

Supplement of Solid Earth, 9, 1141–1156, 2018
<https://doi.org/10.5194/se-9-1141-2018-supplement>
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Supplement of

Multiscale porosity changes along the pro- and retrograde deformation path: an example from Alpine slates

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Helium pycnometry

	Sample	Comment	Geometrical volume (cm³)	Mass (g)	Bulk density (g/cm³)	grain volume (cm³)	stdev. grain volume (cm³)	grain density (g/cm³)	stdev. grain density (g/cm³)	Porosity (vol%)	stdev. Porosity (vol%)
	<i>B #1</i>		4.48	11.97	2.67	4.32	0.00	2.77	0.00	3.65	0.00
	<i>B #2</i>		4.17	11.20	2.69	4.05	0.00	2.77	0.00	2.96	0.00
<i>total of layers average separate layers</i>	<i>B total</i>		8.65	23.16	2.68	8.37	0.00	2.77	0.00	3.32	0.00
	<i>B</i>		4.33	11.58	2.68	4.18	0.00	2.77	0.00	3.31	0.00
	<i>C #1</i>		4.88	12.59	2.58	4.55	0.00	2.76	0.00	6.65	0.00
	<i>C #2</i>		4.86	12.39	2.55	4.48	0.01	2.77	0.00	7.82	0.00
<i>total of layers average separate layers</i>	<i>C total</i>		9.74	24.98	2.56	9.05	0.00	2.76	0.00	7.03	0.00
	<i>C</i>		4.87	12.49	2.56	4.52	0.01	2.76	0.00	7.24	0.00
	<i>D #1</i>		13.81	37.75	2.73	13.72	0.01	2.75	0.00	0.67	0.00
	<i>D #2</i>		12.38	33.75	2.73	12.30	0.01	2.74	0.00	0.65	0.00
<i>average separate layers</i>	<i>D</i>		13.10	35.75	2.73	13.01	0.01	2.75	0.00	0.66	0.00
	<i>E #1</i>		3.99	10.78	2.70	3.90	0.00	2.77	0.00	2.27	0.00
	<i>E #2</i>		5.09	13.72	2.69	4.95	0.00	2.77	0.00	2.85	0.00
<i>total of layers average separate layers</i>	<i>E total</i>		9.08	24.50	2.70	8.83	0.00	2.78	0.00	2.77	0.00
	<i>E</i>		4.54	12.25	2.70	4.42	0.00	2.77	0.00	2.56	0.00
	<i>F #1</i>		10.24	27.04	2.64	10.02	0.00	2.70	0.00	2.11	0.00
	<i>F #2</i>		9.54	25.38	2.66	9.43	0.00	2.69	0.00	1.13	0.00
<i>average separate layers</i>	<i>F</i>		9.89	26.21	2.65	9.73	0.00	2.69	0.00	1.62	0.00
	<i>G #1</i>	<10% chamber fill	3.45	9.22	2.67	3.33	0.00	2.77	0.00	3.51	0.00
	<i>G #2</i>	<10% chamber fill	2.30	6.17	2.68	2.24	0.00	2.76	0.00	2.98	0.00
	<i>G #3</i>	<10% chamber fill	1.43	3.80	2.67	1.38	0.00	2.75	0.00	3.15	0.01
	<i>G #4</i>	<10% chamber fill	1.47	3.93	2.67	1.42	0.00	2.76	0.00	3.20	0.01
	<i>G #5</i>	<10% chamber fill	1.62	4.20	2.59	1.52	0.00	2.76	0.00	5.99	0.01
	<i>G #5</i>	duplo measurement	1.62	4.19	2.59	1.52	0.00	2.76	0.00	6.06	0.01
	<i>G #6</i>	<10% chamber fill	1.48	3.91	2.65	1.42	0.00	2.75	0.00	3.73	0.01

