

Review Report

**Trexler et al., “Total shortening estimates across the Western Greater Caucasus Mountains from balanced cross sections and area balancing”,
TEKTONIKA, 2023.**

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1st Round of Revisions

Decision Letter

19/07/2023

Dear Dr Trexler and co-authors,

We have now received 2 reviews of your manuscript “Total shortening estimates across the western Greater Caucasus Mountains from balanced cross sections and area balancing” submitted to Tektonika.

The two reviews, along with our own assessment, are relatively consistent. The manuscript is well written, well-illustrated and the methodology is well conceived, and we believe this will make a very promising contribution suitable for publication in Tektonika. However, there are some points which need to be addressed, and therefore we are requesting that you complete some revisions and address the points raised to improve the manuscript.

In particular, one critical issue raised is that some relevant input data are missing. The manuscript does not present information on the input data or on the reliability of the initial data sets, so the starting sections have a large degree of interpretation. One reviewer suggested also to add a new figure detailing the methods followed for the cross-section construction.

We look forward to receiving a copy of your revised manuscript by 19th September 2023, and we encourage you to make all the requested modifications suggested by the reviewers before resubmitting your manuscript.

Some of the reviewers have used our review form to provide their comments. We ask that when submitting revisions, you use this review form to answer their comments, point-by-point. When the review form hasn't been used, please use a traditional response letter. We ask you to submit both a copy of your revised manuscript with changes clearly marked and a clean version during your resubmission. If you require additional time for your resubmission, please don't hesitate to get in touch with the editorial team to discuss a revised timeline.

For your guidance, we append the reviewers' comments below.

Thank you for giving us the opportunity to consider your work.

Yours sincerely,

Chiara Montomoli, PhD, Associate Editor - Tektonika

Comments by Reviewer 1 (Dana Davide)

Completed: 2023-06-20 07:21 AM

Recommendation: Revisions Required

Reviewer 1 (see also attached pdf)

The manuscript presents an interesting work estimating the amount of shortening accommodated by the Greater Caucasus orogen.

The manuscript is well written and well illustrated and the methodology used seems to be sound. It should be noted, however, that no information is provided on the geological input data which forms the essential basis for the balancing exercise. This data is not presented and therefore I cannot judge how reliable the initial sections are; some sentences in the text and general common sense, indicate that the input data could be quite incomplete; clearly the two regional sections are highly interpretative (which is, within limits, "part of life"). But, as mentioned, I cannot judge and like in all modelling exercises, if the input data is poor, the result is also poor. No sensitivity analysis is included.

The manuscript also provides estimates of shortening rates, apparently using exhumation data. How these are used to constrain horizontal deformations is not obvious but it is not discussed

At a different level, I encourage the authors to include some of the older Soviet literature. As far as I can say, the GC chain was one of the orogens which were reported as examples of vertical tectonics. It would be very interesting to address also those arguments, even if they look now old-fashioned.

Comments by Reviewer 2 (Giovanni Bertotti)

Completed: 2023-07-08 02:16 PM

Recommendation: See Comments

For editor only

There is a fundamental choice the Editor has to do. The manuscript presents no information on input data and on the reliability of the initial data sets, and it is clear that the starting sections have a large degree of interpretation (especially because there seems to be no seismics); no real comparison is provided with other published sections such as, for instance, those of Saintot et al. Assuming that the initial sections are correct, then the balancing exercise is correct. If the Editor considers only the balancing exercise, then the work can be accepted with small modifications. If, on the contrary she feels at the input data should be at least discussed, then a major revision is needed.

Reviewer 2 (see also Review Form attached)

The manuscript from Trexler et al. discusses the shortening accommodated by the Great Caucasus Mountains and its deformation style (thick-skinned vs thin-skinned). To obtain robust shortening data based on field observation the authors construct two balanced geological cross-sections. The shortening is estimated by applying both line-length and area balancing techniques. Finally, the results are well discussed and integrated by the authors with other published data. The manuscript is well written and gives nice explanations of the method and results. I therefore recommend acceptance with minor revisions.

Re-writing to add detail to the text would improve the manuscript and ensure that each point is backed up by evidence. Much of the writing is clear but some sentences could be improved by rephrasing to simplify the sentence structure and keep terms consistent throughout. Adding additional text/figure that details the methods followed for the cross-section construction would improve the manuscript.

