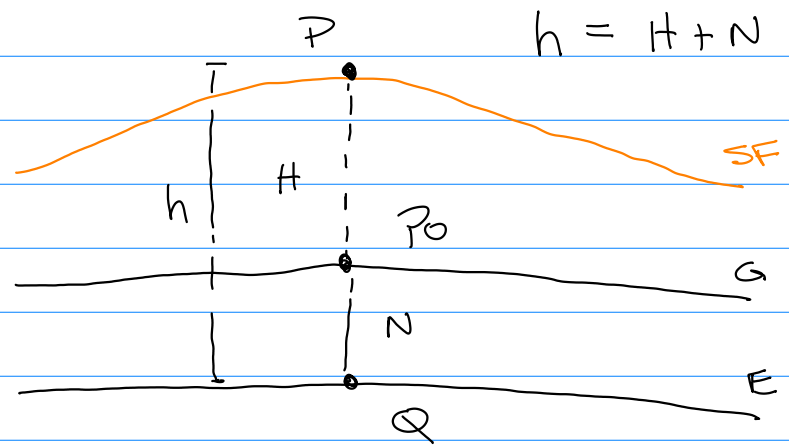


# Classical gravity anomalies

gravity anomaly

$$\Delta g_P = g_0 - \gamma_Q$$



Free-air anomaly  $\Delta g_P^{FA}$

approximations

$$g_P \approx g_0 + \frac{\partial g}{\partial H} H$$

$$\frac{\partial g}{\partial H} \approx \frac{\partial \gamma}{\partial h} \rightarrow \approx -0,3086 \text{ mGal/m}$$

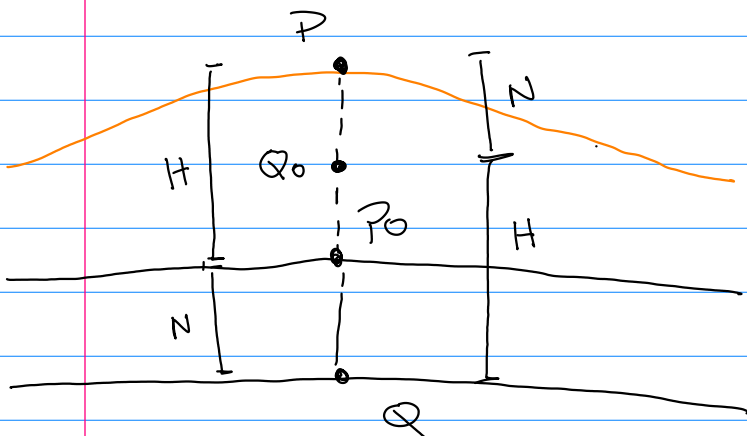
$$\Delta g_P^{FA} = g_0 - \gamma_Q$$

$$\approx \left( g_P - \frac{\partial \gamma}{\partial h} H \right) - \gamma_Q$$

$$\approx g_P - \underbrace{\left( \gamma_Q + \frac{\partial \gamma}{\partial h} H \right)}_{\approx \gamma_{Q_0}}$$

$$\gamma_P \approx \gamma_Q + \frac{\partial \gamma}{\partial h} h$$

$$\begin{aligned} \delta g_P &= g_P - \gamma_P \\ &\approx g_P - \left( \gamma_Q + \frac{\partial \gamma}{\partial h} h \right) \end{aligned}$$



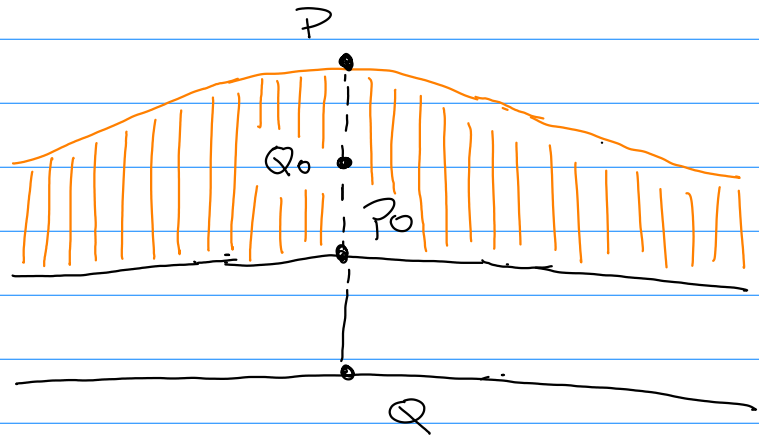
$$\delta g_P - \Delta g_P^{FA} \approx - \frac{\partial \gamma}{\partial h} \underbrace{(h - H)}_N$$

