

Modeling spatio-temporal random fields locally with vine copulas

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Copulas makes it possible to build flexible multivariate distributions with mixed margins. In such models, the copula describes the multivariate dependence structure coupling the margins. In classical geostatistics, a multivariate Gaussian distribution is typically assumed and dependence is summarized in a covariance matrix implying limitations like elliptical symmetry in the strength of dependence. Copulas allow for dependence structures beyond the Gaussian one, being for instance asymmetric. In this talk, I will describe how spatio-temporal vine copulas can be built by allowing the bivariate copula families in the lower trees to change with distance across space and time, allowing not only for variation both in the degree and structure of dependence. These spatio-temporal distributions allow to predict values at unobserved locations, assess risk, or run simulations. Different specifications of the spatial vine copulas will be presented, from using only one spatial tree to several ones, up to spatio-temporal vine copulas. The prediction quality in the different applications will be assessed using cross-validation.

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