GeoStat Framework: Create your geo-statistical model with Python!

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The "GeoStat Framework" (http://geostat-framework.org) is a Python framework for geo-statistical applications and subsurface simulations. It provides an easily accessible open source collection of python packages with the purposes of:
• spatial random field generation and analysis based on variogram methods (GSTools)
• pre-processing, running and post-processing subsurface flow and transport simulations using a python API for the FEM solver OpenGeoSys 5 (ogs5py)
• providing (semi-)analytical solutions for specific groundwater-flow scenarios (AnaFlow)
• store, manipulate and analyze well-based field testing campaigns (welltestpy)

With this flexible tool-box for geo-statistical aquifer analysis we aim to close the gap of missing software for real-world applications. Especially GStools is the first comprehensive python-toolbox for covariance models and field generation. It further provides a user interface for self defined covariance models and a fast variogram estimator. Random field generation, variogram fitting and spectral analysis is now easily doable and generation of structured and unstructured fields is done within a few lines of Python code.

We present an application example for a pumping test simulation on a heterogeneous aquifer combining OGS5 and GSTools. The subsurface flow model was setup up, run and post-processed dynamically using the ogs5py API while the transmissivity fields were generated with GSTools.