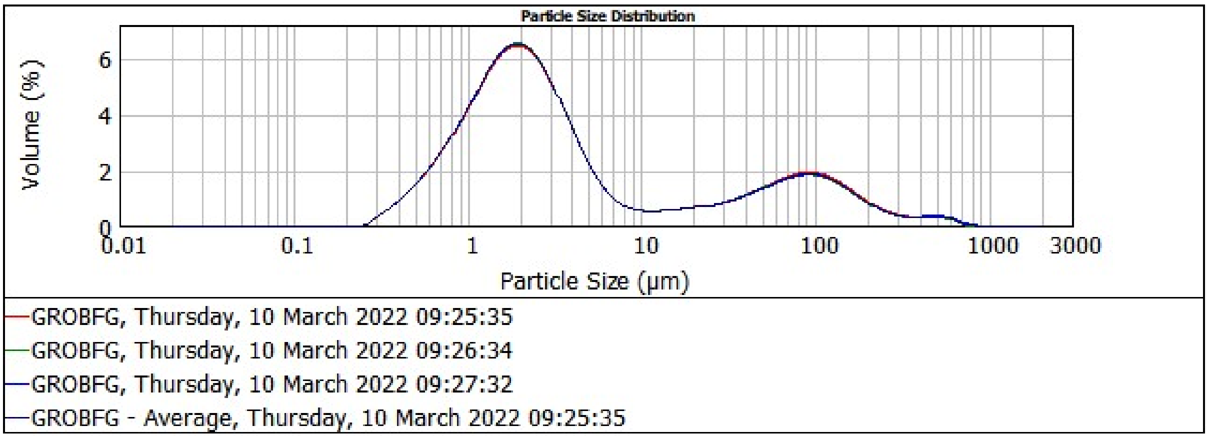
Supplementary for “Dissolution-precipitation creep in polymineralic granitoid shear zones in experiments part II: Rheological parameters”

Supplementary 1: Grain size analysis starting material Type III



Supplementary Figure 1: Grain size analysis from Mastersizer for fine-grained gouge material. All material was sieved and afterwards separated by Atterberg sedimentation such that the larger grain sizes, especially grain sizes of >20 µm must be due to clustering in suspension. Note also the volume-% on y-axis.

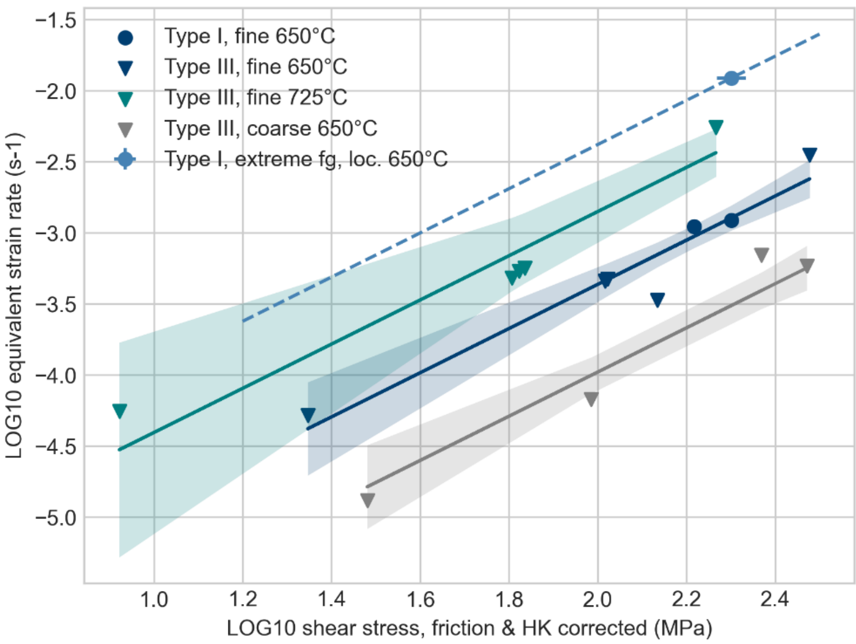
Supplementary 2: HK-correction impact on flow law parameter calculations

The Holyoke and Kronenberg (2010) correction for our experimental data has been discussed in the main text to be not appropriate, due to the very low stresses in the experiments. Here we still verify that even if applied, there would be no change for the calculated values.

