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Abstract

Titel:

Regression analysis for compositional data using the logratio approach

Regression analysis gives answers to one of the basic problems in statistics, namely, how the response variables are related to the explanatory variables. The methodology for regression analysis with covariates and responses that carry absolute information, i.e. an interval scale based on the Euclidean geometry in real space, is well known. However, many data sets from geochemistry, economics and many other sources are often of compositional nature. Compositional data are multivariate observations carrying relative information on the importance or weight of a set of parts in a total (represented usually as proportions or percentages). Hereby, the standard regression model assumptions fail, because compositional data induce their specific scale and geometry, the log-ratio Aitchison geometry. To perform regression analysis adequately, the compositions have to be expressed in some coordinates (with respect to this Aitchison geometry) and the regression analysis must be built on these coordinates. Finally, one must interpret regression results attending to the natural restrictions of these coordinate representations and to the compositional scale of the analysed data. This contribution will present a concise approach to regression analysis, where either response variables, or covariates are of compositional nature. Theoretical results will be illustrated with real-world data from applications.