

Exploring the Deep Water Gulf of Mexico Petroleum Systems

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To place the exploration geology of the deep water petroleum systems of the Gulf of Mexico into proper global context, this one day short course begins with a look at the transformation of global deep water exploration during the recent “lower and longer” oil price crash. Exploration activities have mostly switched emphasis from frontier exploration in untested or sparsely drilled basins to areas of known “commercial possible” discovery corridors, and to backyard exploration for deeper pools or for adjacent structures or stratigraphic traps within tieback range.

Then we will look at the three key northern Gulf of Mexico conventional deep water plays in the Jurassic (Norphlet Aeolian sandstone), Eocene/Paleocene/Oligocene (Whopper, Wilcox, and Frio Formations), and subsalt Miocene/Pliocene. Our focus will begin with a sequence stratigraphic perspective that looks at the sediments expected to be deposited in the slope and deep water basin plain during High Stands such as condensed section marine mudstones, Falling Stage including mud-rich mass transport deposits), and Low Stand depositional sequences such as basin floor fan and channel levee deposits.

Then we will discuss the critical factors in the deep water Gulf of Mexico Petroleum Systems beginning with forming the basin (global evolution and source rocks), subsequent filling of the basin (carbonate and clastic reservoirs and seals), and migration through the overburden to the conventional reservoirs. This petroleum systems section of the class will conclude with a look at the deformation of the basin to create both structural and stratigraphic traps for hydrocarbon accumulation.

We will then turn to some interesting important auxiliary issues such as petrophysical considerations of pressure and diagenesis, and then review some aspects of the “Funny Looking Things” (FLT’s and DHI’s) that characterize many of the shallow prospects in the area, and then examine some of the challenges of drilling for the petroleum prize through the geohazards at the sea floor and around salt that are often in the way of the petroleum accumulations we seek.

Time permitting, we will conclude with a discussion of how we can utilize seismic data to help understand critical geologic risks of the turbidite play.