Data sheet:
Carbonate Workflow

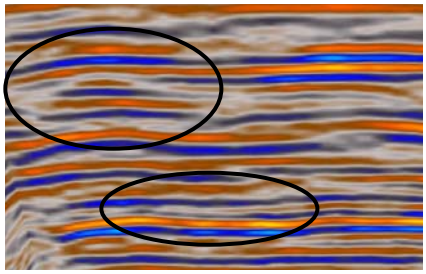
Background

The ffA Carbonate Workflow was developed using over 3000 km^2 of data from different geographical locations and epochs, and the results have been calibrated with well data. The workflow highlights and delineates carbonate features including Reefs, Build-ups and Karst. All elements of the workflow can be provided by ffA Services and most of the attributes illustrated here are available in ffA Software.

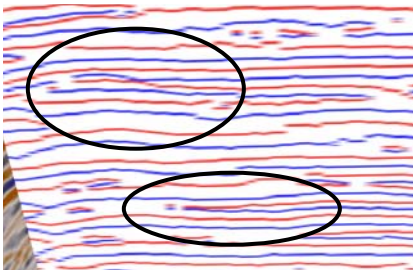
"Although one of the data sets has been worked on since 2000, this is the first time it has been possible to fully define the connectivity of the bodies"

David Hunt, Project Leader, Carbonate Exploration Research, StatoilHydro.

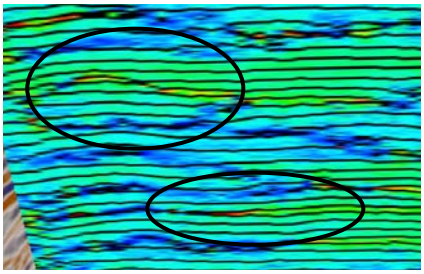
Clinoforms, On-laps & Pinchouts



a) Noise Cancelled data



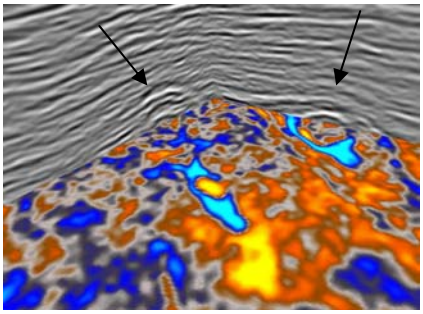
b) Bedform attribute



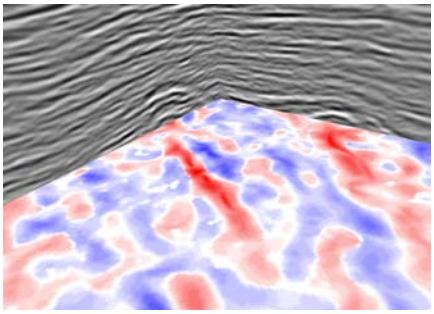
c) Frequency Bedform attribute

Understanding the bedform geometries is a key factor in understanding carbonate features. Identifying the individual bedforms and combining them with instantaneous frequency highlights mounds, clinoforms, on-laps, and pinchouts, irrespective of their amplitude. This accelerates the identification of subtle stratigraphic features.

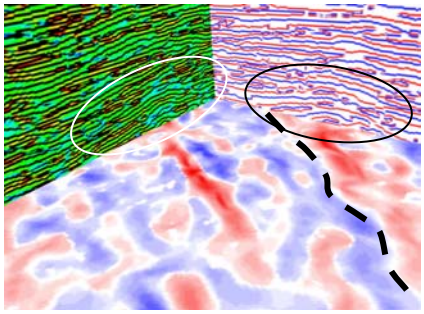
Reefs & Mounds



a) Noise Cancelled data



b) Flexure attribute



c) Flexure with Bedform attributes

Identifying the extent of reef systems and understanding the internal characteristic is a complex and time consuming task. Using Flexure, a form of curvature analysis, the antiformal shape of reefs and mounds are highlighted in the data creating a defined edge which illustrates the extent of the reef. The internal characteristics are apparent in the Bedform attribute (black circle) and the onlap onto the top of the reef is seen in the Frequency Bedform attribute (white circle).

