Supplementary Material

This section contains two tables and four figures that display details and may be of interest to some readers.

Table S1. List of additional Triassic quartzite samples with location, Swiss coordinates and (0001) pole figure maxima (in multiples of a random distribution). These samples are not referred to in the text but pole figures determined from neutron diffraction data are shown in Figure S3.

Sample #	Place	Coord.	(mrd)
Brg768	Roticcio	769.0/136.8	3.8
Brg 1102	Casaccia	771.8/139.7	6.9
Brg 1104	Casaccia	771.9/139.8	6.9
Brg1134	Val Turba	767.9/142.9	6.4
Brg1144	Alpascela	769.4/141.2	3.0
Brg1161	Lavinair	773.2/138.2	3.3
Sci720	Laira	759.6/136.0	2.1
Sci1270	Gletscherhorn	762.8/138.9	1.5

Table S2. EBSD twin boundary statistics with individual scans (Compare with Table 2 in main paper).

Sample Scan	Area (mm × mm) (steps) (micron)	Total Data Used (K)	Selected Data (K)	Twin Boundaries (K)	Inverse Ratio 10^{-2}
		A Triassic Quartzites			
Brg568-1	1.0×1.0 (2)	296	292	8	2.6
Brg568-2	1.0×1.0 (2)	298	295	8	2.7
Brg641-1	1.0×1.0 (2)	293	284	2	0.9
Brg641-2	1.0×1.0 (2)	295	280	3	0.9
Brg641-3	1.0×1.0 (2)	295	280	2	0.7
Brg980-1	2.0×2.0 (2.2)	862	629	10	1.6
Brg981-2	1.0×1.0 (2)	331	314	7	2.2
Brg981-4	1.3×1.3 (2)	435	416	7	1.8
Brg1126-1	1.0×1.0 (1.2)	829	770	10	1.3
Brg1126-2	1.0×1.0 (1.2)	831	770	14	1.9
Brg1127-3	1.0×1.0 (1.5)	504	468	7	1.5
Brg1127-5	1.0×1.0 (1.2)	797	648	5	0.7
Brg1135-1	1.2×1.2 (2)	391	204	5	2.3
Brg1135-2	1.4×1.4 (2)	491	393	12	3.0
Brg1137-1	1.0×1.0 (2)	230	219	14	6.2
Brg1137-2	1.0×1.0 (2)	222	188	8	4.4
Brg1477-1	1.3×1.3 (2)	401	300	4	1.3
Brg1477-2	1.2×1.2 (2)	390	314	5	1.7
Brg1618-1	0.5×0.5 (0.8)	426	337	7	2.1
Brg1618-2	0.7×0.7 (0.9)	532	418	9	2.2
Brg1618-3	2.0×2.0 (2)	958	502	14	2.9
Brg1643b-4	1.0×1.0 (1.2)	637	615	7	1.1
Brg1643b-5	1.0×1.0 (1.2)	644	624	5	0.8
Brg1643b-6	1.0×1.0 (1.2)	796	726	4	0.6
Brg1643b-7	1.0×1.0 (1.2)	777	664	4	0.6
Sci638-1	1.7×1.7 (3)	311	306	13	4.1
Sci638-2	1.0×1.0 (2)	230	227	9	3.8
Sci638-3	1.0×1.0 (2)	228	223	8	3.7
Sci690-1a	1.0×1.0 (2)	220	217	4	1.7
Sci690-2	0.8×0.8 (2)	148	146	2	1.1
Sci690-3	1.0×1.0 (2)	224	220	3	1.4
Sci881-1	1.0×1.0 (2)	280	216	10	4.5

