PISTON CORE INTERPRETATION WORKFLOW

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Piston core survey is one of several important tools in de-risking the deepwater play. A false positive is a common problem in interpreting piston core data and can lead to over-confidence in source rock presence risking. Two main pitfalls in interpreting piston core data include the following:

1) Failure to correctly identify an anomaly. Very often the interpreter defines an anomaly based only on the data set that they are working on which inevitably results in anomalous samples being found in every data set.

2) Cherry-picking a few data types that support the seeps presence narrative. The GC and GCMS data are the two types of data that are often interpreted without careful iteration with other data sets such as TSF and EOM. Gas chromatograms that show a smooth normal alkane envelope are often interpreted as evidence of fresh (unbiodegraded) oil without supporting evidence from other measured parameters (e.g., TSF, EOM, etc.). While fresh seeps are occasionally observed in piston core samples, a smooth n-alkanes envelope observed in sea floor sediment can be related to other phenomenon. Another common mistake is to use source- and or maturity-related biomarker observations without incorporating other basic screening parameters.

A careful, systematic evaluation using a holistic approach could minimize interpretation error. The first step is to look at each measured parameter and interpret them individually. The colors red, yellow, and green are then assigned to each parameter for each sample to represent the degree of confidence (the likelihood) of the samples being seeps (Red denotes not likely to be a seep; yellow denotes probable seeps, and green denotes most likely to be a seep). The color assignment should be based on worldwide observations of common traits of seeps, recent organic matter or reworked organic matter contained in sea floor sediment. The results of the individual interpretation is documented in the interpretation matrix table (see below for example). The last step is to iterate all of the observations from each individual sample. Samples that are marked as green in all parameters across the metrics table are interpreted to most likely be seeps.

A systematic interpretation that includes all available parameters should enable us to provide reliable, objective interpretation results.
Figure 1 Piston core interpretation workflow. Interpretation of organofacies and thermal maturity level should be done only after the seep is successfully validated by the initial screening interpretation.