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Vertical Evolution of MTC

The vertical succession of strato-structural units suggests that MTE bodies in a basin undergo an evolution over time. This evolution, from oldest to youngest, is as follows:

· Large, semi-rigid slump bodies with a high degree of internal mesoscopic deformation (Units B1-3).

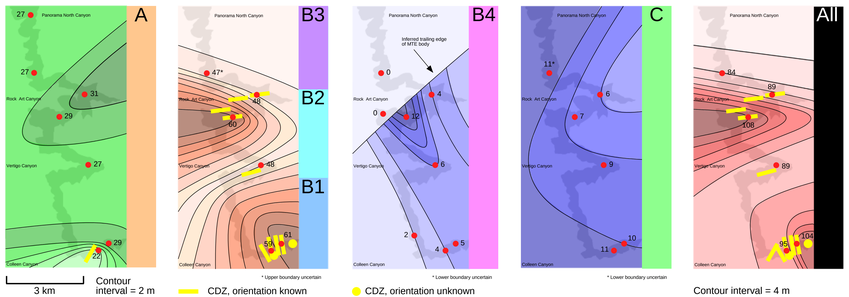
· Small, semi-rigid slump bodies with a higher degree of mesoscopic deformation (top of Unit B3, Unit B4).

·A return to sediment gravity flows as the primary form of deposition with localized slumping on local topography (Unit C).

This pattern of waning size and/or deformation of MTE bodies occurs as the basin lowers its gradient through time.

Isopach Maps of Strato-Structural Units

Note: Units B1-3 have been mapped as a combined unit due to uncertain unit boundaries in Rock Art and Vertigo Canyons



Thickness Relationships

Isopach maps of the six strato-structural units suggest that:

· Unit A may be a drape or a rigid slide body.

· Units B1-3 had the greatest effect on overall thickness.

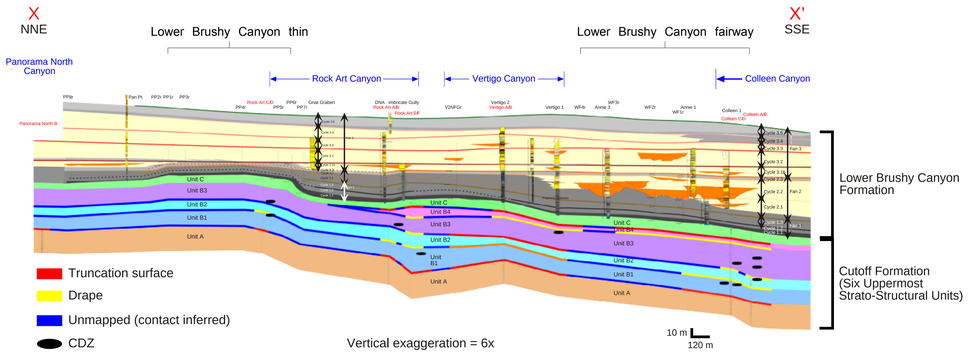
· Unit B4 is a local (less far-traveled) MTE body which may have slumped from a locally steep gradient immediately to the north.

· Unit C is a drape (with local slumping at its top).

· CDZs are concentrated in thicks.

. Cutoff topography affects Brushy Canyon geometry, but units underlying the six strato-structural units must also be a control. Basement control remains a possibility.

Cross Section X-X' from Panorama North Canyon to Colleen Canyon



Cross section assumptions:
· Thickness change is constant within all strato-structural units between measured sections
· Underlying structure is a control on MTE body geometries with possible basement influence
· Topography at the surface of the Cutoff Formation is a control on Brushy Canyon Formation deposition
· Thickness changes within the six strato-structural units may be a result of folding or of thrust sheet stacking within those units

Conclusions

· There were a minimum of six, and probably at least eight, MTEs in the study area based on significant variations in lithology, style, and intensity of deformation, regional truncation surfaces, orientation of structures, and presence of drape facies.

· The dominant transport vector for the MTEs is generally N–S with a secondary ENE-WSW component, based on orientation of mesoscopic fold axes and lineations.

· The dominant structural style is contractional, based on presence of folds, reverse faults, and contractional overprinting of extensional microstructures.

· Contraction may cause Cutoff thickness to double over a distance of 20+ km. Local highs that concentrate sandstone deposition within the intervening topo-graphic lows result both from MTE body geometry in the six strato-structural units and from topographic control by underlying units.

· MTE bodies exhibit a pattern of waning volume and degree of deformation through time.

· CDZs are concentrated in areas of increased stratigraphic thickness.

· Deformation is ductile to brittle; occurrence of fluidal deformation is localized, reflecting differences in carbonate lithology and rheology.

References are available in the handout below. Please feel free to take a copy.

Ongoing Research

Current work being done in the Cutoff on the slope and proximal basin in the Guadalupe Mountains suggests the following:

· The Cutoff is absent on the shelf margin and on much of the slope. The lack of structures indicative of slumping and sidelap relationships of lower units suggests erosion (Harris, 1982), but upper units, tentatively correlated with the six strato-structural units, may have been removed by slumping.

· Large slump structures appear at toe of slope and continue basinward.

· The six strato-structural units appear to correlate with unit 5 of Harris (1982) and thereby would correlate with the shelfal Middle San Andres of Sarg and Lehmann (1986).

Continuing work will help to confirm these relationships and to establish the dominant transport direction of the MTEs in the Guadalupes.

Land access issues have prevented continuing work in the Delawares, but planned future research there includes completion of mapping and collection of additional structural and thickness data, as well as extension of the study to include outcrops to the north and south and the Cutoff units below the six strato-structural units.