Sci881-2	1.0×1.0 (2)	273	245	7	2.9
Sci881-3	1.0×1.0 (2)	272	215	9	4.0
Sci881-4	1.0×1.0 (1.3)	650	437	12	2.7
		B Quartz Layers			
Brg407-1	0.4×0.4 (0.8)	290	289	2	0.8
Brg407-2	0.9×0.9 (1.4)	388	381	4	1.1
Brg603-1	1.0×1.0 (2)	277	275	4	1.6
Brg603-2	1.0×1.0 (2)	286	286	6	2.1
Brg1167-1	1.0×1.0 (1.2)	780	642	7	1.1
Brg1167-2	1.0×1.0 (1.2)	788	561	6	1.1
Brg1167a-1	1.5×1.5 (3)	263	180	3	1.4
Brg1520b-1	1.3×1.3 (2)	394	344	1	0.2
Brg1520b-2	1.3×1.3 (2)	410	385	2	0.5
Brg1524b-1	0.9×0.9 (1.5)	346	313	5	1.5
Brg1524b-2	1.2×1.2 (1.5)	598	504	5	1.0
Sci292-2	3.6×3.6 (0.5)	521	333	1	0.3
Sci292-7	0.3×0.3 (0.4)	442	217	1	0.3
Sci763-1	1.0×1.0 (2)	270	269	2	0.7
Sci763-2	1.0×1.0 (2)	271	270	2	0.6
Sci763b-1	1.0×1.0 (2)	294	288	3	1.2

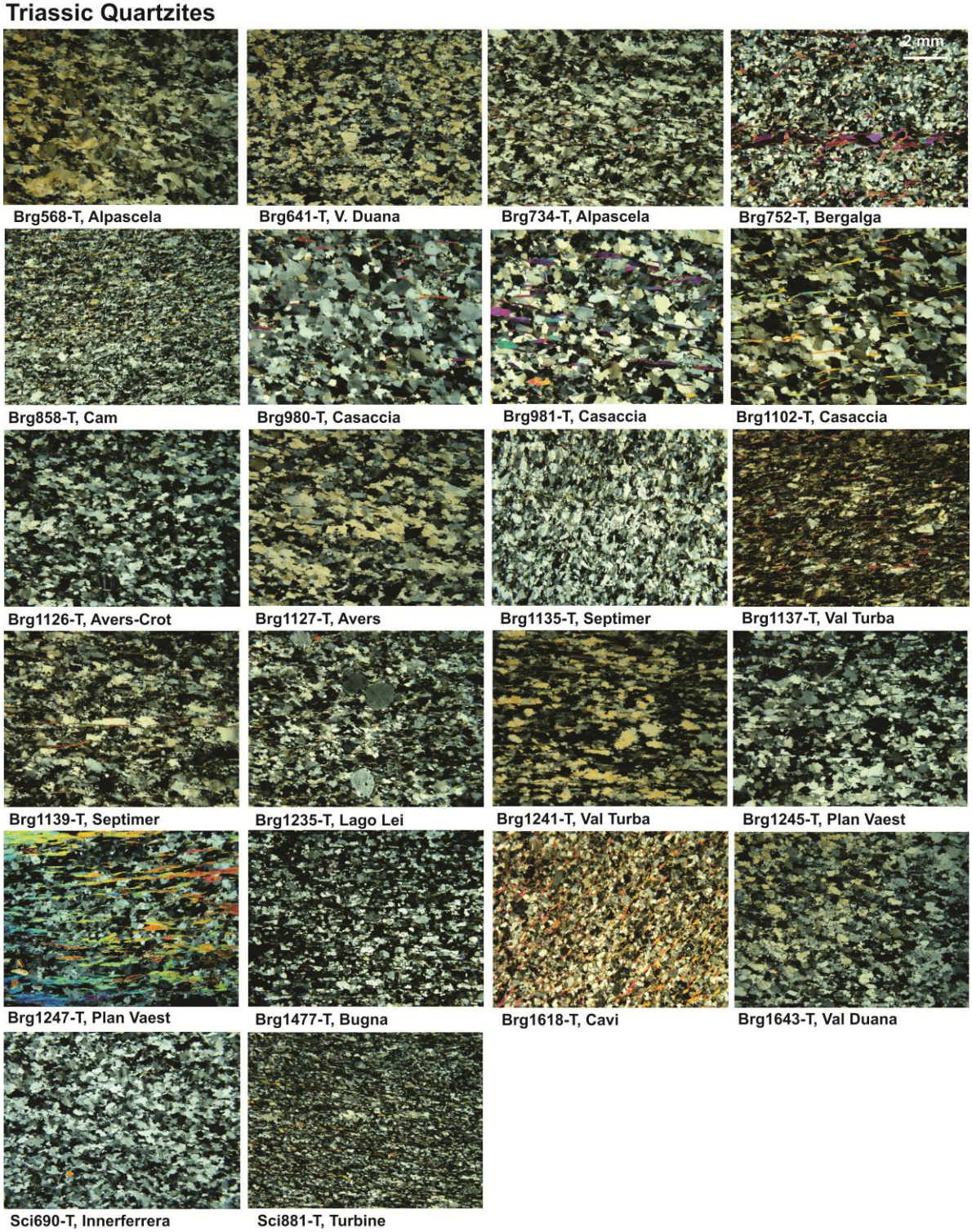


Figure S1. Optical images of microstructures of Triassic quartzites listed in Table 1. Crossed polarizers. Scale bar is indicated on top right.

