Answer to the Reviewer Report
"The design, deployment and testing of Kriging models in GEOframe" by Marialaura
Bancheri et al.

The manuscript has significantly improved with respect to the first version. Now its aims are
clearer and the overall structure more consistent. I still would like to see more comparison
with the available alternatives, but I understand there are technical problems in pursuing these
kind of comparison.
Despite the improvements, I think minor revision are still required before publication on any
international journal.

The Authors thank the reviewer for his recognitions and for the reviews.

A couple of technical aspects need first to be clarified:
Q1. L1-3P14: How do you choose the "best variogram model"? Is it an automatic on manual
procedure? Based on what? The authors remarks in the conclusions that "the tests also show
how it is possible to choose between 11 variograms…" but the choosing rationale is not
explained across the manuscript.

A1. *The author ranked the semivariogram models according to the GOF shown in Table 1.
The procedure was manual and performed using the R package hydroGOF. This is specified
in L1-7P13.*

Q2. L21P19: "Regarding the estimates… these are usually different". I can not understand
how it is possible. If the setup of the methodology is the same, the variogram bins and
distances the same and, obviously, the kriging equation the same, how can the two packages
provide different results?

A2. *The differences in the performances are due to the solver of the linear system of the
weights of the Kriging component. Moreover, these differences are larger in the month were
more no-values are present in the time series of the interpolated variables. The treatment of
the no-values is going to be improved in the next versions of the SIK package.*

Q: In addition, despite the authors' revision, my greatest concerns are still related to style and
use of English language. I am not English mother tongue either, but I strongly suggest the
authors to undergo a global language and style revision with the help of an expert (mother
tongue, if possible) as wording and language structures not commonly used in English are
still present, especially in some sections of the manuscript: they severely degrade the
readability of the paper. The consistence with the journal style has to be checked too.

A: *The paper was already revised by an English mother tongue, before the submission of the
reviews. However, the authors will go through a further check, as asked by the reviewer.*

In the following, please find some examples of the language, structure and style problems. It is just a non-exhaustive list:

3. L8P1: "For both variables" → "For both the variables"

Changed accordingly.

4. L22P1: "…by several authors, (Tabios and Salas, 1985; Jarvis and Stuart, 2001), among others" → I don't think this is consistent with the citation stile you adopted. As (Tabios and Salas, 1985; Jarvis and Stuart, 2001) are part of the sentence they should be cited, e.g., like the authors at L23P1 "…by several authors, among others Tabios and Salas (1985) and Jarvis and Stuart (2001), who…" or you can rephrase: "…by several authors (e.g., Tabios and Salas, 1985; Jarvis and Stuart, 2001), who…"

The sentence was changed in: "Their performances have been assessed by several authors, among others Tabios and Salas (1985) and Jarvis and Stuart (2001), who..."

5. L15P2: "make" → "makes"

Changed accordingly.

6. LL24-26P2: "In this work…error of estimates" → The sentence is not well structured, please rephrase it (consider using a bulleted list)

A list of the component was introduced. The sentence was changed in:
"In this work, the SIK package is presented as four components:
   1. the first is used for the production of the experimental semivariograms;
   2. the second is used for the production of the theoretical semivariograms;
   3. the third is used for the Kriging interpolation;
   4. and the last is used for an automatic and easy jackknife resampling to asses the error of estimates. "

7. L14P3: "First some preliminary…" → "First, some preliminary…"

Changed accordingly.

8. L20P3: "…measured data, (…)." → "…measured data (….).". Please, verify all across the manuscript mis-uses of commas in the correspondence of brackets.

Changed accordingly.

9. L6P4: "…too strict, (…)." → "…too strict (…)."

Changed accordingly.

10. L19P4: "…of errors, (…)." → "…of errors (….)."

Changed accordingly.

11. LL26-27P4: "Further details… Appendix A" → Already mentioned at the beginning of the section, consider removing.

The sentence was removed.

12. L28P4: "Design of the SIK package, its deployment and use cases" → The title sounds really bad in English, consider alternatives, e.g., "Design, deployment and use cases of the SIK package" or "The SIK package: design, deployment and use cases"

Changed in "Design, deployment and use cases of the SIK package".

13. L29P4: "…and on the use cases…" → "…and of the use cases…"

Changed accordingly.

14. L30P4: "…four levels of detail, the logic of which is explained below" → It is not clear what lever of detail you are referring to and I can't find where you explain their logic. Do you refer to the 4 OMS3 components? I think the can not be defined "levels of details" as they are just the necessary steps for the kriging algorithm to work. Please, try to adopt a more readable structure, where the 4 levels are clearly listed and explained. Otherwise, please remove the sentence.

