Testing the effect of covariates in a spatial functional model in the presence of heteroscedasticity

Eva Fišerová and Veronika Římalová

Palacký University, Olomouc, Czech Republic

Abstract

The aim of the contribution is to introduce a permutation-based test for the effect of covariates for a functional regression model with the heterogeneous spatial structure. In this context, a permutation of residuals from the functional regression model instead of the observations themselves is proposed. A weighted least squares model is fitted to the observations, resulting into approximately exchangeable, and thus permutable, residuals. A simulation study shows that the proposed testing procedure outperform the competitor approaches that neglect the spatial structure, both in terms of power and size. The methodology will be demonstrated on a real-world geochemical data set. The spatiotemporal models are used to analyse and reveal differences in the geochemical properties of the soil at the border between the forest and field.

References:

Ramsay, J.O., and B.W. Silverman (2013). *Functional data analysis.* New York, NY, Springer.

Římalová, V., A. Menafoglio, A. Pini, V. Pechanec, and E. Fišerová (2020). A permutation approach to the analysis of spatiotemporal geochemical data in the presence of heteroscedasticity *Environmetrics, 31*:e2611.