

**A Comparison of Four Methods for Performing Fluid Contact and Flat Spot Analysis as Applied to a Single Gulf of Mexico 3-D Seismic Anomaly**  
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There are now available both horizon and 3D based methods of analyzing and scanning for “flat spots” or “fluid contacts” in seismic data. The 4 treated and illustrated here are Horizon Binning, 2D GrAZ, GrAZ 3D scanning and 3D Dipstack.

<p>Horizon Binning and 2D GrAZ are horizon based methods for assessing the quality of an HCI and for determining the location of a fluid contact. Horizon Binning is a technique for accumulating statistics as a function of structure within a region of interest. A fluid contact is inferred when, at a given time (or depth), there is a consistent change from a water leg response to a “not-water” response. An attribute that can be used with Horizon Binning to further enhance a hydrocarbon effect is 2D GrAZ. 2D GrAZ is a horizon attribute computed as a dot product of the gradient of the structure with the gradient of an attribute (e.g., amplitude). A 2D GrAZ anomaly will appear as a peak, at the time (depth) of the fluid contact. <p>GrAZ 3D and Dipstack are volume based methods for fluid contact detection and anomaly assessment. In GrAZ 3D a dot product is formed between a structural dip vector field and a gradient vector field of an attribute volume and is stored as a 3D volume. A fluid contact is interpreted as a GrAZ 3D anomaly that is restricted in time (or depth) and extends to logical reservoir boundaries (e.g., faults). For reservoirs in which the hydrocarbon bearing sand is “slower” than the surrounding material, fluid contacts dip downward in time. For faster sands, fluid contacts dip upward. Seismic attribute data is summed along expected flat spot directions to enhance fluid contact signals, forming a Dipstack volume of extracted “fluid contacts.”

<p>These methods do not work when the structure is too flat or noise is too high. They will not distinguish between a paleo fluid contact, which has leaked, and a reservoir which is still full. With these limitations, Horizon Binning, 2D GrAZ, GrAZ 3D and Dipstack act as additional tools available to practicing geoscientists, but are not “silver bullets.”