TABLE 3 (continued)

Identification number	Pressure [kb]	V_p/V_s	σ	ϕ [km sec^{-1}]^2	K [Mb]	β [Mb^{-1}]	μ [Mb]	E [Mb]	λ [Mb]
7-63.0-11	0.4	1.87	0.30	19.9	0.55	1.80	0.26	0.67	0.38
	1.0	1.87	0.30	20.2	0.56	1.77	0.26	0.68	0.39
	2.0	1.86	0.30	20.3	0.57	1.76	0.27	0.69	0.39
	6.0	1.85	0.29	20.7	0.58	1.71	0.28	0.72	0.40
	10.0	1.86	0.30	21.3	0.60	1.66	0.28	0.73	0.41
7-63.0-10	0.4	1.85	0.30	20.7	0.59	1.71	0.28	0.72	0.40
	1.0	1.86	0.30	21.0	0.60	1.68	0.28	0.73	0.41
	2.0	1.86	0.30	21.3	0.60	1.66	0.29	0.74	0.41
	6.0	1.86	0.30	21.7	0.62	1.61	0.29	0.76	0.43
	10.0	1.87	0.30	22.1	0.64	1.57	0.29	0.76	0.44
9-77B-54	0.4	1.95	0.32	18.6	0.50	1.98	0.20	0.54	0.37
	1.0	1.94	0.32	18.9	0.51	1.96	0.21	0.55	0.37
	2.0	1.94	0.32	19.2	0.52	1.92	0.21	0.56	0.38
	6.0	1.95	0.32	20.0	0.55	1.83	0.22	0.59	0.40
	10.0	1.96	0.33	20.6	0.57	1.76	0.22	0.60	0.42
9-79-17	0.4	1.95	0.32	22.4	0.61	1.63	0.25	0.65	0.45
	1.0	1.93	0.32	22.5	0.62	1.63	0.26	0.68	0.44
	2.0	1.93	0.32	22.7	0.62	1.60	0.26	0.69	0.45
	6.0	1.93	0.32	23.5	0.65	1.54	0.27	0.71	0.47
	10.0	1.95	0.32	24.2	0.67	1.49	0.27	0.72	0.49
9-82-7	0.4	1.96	0.32	21.5	0.60	1.66	0.24	0.64	0.44
	1.0	1.91	0.31	22.1	0.62	1.61	0.27	0.70	0.44
	2.0	1.87	0.30	22.7	0.64	1.57	0.29	0.76	0.44
	6.0	1.85	0.29	23.9	0.68	1.48	0.33	0.84	0.46
	10.0	1.85	0.29	24.6	0.70	1.43	0.33	0.86	0.48
9-84-30	0.4	1.92	0.31	21.7	0.61	1.64	0.26	0.68	0.44
	1.0	1.93	0.32	22.1	0.62	1.61	0.26	0.69	0.45
	2.0	1.93	0.32	22.3	0.63	1.59	0.26	0.69	0.45
	6.0	1.94	0.32	23.2	0.66	1.52	0.27	0.71	0.48
	10.0	1.96	0.32	24.0	0.69	1.46	0.27	0.72	0.50
9-83-9	0.4	1.90	0.31	21.1	0.60	1.67	0.27	0.69	0.42
	1.0	1.90	0.31	21.5	0.61	1.64	0.27	0.71	0.43
	2.0	1.90	0.31	22.2	0.63	1.59	0.28	0.72	0.45
	6.0	1.91	0.31	23.3	0.67	1.50	0.29	0.75	0.47
	10.0	1.93	0.32	23.9	0.69	1.45	0.29	0.76	0.49

velocity at each site are related to slight differences in weathering.

4. Progressive weathering and associated changes in seismic velocities

It was suggested from the study of cores recovered from Legs 2, 3, and 4 in the Atlantic that the velocities of seismic waves through layer 2 basalts decrease steadily with age due to decreasing density brought about by progressive submarine weathering, mineralogically expressed as a steady increase in phyllosilicates and zeolites at the expense of feldspar, pyroxene and olivine. These early conclusions, though based upon findings at only a small number of sites, have now been confirmed.

