Supplementary material

Table S1: Evolution of the unit-cell parameters of chlorite with pressure, as obtained by single-crystal X-ray diffraction data (*e.s.d.* in parentheses).

Step	*P* (GPa)	*a* (Å)	*b* (Å)	*c* (Å)	*α* (°)	*β* (°)	*γ* (°)	*V* (Å³)
0	0.50(5)	5.34487(13)	9.2548(12)	14.265(5)	89.864(18)	97.119(8)	89.986(5)	700.2(3)
1	0.60(5)	5.34442(13)	9.2541(11)	14.273(5)	89.876(16)	97.116(8)	89.988(4)	700.5(3)
2	0.73(5)	5.34060(13)	9.2476(11)	14.266(5)	89.863(18)	97.121(8)	89.984(4)	699.1(3)
3	0.91(5)	5.33763(14)	9.2418(11)	14.248(5)	89.846(17)	97.121(8)	89.982(5)	697.4(3)
4	1.06(5)	5.33512(14)	9.2384(12)	14.238(5)	89.871(19)	97.118(9)	89.983(5)	696.4(3)
5	1.28(5)	5.33245(14)	9.2323(11)	14.227(5)	89.854(17)	97.109(8)	89.987(5)	695.0(3)
6	1.44(5)	5.32977(13)	9.2277(12)	14.210(5)	89.841(18)	97.122(8)	89.982(5)	693.5(3)
7	1.64(5)	5.32683(15)	9.2225(12)	14.193(5)	89.833(18)	97.113(9)	89.986(5)	691.9(3)
8	1.91(5)	5.32315(15)	9.2159(12)	14.175(5)	89.829(19)	97.111(9)	89.985(5)	690.0(3)
9	2.14(5)	5.31952(17)	9.2094(14)	14.160(6)	89.82(2)	97.111(10)	89.981(6)	688.4(3)
10	2.31(5)	5.31578(17)	9.2036(14)	14.151(6)	89.83(2)	97.108(10)	89.981(6)	687.0(3)
11	2.56(5)	5.31070(16)	9.1949(14)	14.136(6)	89.81(2)	97.114(10)	89.978(5)	685.0(3)
12	2.88(5)	5.30643(17)	9.1876(14)	14.115(6)	89.81(2)	97.101(10)	89.985(6)	682.9(3)
13	3.06(5)	5.30143(18)	9.1789(13)	14.108(6)	89.79(2)	97.089(11)	89.979(6)	681.2(3)
14	3.38(5)	5.29658(19)	9.1697(15)	14.066(7)	89.74(2)	97.093(11)	89.979(6)	677.9(4)
15	3.67(5)	5.2916(2)	9.1605(15)	14.061(6)	89.71(2)	97.067(12)	89.977(7)	676.4(4)
16	3.99(5)	5.2863(2)	9.1518(16)	14.038(7)	89.70(2)	97.062(13)	89.974(7)	674.0(4)
17	4.32(5)	5.2805(2)	9.1429(16)	14.007(7)	89.67(2)	97.061(13)	89.977(7)	671.1(4)
18	4.80(5)	5.2735(4)	9.1290(2)	13.943(9)	89.52(3)	97.020(19)	89.970(12)	666.2(5)
19	5.14(5)	5.2681(4)	9.1190(2)	13.971(9)	89.55(3)	96.987(18)	89.977(11)	666.2(5)
20	5.47(5)	5.2623(4)	9.1090(2)	13.944(10)	89.47(4)	96.980(19)	89.971(12)	663.4(5)
21	5.84(5)	5.2573(4)	9.1020(3)	13.927(10)	89.43(4)	96.88(2)	89.982(13)	661.6(6)
22	6.11(5)	5.2512(3)	9.00938(17)	13.931(7)	89.42(3)	96.913(14)	89.974(8)	660.4(4)
23	6.28(5)	5.2479(2)	9.0888(16)	13.917(6)	89.89(2)	96.885(13)	89.971(8)	659.0(3)
24	6.57(5)	5.2441(8)	9.0880(3)	13.903(12)	89.32(4)	97.06(4)	90.010(2)	657.5(6)
25	7.11(5)	5.2333(3)	9.0638(16)	13.869(12)	89.21(2)	96.791(13)	89.973(8)	653.2(4)
26	7.54(5)	5.2253(2)	9.0513(17)	13.857(7)	89.08(2)	96.701(13)	89.969(8)	650.8(4)
27	7.96(5)	5.2186(2)	9.0411(16)	13.833(6)	88.91(2)	96.633(12)	89.962(7)	648.2(3)
28	8.33(5)	5.2110(3)	9.0290(2)	13.789(10)	88.67(4)	96.467(17)	89.958(10)	644.4(5)
29	8.84(5)	5.2093(6)	9.0110(5)	13.620(20)	87.26(8)	95.16(4)	90.02(2)	636.0(1)
30	9.16(5)	5.2058(6)	9.0208(4)	13.560(7)	90	97.34(3)	90	631.6(2)
31	9.16(5)	5.2170(13)	9.0430(16)	13.548(13)	90	97.49(5)	90	633.7(6)
32	9.42(5)	5.2113(4)	9.0249(4)	13.515(5)	90	97.397(17)	90	630.4(2)
33	9.70(5)	5.2087(4)	9.0199(4)	13.505(5)	90	97.412(19)	90	629.2(2)
34	10.02(5)	5.2003(4)	9.0041(4)	13.487(5)	90	97.393(16)	90	626.3(2)
35	10.35(5)	5.1961(4)	8.9980(4)	13.467(4)	90	97.404(17)	90	624.4(2)
36	10.66(5)	5.1900(4)	8.9868(4)	13.460(5)	90	97.385(16)	90	622.6(2)
37	10.98(5)	5.1857(4)	8.9802(4)	13.440(5)	90	97.394(17)	90	620.7(2)
38	11.30(5)	5.1790(4)	8.9675(4)	13.421(5)	90	97.404(17)	90	618.1(2)
39	11.64(5)	5.1730(4)	8.9579(4)	13.414(5)	90	97.397(18)	90	616.4(2)
40	11.96(5)	5.1679(4)	8.9479(4)	13.399(5)	90	97.388(17)	90	614.5(2)

