

13.07: Trap Integrity & Fluid Venting in Hydrate Systems

Kevin Meazell, University of Texas, Austin

ABSTRACT

We use 3D seismic data to show that three rows of seafloor gas mounds can be traced downward to leak points that lie at the hydrate-gas contact within three individual dipping coarse-grained sand bodies in the Terrebonne Basin, Walker Ridge block 313, northern Gulf of Mexico. We predict the overpressure within the sand bodies by assuming that the gas pressure at the vent points equal the least principal stress. The free gas accumulates until the gas pressure at the base of the hydrate stability zone reaches the least principal stress in the overlying mudrock, whereupon hydraulic fractures form and fluids are vented to the surface. The warm rising fluids and perhaps localized exothermic formation of hydrate raise the local salinity and temperature. This process progressively shifts the base of the hydrate stability zone to shallower depths and dissociates the hydrate seal within the sand, which creates new leak points and results in the observed migration of the seafloor vents. This study shows how the hydrate stability zone influences the location of fluid expulsion and how hydrate deposits can be ephemeral. See (Meazell & Flemings, 2022) for further details.

Meazell, P. K., & Flemings, P. B. (2022). The evolution of seafloor venting from hydrate-sealed gas reservoirs. *Earth and Planetary Science Letters*, 579, 117336. <https://www.sciencedirect.com/science/article/pii/S0012821X21005926>

CLICK ON IMAGE FOR LARGER VIEW

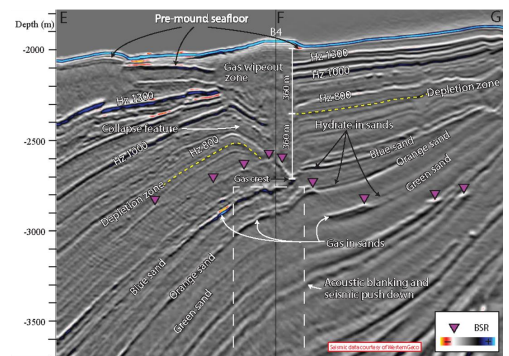


Fig 1: Seismic cross section illustrating venting from the base of the hydrate stability zone in the Blue Sand in WR 313, Terrebonne basin.

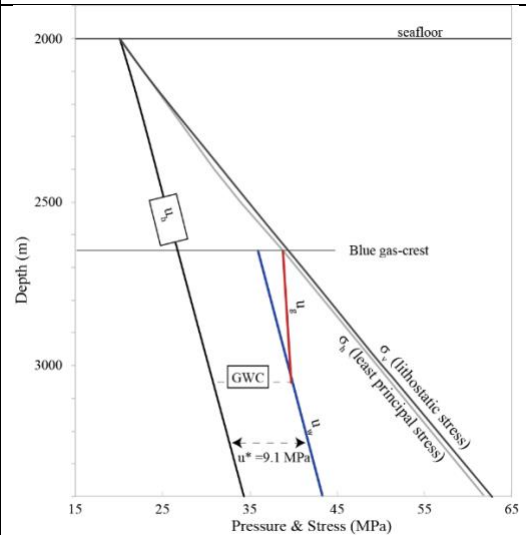


Fig 2: Interpreted pressure at the vent location. The free gas accumulates until the gas pressure at the base of the hydrate stability zone reaches the least principal stress in the overlying mudrock, whereupon hydraulic fractures form and fluids are vented to the surface.

