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Genesis of natural hydraulic fractures as an indicator of basin inversion

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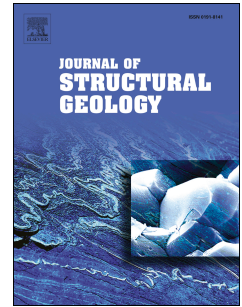
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1 Genesis of natural hydraulic fractures as an indicator of basin
2 inversion

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6 **ABSTRACT**

7 Satin spar (fibrous gypsum) veins, which occur in evaporite basins worldwide, provide
8 significant insights into host rock deformation and fluid flow, although the genetic mechanism
9 remains obscure. Satin spar veins in the red marls of the Triassic Mercia Mudstone of the Bristol
10 Channel Basin were characterized in the context of regional and local setting. The vein network
11 in the Keuper Marl (lower Mercia) exhibits a lack of systematic cross-cutting between three
12 distinct vein sets. Two sets of veins are observed in the overlying Tea Green Marl, with one set
13 clearly crossing the other. The gypsum veins commonly contain a blocky median zone of
14 multiple thin bands of host-rock inclusions and alabastrine gypsum crystals, exhibiting crack-
15 seal patterns. Fibrous zones on either side of the median zone consist of pure parallel-aligned
16 gypsum fibres that are oblique to vein walls, indicating a hybrid shear-extensional mode of vein
17 widening. Veins developed within reverse-reactivated faults contain fibre lineations in the
18 median zones and also on vein surfaces, suggesting a minimum of two phases of fault slip. The
19 veins are interpreted to have formed as a result of overpressure in the low-permeability
20 mudstones by tectonic compression during basin inversion, giving rise to the median zone.

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