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GSTools: The Python toolbox for your geo-statistical project!

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Geo-scientific model development is lacking comprehensive open source tools, that are providing state-of-the art geo-statistic methods. To bridge this gap, we developed a geo-statistical toolbox named GSTools, which is a Python package providing an abundance of methods in a modern object oriented approach. Covered use-cases are:

- covariance models (many readily provided and even user-defined models with a lot of functionality)
- random field generation (multigaussian and in-compressible vector fields)
- field transformations (boxcox, Zinn and Harvey, log-normal, binary)
- kriging (simple, ordinary, universal, external drift or detrended)
- variogram estimation (Cressie and Matheron estimators)
- I/O routines (interfaces to pyvista and meshio for mesh support)
- plotting routines (inspect your covariance model or random field on the fly)

GSTools is developed openly within a GitHub organization (<https://github.com/GeoStat-Framework>). On the one hand to be able to respond to the needs of the modeling community and integrate suggested functionalities and contributions, on the other hand to guarantee stability and reliability of the code-base through continuous-integration features provided by the GitHub infrastructure.

We will present several applications of the mentioned routines to demonstrate the interface and capabilities of GSTools.