Simple Seismic Velocity - Melt Fration Derivatives
Based on Clark and Lesher (2017)
Bill Menke, April 19, 2020

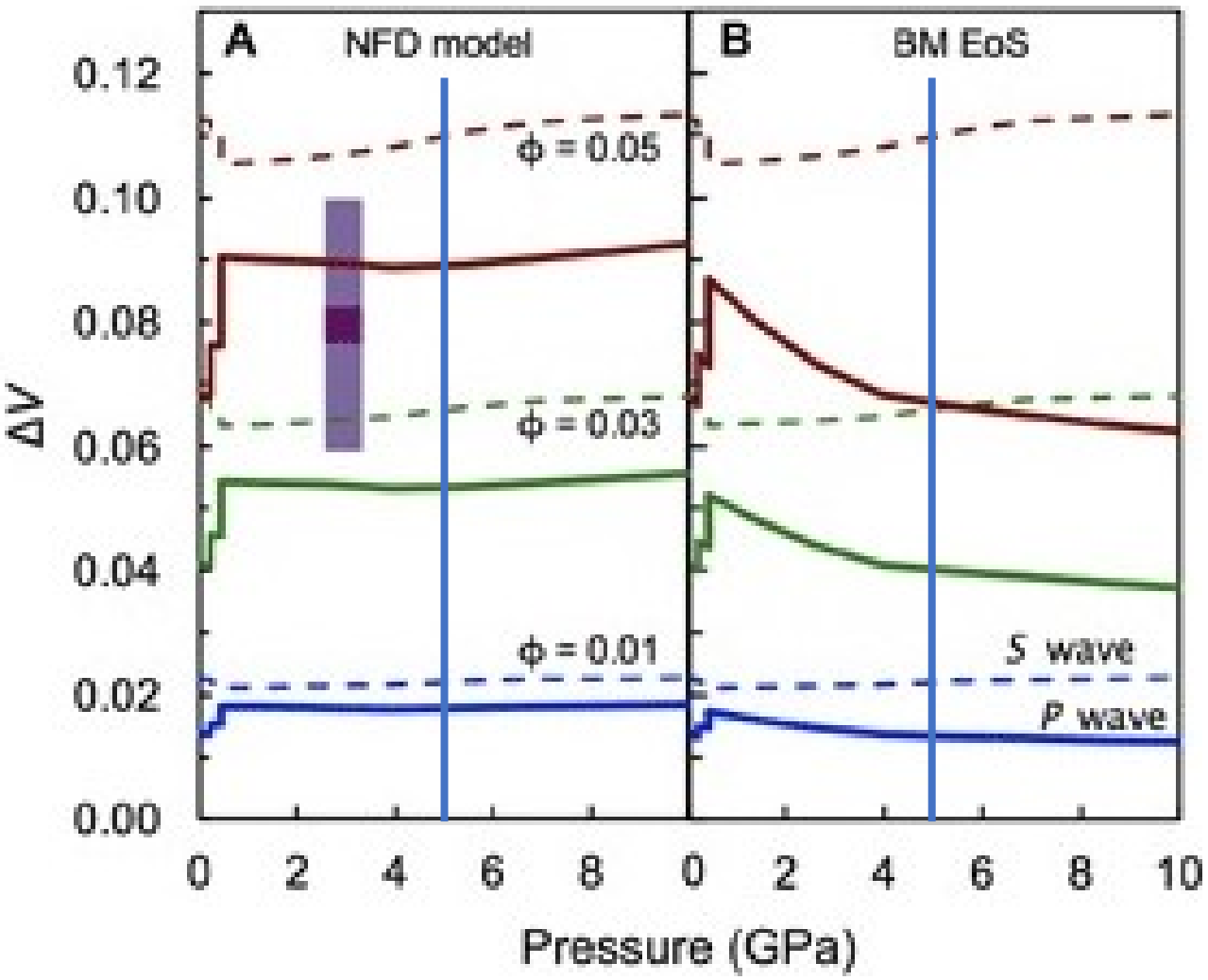
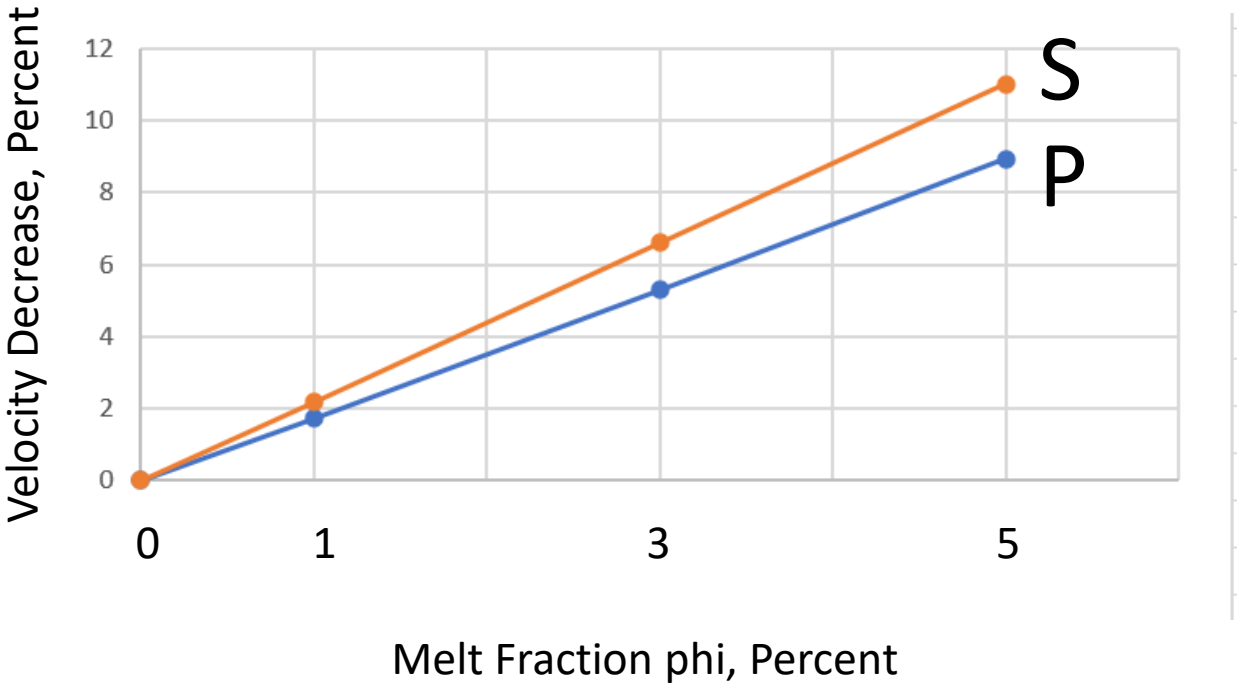