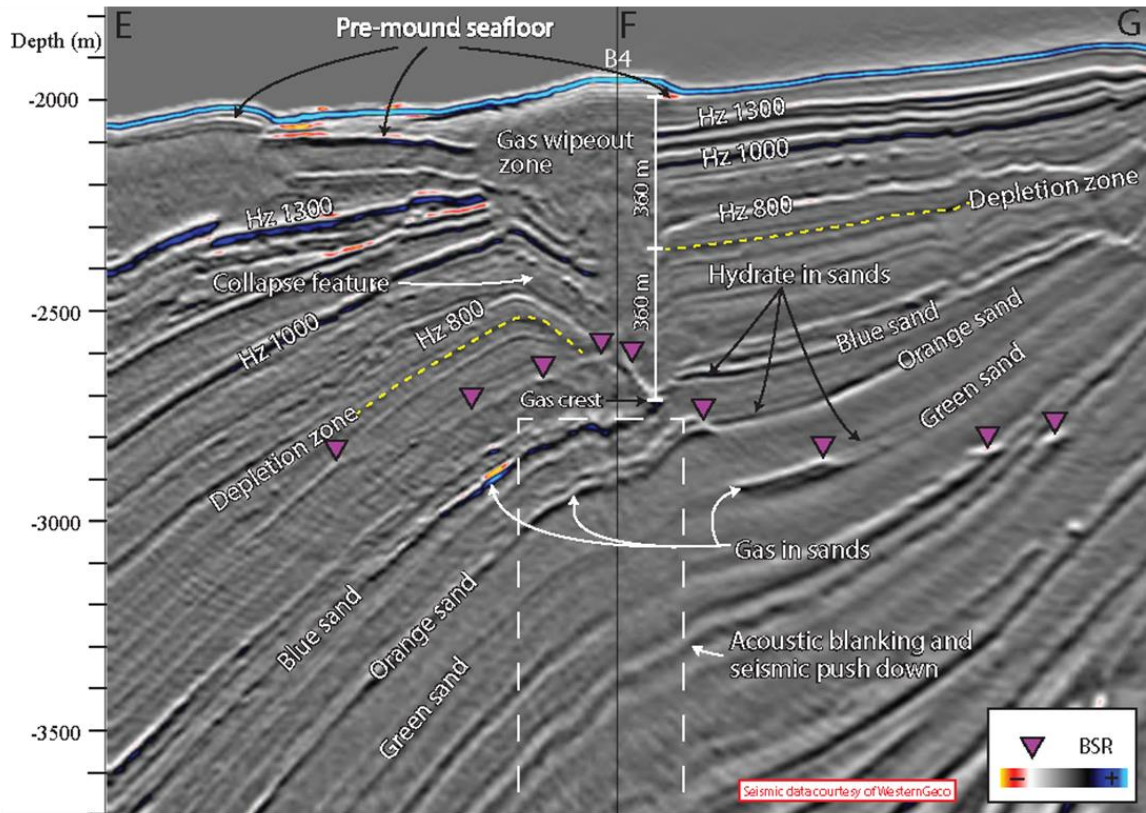


Fig. 1. Seismic cross section illustrating venting from the base of the hydrate stability zone in the Blue Sand in WR 313, Terrebonne basin.

[Back](#)

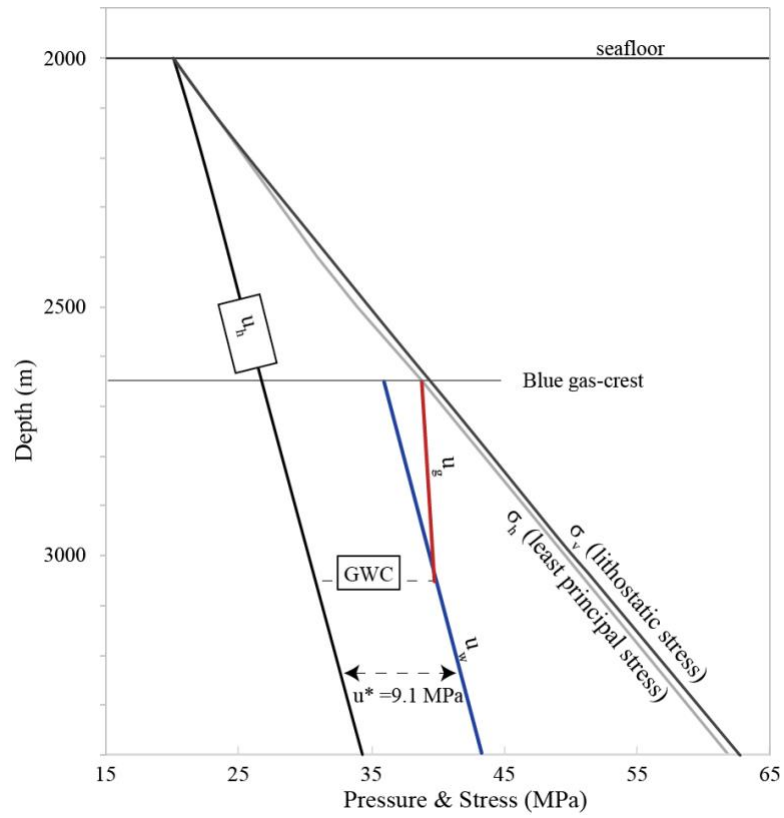


Fig. 2: Interpreted pressure at the vent location. The free gas accumulates until the gas pressure at the base of the hydrate stability zone reaches the least principal stress in the overlying mudrock, whereupon hydraulic fractures form and fluids are vented to the surface.

[Back](#)