-odds. Interpolated log-odds can afterwards be easily re-expressed as the desired cpdf or ccdf. An alternative but equivalent approach may also be based on log-likelihoods. Both versions of the method avoid by construction all conventional IK standard drawbacks: estimates are always within the (0, 1) interval and present no order-relation problems (either with kriging or co-kriging). Even the modeling of indicator structural functions is clarified.