The sentence was changed in : "On the basis of the analysis of the mathematical problems and of the use cases delineated in the previous section, the design of the software was organized in four OMS3 components, the logic of which is explained below."

15. FIGURE 1 → Why don't you call the OMS components with the name you assign them in the manuscript instead of the titles? It would help readability (Krigings → SIK-K, etc.).

Figures 1, 3 and 4 were changed and now the components are called with the same names assigned in the manuscript.

16. L6P6: "…the four OMS components…" → What about the "Particle Swarm"? Isn't it an OMS component? In the case the components are five.

The components of the SIK package are actually four. The particle Swarm is a calibrator integrated in the core of OMS3.

17. L12P6: "…the use of DP" → Please explain the acronyms the first time you use them. Here and across the manuscript.

The first time the author introduced the acronyms DP is before in L30P2, and there DP is defined. Besides, it also appears in the list of acronyms in appendix B..

18. L15P6: "…makes the code easier to "read" and maintain." → "…makes the code easier to be read and maintained."

Changed accordingly.

19. L18P6: "…of good practice can be found in the scientific literature, (…)." → "…of good practice can be found (…)." (it is clear from the previous lines you refer to scientific literature).

Changed accordingly.

20. L1P9: "Here we delineate the practices implemented in building the SIK package that make it a Reproducible Research System…" → "Here, we delineate the practices implemented in building the SIK package for making it a Reproducible Research System…"

Changed accordingly.

21. FIGURE 3 – caption: "…as used in (Bancheri, 2017)" → "…as used in Bancheri (2017)" (see previous comments)

Changed accordingly.

22. LL3-8P9: "Although the initial code (let's call it v 0.1) was already available from a control version system under GPL v3 license (www.gnu.org/licenses/gpl-3.0.en.html), the repository was owned by the original Author. An non-personal repository was judged to be better suited to host a collaborative work. Therefore, for SIK and its companion tools the collective GEOframe organization repository was created under Github (www.github.com), using Git (www.git-scm.com), and can be found at the following link (www.github.com/geoframecomponents)." → Please, correct the typos: "Despite the initial code, that will be referred to as v0.1, was already available from a control version system under GPL v3 license

(www.gnu.org/licenses/gpl-3.0.en.html), the repository was owned by the original author. A non-personal repository was judged to be better suited for hosting a collaborative work. Therefore, for SIK and its companion tools the collective GEOframe organization repository was created under Github (www.github.com), using Git (www.git-scm.com). It can be found at the following link: www.github.com/geoframecomponents).”

The typos were corrected and the sentence was changed according to the reviewer suggestions.

23. LL1-27P10: all this part of the section requires a deep revision as there are significant phrasing and structural errors that make it hardly readable, I just report some examples:

o L1: “Moreover, code v0.1” → Remove “moreover”, the sentence is not related to the previous
o L1: “contemporary” → Here “modern” is better.
o L2: “various libraries that concur” → “various concurring libraries”
o L5: “Maven and Grandle can…” → “Both Maven and Grandle can…”
o L6: “…depending on use of the….with respect to the…” → “…thanks to the use of the…compared to the….”
o L7: “…has the practical effect of abstracting…” → “…allows at abstracting…”
o L9: “…support Gradle and Maven (and Ant)…” → “…support both Gradle, Maven and Ant…”
o L10: “…but they are hardly used at all by scientists…” → “…but rarely by scientists…”
o L11: “…researchers can…” → “…researchers could…”
o L13-14: “while certainly not necessary to doing good science” → Please remove the part, as it just complicates the structure of the sentence without adding anything (or, at least, correct “to doing” with “for doing”).
o LL17-22: “Travis CI, (https://travis-ci.org), is a good choice for a continuous integration service, which uses GitHub as a web-based git repository hosting service. Continuous integration, (Meyer, 2014), is the practice of merging all developer working copies to a shared mainline several times a day. Unit Tests, (Beck, 2003), are built with the code and run each time the merging is done. The continuous integration service automatically builds the executable codes, checks if the tests are performed correctly and returns a positive answer if all is done properly. Eventually, major code commits are tagged with release numbers, under the GPL v3 license.” → The structure is confused: first you have to explain that continuous integration is, then you can suggest a good choice. Moreover, it is not clear if you effectively used Travis CI. Please, clarify (and, again, be careful to the use of commas): “Continuous integration (Meyer, 2014), is the practice of merging all developer working copies to a shared mainline several times a day. Unit Tests (Beck, 2003) are built with the code and run each time the merging is done. The continuous integration service automatically builds the executable codes, checks if the tests are performed correctly and returns a positive answer if all is done properly. Eventually, major code commits are tagged with release numbers, under the GPL v3 license. For this purposes, we chose/not choose to use Travis CI (https://travis-

ci.org), which uses GitHub as a web-based git repository hosting service, and is a good choice for a continuous integration service."

