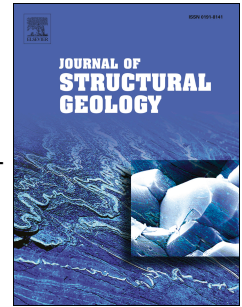


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Formation of dome and basin structures: Results from scaled experiments using non-linear rock analogues

J. Zulauf, G. Zulauf, F. Zanella



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5 J. Zulauf ¹, G. Zulauf ¹, F. Zanella ²

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7 ¹Institut für Geowissenschaften, Universität Frankfurt a.M., Altenhöferallee 1, D-60438 Frankfurt a.M., Germany,

8 j.zulauf@em.uni-frankfurt.de

9 ²Institut für Neuroradiologie, Universität Frankfurt a.M., Theodor-Stern-Kai 7, 60596 Frankfurt a.M., Germany

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14 **Abstract:**

15 Dome and basin folds are structures with circular or slightly elongate outcrop patterns, which can
16 form during single- and polyphase deformation in various tectonic settings. We used power-law
17 viscous rock analogues to simulate single-phase dome-and-basin folding of rocks undergoing
18 dislocation creep. The viscosity ratio between a single competent layer and incompetent matrix
19 was 5, and the stress exponent of both materials was 7. The samples underwent layer-parallel
20 shortening under bulk pure constriction.

21 Increasing initial layer thickness resulted in a decrease in the number of domes and basins and an
22 increase in amplitude, A , arc-length, L , wavelength, λ , and layer thickness, H_f . Samples deformed
23 incrementally show progressive development of domes and basins until a strain of $e_{Y=Z} = -30\%$ is
24 attained. During the dome-and-basin formation the layer thickened permanently, while A , L , and
25 λ increased. A dominant wavelength was not attained. The normalized amplitude (A/λ) increased
26 almost linearly reaching a maximum of 0.12 at $e_{Y=Z} = -30\%$. During the last increment of
27 shortening ($e_{Y=Z} = -30 - -40\%$) the domes and basins did not further grow, but were overprinted
28 by a second generation of non-cylindrical folds. Most of the geometrical parameters of the
29 previously formed domes and basins behaved stable or decreased during this phase. The
30 normalized arc-length (L/H_f) of domes and basins is significantly higher than that of 2D
31 cylindrical folds. For this reason, the normalized arc length can probably be used to identify
32 domes and basins in the field, even if these structures are not fully exposed in 3D.

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