

A Global Review of Stratigraphic and Subtle Combination Traps

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ABSTRACT

The term stratigraphic trap is inconsistently used across the Petroleum Geologist community. All agree a stratigraphic trap retains oil due to changes of rock character rather than faulting or folding, or due to a change in fluid properties. Types of fluidic traps are also inconsistently used and the interaction between stratigraphic and fluidic traps is important in some giant fields, which will be demonstrated. Included in the broadest stratigraphic definition are trap styles that are four-way dip closed, e.g. carbonate reefs and paleogeomorphologic traps. For others a stratigraphic trap is one where the stock tank oil initially in place (STOIIP) cannot be calculated using a depth structure map alone e.g. a sand body that has lateral pinch out onto a high. We suggest these are a sub-class of the broader stratigraphic trap. Trap classifications is further complicated by combination or complex traps, which combine two or more trap styles (structural, stratigraphic or fluidic) depending on the contact depth. In this presentation a brief overview of all stratigraphic and subtle combination trap styles is presented. The focus will then shift to traps that require a component of up-dip lateral pinch out. Defining the sand body edge (trap gross rock volume uncertainty) and the up-dip seal (retention risk) is often problematic when evaluating these prospects. 500 well-documented stratigraphic and subtle combination traps from around the world were reviewed. Eight major trap categories, which comprise sixteen individual trap types, were defined using this data set. The major trap categories include lateral depositional change, buried depositional relief, sub-unconformity truncation, buried erosional relief, onlap onto erosional surface, erosional trough fill, diagenetic and fluidic. Onlap onto a regional unconformity surface, is the largest category, accounting for 32%. The second largest category (20%) is Lateral depositional change, which includes lateral facies change and lateral depositional pinch-out. Buried depositional relief (15%), which includes organic buildup and clastic macroform, is the third largest category. The vast majority of stratigraphic/subtle traps occur in just four basin types: foreland (64%), passive margin (11%), rift (11%) and intracratonic (10%). We will present a number of global analog case studies and discuss some observations and ideas that may guide future exploration campaigns for these traps styles.