Bouguer anomaly  $\Delta g_P^B$

approximations

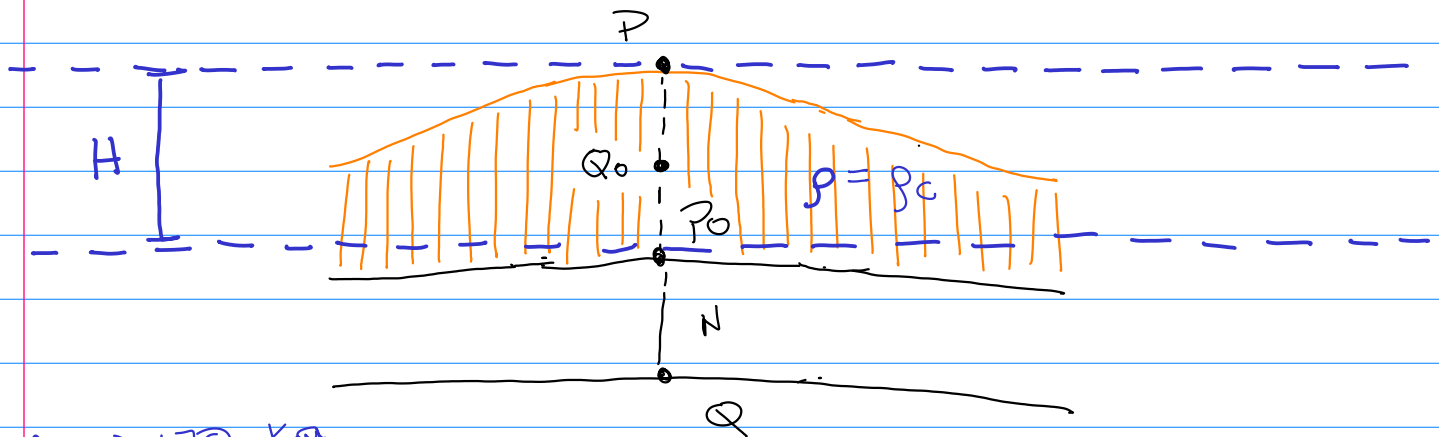
$$g_P \approx g_0 + \frac{\partial g}{\partial H} H + g_P^t$$

$$\frac{\partial g}{\partial H} \approx \frac{\partial \sigma}{\partial h}$$

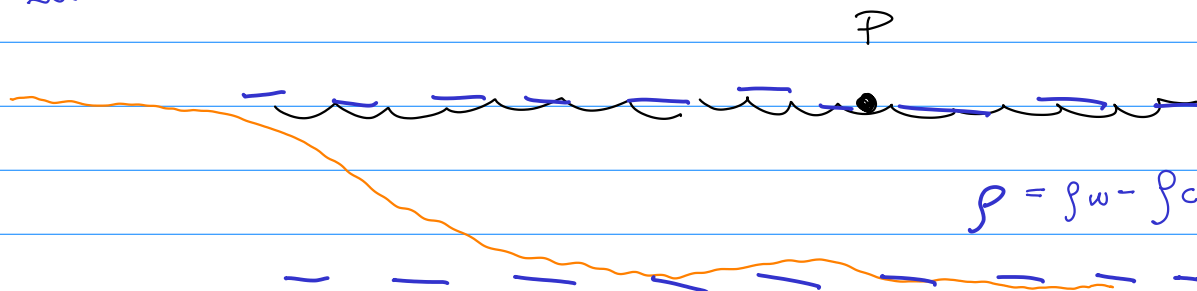


$$\begin{aligned} \Delta g_P^B &= g_0 - \gamma_Q \\ &\approx \left( g_P - \frac{\partial \sigma}{\partial h} H - g_P^t \right) - \gamma_Q \\ &\approx g_P - \left( \gamma_Q + \frac{\partial \sigma}{\partial h} H \right) - g_P^t \end{aligned}$$

$$g_P^t \approx 10^{-5} \times 2\pi G \rho H \quad (\text{BOUGUER plate})$$



$$\rho_c = 2670 \frac{\text{kg}}{\text{m}^3}$$



$$\delta g_P^B \approx g_P - \left( \gamma_Q + \frac{\partial \gamma}{\partial h} h \right) - 2\pi G \rho h$$

$$\begin{aligned} \delta g_P^B - \Delta g_P^B &\approx - \frac{\partial \gamma}{\partial h} N - 2\pi G \rho N \\ &\approx \left( - \frac{\partial \gamma}{\partial h} - 2\pi G \rho \right) N \end{aligned}$$

geophysical indirect effect  
(Hinze, et al, 2005)