17. We assume that the pressure is the same at all points that are the distance $d = 20\,\text{km}$ below the surface. For points on the left side of Fig. 15-31, this pressure is given by $p = p_0 + \rho_o g d_o + \rho_c g d_c + \rho_m g d_m$, where p_0 is atmospheric pressure, ρ_o and d_o are the density and depth of the ocean, ρ_c and d_c are the density and thickness of the crust, and ρ_m and d_m are the density and thickness of the mantle (to a depth of 20 km). For points on the right side of the figure p is given by $p = p_0 + \rho_c g d$. We equate the two expressions for p and note that g cancels to obtain $\rho_c d = \rho_o d_o + \rho_c d_c + \rho_m d_m$. We substitute $d_m = d - d_o - d_c$ to obtain

$$\rho_c d = \rho_o d_o + \rho_c d_c + \rho_m d - \rho_m d_o - \rho_m d_c \ .$$

We solve for d_o:

$$\begin{aligned} d_o &= \frac{\rho_c d_c - \rho_c d + \rho_m d - \rho_m d_c}{\rho_m - \rho_o} = \frac{(\rho_m - \rho_c)(d - d_c)}{\rho_m - \rho_o} \\ &= \frac{\left(3.3\,\text{g/cm}^3 - 2.8\,\text{g/cm}^3\right)(20\,\text{km} - 12\,\text{km})}{3.3\,\text{g/cm}^3 - 1.0\,\text{g/cm}^3} = 1.7\ \text{km} \ . \end{aligned}$$