Section A: Overview of manuscript

A1) Overall evaluation, general comments & summary

A1.1) Reviewer's comments

A1.1.1) General evaluation and publication suggestion – Required:

This manuscript discusses the shortening accommodated by the Great Caucasus Mountains and its deformation style (thick-skinned vs thin-skinned). To obtain robust shortening data based on field observation the authors construct two balanced

geological cross-sections. The shortening is estimated by applying both line-length and area balancing techniques. Finally, the results are well discussed and integrated by the authors with other published data. The manuscript is well written and gives nice explanations of the method and results. I therefore recommend acceptance with moderate revisions.

A1.1.2) What does the submission need to be publishable? (select as needed; comment for all cases)

- No changes required
- Rewriting
- Reorganising
- More data/figures
- Condensing
- Reinterpretation
- Other

Comments:

Minor changes. Re-writing to add detail to the text would improve the manuscript and ensure that each point is backed up by evidence. Much of the writing is clear but some sentences could be improved by rephrasing to simplify the sentence structure and keep terms consistent throughout.

A1.1.3) Can the submission be improved by reducing/adding any of the following? (select as needed; comment for all cases)

- Text
- Table
- Figures
- Supplementary material

Comments:

Adding additional text/figure that details the methods followed for the cross-section construction would improve the manuscript.

A1.1.4) Please complete the following section if you recommend that the submission is NOT appropriate for publication (select as needed; comment if a box is selected)

- Quality is poor
- Research is not reproducible

Other

Comments:

[Free form box]

A1.2) Author(s) Responses:

We have made two primary changes to address these comments: first, we have added the maps and structural data that informed the construction of cross sections as supplementary figures S1 and S2. These maps were originally published in Trexler et al. (2022). Secondly, we have added additional details, particularly in the supplementary information to more clearly explain the process used to construct the line-length balanced cross sections.

Beyond these specific changes, we also have made minor changes to the text throughout based on feedback from this reviewer and two others (a second reviewer for Tektonika and an internal reviewer from the US Geological Survey) that we hope clarify and streamline the manuscript and the presentation of our results.

A2) Summary of main merits and main points of improvement

A2.1) Reviewer's comments

The main merits I have found are...

This is a well-written manuscript that clearly explains the background and rationale behind the balanced cross-sections realized. The methods are quite clearly written and the results well presented. The balanced cross-sections realized are interesting and cleverly explore different shortening scenarios, providing valuable information about the tectonic style of the Greater Caucasus Mountains.

The main points of improvement I have found are...

The manuscript would benefit from more detail about the adopted balancing methods and cross-section construction.

A2.2) Author's responses:

As mentioned in the above response, we have added text and primary data figures for the line-length balanced cross sections (originally published in Trexler et al., 2022) to the supplement. We have also rebuilt the figure explaining the area balancing analysis (Figure 4) and made minor modifications to the main text to clarify the specifics of input datasets and model geometries.

Section B: Detailed evaluation of manuscript

B1) Title and abstract

B1.1) Reviewer's comments

The *Title* describes the main topic of the manuscript **accurately** — [YES]

The *Title* describes the main topic of the manuscript **succinctly** — [YES]

The *Title* includes **appropriate key terms** — [YES]

The *Abstract* includes a **clear aim and rationale** — [YES]

The *Abstract* supports the rationale with **sufficient background information** — [YES]

The *Abstract* includes a **well-balanced description of the methods** — [YES] / [NO]

The *Abstract* describes the **main results sufficiently and adequately** — [YES]

The *Abstract* clearly describes the **importance/impact of the study** — [YES]

The *Abstract* clearly states the **conclusions of the study** — [YES]

The *Abstract* is **clear and well structured** — [YES]

Comments:

The title nicely fits the manuscript and the abstract gives a clear outline of the study.

B1.2) Author's responses

No changes made to the title or abstract.

B2) Introduction

B2.1) Reviewer's comments

The *Introduction* provides **sufficient background and context** for the study — [YES]

The *Introduction* describes the **aim/hypothesis/rationale** clearly, providing **sufficient context** — [YES]

The *objective/hypothesis/rationale* flows logically from the background information — [YES]

The *Introduction* describes the study's **objective and approach** (last paragraph) — [YES]

The *Introduction* contains **relevant, suitable citations** — [YES]

The *Introduction* is **organized effectively** — [YES]

Comments:

This is a good clear introduction that sets the scene for the rest of the manuscript. Lots of background information is neatly tied together for the reader and the introduction flows logically.

