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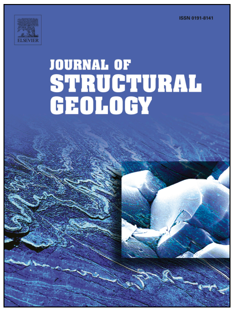


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# Formation of dome and basin structures: Results from scaled experiments using non-linear rock analogues

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**Abstract:**

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

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