

Reply on RC1

Sebastian Müller et al.

Author comment on "GSTools v1.3: a toolbox for geostatistical modelling in Python" by
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We thank the reviewer for his positive evaluation of the manuscript. We further appreciate the constructive review feedback that enabled us to improve the manuscript.

- **In Table 1, I suggest to define all the quantities and the functions appearing in the formulas, e.g., Gamma and Bessel functions.**

We added definitions to the footnotes of the table.

- **Line 90. Substitute "principle" with "principal".**

We corrected this spelling mistake.

- **Figure 4. Here, "earth" should be written with capital E, as this is the proper name of our planet.**

We corrected this spelling mistake.

- **Figure 20. I think that it would be useful to show how the interpolated field can be limited to a region, for instance, within the Germany border or in the area where data are available.**

Thank you for the suggestion. We think that this would be a nice exercise for one of the more detailed examples we provide online alongside GSTools. But in order to keep the manuscript as concise as possible, we suggest to not include it. One could also argue that tasks like these are not part of GSTools, but are rather part of the pre- and postprocessing work of a modeller when using a package like GSTools. A nice Python package which works well for tasks like limiting points to a polygon, like the German border, is Shapely (<https://shapely.readthedocs.io/en/latest/>).

- **Section 4.2. The concept of "connectivity" is not well defined here. Indeed, it can be used in several different ways when different fields or physical processes are considered (see, e.g., doi:10.5194/gmd-12-2285-2019, doi:10.1016/j.advwatres.2011.12.001, doi:10.1007/s10040-009-0523-2, doi:10.1016/j.advwatres.2004.09.001, doi:10.1007/s11242-007-9185-5, doi:10.1016/S0098-3004(03)00028-1, doi:10.1029/2000WR900241, etc.). Few relevant references could be selected and a discussion about how the toolbox can provide insights on different connectivity indicators could be useful. Also, I think it would be quite easy to include the computation of some of the connectivity indicators in GSTools.**

Thank you for this suggestion. Since we only wanted to demonstrate the application of the Zinn&Harvey transformation, we are following their definition of connectedness, which they define as connected paths of extreme or special values in the conductivity field. For the sake of brevity and since this workflows was meant to demonstrate the concept of field transformation implemented in GSTools, we want to keep out a

discussion about connectivity but added a note about the used concept of connectedness from the paper of Zinn and Harvey. Beside this transformation, GSTools doesn't provide any further tools to analyze or handle connectivity, so it wouldn't make much sense to add a discussion here. Nonetheless, this could be a good starting point for further development of GSTools.

▪ **I think it would be fair to discuss the differences between GSTools v1.3 and SGeMS, which is also interfaced with Python.**

S-GeMS is indeed a very mature software suit for geostatistical applications and provides a similar functionality compared to GSTools. However, we think that it is quite distinct from our approach by virtue of using a GUI. Apart from the user experience this provides, we think that the use of GUI is a liability for building up a community. A notion, which we also briefly mention in the manuscript. S-GeMS may be an example of how this can be the case. Despite their sourcecode being open-source and the software being highly modularized, the building of a community that is actively contributing to S-GeMS seems to be lacking. To the best of our knowledge, no major additions to the software have been made in quite a while. Since Python has the ability to sustain a diverse group of collaborators, this is a problem that our approach may be able to overcome. As for the manuscript, we would like to refrain from making this kind of comparison since it is not our intention to single out any particular software for criticism. We do however, mention S-GeMS now in the revised version of the manuscript as an example for a geostatistical software using a GUI.