Earth Surf. Dynam. Discuss., 1, C299–C303, 2013
www.earth-surf-dynam-discuss.net/1/C299/2013/

Earth Surface Dynamics Discussions

Interactive comment on "Generalized swath profiles" *by* S. Hergarten et al.

M. D. Hurst (Referee)

mhurst@bgs.ac.uk

Received and published: 9 December 2013

Below is a review of the manuscript 'Generalized swath profiles' published as a discussion article with Earth Surface Systems. In this review I will provide general comments addressing questions from the review criteria provided by the journal, followed by specific comments and editorial/technical corrections.

General Comments

Hergarten and colleagues present a new method for producing swath profiles to analyse the relationship of spatially distributed data to a fixed reference. The novelty in their method comes from its ability to take a polygonal line or shape (or a point) as that fixed reference. There are potentially a wide variety of applications in geospatial analysis, most pertinently for quantitative topographic analysis. The authors have taken steps to ensure that the technique is easy to implement and efficient, and demonstrated its ap-

plication to topographic analysis with well-chosen examples. The manuscript is timely given recent advances in methods to analyse topographic datasets at increasingly finer resolutions (e.g. Hurst et al. 2012; Dibiase et al 2012; Passalacqua et al., 2012 and others) and it is my recommendation that this be published in Esurf. However I reserve judgement as to whether presentation of software methods falls within the scope of Esurf. Perhaps this work would be more appropriately published as a short communication given that it presents a technical advancement rather than answering scientific questions within the scope of Esurf. I am delighted that the authors continue to make their software readily available to other users.

Before the article is ready to be published, the presentation could use some polish. The method is easy to understand conceptually, aided by the results presented in figures 3-5, yet the description of the method and implementation was somewhat confused. There are also some minor grammar/language issues. I have made suggestions below that I hope will aid the authors in bringing clarity to this aspect of the manuscript.

Specific comments

388/2: The abstract is somewhat brief but provides a basic summary. I would suggest expanding to include a definition of a swath profile, and allude to its application to topographic analysis.

388/4: Suggests the method measures 'distance to a given baseline' but I think it is worth emphasizing that the reference is very flexible, and can also be a point or polygon.

388/10: "eliminate small-scale structures from topographic profiles" sounds like a smoothing technique, but the small scale structures are a part of the signal you are extracting in terms of variability of topography.

388/18: There is a grammar/sentence structure issue here.

388/23: Should the figure reference be to figure 2 here? The point you are trying

to make is unclear, even though I have an appreciation of the problems that may be inherent in using straight baselines when a valley is unlikely to be straight. Generally speaking I think that some of these issues would be better illustrated using examples of real topography in addition to the diagrams you present of the profile lines e.g. the V-shaped valley appearing as a U-shape.

389/1: This paragraph would be better placed above the previous paragraph.

389/5: Stray "and" after "discussions", replace "e.g." with "for example".

389/6: This sentence adds no useful information, you could either cite Telbisz et al. at the end of the first sentence or expand this with some discussion of their considerations.

389/10: Did Telbisz do this? If so it isn't clear, and I can't read Hungarian! :(

390/1: I suggest changing this title to "Generalised swath profile method"

390/18: I'm not sure what you mean by "arbitrary numbers" here. For each DEM point/cell you obtain the distance to the nearest part of the baseline, and then organise the elevation data using distance bins.

390/19: delete "it"

390/20: Avoid referring to the "coordinate axes" here since this tends to mean Lat/Long or Easting/Northing, whereas I think you mean relative to the baseline orientation.

390/22: This paragraph could be substituted with a simple statement that you only consider data within a fixed distance from the baseline and whose nearest point on the baseline isn't an end point.

391/6: Again, consider referring to this as something other than the "coordinate axes"

391/10: Delete "Then", this doesn't need to be a new paragraph

391/14: This section needs to be rewritten. There are undefined parameters lambda

and q which need to be explained. The procedure is not clear and should be presented in a more logical, stepwise fashion. Ideally the reader should be able to recreate your method based on the description in the paper.

391/18: It is not clear to me what the difference between distance and oriented distance is, nor why the latter is favoured. The method is beautifully simple, find the shortest distance to the baseline from every point in the DEM, yet the way it has been presented is somewhat confused, to my mind at least.

393/13: I think it is worth highlighting here, or in the methods section, that binned elevations are relative the the elevation of the nearest point on the baseline i.e. that you are normalising for longitudinal valley/stream gradient.

394/10: This could be a lithologic signal, the Grand Canyon is comprised of $\sim$flat lying sedimentary rocks of varying coherence.

394/12: Replace "proves" with "demonstrates"

394/16: "Curvature in ordinary strath profiles" I thought ordinary strath profiles were straight? I presume you mean the curvature of the channel/valley floor?

395/3: This conclusion is a stretch. There is a valley entering the swath zone $\sim$perpendicular to the swath orientation which may be causing this apparent 'surface'.

396/5: "and in case of minima graben structures" grammar problem.

396/18: replace "topography with "topographic"

396/19: There may therefore be insight to be gained by segmenting the baseline and constructing swath profiles at regular intervals to analyse along strike variability. Similarly segmentation as you have done in Fig. 4 could be automated to assess variation in valley morphology/channel geometry along the entire length of river networks.

Figures

The figures presented are clear and the captions appropriate. However it would be good to show an example where real topography is used to create a standard swath profile, which can then be later compared to a profile generated by your new method so that the reader can compare the results and see the benefits directly.

Interactive comment on Earth Surf. Dynam. Discuss., 1, 387, 2013.