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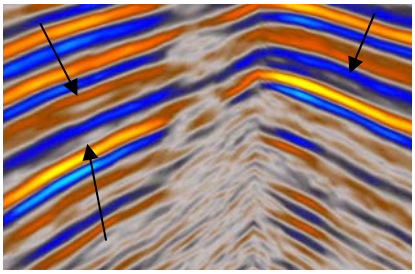
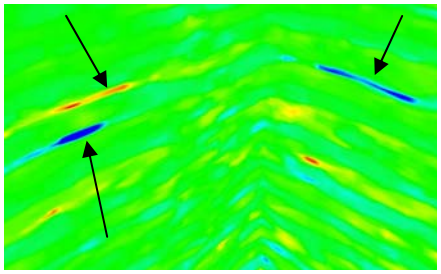
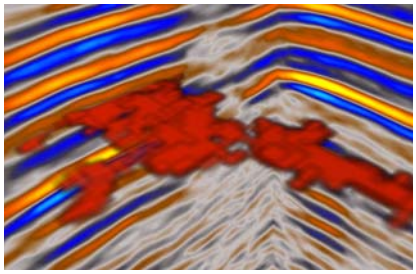
Thin Build-ups



a) Noise Cancelled data



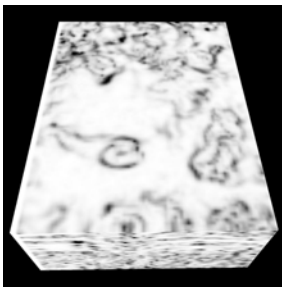
b) Doublet attribute



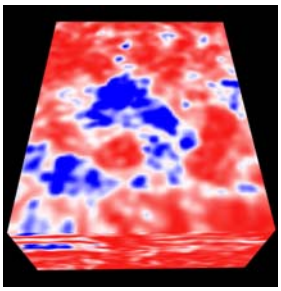
c) Geobody

Carbonate build-ups with a limited vertical extent are occasionally expressed as poorly resolved reflectors. These "doublets" are identified by analysing the wavelet shape so that peak and trough anomalies are highlighted in the data. Once highlighted the doublets are converted into Geobodies so that the extent and connectivity of the potential build-up areas can be visualised in 3D. Further analysis can be run on the Geobodies to identify their thickness, volume and lateral extents.

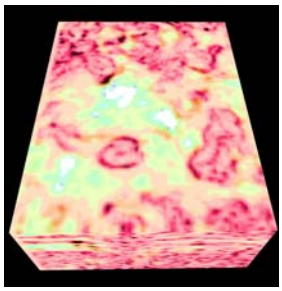
Dissolution Features



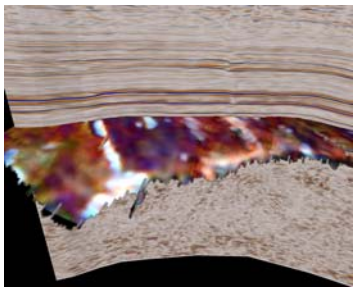
a) SO Discontinuity



b) Continuity

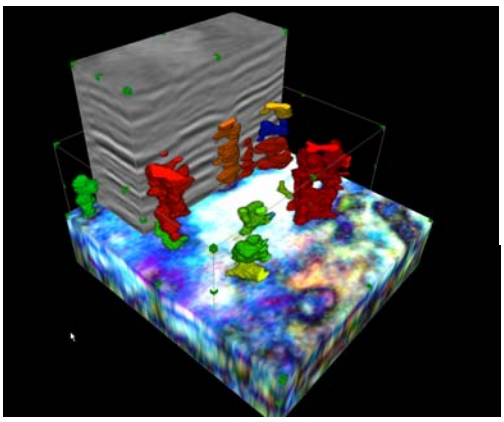


c) Combination of a&b



d) RGB blend on horizon

Dissolution features such as karst, breccia and canyons are imaged using one of several attributes which can identify either the edges or the infill of dissolution features. Both sets of information must be combined to define the edge of the features whilst also identifying internal characteristics. Frequency Decomposition and RGB Blending also identify dissolution features by highlighting frequency variations within and outwith the area. The 3D geometries of the dissolution features are then delineated by creating Geobodies from the attribute volumes. The size, extent and connectivity of the features is analysed, and information on the surrounding rock can be ascertained from the extent of the dissolution.



Left : Vertically extensive karst displayed above an RGB blend.

Right : Karst features within a stable reflector package identified by an RGB blend.