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Ultralow velocities of CaCO3 and the origin of seismic anomalies in the Earth's upper mantle

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Table 1. Velocities of aragonite and amorphous $CaCO_3$ measured using the pulse-echo-overlap method combined with Paris-Edinburgh press at HPCAT, APS

T (K)	P (GPa)	V_P (km/s)	V_S (km/s)
300	3.0	6.115	3.168
300	3.6		3.204
300	4.1		3.293
373	3.0	6.078	3.125
373	3.8	6.462	3.202
373	4.4		3.310
473	3.0	5.946	3.092
473	3.8	6.149	3.203
473	3.9	6.411	3.193
473	4.1		3.233
573	3.9		3.409
573	4.4	6.127	3.081
573	4.8		3.479
673	3.8	6.189	3.104
673	4.1	6.507	3.187
673	5.0	6.255	3.190
773	4.0	6.249	3.339
773	4.0	6.252	3.210
773	4.9	6.428	3.371
873	4.0	6.440	3.195
873	4.7	6.455	3.280
973	3.8	6.226	3.144
973	4.6	6.009	3.192
1073	3.6	4.999	1.398
1073	4.6	5.127	2.700
1173	3.6	5.006	1.377
1173	4.1	5.115	1.468
1173	4.5	4.743	1.764
1273	3.6	4.550	1.228
1273	4.2	4.124	1.419
1273	5.1	4.188	1.536
1373	3.6	4.681	1.499
1373	4.7		1.401
1373	5.0	4.331	1.664

Table 2. Calculated velocities and densities of aragonite, and amorphous $CaCO_3$ at high P-T condition near subduction slabs

P (GPa)	2.7	3.7	3.9	5.1	6.4	7.4	7.9	8.4	9.2
Depth(km)	84	105	125	160	200	231	244	261	285
T (K)	660	760	848	1016	1202	1342	1406	1485	1595
Aragonite									
V_P (km/s)	5.87	5.97	6.05	6.21					
V_S (km/s)	3.09	3.16	3.21	3.32					
ρ (g/cm^3)	3.06	3.07	3.09	3.09					
K_S (GPa)	66.5	68.5	70.5	73.8					
G (GPa)	29.3	30.6	31.9	34.1					
Amorphous $CaCO_3$*									
V_P (km/s)				4.26	4.45	4.59	4.66	4.74	4.85
V_S (km/s)				1.61	1.81	1.96	2.03	2.12	2.24
ρ (g/cm^3)				2.69	2.71	2.72	2.72	2.73	2.72
K_S (GPa)				39.5	41.7	43.3	44.0	44.8	45.7
G (GPa)				7.0	8.9	10.5	11.3	12.3	13.6
*: The acoustic velocities listed here are obtained from partially amorphized $CaCO_3$ and they represent the upper bound of the pure amorphous phase.									