Figure 4 from Alisha N. Clark and Charles E. Lesher, **Elastic properties of silicate melts: Implications for low velocity zones at the lithosphere-asthenosphere boundary, Science Advances 13 Dec 2017: Vol. 3, no. 12, e1701312 OI: 10.1126/sciadv.1701312**

NFD at 5 GPA

	0.01	**0.03**	**0.05**
P	12*0.59/4.1=1.73	12*1.81/4.1=5.30	12*3.05/4.1=8.93
S	12*0.74/4.1=2.17	12*2.25/4.1=6.59	12*3.76/4.1=11.00



$$\frac{dV_P}{d\varphi} = -0.142 \ \text{(km/s per percent)}$$

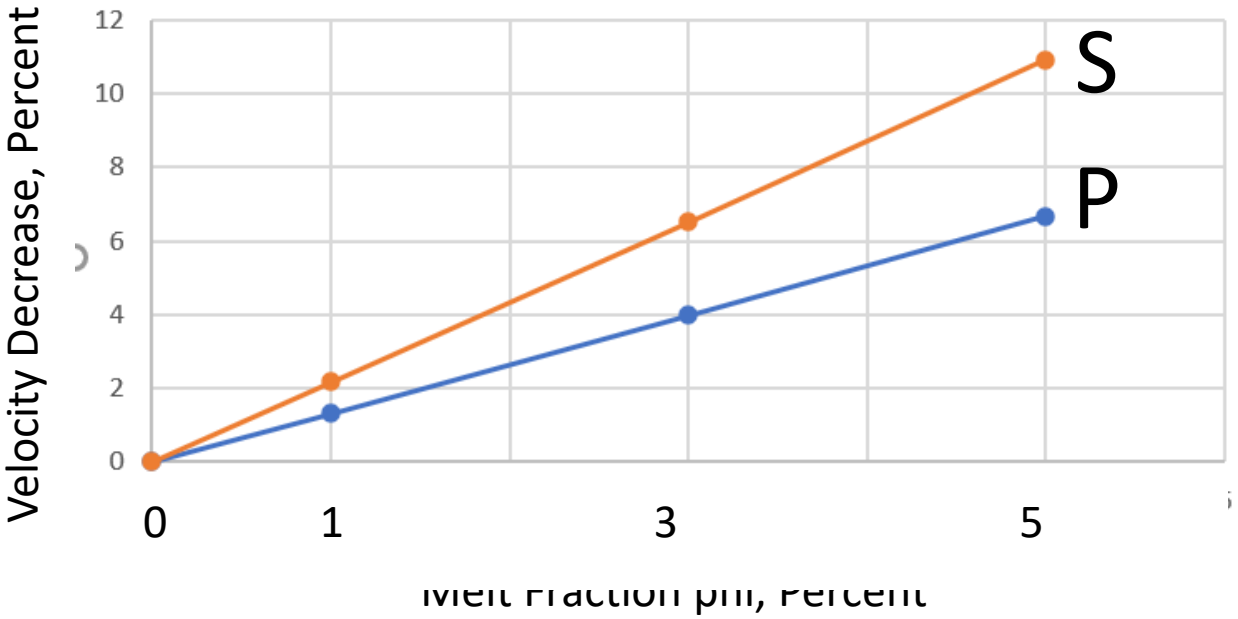
$$\frac{dV_S}{d\varphi} = -0.098 \ \text{(km/s per percent)}$$

$$\frac{dV_P}{dV_S} = 1.46 \quad \text{and} \quad \frac{\Delta T_s}{\Delta V_p} = 2.29$$

using $V_s = 4.5\,\text{km/s}$ and $V_P/V_s = 1.83$

BMEosS at 5 GPA

	0.01	**0.03**	**0.05**
P	12*0.45/4.1=1.32	12*1.36/4.1=3.98	12*2.28/4.1=6.67
S	12*0.74/4.1=2.17	12*2.22/4.1=6.50	12*3.73/4.1=10.92



$$\frac{dV_P}{d\varphi} = -0.108 \ \text{(km/s per percent)}$$

$$\frac{dV_S}{d\varphi} = -0.098 \ \text{(km/s per percent)}$$

$$\frac{dV_P}{dV_S} = 1.11 \quad \text{and} \quad \frac{\Delta T_s}{\Delta T_P} = 3.02$$

using $V_s = 4.5\,\text{km/s}$ and $V_P/V_s = 1.83$