
Temporal and Spatial Evolution of Traps, Northern Deepwater Gulf of Mexico

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ABSTRACT

The traps for the 226 fields in the northern deepwater Gulf of Mexico have been characterized based on their style, timing, and occurrence by province. A three-fold classification was used to define eight categories. Four-way closures include contractional traps (29 fields), extensional anticlines (turtles; 6 fields), fault-bounded (8 fields), and compactional drape (12 fields). Three-way combined structural-stratigraphic traps include: faulted-bounded (66), along flank of salt (45), and against salt (subsalt; 27 fields). The 28 fields with stratigraphic traps are found primarily in the northeastern part of the area (Mississippi Canyon and Viosca Knoll) and include pinchouts due to onlap, erosional truncation, and facies change. Of particular significance for the stratigraphic traps is that they are all associated with amplitude anomalies.

The timing of trap formation varies greatly among the major exploration provinces and plays. Traps in the lower Oxfordian eolian Norphlet play (four discoveries) developed associated with late Oxfordian salt rafts. The traps in the subsalt play (Wilcox, 20 fields) associated with the Keathley-Walker Fold Belt developed between 24 and 15 Ma. Perdido Fold Belt traps (9 fields, including Mexico) formed between 25 and 23 Ma. Traps for the 8 of 10 fields in the Mississippi Fan Fold Belt developed between 15 and 5.5 Ma. The timing of trap formation in the upper to middle slope is quite variable, both the duration and absolute age. Both turtle structures and compactional drape traps develop within 1 to 3 Myr after reservoir deposition. The timing of 3-way and 4-way fault bounded traps are variable and depend upon the cessation of fault movement. Three-way closures with sands lapping out against the salt take between 1 to 5 myr to develop. Subsalt traps and generally from 2 to 4 Myr after reservoir deposition. Finally, stratigraphic traps develop shortly after from time of reservoir deposition to 1 to 2 Myr later.

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