Solid Earth Discuss.,
https://doi.org/10.5194/se-2019-74-AC1, 2019

Solid Earth
Discussions

Interactive comment on "Visual analytics of the aftershock point cloud data in complex fault systems" *by* C. Wang et al.

C. Wang et al.

jiangjincheng0305@126.com

Received and published: 17 July 2019

Reviewer1: The authors present a platform where the aftershock data can be visualized well, including the 3D view, fault plane fitting and outliers removal. Although the platform may be helpful to researchers that have crucial demands on 3D data visualization, it is not that clear why this platform is new and important in finding new fault planes or aftershock migrations. The proposed procedure of determining fault planes in principle relies heavily on the amount and accuracy of the catalog, which plays a much more important role.

Authors: Thanks for this comment. It is true that the accuracy of aftershock data is of great importance in determining fault geometry and finding aftershock migrations.

Printer-friendly version

Discussion paper

However, the methods used for data analysis also play a very important role. It is widely accepted that visual analytic with interactive visual interfaces can amplify human cognitive capabilities, and is suitable for solving some complex problem relying on closely coupled human and machine analysis. When applying to the aftershock catalog, visual analytic can therefore help to discover some new fault planes or weak signals of aftershock migrations, which might be hard to observe directly from the data.

Specifically, the designed visual analytics procedure can assist the knowledge discovery from aftershock catalog in several ways: 1) by accelerating the fault segment discovery processing through 3D view manipulation (e.g. zooming, panning, and rotating); 2) by enhancing the recognition of fault segments pattern through rapid visual computing functions (e.g. interactive projection, plane fitting, and fault data fusing); 3) by reducing the influence from low-quality or irrelevant aftershock points through various filtering (e.g. depth, LOF, time, and magnitude filtering); 4) by enabling the aftershock migration exploration through providing more cognitive resources (e.g. animation, and propagation distance-time plotting).

Reviewer1: Below are some line comments: p1, line 24: ' where they are divided into a number of subparallel segments with the lengths of approximately 10-25 km ', is this true for all types of faults?

Authors: Thanks for the comment. The cited reference used normal fault dataset and is published 22 years ago. We will cite a more recent reference to update the description. Manighetti, I., C. Caulet, L. Barros, C. Perrin, F. Cappa, and Y. Gaudemer (2015), Generic alongâĂŘstrike segmentation of Afar normal faults, East Africa: Implications on fault growth and stress heterogeneity on seismogenic fault planes, Geochemistry Geophysics Geosystems, 16(2), 443-467.

Reviewer1: p2, line 2, again, the complex fault geometry most directly results from an accurate catalog

Authors: Thanks for the comment. Given an accurate catalog, a proper analytic method is also important for finding more details.

Reviewer1: p2, lines 15-25, it is not clear why the interactive visual analysis represents an ’emerging field’, I think it’s only a good way to help visually understand the data

Authors: Thanks for the comment. Visual analytics is considered as an outgrowth of the fields of data visualization [Pak Chung Wong and J. Thomas, 2004], which focuses on analytical reasoning facilitated by interactive visual interfaces. For better clarification, we down-phrase it from ’field’ to ’research direction’.

Pak Chung Wong and J. Thomas (2004). "Visual Analytics". in: IEEE Computer Graphics and Applications, Volume 24, Issue 5, Sept.-Oct. 2004 Page(s): 20–21.

Reviewer1: p2, line 16: assists -> assist

Authors: Thanks for the comment. It would be corrected in the revised manuscript.

Reviewer1: p5, line 19, from point p (to) the k-th

Authors: Thanks for the comment. It would be corrected in the revised manuscript.

Reviewer1: p8, line 7, any references for the triggering relationship?

Authors: Thanks for the comment. We will include the following reference to support the triggering relationship. Papadopoulos, G. A., et al. "Earthquake triggering inferred from rupture histories, DInSAR ground deformation and stress-transfer modelling: the case of Central Italy during August 2016–January 2017." Pure and Applied Geophysics 174.10 (2017): 3689-3711.

Reviewer1: p9, line 12, is should -> should

Authors: Thanks for the comment. It would be corrected in the revised manuscript.

Reviewer1: p10, line 3, the migration of aftershocks could also be related to afterslip and/or pressure transients

Authors: Thanks for the suggestion. We will include the afterslip and/or pressure transients as the possible mechanisms for aftershock migration in the revised manuscript.

Reviewer1: p10, line 9, the northward trend is not obvious in Figure 7a

Authors: Thanks for the comment. The aftershock points in the north (left points on the figure) happened more lately (colored by red) than south. We will include north arrow and color bar to better demonstrate the northward trend of aftershock migration in the revised manuscript.

Interactive comment on Solid Earth Discuss., https://doi.org/10.5194/se-2019-74, 2019.