B2.2) Author's responses

Minor changes to the introduction and background were made following separate comments from other reviewers.

B3) Data and methods

B3.1) Reviewer's comments

The *Methods* are described **concisely and with enough detail** for reproducibility — [YES]

Necessary information about **data sources/acquisition/processing** is included — [NO]

Data used are accessible via either supplementary files or links in the data availability statement - [NO]

The *Dataset and/or Methods* are **organized effectively** — [YES]

Comments:

There is no data availability statement in the manuscript.

I think it is important to include in the main text and slightly deepen how the presented balanced sections were constructed. Some of this information is currently part of the supplementary material. In particular, the processes followed to calculate the areas should be better highlighted; perhaps creating a new, more explicit figure showing these areas on cross-sections a and b.

B3.2) Author's responses

We have refined the main text discussion of the construction of line-length balanced cross sections, and added additional detail to the supplementary text (in addition to maps and structural data, also in the revised supplementary materials). We have also added a clear statement about the data source in the main text and supplement, as well as adding a Data Availability Statement to the end of the main text.

We have also made substantial revisions to the area balancing figure (figure 4), to clarify the approach we took and what we perceive to be the significance of the results in the context of this manuscript.

B4) Results

B4.1) Reviewer's comments

The *Results* findings are **supported by data** — [YES]

The *Results* findings are presented **clearly and succinctly** — [YES]

The text in the *Result* section **cites tables and figures appropriately** — [YES]

The *Results* directly **relate to the study objectives** — [YES]

The *Results* present **data for all the approaches** described in the *Methods* section — [YES]

The *Results* **text belongs to the Results section**, not to *Introduction*, *Methods*, or *Discussion*. — [YES]

The *Results* section is **organised effectively** — [YES]

Comments:

The results section gives clear descriptions of the findings based on evidence from the data, citing figures appropriately. The results are organised in a logical manner.

B4.2) Author's responses

No specific changes to the results section have been made as a response to this reviewer's comments.

B5) Discussion and conclusions

B5.1) Reviewer's comments

The *Discussion* is **focused on the objectives** of the study — [YES]

The *Discussion* **addresses all major results** of this study, which are shown in *Results* — [YES]

The *Discussion* section makes **comparisons with other studies** that are relevant and informative — [YES]

The *Discussion* section properly identifies all **speculative statements** — [YES]

The *Discussion* section presents the **implications of the study** persuasively — [YES]

The *Discussion* section **highlights novel contributions** appropriately — [YES]

The *Discussion* section **addresses the limitations** of the study appropriately — [YES]

The *Discussion* section is **organised effectively** — [YES]

The *Conclusions* are **consistent** with and **summarise** the rest of the manuscript — [YES]

The *Conclusions* are **supported by the data** in *Results* and **follow logically** from the *Discussion* — [YES]

The *Conclusions* are **clear and concise** — [YES]

Comments:

The discussion is well-developed and addresses the key points of the work. The conclusions section gives a great outline of the study.

B5.2) Author's responses

No specific changes to the results section have been made as a response to this reviewer's comments.

B6) Figures, tables and citations

B6.1) Reviewer's comments

Tables and Figures are **ordered logically** and **numbered sequentially** — [YES]

Tables and Figures have **captions that explain** all their major features — [YES]

Tables and Figures have **captions that complement** the information in the main text — [YES]

Tables and Figures present data that **relate** to the study objective — [YES]

Tables and Figures present data that are **consistent** with and support the description of results — [YES]

Tables and Figures have **succinct and informative titles** — [YES]

Figures are **accessible** (elements are clearly labelled, accessible colour palettes, colour contrasts, font size legible, etc....) — [YES]

Please, check our [\[Figure guidelines\]](#)

Figures with **maps or cross-sections** contain all **elements to be understood** (north arrow orientation, scale, visible coordinates, sufficient coordinate grid intercepts) — [NO]

Figures with **maps** have **sufficient location information** (in the map or caption) — [YES]

Cross-sections have clear labels for **scale and coordinates** at ends and within-section kinks — [YES]

All georeferenced elements are provided in common format (.shp, .geotiff, .kml) [in an open-access repository] — [YES]

Citations throughout are relevant, suitable, and comprehensive — [YES]

Comments:

In Figure 1c some of the white labels are barely legible, perhaps a separate small legend could be made (ex. Active fold/thrust belt).