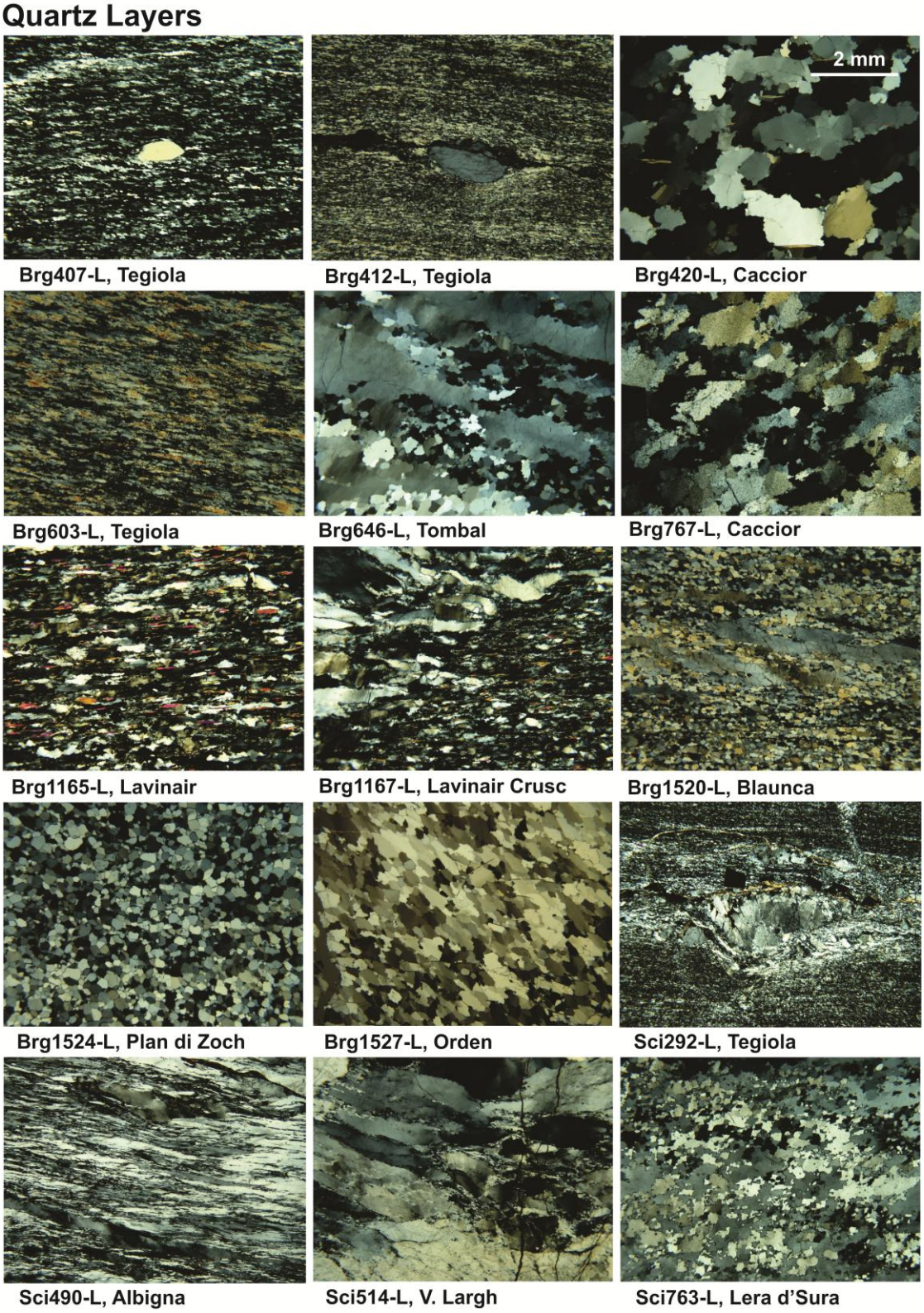


Figure S2. Optical images of quartz layers listed in Table 1. Crossed polarizers. Scale bar is indicated on top right.