41	12.31(5)	5.1606(4)	8.9358(4)	13.372(5)	90	97.386(18)	90	611.5(2)
42	12.58(5)	5.1543(4)	8.9247(4)	13.349(4)	90	97.404(17)	90	609.0(2)
43	12.48(5)	5.1585(4)	8.9333(4)	13.358(5)	90	97.418(17)	90	610.4(2)
44	12.95(5)	5.1511(4)	8.9192(4)	13.340(5)	90	97.389(17)	90	607.8(2)
45	13.37(5)	5.1451(4)	8.9078(4)	13.323(5)	90	97.404(18)	90	605.5(2)
46	13.77(5)	5.1376(5)	8.8984(5)	13.301(7)	90	97.42(2)	90	603.0(3)
47	14.15(5)	5.1326(4)	8.8888(4)	13.291(6)	90	97.400(19)	90	601.3(3)
48	14.50(5)	5.1259(4)	8.8764(4)	13.276(5)	90	97.398(17)	90	599.0(2)
49	15.40(5)	5.1109(6)	8.8540(4)	13.257(6)	90	97.44(3)	90	594.8(3)
50	15.59(5)	5.1044(4)	8.8429(2)	13.229(4)	90	97.472(16)	90	592.06(18)
51	15.80(5)	5.1032(4)	8.8405(2)	13.226(4)	90	97.468(15)	90	591.61(17)
52	16.08(5)	5.1002(4)	8.8342(2)	13.218(3)	90	97.465(13)	90	590.49(15)
53	16.48(5)	5.0945(4)	8.8248(2)	13.210(3)	90	97.444(14)	90	588.88(16)
54	16.87(5)	5.0886(4)	8.8155(3)	13.183(3)	90	97.485(15)	90	586.33(16)
55	17.32(5)	5.0818(4)	8.8020(3)	13.166(4)	90	97.449(15)	90	583.95(17)
56	17.86(5)	5.0774(4)	8.7945(3)	13.144(4)	90	97.494(15)	90	581.92(17)
57	18.42(5)	5.0702(4)	8.7801(2)	13.128(3)	90	97.474(14)	90	579.44(15)
58	18.83(5)	5.0613(4)	8.7704(3)	13.118(4)	90	97.498(15)	90	577.52(17)
59	19.34(5)	5.0580(4)	8.7598(2)	13.102(4)	90	97.488(15)	90	575.58(16)
60	19.85(5)	5.0509(4)	8.7473(2)	13.086(3)	90	97.491(14)	90	573.22(16)
61	20.60(5)	5.0444(3)	8.7352(2)	13.061(3)	90	97.488(13)	90	570.62(14)

Table S2: Evolution of the crystal lattice parameters of chlorite in the H*P*H*T* experiment, obtained by single-crystal X-ray diffraction data (e.s.d. in parentheses).