The maps in Figures 1 and 3 would be easier to read by incorporating some geological structure measurements (bedding, foliations, fold axes, etc.) and using different symbols for normal faults and thrusts.

Please, add the north arrow in figure 3 map.

B6.2) Author's responses

In Figure 1c, we have added grey boxes behind white text when over light colors, and removed the stippled pattern on the active fold/thrust belts so simplify the symbology and increase readability. We have also made other minor modifications to label color and placement to make the text simpler and more legible.

We assume that the reviewer's second comment is intended to refer to figures 2 and 3, rather than 1 and 3. We think that this author's point is an important one, and recognize through this comment and others in the main text that the underlying data for these sections were not well-presented in the original draft. We hope that our inclusion of detailed primary structural data in figures S1 and S2 helps address this concern. We have also added thrust fault symbology to figures 2 and 3.

We have added a north arrow to figure 3.

Section C: Additional comments

C1) Minor/line-numbered comments

C1.1) Reviewer's comments

Line 44 – add a comma before Buthan

C1.2) Author's responses

Change made.

C2) Other remarks

C2.1) Reviewer's comments

[Free form box]

C2.2) Author's responses

[Free form box]

Section D: Feedback to improve Tektonika's review process

We kindly ask reviewers and authors to provide any feedback that can help improve this review form, or other aspects of the review process.

Feedback can also be emailed at any time to jtektonika@gmail.com

Authors' Reply to Reviewer 1

Dear editor,

We have undertaken revisions of our manuscript in response to reviewer and editor comments, detailed below. We have reproduced the reviewer comments in full (black text), with our response and explanation of revisions following in blue text. We note that the revised manuscript also includes revisions based upon an internal review conducted as part of U.S. Geological Survey protocol. These comments and revisions are minor and are included in the attached revised manuscript, but not individually addressed in this response.

Attached are revised manuscript text and supplementary text (two versions of each, one clean and one with tracked changes), along with revised figures and two new supplementary figures. We believe that these revisions and additions address the valuable comments and suggestions provided by the reviewers, and improve the manuscript.

If we can provide anything in further support of this manuscript, please do not hesitate to reach out.

Sincerely,

Charles Trexler

Reviewer 1 (see also attached pdf)

The manuscript presents an interesting work estimating the amount of shortening accommodated by the Greater Caucasus orogen. The manuscript is well written and well illustrated and the methodology used seems to be sound.

It should be noted, however, that no information is provided on the geological input data which forms the essential basis for the balancing exercise. This is data is not presented and therefore I cannot judge how reliable the initial sections are; some sentences in the text and general common sense, indicate that the input data could be quite incomplete; clearly the two regional sections are highly interpretative (which is, within limits, "part of life"). But, as mentioned, I cannot judge and like in all modelling exercises, if the input data is poor, the result is also poor. No sensitivity analysis is included.

We have made changes to the main text and supplementary text to more clearly state what input data were used, and how they informed the construction of the line-balanced cross

sections. We have also added two supplementary figures, modified from Trexler et al. (2022), that present the stratigraphic and structural data that served as inputs and ground truthing for the cross sections we present in this manuscript. Finally, we have added a Data Availability Statement that clarifies the source of the input data for the balanced cross sections as Trexler et al. (2022), and refers the reader to that publication and its supplementary datasets.

The suggestion of a sensitivity test is, in theory, a very good one, and other studies in locations have included such tests for cross section in locations with much greater constraints on variables such as stratigraphic thickness and continuity of units along section. Datasets from the Greater Caucasus are more limited, and insufficient to inform a meaningful version of this type of analysis. These limitations and our desire for some sort of sensitivity or permissibility test on our line-length sections is, in fact, the ultimate motivation for including the area balancing models as a part of this study.

The manuscript also provides estimates of shortening rates, apparently using exhumation data. How these are used to constrain horizontal deformations is not obvious but it is not discussed.

At a different level, I encourage the authors to include some of the older Soviet literature. As far as I can say, the GC chain was one of the orogens which were reported as examples of vertical tectonics. It would be very interesting to address also those arguments, even if they look now old-fashioned.