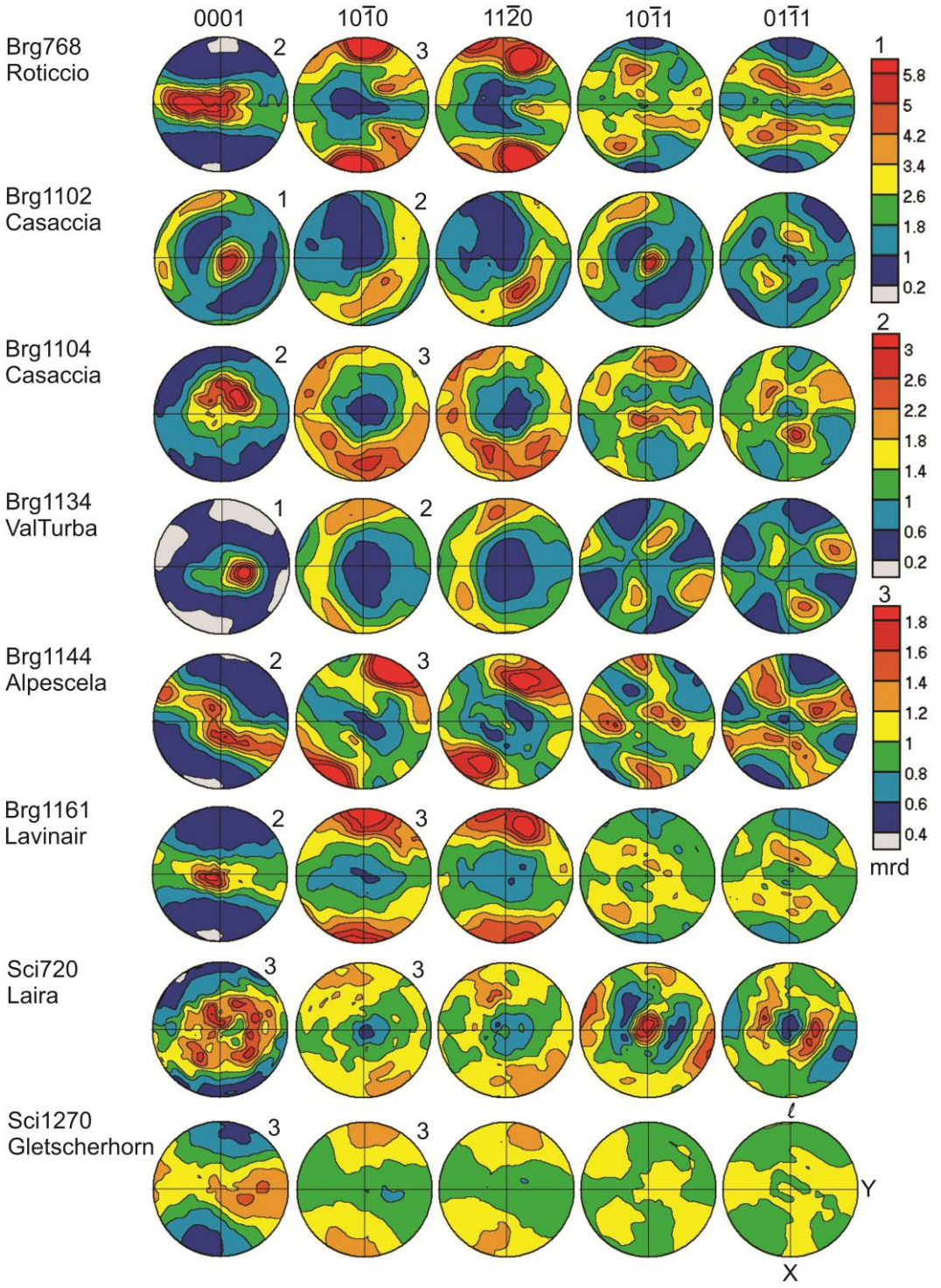
