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Fast spatial interpolation using Spartan random fields with Environmental Health Applications

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We present an explicit spatial interpolator based on Spartan random fields. The spatial correlations are imposed by means of Gibbs energy functionals with explicit coupling coefficients instead of covariance matrices. The model inference process is based on physically identifiable constraints corresponding to distinct terms of the energy functional. The Spartan predictor is compared with the ordinary kriging using simulated samples, daily rainfall data, and daily averages of radioactivity gamma dose rates. It is shown that Spartan interpolation is significantly faster than kriging for large sample sizes.

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