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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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Abstract

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

## 1. Introduction

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