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Use of a new artificial cohesive material for physical modelling: application to sandstone intrusions and associated fracture networks

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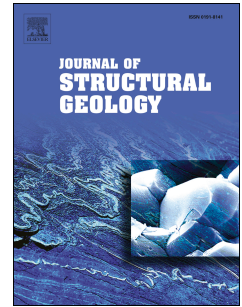
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18 **Keywords:** Analogue material, physical experiments, cohesive, sandstone intrusions.
19

20 **Abstract**

21 Sandstone intrusions are formed by fluidisation and injection of sand into hydraulic
22 fractures. To experimentally reproduce sandstone intrusion emplacement and to understand
23 mechanisms governing their final morphology, it is necessary to employ a brittle, granular
24 material simulating the intruded medium with water as a pore-fluid. We created a new
25 analogue material made of a mixture of sand and gelatine to simulate overburden behaviour
26 and which is capable of reproducing fracturing in water saturated sediments. The cohesion
27 and frictional coefficient of this material is controlled by gelatine concentration. An increase
28 of gelatine concentration of 1g/l results in an increase of 490Pa and 0.08 of cohesion and
29 frictional coefficient, respectively. Permeability of sand is sufficiently reduced to prevent
30 fluid-flow prior to hydraulic fracturing (10^{-14} to 10^{-17} m²). Oscillatory tests on sand/gelatine
31 mixture suggest a visco-elastic behaviour with a dominant elastic behaviour. Initial
32 experimental results are presented here and show that the main geometries of sandstone
33 intrusions (sills, dykes, wing-like intrusions and cones) and their network geometry (dyke to

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