Step	***T*** (K)	***P*** (GPa)	***a*** (Å)	***b*** (Å)	***c*** (Å)	***α*** (°)	***β*** (°)	***γ*** (°)	***V*** (Å³)
0	RT	0.0001	5.3427(3)	9.2522(7)	14.303(9)	89.419(18)	97.529(17)	90.036(6)	700.9(5)
1	428	1.40(5)	5.3441(3)	9.2562(7)	14.195(8)	89.452(16)	97.606(16)	90.033(5)	696.0(4)
2	600	1.49(5)	5.3432(4)	9.2573(8)	14.258(9)	89.209(19)	97.659(19)	90.043(7)	698.9(5)
3	600	2.15(5)	5.3324(4)	9.2329(7)	14.190(8)	89.313(17)	97.698(17)	90.017(6)	692.3(4)
4	600	2.68(5)	5.3238(3)	9.2195(6)	14.169(7)	89.197(14)	97.707(14)	90.015(5)	689.1(3)
5	600	3.04(5)	5.3193(4)	9.2120(7)	14.124(7)	89.180(16)	97.779(16)	90.022(6)	685.6(4)
6	600	3.27(5)	5.3162(3)	9.2042(7)	14.100(8)	89.200(17)	97.755(16)	90.016(6)	683.6(4)
7	600	3.57(5)	5.3115(3)	9.1953(7)	14.096(9)	89.148(18)	97.790(17)	90.008(6)	682.0(4)
8	600	3.85(5)	5.3072(3)	9.1892(7)	14.075(7)	89.102(17)	97.793(16)	90.002(6)	680.0(4)
9	600	4.16(5)	5.3015(3)	9.1785(6)	14.050(7)	89.059(15)	97.867(15)	89.994(5)	677.1(4)
10	600	4.34(5)	5.2972(4)	9.1694(7)	14.030(8)	89.034(17)	97.910(16)	89.992(6)	674.9(4)
11	600	4.85(5)	5.2911(4)	9.1592(7)	14.016(8)	88.917(17)	97.946(16)	89.994(6)	672.6(4)
12	600	5.10(5)	5.2860(3)	9.1499(7)	14.041(6)	88.889(15)	97.919(14)	89.911(5)	672.5(3)
13	600	5.43(5)	5.2805(3)	9.1408(6)	14.034(6)	88.770(15)	97.981(14)	89.980(5)	670.7(3)
14	600	5.78(5)	5.2748(3)	9.1299(6)	14.018(6)	88.653(14)	98.029(13)	89.970(5)	668.3(3)
15	600	6.05(5)	5.2704(3)	9.1223(7)	14.006(6)	88.562(15)	98.069(14)	89.964(5)	666.5(3)
16	600	6.42(5)	5.2644(3)	9.1117(6)	13.974(6)	88.445(14)	98.162(13)	89.952(5)	663.3(3)
17	600	6.69(5)	5.2597(3)	9.1027(7)	13.978(7)	88.299(16)	98.261(15)	89.946(6)	662.0(3)
18	600	7.13(5)	5.2526(3)	9.0881(8)	13.971(6)	87.988(15)	98.439(13)	89.938(6)	659.3(3)
19	600	7.40(5)	5.2489(6)	9.0813(17)	13.960(13)	87.83(3)	98.66(3)	89.989(12)	657.4(7)

20	600	7.84(5)	5.2340(7)	9.0651(8)	13.606(13)	90	97.41(4)	90	640.2(6)
21	600	8.48(5)	5.2272(4)	9.0543(4)	13.587(8)	90	97.42(2)	90	637.7(4)
22	600	9.50(5)	5.2097(4)	9.0223(4)	13.544(7)	90	97.40(3)	90	631.3(3)
23	600	10.22(5)	5.1996(4)	9.0053(3)	13.493(6)	90	97.43(2)	90	626.5(3)
24	600	11.06(5)	5.1840(5)	8.9804(6)	13.408(10)	90	97.35(3)	90	619.7(4)
25	600	12.73(5)	5.1587(4)	8.9323(4)	13.376(7)	90	97.44(2)	90	611.1(3)
26	600	13.07(5)	5.1491(3)	8.9138(3)	13.363(6)	90	97.397(19)	90	608.2(3)
27	600	14.11(5)	5.1417(5)	8.9045(4)	13.321(9)	90	97.46(3)	90	604.7(4)
28	600	14.45(5)	5.1282(4)	8.8765(4)	13.316(8)	90	97.36(3)	90	601.2(4)

