# Automation of the SGM neotectonic stresses reconstruction method of L.A. Sim applied to the Lena-Olenek interfluve region

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Introduction

The development of the application is based on the automation and upgrading the structural-geomorfological (SGM) neotectonic stresses reconstruction method of L.A. Sim [5].

This method uses statistical data on neotectonical stresses, which are reconstructed by relations [1] of multiple lineaments in the horizontal plane – megacracks.

Program package description

The application is developed on Python programming language for Windows x32 and x64 bit platform. The base of solution of the L.A. Sim SGM method automation problem is the lineament analysis, performed on satellite images, topographic maps, etc.

The proposed algorithm of automation of the L.A. Sim SGM method analyzes and classifies faults for specific map areas, taking into account certain types of lineaments. This algorithm consists of three stages: at the first stage, the necessary lineaments are deciphered, at the second — the search and measurement of the angles between the adjacent lineaments is performed, at the third — the classification by M.V. Gzovsky is applied [1,2].

The selection of lineaments can be performed either manually or automatically using the height-map skeletonization algorithm. In the automatic mode, a search of so-called specific points procedure is applied to the skeletonized image. Further on, the vector mask of lineaments is constructed from these points.

The next step is the measurement of the angles between the lineaments inside the resizable window with the center on the fault line and the tangent to the fault line passing through the center of this window.

At the third stage, the classification is carried out by calculating the probabilities of belonging to a particular type.

The region of the Leno-Olenek interfluve was chosen for testing [3,4].

Discussion and conclusion

In general, the testing carried out should be considered as successful, since most of the faults under study were correctly classified.

The main circumstance that negatively affects the result of the application's work in automatic mode is that the existing algorithm does not distinguish between gaps and megatracks at the stage of lineaments deciphering.

Thus, to date has been created and successfully tested a software tool, which allows to perform the automation of L.A. Sim SGM method and significantly speed up the work on the neotectonic stresses reconstruction with the help of this method.

References:

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