	<i>G #7</i>	<10% chamber fill	0.94	2.46	2.62	0.90	0.00	2.75	0.00	4.57	0.01
<i>total of layers</i>	<i>G total</i>		12.68	33.69	2.66	12.15	0.00	2.77	0.00	4.23	0.00
<i>average separate layers</i>	<i>G</i>		1.81	4.81	2.65	1.74	0.00	2.76	0.00	4.15	0.01
	<i>G1 #A</i>	<10% chamber fill	1.39	3.65	2.62	1.32	0.00	2.76	0.00	5.18	0.01
	<i>G1 #B</i>	<10% chamber fill	2.85	7.72	2.71	2.81	0.00	2.75	0.00	1.42	0.01
	<i>G1 #C</i>	<10% chamber fill	1.14	3.03	2.65	1.10	0.00	2.76	0.00	3.80	0.00
<i>total of layers</i>	<i>G1 total</i>	<10% chamber fill	5.39	14.41	2.67	5.23	0.00	2.76	0.00	3.04	0.00
<i>average separate layers</i>	<i>G1</i>	<10% chamber fill	1.80	4.80	2.66	1.74	0.00	2.76	0.00	3.47	0.01
	<i>G2 #A</i>	<10% chamber fill	1.00	2.66	2.67	0.97	0.00	2.75	0.01	2.79	0.01
	<i>G2 #B</i>	<10% chamber fill	0.65	1.70	2.60	0.62	0.00	2.74	0.00	5.16	0.02
	<i>G2 #C</i>	<10% chamber fill	2.20	5.89	2.68	2.15	0.00	2.75	0.00	2.24	0.00
	<i>G2 #D</i>	<10% chamber fill	0.39	0.99	2.57	0.36	0.00	2.74	0.01	6.29	0.03
	<i>G2 #E</i>	<10% chamber fill	0.83	2.19	2.65	0.79	0.00	2.76	0.01	4.14	0.01
<i>total of layers</i>	<i>G2 total</i>		5.06	13.43	2.66	4.87	0.00	2.76	0.00	3.62	0.00
<i>average separate layers</i>	<i>G2</i>		1.01	2.69	2.63	0.98	0.00	2.75	0.00	4.12	0.01
	<i>H #1</i>		7.34	19.54	2.66	7.14	0.00	2.74	0.00	2.74	0.00
	<i>H #2</i>		5.93	15.91	2.68	5.82	0.00	2.73	0.00	1.81	0.00
<i>total of layers</i>	<i>H total</i>		13.27	35.45	2.67	12.96	0.00	2.74	0.00	2.40	0.00
<i>average separate layers</i>	<i>H</i>		6.64	17.73	2.67	6.48	0.00	2.73	0.00	2.28	0.00

Table S1. Overview of all He-pycnometry data.

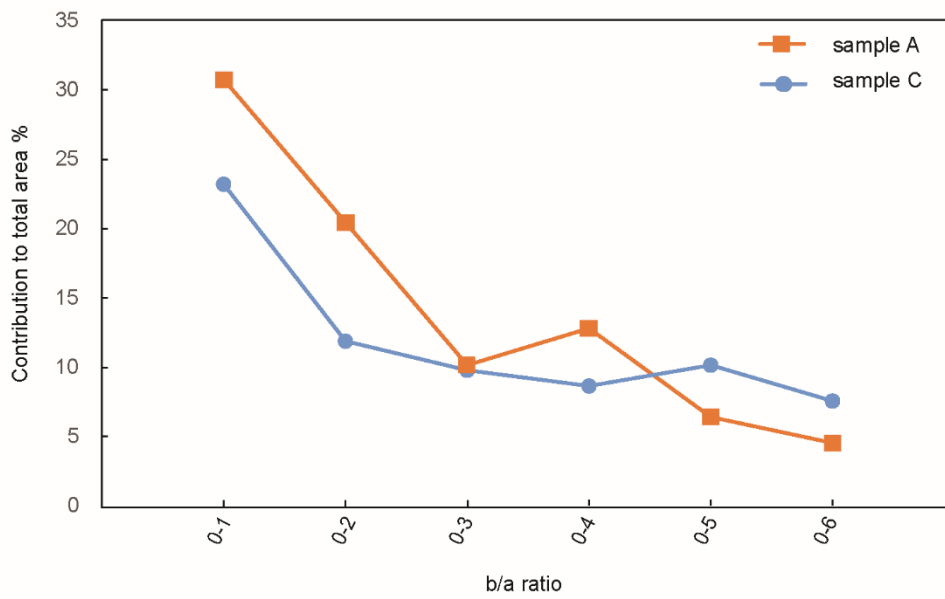


Figure S1. Plot of minor/major axis (b/a ratio) vs. the area % shows that fractures are defined from a ratio of <0.3. To be sure that all pores are microfractures a ratio of <0.2 is chosen.

