

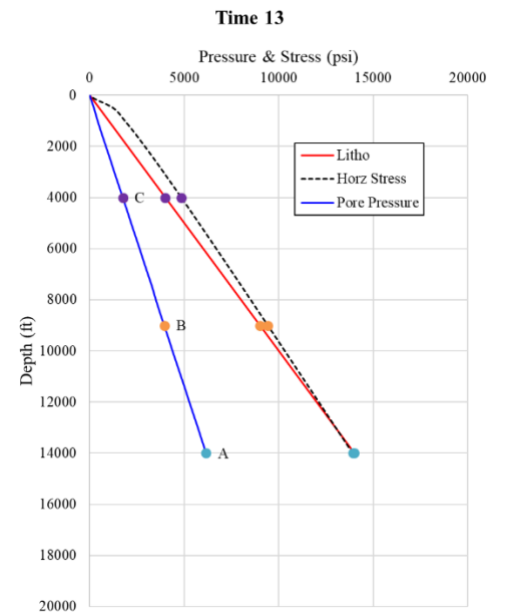
## 11.10: Pressure and stress changes caused by unloading

Landon Lockhart, The University of Texas at Austin

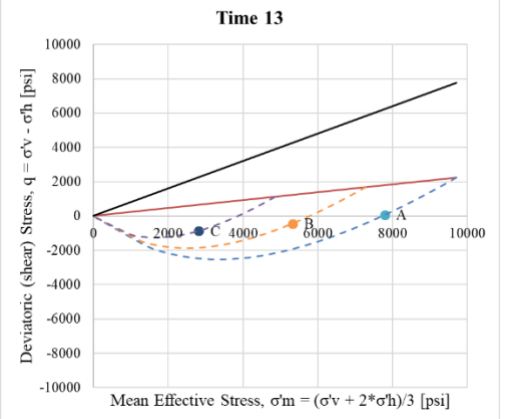
### ABSTRACT

I present model the changes in stress caused by unloading of normally pressured strata (Fig's. 1 & 2). I apply the equation proposed by Schmidt (1966) to approximate the changes in the uniaxial stress ratio ( $K_0$ ) during the unloading phase ( $K_{OU}$ ). I show that the behavior of mudrocks during loading is different than the behavior during unloading, and reveal that a  $K_0$  value that is less than 1.0 during normal compression can exceed 1.0 after unloading (Fig's. 1 & 2).

CLICK ON IMAGE FOR  
LARGER VIEW



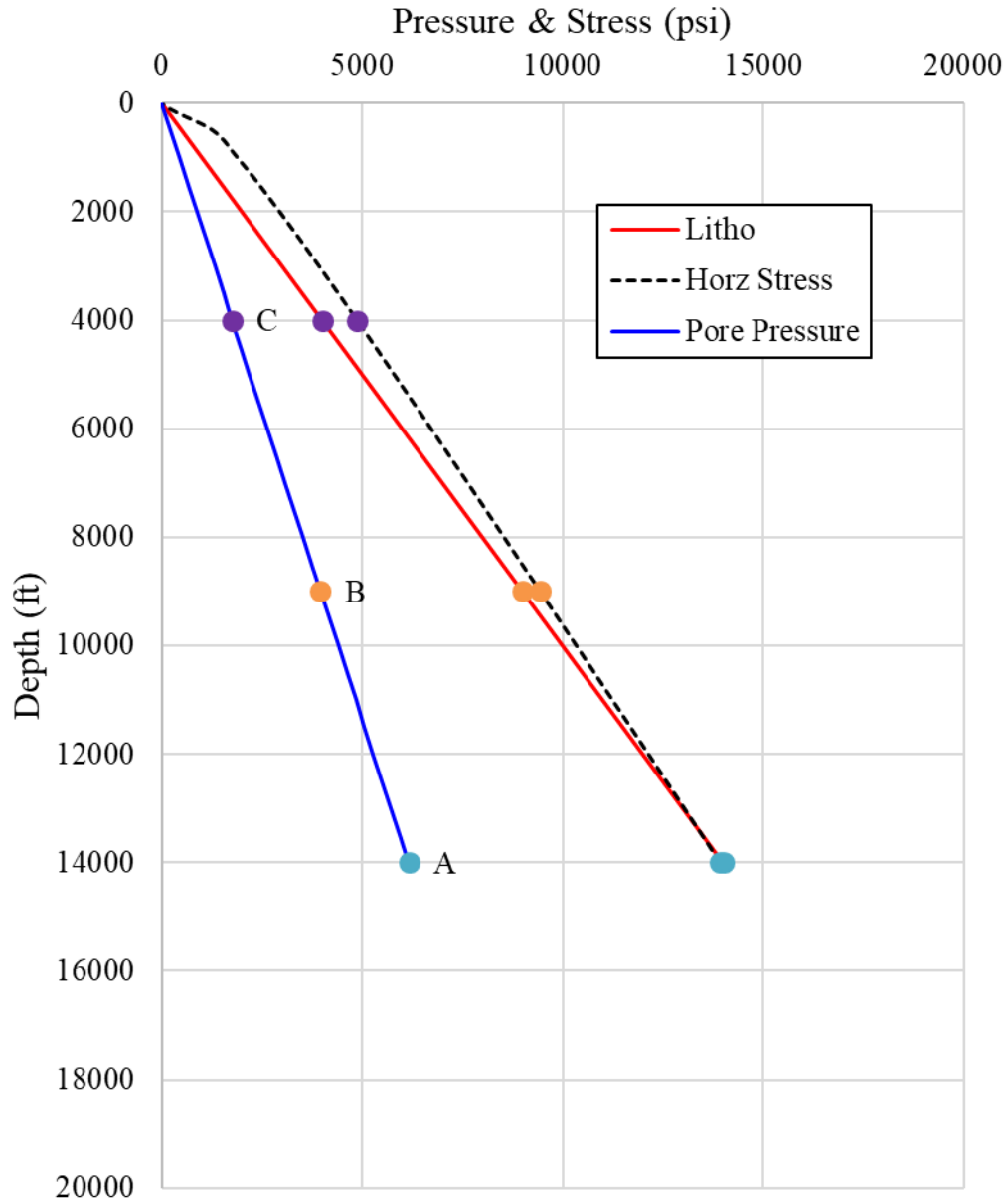
**Fig 1:** Response of minimum horizontal stress to 6000 ft of erosional unloading. An initial  $K_0$  of 0.8 is assumed.  $K_{OU}$  for point A = 0.99, point B = 1.09, and point C = 1.39.



