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Module 6

1. limestone with 30% porosity with change in water table depth from 2m to 20m
1) change in density from saturated to unsaturated
$\rho_{sat} = \rho(1-V_f) + \rho_f V_f$ using limestone $\rho = 2200 kg/m^3$
$\rho_{unsat} = 2200(1-.3) = 1540 kg/m^3$
$\rho_{sat} = 2200(1-.3) + 1000(.3) = 1840 kg/m^3$
There is a $300 kg/m^3$ change in density.
2) change in gravity from dry to wet season
using an infinite horizontal slab slab with a thickness of 18m for the change in water table
$g = 2\pi G \Delta\rho h = 2.26 \times 10^{-6} m/s^2$ and $\Delta\rho = 300 kg/m^3$
so the change in gravity due to an 18m rise in water table with a $300 kg/m^3$ increase in density is around 0.226 mGal.

2. The plot of changing density with P-wave velocity by the Drake-Nafe curve for a basin with increasing wave velocity with depth shows a change in density from $1.635 g/cm^3$ at the surface to $1.782 g/cm^3$ at 5km depth. This makes sense as material tends to be more dense with increasing depth.

3. The Density given from the linear fit to the plot of the X and Y equations is around $2181 kg/m^3$.