The correction for the solid salt assembly (SSA) is formulated as:

$\sigma_{gas} = 0.73 \times \sigma_{GriggsSSA} - 48$ MPa +/−30 MPa

We neglect the constant subtraction part of the equation to avoid negative values. The correction equation becomes $\sigma_{gas} = 0.73 \times \sigma_{GriggsSSA}$, which is the same form as the equation for the molten salt cell: $\sigma_{gas} = 0.73 \times \sigma_{GriggsMSA}$. We assume we can do so, as the systematic shift by 48 MPa would not change the slope (Supplementary Fig. 2.2). The slopes calculated for the respective datasets were *n* = 1.5+/-0.5 for fine-grained exp. at 650°C, *n* = 1.4+/-1.0 for fine-grained exp. at 725°C and *n* = 1.8+/-0.4 for coarse-grained exp. at 650°C. These values are the same within the last digits to values shown in the main text (*n* = 1.47, 1.49 and 1.81 respectively).



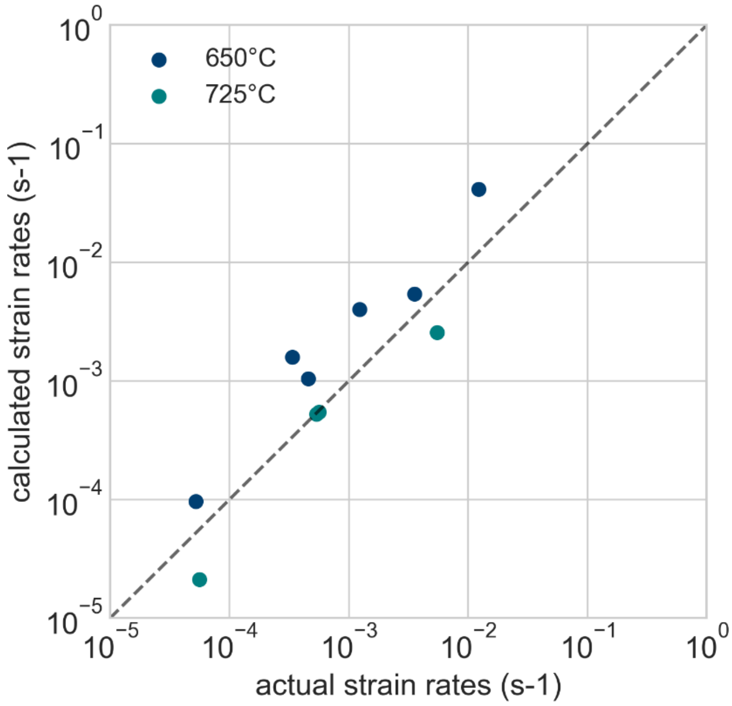
Supplementary Figure 2: Plot for n-value calculation with uncertainties, where shear stress is corrected with the Holyoke and Kronenberg (HK) correction for a molten salt cell.

Supplementary 3: Example error calculations

Supplementary Table 1: Example calculations for the ranges of shear strain rates depending on various shear zone thicknesses and angles. D = vertical shortening of the cylinder, ΔL = offset along the shear zone.

Shear zone thickness (µm)	**Shear angle (°)**	**D vertical (mm)**	**ΔL (mm)**	**Time (h)**	**Shear strain γ**	**Shear strain rate $\dot{\gamma}$**
10	**30**	3.5	1.52	52	151	8.10E-04
10	**35**	3.5	1.64	52	164	8.78E-04
10	**45**	3.5	1.75	52	175	9.35E-04
50	**30**	3.5	1.52	52	30	1.62E-04
50	**35**	3.5	1.64	52	32	1.76E-04
50	**45**	3.5	1.75	52	35	1.87E-04
100	**30**	3.5	1.52	52	15	8.10E-05
100	**35**	3.5	1.64	52	16	8.78E-05
100	**45**	3.5	1.75	52	17	9.35E-05

Supplementary 4: Verification flow law parameters



Supplementary Figure 3: Actual and calculated strain rate values are plotted against each other. Calculated values are calculated with the flow law parameters used for extrapolations in the main text: n = 1.47, m = 1.66, Q = 167 kJ/mol, A = 49.4 MPa^{-n} μm^{m} s^{-1}.