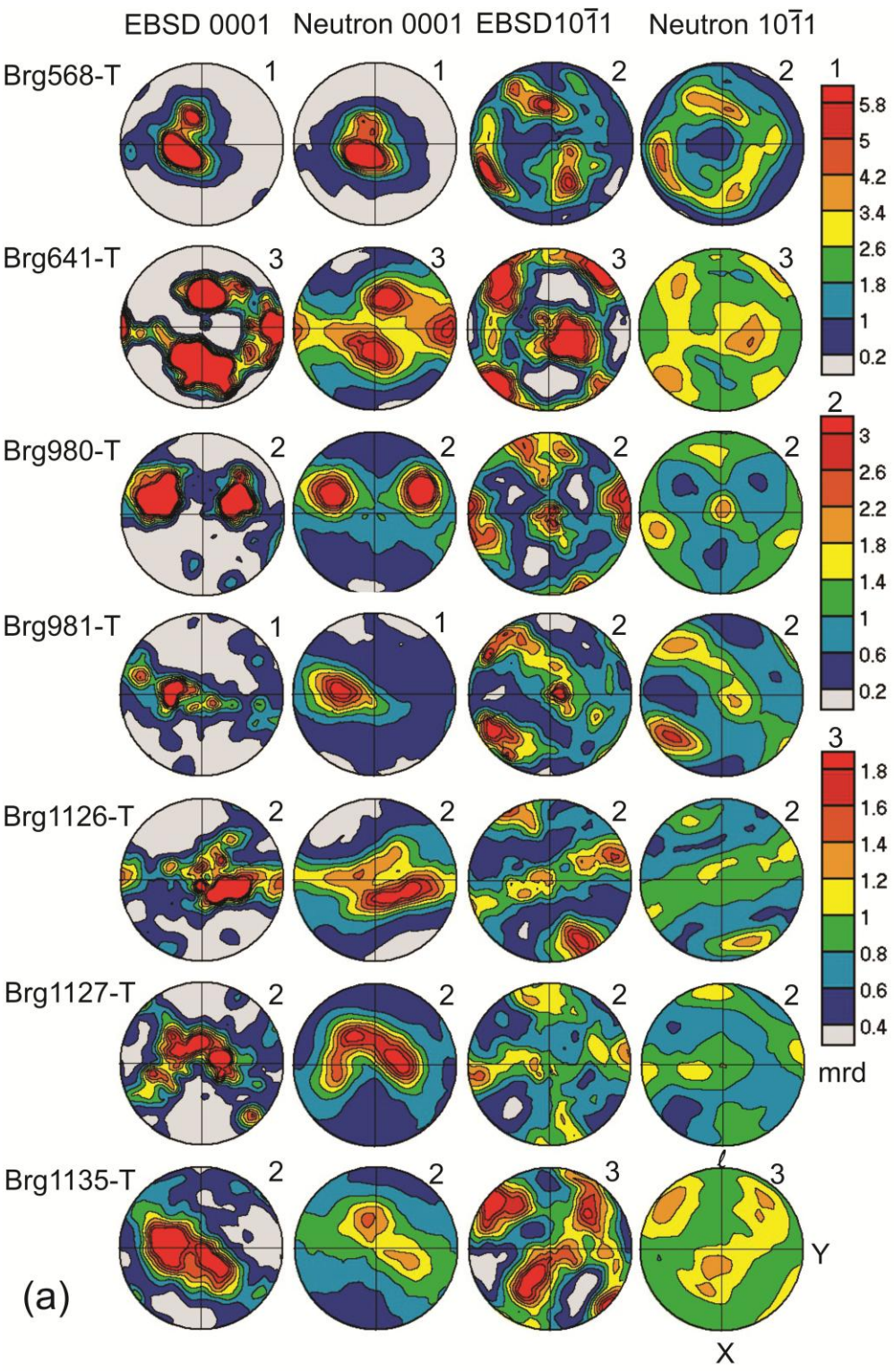