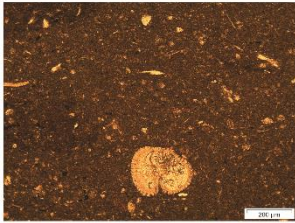
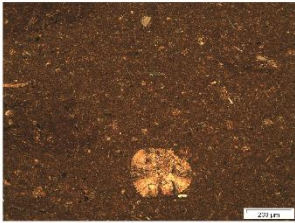
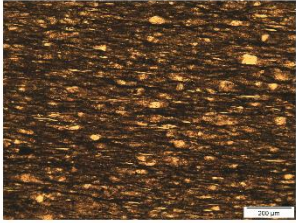
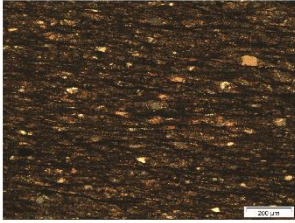
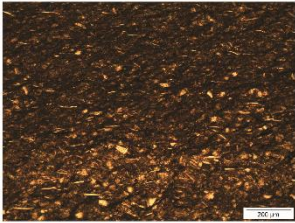
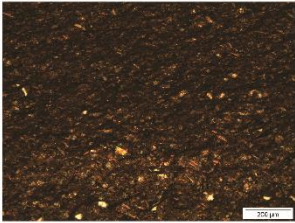
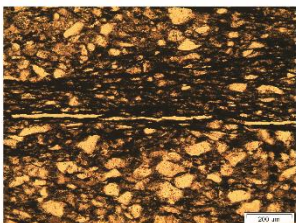
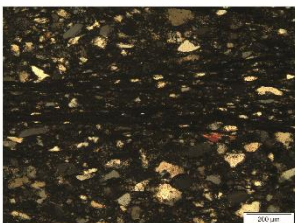
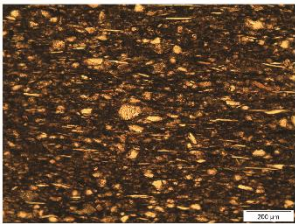
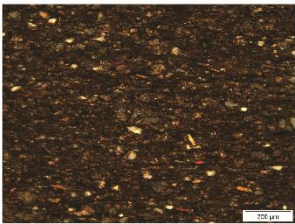
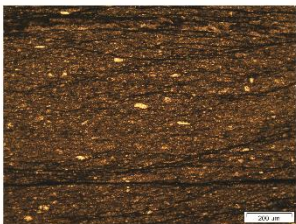
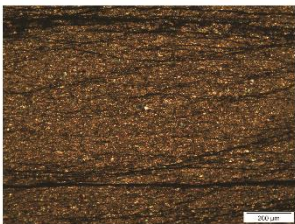
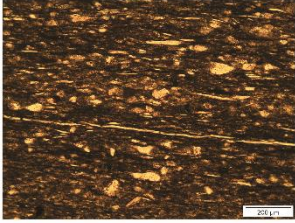
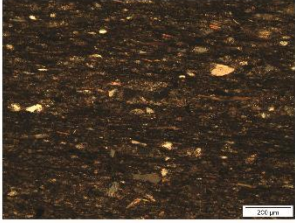
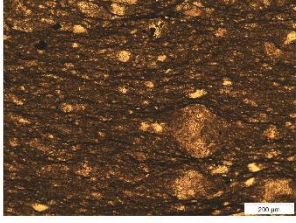
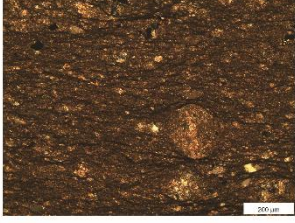
	Plane polarised light	Cross polarised light	Description		Plane polarised light	Cross polarised light	Description
A- 16W01			Weakly deformed homogenous slate with fine grained mud rich matrix. Fossils filled in with diagenetic cement. Detrital micas are unorientated and show no alignment.	E- 17LP06			Collected sub-surface. Higher strained sample than sub-surface sample 17LP04. Quartz grains are elongated, mica define a mature spaced cleavage.
B- 16SCH01B			Micas are aligned bedding parallel. Oblique to bedding forms secondary foliation. Alteration of mica-rich and silt-rich (quartz) layers.	F- 16KR4			Quartz-rich sample with intervals of finer grained micas, which are strongly aligned within the bedding plane.
C- 16EN1A			Spaced cleavage of pressure solution seams starts to form by connection of micas in the bedding plane. Alteration of mica-rich layers and silt-rich layers.	G- 16W11A			Relatively fine grained sample with oblique to the bedding a secondary foliation defined by the alignment of micas. High-strain end-member.
D- 17LP04			Collected sub-surface. Strong alignment of mica in the bedding plane. Quartz grains are slightly elongated.	H- 16MM01			Fine grained matrix with quartz porphyroblasts showing pressure shadows. High-strain end-member.

