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Correlation analysis of fracture arrangement in space

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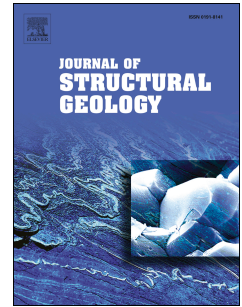
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# 1 Correlation analysis of fracture arrangement in space

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- 12 • Fracture spacing does not effectively characterize overall pattern arrangement
- 13 • New analyses includes positional information for better pattern description
- 14 • New analyses employ Fourier periodograms and correlation integral
- 15 • Approaches can include fracture size
- 16 • Software measures statistical significance spatial correlation and allows rigorous pattern classification

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## 20 **Graphic abstract: Figure 12**

21 Variation of spatial correlation with length scale, and interpretation of some patterns (a-h). x-axis is linear  
22 in a through d, logarithmic in e through h. (a) A flat-line pattern of spatial correlation (slope = 0;  
23 correlation = 1) indicates no statistically significant organization. (c, d, h) Periodic peaks and troughs  
24 (best appreciated with linear graduations of length scale) indicate regular spacing, another form of self  
25 organization. Combinations of any or all of these patterns can occur, with different patterns characterizing  
26 different ranges of length scale. (b) Individually anti-clustered but not regularly spaced. (f-h) Power-law  
27 variation of spatial correlation with length scale (slope  $\neq 0$ ; best appreciated with logarithmic graduations  
28 of length scale) indicates fractal clustering, one form of self organization. (e) A plateau-and-basin pattern  
29 of spatial correlation (slope = 0; correlation  $\neq 1$ ) indicates statistically significant clustering, due to some  
30 process other than self organization such as inherited or externally imposed control. Column colors mark  
31 linear and log scales.

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