**Fig 2:** Stress paths for unloading. Points A, B, and C correspond to the equivalent points in Fig. 1. The dashed lines represent the complete stress paths from the maximum loading (or pre-consolidation stress) complete unloading (0 ft).

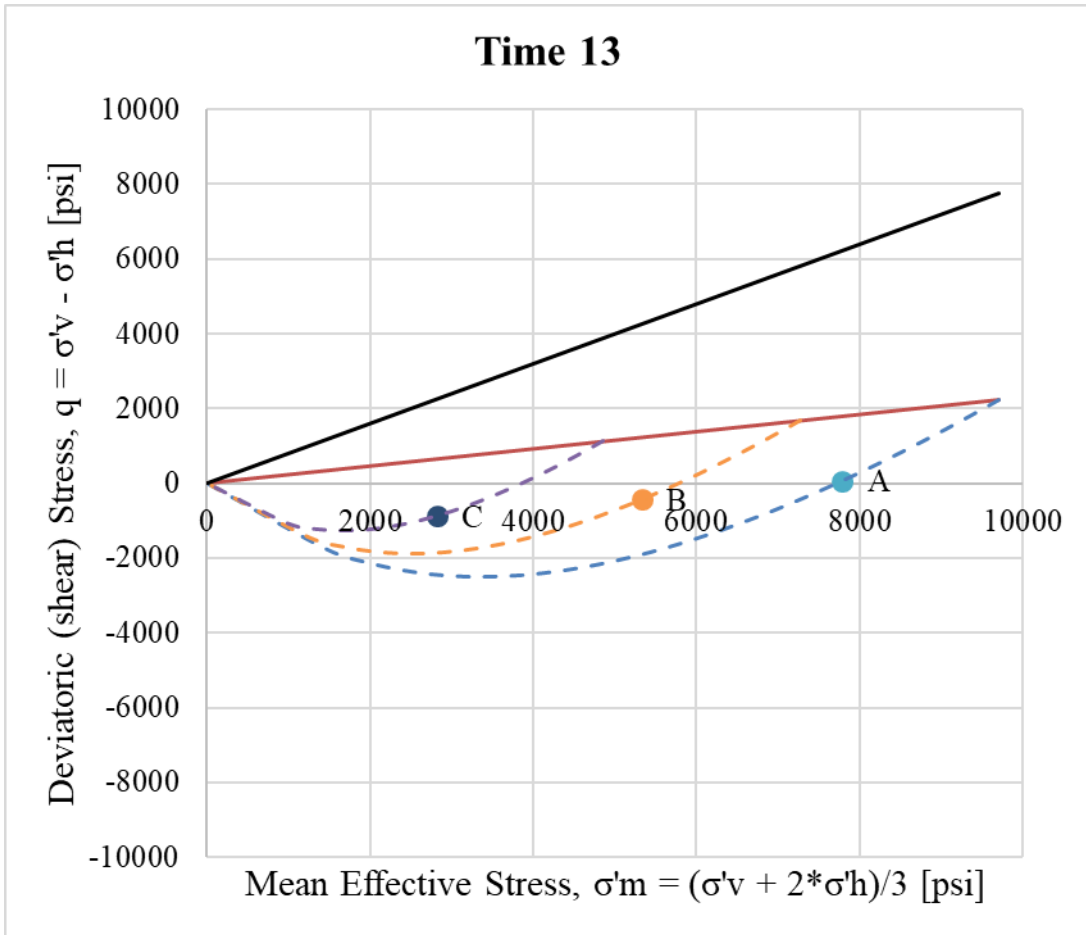


### Time 13



**Fig. 1:** Basin model after 6000 ft of erosional unloading and an initial  $K_0$  of 0.8.  $K_{0U}$  for point A = 0.99, point B = 1.09, and point C = 1.39.

[Back](#)



**Fig. 2:** Stress paths for unloading. Points A, B, and C correspond to the points in Fig. 1. The dashed lines represent the complete stress paths from maximum loading (pictured example = 20,000 ft) to complete unloading (0 ft).

[Back](#)

## Reference

Schmidt, Birger. "Earth pressures at rest related to stress history." *Canadian Geotechnical Journal* 3.4 (1966): 239-242.