Line numbered comments:

L76: also the older literature

Older citations to Soviet-era models added. These references predate plate tectonic theory and employ vertical tectonics as an explanation for high-angle structures. I note that we have taken care not to directly link the more modern thick skin model references to Soviet-era vertical tectonics, as this does not do the modern models justice.

L166: not available to me

No change made by the authors here

L173: This is quite an important information - if it is not available, how reliable is the entire reconstruction?

We have replaced “preservation is ... poor” with “preservation is ... uncommon”, which is a more accurate description of the challenges we faced in cross section construction.

We have also clarified the language later in the sentence to emphasize that we do indeed have primary structural data on which we are basing our models

L243: ?

We have added an introductory sentence to this paragraph, to clarify the intent of this first-order analysis. We have also added more references to the low-temperature

thermochronologic datasets that we used for this first-order analysis.

L265: *The thin-skinned geometry is the assumption which leads to the amount of shortening, not vice versa*

Yes, we absolutely agree and did not mean to imply otherwise. I have rewritten this sentence to make this point more clearly.

Authors' Reply to Reviewer 2

A1.2) Author(s) Responses:

We have made two primary changes to address these comments: first, we have added the maps and structural data that informed the construction of cross sections as supplementary figures S1 and S2. These maps were originally published in Trexler et al. (2022). Secondly, we have added additional details, particularly in the supplementary information to more clearly explain the process used to construct the line-length balanced cross sections.

Beyond these specific changes, we also have made minor changes to the text throughout based on feedback from this reviewer and two others (a second reviewer for Tektonika and an internal reviewer from the US Geological Survey) that we hope clarify and streamline the manuscript and the presentation of our results.

A2) Summary of main merits and main points of improvement

A2.1) Reviewer's comments

The main merits I have found are...

This is a well-written manuscript that clearly explains the background and rationale behind the balanced cross-sections realized. The methods are quite clearly written and the results well presented. The balanced cross-sections realized are interesting and cleverly explore different shortening scenarios, providing valuable information about the tectonic style of the Greater Caucasus Mountains.

The main points of improvement I have found are...

The manuscript would benefit from more detail about the adopted balancing methods and cross-section construction.

A2.2) Author's responses:

As mentioned in the above response, we have added text and primary data figures for the line-length balanced cross sections (originally published in Trexler et al., 2022) to the supplement. We have also rebuilt the figure explaining the area balancing analysis (Figure 4) and made minor modifications to the main text to clarify the specifics of input datasets and model geometries.

Section B: Detailed evaluation of manuscript

B1) Title and abstract

B1.1) Reviewer's comments

The *Title* describes the main topic of the manuscript **accurately** — [YES]

The *Title* describes the main topic of the manuscript **succinctly** — [YES]

The *Title* includes **appropriate key terms** — [YES]

The *Abstract* includes a **clear aim and rationale** — [YES]

The *Abstract* supports the rationale with **sufficient background information** — [YES]

The *Abstract* includes a **well-balanced description of the methods** — [YES] / [NO]

The *Abstract* describes the **main results sufficiently and adequately** — [YES]

The *Abstract* clearly describes the **importance/impact of the study** — [YES]

The *Abstract* clearly states the **conclusions of the study** — [YES]

The *Abstract* is **clear and well structured** — [YES]

Comments:

The title nicely fits the manuscript and the abstract gives a clear outline of the study.

B1.2) Author's responses

No changes made to the title or abstract.

B2) Introduction

B2.1) Reviewer's comments

The *Introduction* provides **sufficient background and context** for the study — [YES]

The *Introduction* describes the **aim/hypothesis/rationale** clearly, providing **sufficient context** — [YES]

The *objective/hypothesis/rationale* flows logically from the background information — [YES]

The *Introduction* describes the study's **objective and approach** (last paragraph) — [YES]

The *Introduction* contains **relevant, suitable citations** — [YES]

The *Introduction* is **organized effectively** — [YES]

Comments:

This is a good clear introduction that sets the scene for the rest of the manuscript. Lots of background information is neatly tied together for the reader and the introduction flows logically.

B2.2) Author's responses

Minor changes to the introduction and background were made following separate comments from other reviewers.

B3) Data and methods

B3.1) Reviewer's comments

The *Methods* are described **concisely and with enough detail** for reproducibility — [YES]

Necessary information about **data sources/acquisition/processing** is included — [NO]

Data used are accessible via either supplementary files or links in the data availability statement - [NO]

The *Dataset and/or Methods* are **organized effectively** — [YES]

Comments:

There is no data availability statement in the manuscript.