Figure S3. Neutron diffraction pole figures of samples not included in the main text. Approximate localities are indicated under sample numbers. Equal area projection on the schistosity plane. Lineation is *l*. Numbers on top right of pole figures indicate which pole density scale was used (in mrd).


EBSD 0001
Neutron 0001
EBSD10$\bar{1}$1
Neutron 10$\bar{1}$1
Brg568-T
Brg641-T
Brg980-T
Brg981-T
Brg1126-T
Brg1127-T
Brg1135-T
1
5.8
5
4.2
3.4
2.6
1.8
1
0.2
2
3
2.6
2.2
1.8
1.4
1
0.6
0.2
3
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
mrd
Y
X
(a)

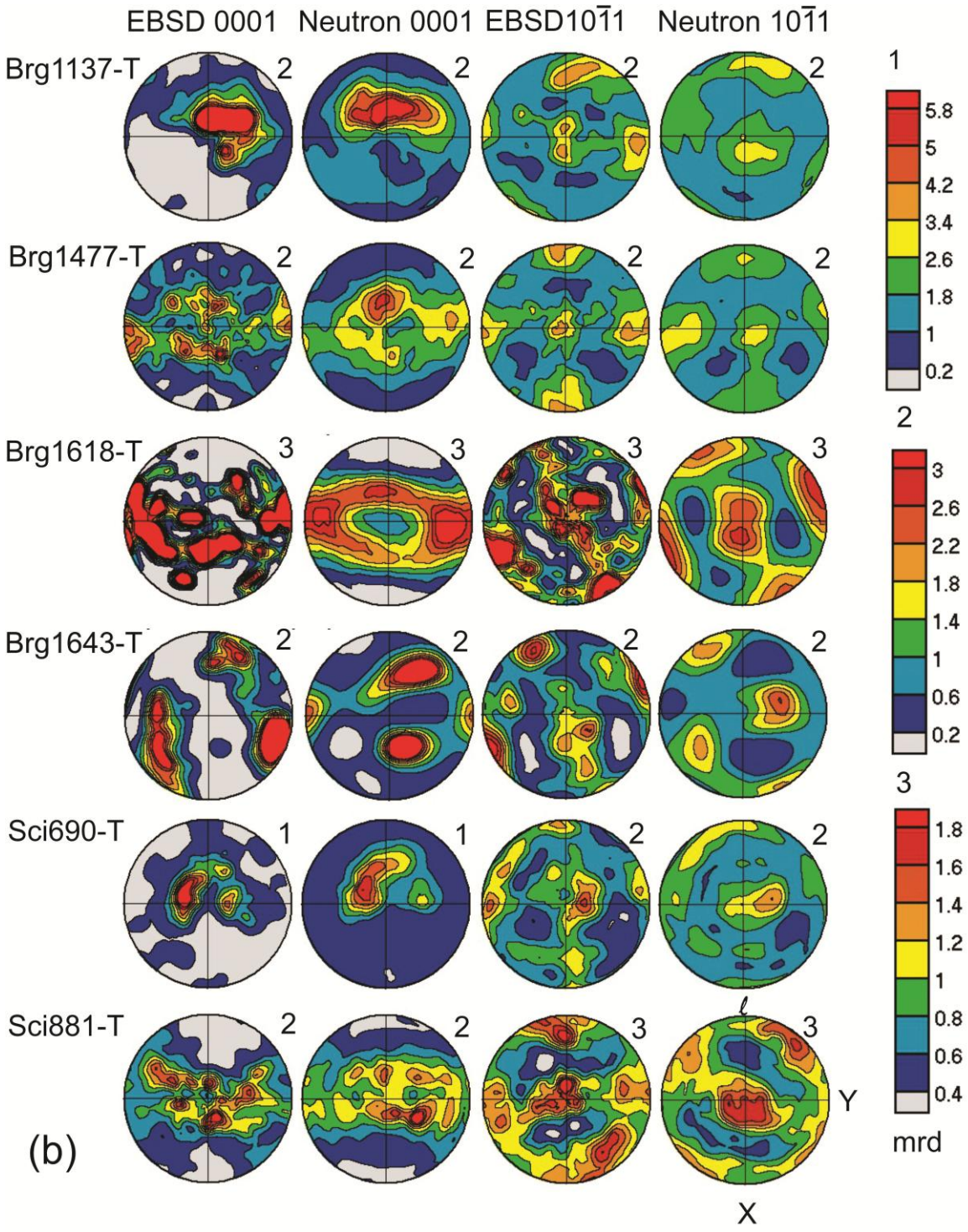


Figure S4. Comparison of (0001) and (10$\bar{1}$1) pole figures of quartz for Triassic quartzites and EBSD and neutron diffraction. Selected cases are also shown in Figure 12. Equal area projection on the schistosity plane. Lineation is *l*. Numbers on top right of pole figures indicate which pole density scale was used (in mrd).