Table S3: Elemental composition of the natural clinochlore sample determined through EMPA, expressed in weight percent of oxides. Standard reference materials were employed for calibration: Grossularia del Martire for Al and Si, fayalite USNM 85276-143 for Fe, olivine (Fo83) USNM-2566-153 for Mg, ilmenite USNM 96189-149 for Ti, and pure metallic Cr for Cr. The analysis was conducted using TAP for Mg, Si, and Al; PETL for Ti and Cr; and LIFH for Fe. Each element's measurement time was set at 30 seconds, with a background measurement time of 10 seconds.

No.	**MgO**	**Al_2O_3**	**TiO_2**	**FeO**	**SiO_2**	**Cr_2O_3**	**Total**
1	19.25	18.37	0.0334	21.81	28.2	0	87.6635
2	18.96	18.4	0.0087	21.35	28.15	0	86.8688
3	19.01	20.29	0	21.5	27.64	0.0681	88.5082
4	20.8	18.64	0.0393	20.49	27.97	0	87.9394
5	20.16	18.64	0.0175	20.5	28.01	0.0104	87.338
6	21.14	18.72	0.0306	19.53	27.91	0	87.3307
7	21.01	19.3	0.0014	20.2	28.15	0	88.6615
8	19.75	18.82	0	20.98	28.06	0.0379	87.648
9	19.49	19.04	0.0595	21.86	28.02	0	88.4696
10	19.64	18.64	0	21.05	27.79	0.0197	87.1397
11	21.08	19.3	0	19.49	27.8	0.0226	87.6926
12	18.09	19.61	0.0669	20.69	28.43	0	86.887
13	20.52	18.92	0	20.1	28.1	0	87.6401
14	20.85	18.47	0.0175	19.5	28.61	0	87.4476
15	20.86	18.4	0.0131	19.63	28.07	0.0641	87.0373
16	20.11	18.88	0.0131	20.05	28.49	0	87.5432
17	19.62	18.42	0.0872	20.99	28.03	0	87.1473
18	20.08	18.44	0	20.45	28.48	0	87.4501
19	20.25	18.48	0.0189	20.49	28.13	0	87.3689
20	21.66	18.79	0.0117	18.72	28.47	0.001	87.6528
Average	20.1165	18.8285	0.0209	20.469	28.1255	0.0112	87.5716
Sigma	0.8979	0.4873	0.0251	0.8404	0.2593	0.0214	0.505

Table S4: Polyhedra volume variation with pressure of chlorite IIa polytype. Volume data obtained with Vesta software. The linear compressibility of the octahedral sites reveals that Mg3 and Mg4 sites (octahedral interlayer) have a larger compressibility than Mg1 and Mg2 sites (Octahedral T-O-T)

P (GPa)	***V*** **(Å^3) Si1**	***V*** **(Å^3) Mg1**	***V*** **(Å^3) Mg2**	***V*** **(Å^3) Mg3**	***V*** **(Å^3) Mg4**
9.16(5)	2.253	11.9875	11.9325	9.2798	11.8898
9.70(5)	2.3925	11.0913	11.066	8.969	11.3912
10.66(5)	2.3723	10.9484	10.8921	8.7793	11.1746
11.64(5)	2.3686	10.9668	10.887	8.8418	11.2217
12.58(5)	2.3465	10.944	10.8056	8.8769	11.1809
13.37(5)	2.3473	10.4548	10.4423	8.731	11.0956
14.50(5)	2.3205	10.7164	10.6613	8.5458	10.9104
15.40(5)	2.2961	10.8596	10.8259	8.5194	10.7198
16.08(5)	2.2802	10.8261	10.7992	8.4715	10.6674
17.32(5)	2.2564	10.7797	10.7783	8.3332	10.5535
18.83(5)	2.2482	10.7159	10.7188	8.2693	10.4766
20.60(5)	2.2554	10.6358	10.6826	8.2461	10.4059