Geophysical Research Abstracts
Vol. 21, EGU2019-7377, 2019
EGU General Assembly 2019

Using wavelet analysis to quantify deformation microstructures

James Gilgannon, Vénice Akker, Alfons Berger, and Marco Herwegh
Bern University, Institute of Geological Sciences, Bern, Switzerland (james.gilgannon@geo.unibe.ch)

Here we will address two possible applications of wavelet analysis for deformation microstructures: firstly, the isolation of features of interest and secondly the quantification of the frequency of those features.

In microstructural analysis data is often complex with many features that have various fractal or periodic characteristics. Consequentially, when data is acquired it often contains an excess of data for the questions at hand. In image analysis of microstructures, data is often excluded qualitatively by eye. This is a time consuming exercise and might succumb to selection and confirmation biases. Here we show how wavelets can be used to find statistically significant features and isolate them. Furthermore, by virtue of the wavelet technique this analysis also yields the frequency of those features. Even more critically, the technique preserves the spatial arrangement of the features of interest. In this way, wavelet analysis overcomes some of the abstraction and loss of spatial information that classical Fourier frequency analysis is encumbered with.

Wavelet analysis is routinely used in Geophysics and other wave based fields of study and is emerging in more of Earth sciences. Our analysis highlights two possibilities where the technique enhances the knowledge that can be obtained from quantitative microstructural analysis.