In fig. 4, the averages of the compressional and shear wave velocities measured at 0.5 kb for each of the 18 Pacific and Atlantic sites examined to date are

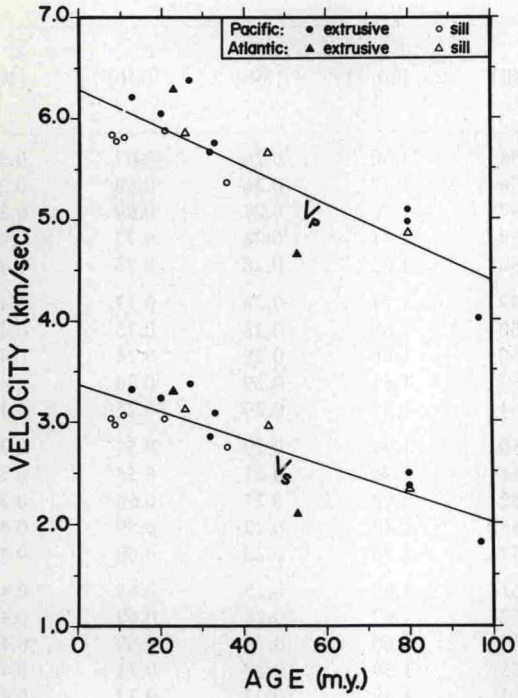

Fig. 4. Compressional (V_p) and shear (V_s) velocities at 0.5 kb vs. age for layer 2 basalts.

seen to decrease markedly with age. The rates of change of V_p and V_s with age have been computed respectively as

$$\Delta V_p/\Delta t = -1.89 \times 10^{-2} \text{ km/sec my}$$

and

$$\Delta V_s/\Delta t = -1.35 \times 10^{-2} \text{ km/sec my}$$

by the method of least squares, and the solutions plotted in fig. 4. The effect of submarine weathering upon seismic velocities measured in the laboratory is clearly profound; young basalts cored near the ridge crests display compressional wave velocities of nearly 6.5 km/sec, whereas samples cored in 100 my old sea floor average only 4.5 km/sec.

It should be noted that no clear distinction can be made in fig. 4 between intrusive and extrusive trends of velocity on age, suggesting that the intrusion of sills at the sites examined has been nearly contemporaneous with the formation of the underlying sea floor and that submarine weathering continues beneath the accumulating sediment pile.

Should weathering penetrate to depths of several hundred meters, equivalent to the wavelengths monitored in refraction surveys, its effects should be noted in refraction results as a pronounced decrease in layer 2 refraction velocities with age. As was noted by Christensen and Salisbury [1], this proposition can be readily tested from published refraction data. In fig. 5a layer 2 refraction velocities from the literature are presented in histogram form. All incorporated velocity measurements are from sites in the main ocean basins which can be dated and which are structurally uncomplicated (thus velocities from behind-arc basins, trenches, island chains and fracture zones are omitted).

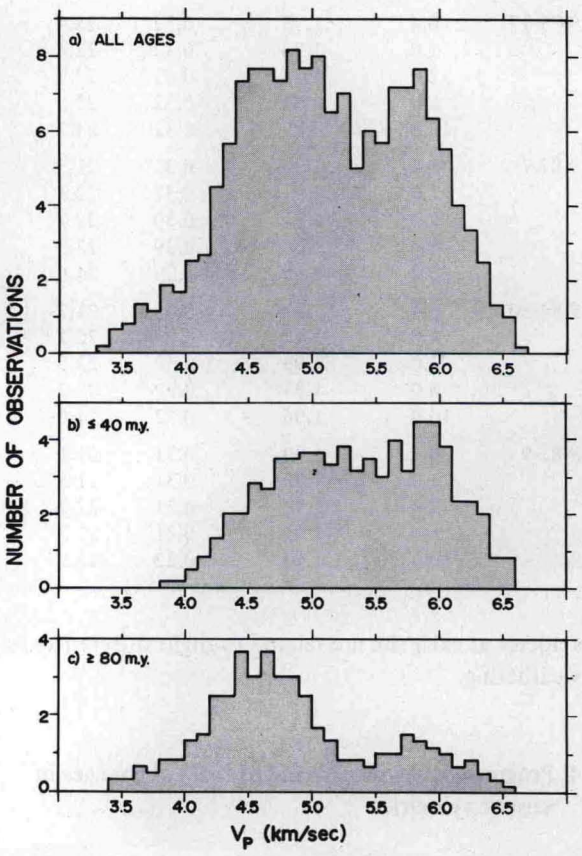

Fig. 5. Compressional wave refraction velocity histograms for layer 2 (data from [9, 10]). Fractional observations arise from digital filtering.