I think it is important to include in the main text and slightly deepen how the presented balanced sections were constructed. Some of this information is currently part of the supplementary material. In particular, the processes followed to calculate the areas should be better highlighted; perhaps creating a new, more explicit figure showing these areas on cross-sections a and b.

B3.2) Author's responses

We have refined the main text discussion of the construction of line-length balanced cross sections, and added additional detail to the supplementary text (in addition to maps and structural data, also in the revised supplementary materials). We have also added a clear statement about the data source in the main text and supplement, as well as adding a Data Availability Statement to the end of the main text.

We have also made substantial revisions to the area balancing figure (figure 4), to clarify the approach we took and what we perceive to be the significance of the results in the context of this manuscript.

B4) Results

B4.1) Reviewer's comments

The *Results* findings are **supported by data** — [YES]

The *Results* findings are presented **clearly and succinctly** — [YES]

The text in the *Result* section **cites tables and figures appropriately** — [YES]

The *Results* directly **relate to the study objectives** — [YES]

The *Results* present **data for all the approaches** described in the *Methods* section — [YES]

The *Results* **text belongs to the Results section**, not to *Introduction*, *Methods*, or *Discussion*. — [YES]

The *Results* section is **organised effectively** — [YES]

Comments:

The results section gives clear descriptions of the findings based on evidence from the data, citing figures appropriately. The results are organised in a logical manner.

B4.2) Author's responses

No specific changes to the results section have been made as a response to this reviewer's comments.

B5) Discussion and conclusions

B5.1) Reviewer's comments

The *Discussion* is **focused on the objectives** of the study — [YES]

The *Discussion* **addresses all major results** of this study, which are shown in *Results* — [YES]

The *Discussion* section makes **comparisons with other studies** that are relevant and informative — [YES]

The *Discussion* section properly identifies all **speculative statements** — [YES]

The *Discussion* section presents the **implications of the study** persuasively — [YES]

The *Discussion* section **highlights novel contributions** appropriately — [YES]

The *Discussion* section **addresses the limitations** of the study appropriately — [YES]

The *Discussion* section is **organised effectively** — [YES]

The *Conclusions* are **consistent** with and **summarise** the rest of the manuscript — [YES]

The *Conclusions* are **supported by the data** in *Results* and **follow logically** from the *Discussion* — [YES]

The *Conclusions* are **clear and concise** — [YES]

Comments:

The discussion is well-developed and addresses the key points of the work. The conclusions section gives a great outline of the study.

B5.2) Author's responses

No specific changes to the results section have been made as a response to this reviewer's comments.

B6) Figures, tables and citations

B6.1) Reviewer's comments

Tables and *Figures* are **ordered logically** and **numbered sequentially** — [YES]

Tables and *Figures* have **captions that explain** all their major features — [YES]

Tables and *Figures* have **captions that complement** the information in the main

text — [YES]

Tables and *Figures* present data that **relate** to the study objective — [YES]

Tables and *Figures* present data that are **consistent** with and support the description of results — [YES]

Tables and *Figures* have **succinct and informative titles** — [YES]

Figures are **accessible** (elements are clearly labelled, accessible colour palettes, colour contrasts, font size legible, etc....) — [YES]

Please, check our [\[Figure guidelines\]](#)

Figures with **maps or cross-sections** contain all **elements to be understood** (north arrow orientation, scale, visible coordinates, sufficient coordinate grid intercepts) — [NO]

Figures with **maps** have **sufficient location information** (in the map or caption) — [YES]

Cross-sections have clear labels for **scale and coordinates** at ends and within-section kinks — [YES]

All georeferenced elements are provided in common format (.shp, .geotiff, .kml) [in an open-access repository] — [YES]

Citations throughout are relevant, suitable, and comprehensive — [YES]

Comments:

In Figure 1c some of the white labels are barely legible, perhaps a separate small legend could be made (ex. Active fold/thrust belt).

The maps in Figures 1 and 3 would be easier to read by incorporating some geological structure measurements (bedding, foliations, fold axes, etc.) and using different symbols for normal faults and thrusts.

Please, add the north arrow in figure 3 map.