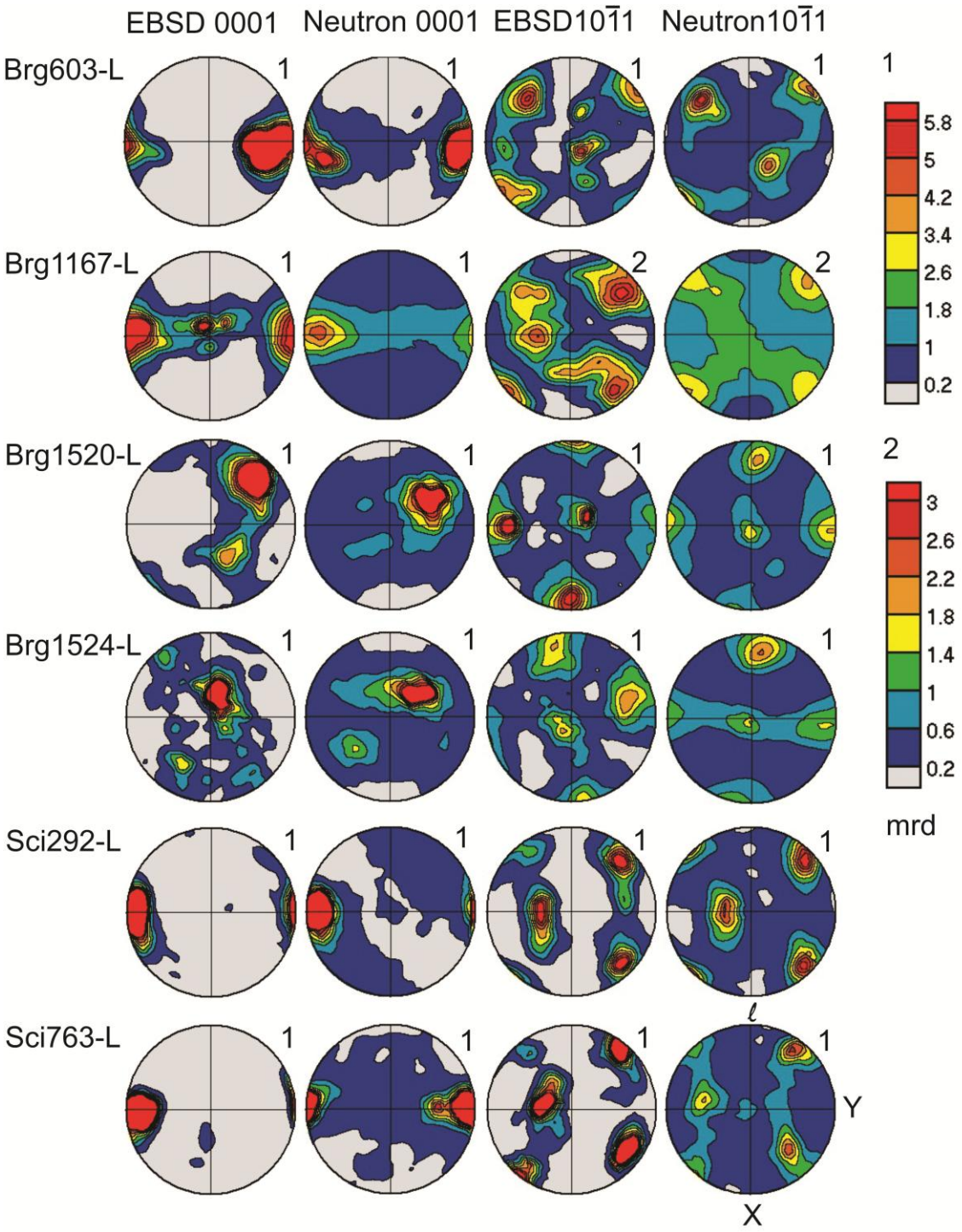


Figure S5. Comparison of (0001) and (10$\bar{1}$1) pole figures of quartz for quartz layers and EBSD and neutron diffraction. Selected cases are also shown in Figure 12. Equal area projection on the schistosity plane. Lineation is *l*. Numbers on top right of pole figures indicate which pole density scale was used (in mrd).