

TABLE 5. Aggregate Properties of Single-Crystal Olivine and Dunite*

Pressure, kb	V_p , km sec ⁻¹		V_s , km sec ⁻¹		VRH Bulk Mod- ulus, mb	VRH Shear Mod- ulus, mb	VRH Poisson's Ratio	VRH $\partial V_p / \partial P$, km sec ⁻¹ mb ⁻¹	VRH $\partial V_s / \partial P$, km sec ⁻¹ mb ⁻¹	Density, g cm ⁻³
	V	R	V	R						
10 ⁻³	8.48	8.36	4.94	4.84	1.29	0.79	0.25	10.2	3.6	3.311
Olivine [<i>Kumazawa and Anderson, 1969</i>], $m = 20.79$										
Dunite A, $m = 20.84$										
1.0	8.14	8.09	4.42	4.40	1.30	0.63	0.28			3.268
2.0	8.19	8.14	4.45	4.43	1.32	0.64	0.29	34.2	18.6	3.271
4.0	8.25	8.20	4.48	4.46	1.34	0.65	0.29	23.5	11.1	3.276
6.0	8.29	8.23	4.49	4.48	1.36	0.66	0.29	14.8	5.0	3.281
8.0	8.31	8.25	4.50	4.49	1.37	0.66	0.29	8.0	4.9	3.286
10.0	8.32	8.26	4.51	4.50	1.37	0.67	0.29			3.291
Dunite B, $m = 20.98$										
1.0	8.25	8.17	4.71	4.67	1.27	0.73	0.26			3.319
2.0	8.31	8.23	4.73	4.70	1.29	0.74	0.26	40.3	22.7	3.322
4.0	8.38	8.29	4.77	4.74	1.31	0.75	0.26	27.0	16.0	3.327
6.0	8.42	8.34	4.80	4.77	1.33	0.76	0.26	20.4	7.7	3.332
8.0	8.46	8.38	4.81	4.78	1.35	0.77	0.26	17.0	3.0	3.337
10.0	8.49	8.40	4.81	4.78	1.36	0.77	0.26			3.343

* V, Voigt average; R, Reuss average; VRH, Voigt-Reuss-Hill average; m , mean atomic weight.

An additional indication of the error involved in using the mean of three velocities for the calculation of isotropic elastic constants is given by a comparison of the Voigt-Reuss velocities of dunite B with measurements from a sample of Twin Sisters dunite of similar density by Birch [1960] and Simmons [1964]. Birch reported longitudinal wave velocities at 10 kb in three directions of 8.07, 8.23, and 8.95 km/sec. The mean of these measurements, 8.42 km/sec, agrees well with the Voigt and Reuss averages in Table 5. Transverse wave velocities at 10 kb measured by Simmons [1964] for the same sample studied by Birch are 4.70, 4.88, and 4.90 km/sec. The mean velocity of 4.83 km/sec for this rock is also in close agreement with the Voigt and Reuss averages for dunite B.

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