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CONTROL ID: 988413**TITLE:** Identification and Quantification of Paleotrap during Petroleum System Assessments**AUTHORS (FIRST NAME, LAST NAME):** David A. Wavrek¹, Daniel Schelling², Rosella Sbarra³, Don Hall⁴, Doug Strickland⁵, Ashley Hansen¹**INSTITUTIONS (ALL):** 1. Petroleum Systems International, Inc., Salt Lake City, UT, United States.
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4. Fluid Inclusion Technologies, Tulsa, OK, United States.
5. Jayden, Oklahoma City, OK, United States.**ABSTRACT BODY:** The paleotrap is a well-known concept in petroleum geology, but relatively little is known about locating the specific site during the forward modeling process. A paleotrap is defined as the temporary trapping of hydrocarbons (paleoaccumulation), followed by additional migration of the hydrocarbons into a different trap. A significant time gap is implied to exist between the trapping events. This presentation will review a number of methods routinely used to identify and quantify the location of paleotrap, and demonstrate the concept in practical field studies.

Workflow methods for locating paleotrap are applied to both overlaying sequences and actual reservoir zones. In the overlaying sequences, the focus is directed toward identifying depositional system response to an evolving structure at the critical moment of paleotrap charging. Geologic techniques include isopach thinning, erosional unconformities, and water depth indicators from paleontological methods. Within the specific reservoir sequences, a key tool is the fluid inclusion stratigraphy (FIS) signal which identifies the location of the paleoaccumulation, including the paleocolumn height (i.e., in context of the paleorestitution workflow). Microthermometric measurements enable the temperature of emplacement to be determined for the paleoaccumulation. In a similar manner, the authigenic illite method uses K/Ar dating to directly determine the age of oil emplacement to the paleotrap. The collective data provide quantitative input to the 3-D basin model. Additional insight and calibration for the paleotrap can be derived from the direct analysis of oil and gas from hydrocarbon-bearing fluid inclusions identified from the FIS analysis. Additional clues to suggest that a paleotrap is a petroleum system component can be established by the degree of hydrocarbon homogenization in separate pools of present day accumulations.

Petroleum systems that include a paleotrap component are most frequently encountered in compressional tectonic settings (e.g., foreland basin setting). Once the location of the paleotrap is established, the exploration risk is reduced as the focus can be directed to the remigration events. The remigration is usually oriented in a direction that is perpendicular to that of compression. Application of these concepts to the petroleum system assessment indicates that the paleotrap component is more common than usually acknowledged by the prevailing migration paradigm.

CURRENT THEME: Theme 8: Breakthroughs: Tectonics, Salt and Basin Analysis**CURRENT SUB-CATEGORY:** 1) Petroleum Basin Modeling and Basin Analysis