

Review of

Title: Monitoring recent variations of the surface displacements of eight Nyainqêntanglha glaciers

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This paper presents a surface deformation analysis of 8 polythermal glaciers located in the Nyainqêntanglha Mountains (Tibetan Plateau, China). Glacier surface displacements were derived from Landsat imagery representing 3 glacial stages, i.e., 1993, 2003 and 2009, based on surface feature tracking using phase correlation in the spectral domain. Spatial-temporal change of surface movement of the glaciers investigated was analyzed using statistical methods.

The paper is meant as a contribution to the glacier research in China since it focuses on a selected glaciated mountain region in the Tibetan Plateau where glacier studies are rare. Field work is not easy to be carried out. Nevertheless, ground truth data of various kinds are available. Displacement maps obtained (from optical satellite data) are supposed to support studies on glacier rheology. The idea is to better understand the glacier kinematics of polythermal glaciers and to correlate its spatio-temporal change with various triggering factors, for example temperature. Atmospheric warming (global change) may be a key factor of change.

Scientific significance: The present paper does not present a new method, but yet the method applied is one of the (standard) methods in image matching and in glacier studies based on Landsat imagery. As already indicated the value of this paper is on the test site itself.

Scientific Quality: The authors missed to evaluate the potential of the algorithm (phase correlation) implemented. No accuracy assessment has been carried out. Subsequently, the reader/ follow-on researcher (see above) cannot assess the quality of the results obtained. A profound strain analysis is missing. The authors could improve the scientific quality of the paper by focusing more on the key problems/issues (method applied pros&cons, accuracy assessment, etc.) of the paper. Related work and references have been appropriately addressed.

Presentation Quality: The conclusions presented are very general and not very clear and concise (see scientific quality). This is to a great extent based on the bad quality of the figures (see additional remarks given below). The English of the paper should be improved by a native speaker. In several cases the reviewer had problems to clearly understand the content of the respective sentences.

In the following the reviewer is providing some comments which might be helpful in improving the present paper.

Title:

Please change the title of the paper appropriately to sustain the content of the paper.

Monitoring: Are you really monitoring?

Recent: Do your results really reflect recent variations? Maybe it is better to state the observation periods to be compared with.

Surface Displacement: Please clarify in your paper what is the result of your measurements. A displacement map (= principal result of your work) is nowhere shown in the paper. Good examples of cartographic representation can be found the references provided in your paper. Since both observation periods (1993-2003, 2003-2009) are different in time span, the displacements obtained have to be normalized. The result is a velocity (change in length/time unit). The authors should better use the working unit velocity (m/year) for reasons of comparison.

Nyainqêntanglha Mountains: Please add ... in the Nyainqêntanglha Mountains (Tibetan Mountains, China). Readers should know where this mountain range is located at.

Abstract:

The Abstract should better describe the real content of the paper.

line 2: Tibetan Plateau, China

line 12: please name the feature tracking method used

line 13: 'sub-pixel accuracy' has to be validated in the paper

line 14: omit repetition of the names of the glaciers

line 20: specify the space-borne optical imagery you were using, i.e., Landsat imagery

line 20: rephrase 'are promising for potential detection' please be concise, the reader is interested in clear statements

Introduction:

The Introduction should more focus on the topic of the paper. The problems should be highlighted. The paper could benefit from an ending paragraph highlighting the outline of the paper (which is also very helpful in structuring the paper itself).

line 10: reconsider the phrasing '... is assumed to be made of ..'

Study area:

Figure 1 is of bad cartographic quality. A location map (showing Asia/China) indicating the test site is missing. The drawing should clearly show the situation/topography

line 18: phrase '... magnitude of the glacier length was about 10 m ..' unclear

line 20: ... that the ice cover ...

3 Data and methodology

Please give details about the image processing software you were using.

How did you implement your feature tracking method (programming language, etc.)?

3.2 Feature-tracking method

p. 1560, line 11-15: Please add appropriate references to your statements given.

Why are optical imageries more useful (?) for tremendous (?) ice surface displacements monitoring?

p. 1561, line 15: Omit the sentence 'Nevertheless, ...'

p. 1562, line 17: explain acronym TPSS

Please explain your accuracy assessment!

Have you tested your algorithm at stable areas where there is no movement.

The reader might be interested in a comparison of your method with other potential methods. Why should one use the proposed method?

p. 1563, line 13: considerate?

4 Surface displacement observations

Please add a large-scale displacement vector map showing at least one of the glaciers.

Accuracy assessment is missing!

p. 1564, line 11: 425.60 m, is the given precision significant?

The reviewer is confused by the term displacement when change is the focus.

Please normalize all your numbers/results to [m/year] in order to make them comparable.

p. 1564, line 11: spelling 'lager'

Table 1: source of data is missing

Table 2: The content of this table is completely unclear to the reviewer. Please use velocity term [m/year]!

Figure 2: This figure can be improved. Does this figure reflect the content of the paper/title of the paper? Where is the part of change detection?

Figures 3-9: Very bad cartographic quality! Annotations are not legible. Figures should be drawn larger.

What is the scientific rationale behind the figures 7 and 8. Please give explanations.

page 1565, line 11: Please explain in more detail why you did resample the displacement maps.

5 Discussion

p. 1565, line 24: please consider rephrasing of '... remain a considerable in ...'

p. 1565, line 26: Please consider normalization (= velocities) for comparison!

Please give clear statements about the quality of your results obtained. Is the method applied beneficial. The reviewer does not trust very much in the results obtained (see Fig. 4). For the interpretation of the results the expert knowledge of glaciologists would be of great interest. Maybe, the appropriate experts can be asked.

6 Conclusions

P. 1566, line 24: The sentence 'Our research ...' does not make sense to the reviewer.

P. 1567, line 10: 1990s are indeed located in the last century ...