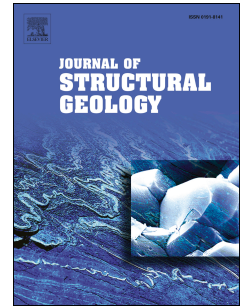


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Recent and future trends in paleopiezometry in the diagenetic domain: Insights into the tectonic paleostress and burial depth history of fold-and-thrust belts and sedimentary basins

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1 Recent and future trends in paleopiezometry in the diagenetic domain: insights  
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4

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11 Keywords : paleostress; paleopiezometry; inversion process; tectonic stress; burial estimates; fold-  
12 and-thrust belt; basin; calcite twinning; stylolites.

13 Abstract

14 Paleopiezometry provides an access to the past stress magnitude, key to better understand the  
15 behaviour of the earth's crust over long period of time. This contribution presents a review of some  
16 paleopiezometric techniques that can be used in the diagenetic domain, in fold-and-thrust belts and  
17 sedimentary basins. Calcite twinning and stylolite roughness techniques have been selected and are  
18 presented through a critical description of their methodologies, along with approaches to further  
19 reconstruct the complete effective stress tensor. Major geological lessons learned over the past  
20 decades from published studies are summarized and discussed along with a way forward to  
21 potential breakthroughs.

22

23 1. Introduction

24 The implication of stress in geological and societal phenomena such as earthquake tectonics,  
25 georesources distribution or mechanical behaviour of materials involves different time scales  
26 (Barton and Zoback, 1994; Mourgues et al., 2011; Sanderson and Zhang, 1999, 2004; Sibson, 1994;  
27 Zoback and Zoback, 1989). To complement current stress measurement unravelling the short-term  
28 mechanical behaviour of the upper crust (e.g., Cornet and Burlet, 1992), it is of prime interest to  
29 characterize not only the orientation, but also the magnitude of stress - should it be of tectonic,  
30 burial or hydrological origin - over long-term time scale (>million years). Past stress magnitude and  
31 its evolution during the geological history is however inherently extremely challenging to infer.

32

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