Figure S2. Photomicrographs from thin sections in both plane and cross-polarised light give an overview of microstructures from all used samples in this study.

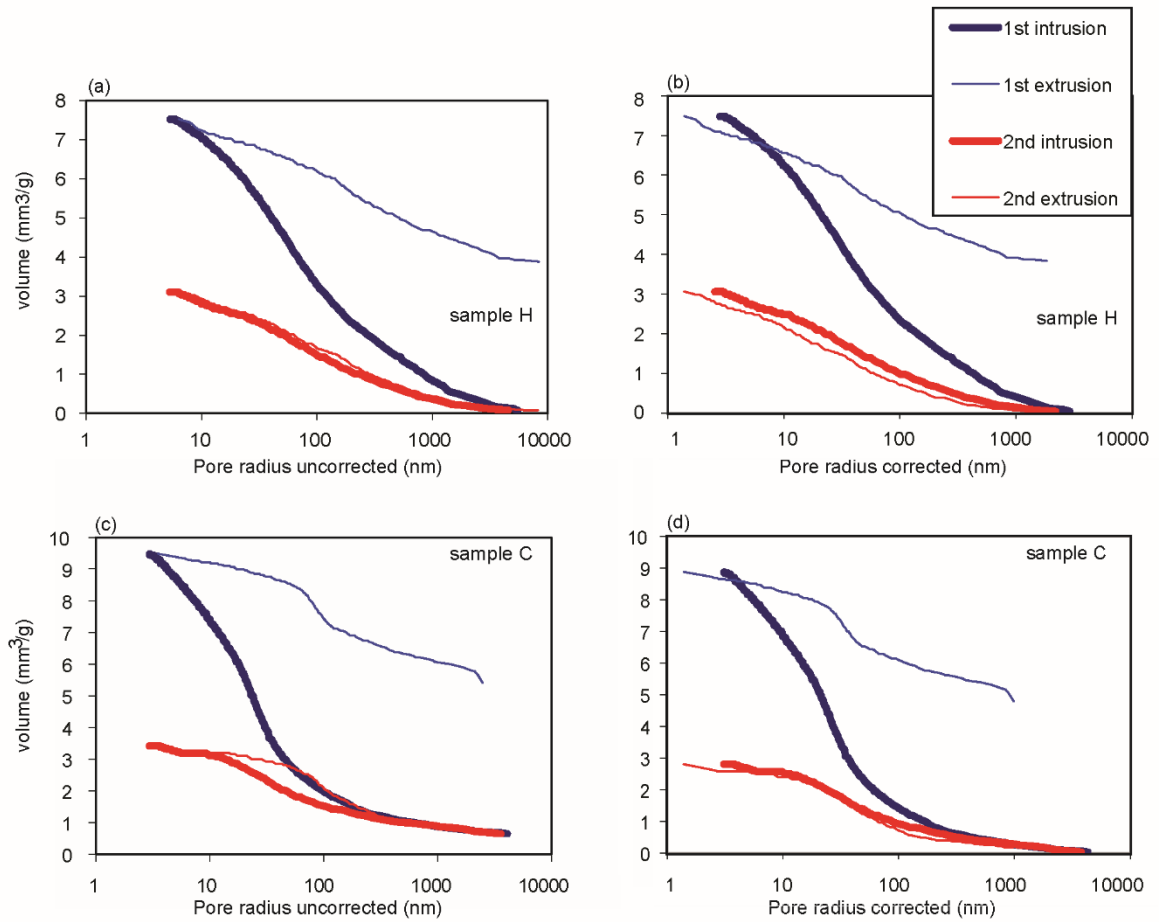


Figure S3. Mercury Intrusion Porosimetry data showing 1st and 2nd intrusion and extrusion curve uncorrected and corrected for the contact angle in the extrusion data. a-b) sample H shows that in the corrected data the hysteresis between the 2nd intrusion and extrusion cycle slightly increases. c-d) sample C shows that in the corrected data the hysteresis between the 2nd intrusion and extrusion cycle reduces.