B6.2) Author's responses

In Figure 1c, we have added grey boxes behind white text when over light colors, and removed the stippled pattern on the active fold/thrust belts so simplify the symbology and increase readability. We have also made other minor modifications to label color

and placement to make the text simpler and more legible.

We assume that the reviewer's second comment is intended to refer to figures 2 and 3, rather than 1 and 3. We think that this author's point is an important one, and recognize through this comment and others in the main text that the underlying data for these sections were not well-presented in the original draft. We hope that our inclusion of detailed primary structural data in figures S1 and S2 helps address this concern. We have also added thrust fault symbology to figures 2 and 3.

We have added a north arrow to figure 3.

Section C: Additional comments

C1) Minor/line-numbered comments

C1.1) Reviewer's comments

Line 44 – add a comma before Buthan

C1.2) Author's responses

Change made.

2nd Round of Revisions

Decision Letter

Dear Dr. Trexler and co-authors,

We have now reached a decision regarding your submission to TEKTONIKA "Total shortening estimates across the western Greater Caucasus Mountains from balanced cross sections and area balancing".

The Associate Editor, Chiara Montomoli, and I are now satisfied that the comments raised by the reviewers and through the editorial process have now been addressed. We are therefore happy to inform you that the paper has been now ACCEPTED to be published.

There are a few new minor points we would like you to address following your most recent changes to the manuscript, though we are happy for these to be corrected during the production phase.

1. The supporting data from Trexler et al. (2022) are now included as supplementary figures and provide the data upon which the modelling depends. However, these maps each need a legend for symbols included, and Figure S1 has quite faint grey labels (distance scale and grid line labels) so please make these darker to improve accessibility for those with limited vision. You might consider how these can be modified in appearance or layout so they are not a replica of the already-published versions.
2. You have on occasion referred to a paper which is in review. We cannot include in review papers in the reference list without full indexing. TEKTONIKA is committed to open access science, so if possible please cite a pre-print of the paper (e.g. EarthArXiv) or remove the citation.
3. In the Supplementary Materials, please add the captions to describe Figures S1 and S2.

Congratulations, and thank you again for submitting your work to Tektonika!

We look forward to publishing your manuscript and I hope you will consider TEKTONIKA again in the future.

Yours sincerely,

Janine Kavanagh, PhD, Executive Editor – Tektonika
Chiara Montomoli, PhD, Associate Editor - Tektonika

Comments by Reviewer 1

Completed: 2023-09-21 04:07 PM

Recommendation: Accept Submission

Comments by Reviewer 2

08/10/2023

Recommendation: Accept Submission

The authors have implemented some/most of the recommendations I made but significant issues on the reliability of the section remains open to me. But I do not think it would be productive to engage in a ping-pong of revision/modification and give, therefore my approval, to the publication of the manuscript. It would be important to underline the fact that other options are possible.

I guess the last word is then to the reader.

Acceptance Letter

Dear Dr. Trexler and co-authors,

We have now reached a decision regarding your submission to TEKTONIKA "Total shortening estimates across the western Greater Caucasus Mountains from balanced cross sections and area balancing".

The Associate Editor, Chiara Montomoli, and I are now satisfied that the comments raised by the reviewers and through the editorial process have now been addressed. We are therefore happy to inform you that the paper has been now ACCEPTED to be published.

There are a few new minor points we would like you to address following your most recent changes to the manuscript, though we are happy for these to be corrected during the production phase.

1. The supporting data from Trexler et al. (2022) are now included as supplementary figures and provide the data upon which the modelling depends. However, these maps each need a legend for symbols included, and Figure S1 has quite faint grey labels (distance scale and grid line labels) so please make these darker to improve accessibility for those with limited vision. You might consider how these can be modified in appearance or layout so they are not a replica of the already-published versions.
2. You have on occasion referred to a paper which is in review. We cannot include in review papers in the reference list without full indexing. TEKTONIKA is committed to open access science, so if possible please cite a pre-print of the paper (e.g. EarthArXiv) or remove the citation.
3. In the Supplementary Materials, please add the captions to describe Figures S1 and S2.

Congratulations, and thank you again for submitting your work to Tektonika!

We look forward to publishing your manuscript and I hope you will consider TEKTONIKA again in the future.

Yours sincerely,

Janine Kavanagh, PhD, Executive Editor – Tektonika

Chiara Montomoli, PhD, Associate Editor - Tektonika