o LL26-27P10: "This could prove important…in a paper where relevant results were obtained and, perhaps, it could… within research groups, at least for ours". → "This could be important… in a paper and, perhaps, it could… within research groups." (Try to keep the sentence simple: all the paper should report significant results, and it's clear that it is your opinion).

All the typos and the sentences were corrected in the manuscript according to the reviewer suggestions.

24. L17P11: "…any outliers from the dataset" → "…any outliers.".

Changed accordingly.

25. L8P12: "…all 11 theoretical models" → "…all the 11 theoretical models."

Changed accordingly.

26. L21P12: "15th June 2008" → "15 June 2008", all across the manuscript. Journal guidelines suggest to use the format: dd month yyyy. The "th" is not required.

Changed accordingly.

27. "…the semivariance [h] and the distance in meters respectively" → "…the semivariance [h] and the distance in [m] respectively"

Changed accordingly.

28. L5P13: "…with high values…" → "…with large values…"

Changed accordingly.

29. L6P13 "3.99°C" → "3.99 °C"

Changed accordingly.

30. L4P14: "…shows the results between the measured and interpolated values using the four…" → "…shows the results for the four…"

Changed accordingly.

31. L12P14: "…model" → "…models." ; "15th February" → "15 February"

Changed accordingly. Model refers to the Bessel semivariogram.

32. L14-15P14: "…the biggest error…the biggest error…" → "…the largest error…the largest error…"

Changed accordingly.

33. L7P15: [*h*] → [h]

Changed accordingly.

34. FIGURE 9 – caption: "29th" "30th" → "29" "30" (also on L7P17)

Changed accordingly.

35. L2P18: "…biggest.." → "..largest…"

Changed accordingly.

36. LL4-6P18+LL1-3P19: "A comparison between SIK and the R package gstat was made in order to highlight their differences and similarities, and to justify the deployment of 5 an alternative software. Benchmarks or quantitative performance comparisons would not have been useful or completely truthful since the "velocity" of computation (a classic quantitative comparison) depends on too many. factors, some of which are described below. Therefore, we performed a qualitative comparison between the two softwares accounting for design, the implemented features, and the accuracy of the results. In our opinion,…" → I suggest to change the order of the sentence: "A comparison between SIK and the R package gstat was made in order to highlight their differences and similarities, and to justify the deployment of an alternative software. We performed a qualitative comparison between the two softwares accounting for design, the implemented features, and the accuracy of the results. Benchmarks or quantitative performance comparisons would not have been useful or completely truthful since the "velocity" of computation (a classic quantitative comparison) depends on too many factors, some of which are described below. Moreover, in our opinion, …."

The Authors agree with the reviewer and the order of the sentences was changed according to the reviews.

37. L5P19: "…it can be executed from within…" → "…it can be executed within…"

Changed accordingly.

38. LL16-18P19 (and across the manuscript): please, adopt a consistent style for "*gstat*".

All the "gstat" were corrected in the text.

39. L19P19: "…to SIK, these are: Matern,…" → "…to SIK: Matern,…"

Changed accordingly.

40. L21P19: "not available at present" → "not available yet"

Changed accordingly.

41. L3P21: I think "To test the performance…variables" (LL3-6P22) should follow here (after "4 types of Kriging interpolations") as it it a part of the "summary" of the paper to be inserted before the general comments on the results.

The Authors agree with the reviewer and the order of the sentences was changed according to the reviews.

42. L12P21: I think it is true "only under certain conditions" and need to be clarified.

It was added in the sentence.

43. L7-9P22: I would remove the sentence "As expected,…. Elevation", as it is an aspect out of the aims of the paper, it is an "expected" result and does not fit the conclusion section.

The sentence was removed.

44. L1P25: "Indexes of goodness of fit" → "Goodness of fit indices"

Changed accordingly.

45. L4P26: "..the eleven theoretical…" → "…the 11 theoretical…"

Changed accordingly.