

Salt detachment deformation:
The influence of salt thickness and
proximity on structural geometry

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ABSTRACT

Structural style above detachment zones has been related to thickness and proximity to the basal detachment layer. Fieldwork, structural measurements and seismic interpretation of evaporite horizons in the Amadeus Basin, Central Australia, have given insight into the impact of salt properties on structural geometry of surrounding rocks during compressional deformation. The lower Gillen Member of the Bitter Springs Formation has acted as a detachment horizon since the Late Proterozoic. Paleo-stress orientations, calculated from conjugate fracture sets in outcrop, express the mechanical detachment of younger packages via a 90° rotation in maximum horizontal stress. Synformal deflection beneath the Ross River Syncline has evacuated salt to the north, providing a greater amount of compensation for compressive stresses in the detachment horizon. Vertical dip-slip displacement along thrust faults has been sufficient enough to exhume basal sedimentary units where grounding between competent layers has occurred as a result of lateral salt exhaustion. Aspect ratios of folds indicate that a decrease in both amplitude, wavelength and arc length can be attributed to the proximity of the layer to a detachment horizon. Fold geometry consists of small-scale isoclinal and large-scale tight folding, thereby increasing geometrical complexity toward the detachment horizon. Detachment of overriding layers has also appeared to eliminate fold vergence.

KEYWORDS

Salt detachment, structural geometry, evaporite, deformation, Amadeus Basin, Bitter Springs Formation.

TABLE OF CONTENTS

Abstract.....	2
List of Figures and Tables	4
Introduction	7
Background.....	12
Methods	19
Results	20
Structural Interpretation of Seismic.....	20
Fieldwork.....	21
Fold geometries in the Amadeus Basin from seismic and field data.....	31
Aspect ratio analysis of folds in the Amadeus Basin	41
Shortening estimates from seismic and field data	46
Discussion.....	50
Conclusions	54
Acknowledgments	54
References	55
Appendix A: Seismic line details	58
Appendix B: Tabulated field data.....	58
Appendix C: Field notebook	58

LIST OF FIGURES AND TABLES

Table 1. Summarised fold properties, fold shapes, aspect ratios and shortening calculations from seismic lines containing salt-cored antiforms in the Amadeus Basin.	32
Table 2. Summarised fold properties, dimensions and fold shapes along Loves Creek and Arltunga Road Transects.	39
Table 3. Summarised fold properties, dimensions and fold shapes along Trepkina Gorge Transect.	40
Figure 1. Schematic representation of the comparison between packages of rocks which deform from compressive stresses. If an incompetent basal detachment is present, overlying layers will slip along it producing structures such as box folds, circular arc folds and fault propagation folds. Adapted from Dahlstrom 1990.	8
Figure 2. Conventional structure of a current day offshore delta system. Pro-delta muds and shales are overlain by competent layers of rock. Extension in the delta top causes listric normal faults and compression in the delta toe forms a fold and thrust belt. From (King <i>et al.</i> 2010).	9
Figure 3. Composite stratigraphic section for the Amadeus Basin, Central Australia (Weste 1990). Adapted from (Skotnicki <i>et al.</i> 2008).	11
Figure 4. Geographical locations of current day salt detachment zones (blue circle). Adapted from Morley <i>et al.</i> 2011.	13
Figure 5. Synformal deflection (Mitra 2003). a) Seismic line P80-11 from the Amadeus Basin (Figure 7a). b) Interpretation showing an example of synformal deflection (Mitra 2003), illustrating the evacuation of the incompetent salt units of the Gillen Member from beneath the synformal structure into the cores of adjacent antiforms.	15
Figure 6. Compressional deformation in detachment zones causes concentric folding of competent layers of rock with parallel geometries in their outer arc. a) A cusped geometry causes space problems in the cores of concentric antiforms, thus, for competent rocks, this model would be inaccurate. However, b) illustrates a basal detachments' ability to form disharmonic folds to accommodate for this. Adapted from (Mitra 2003).	17
Figure 7. a) Map showing the regional extent of the Amadeus Basin and surrounding provinces. Seismic lines that were used in this study have been outlined. (1) 0-7, (2) P81-J14, (3) M87-TA01, (4) P82-GE41, (5) M83-13, (6) M83-13, (7) M82-10, (8) M82-11, (9) P81-U4, (10) p83-HJ1, (11) I99A-16, (12) 2-5, (13) 2-A, (14) M94-PV040R, (15) 2-1, (16) 3-5, (17) 3-4, (18) 73-3-3.6, (19) 73-3-AEX, (20) 73-3-2.3, (21) 3-1, (22) P80-11, (23) 3-2XDX, (24) P80-2, (25) P80-4, (26) MCF81-07, (27) DH91-2N, (28) 82-01, (29) MR89-102, (30) 82-06 b) Location of fieldwork. Structural data was observed and measured along three transects.	21
Figure 8. Equal-area, lower hemisphere stereonet constructed from structural field data in the Amadeus Basin. The scatter of orientations of bedding planes can be seen to dramatically increase in the Bitter Springs Formation.	23
Figure 9. Different types of fractures in the Amadeus Basin. a) Calcite veins in the Bitter Springs Formation. Cross cutting relationships reveal that the E-W vein in this photo has been displaced by left-lateral (sinistral) movement. It is therefore older than the N-S vein. b) precipitation in tensile veins in the Heavitree Quartzite.	24

- Figure 10. Schematic block diagram illustrating the relative arrangement of principal stresses required to produce a certain stress regime (Anderson 1951). Adapted from Sassi & Faure 1996. 25
- Figure 11. a) Photo 47 Bitter Springs Formation with conjugate fractures. b) Interpretation overlay, with implications of stress directions for conjugate fractures to form. c) Schematic diagram of how conjugate fractures form simultaneously with folding- extension in the outer arc, no strain in the centre, and compression in the inner arc. Stereonets show ideal stress regime (Anderson 1964). 26
- Figure 12. Loves Creek Transect. Regional cross section through Loves Creek. Apparent dips were calculated using trigonometry for a north-south transect line with a 001 degrees section azimuth. The cross section illustrates the relatively simple structure of formations that overly the detachment horizons in the Bitter Springs Formation (Figure 3). The orientation of horizontal paleo-stresses remain constant, with the maximum horizontal stress trending east-west. The photo inlay represents some smaller fold structures see within these units. 28
- Figure 13. Arltunga Road Transect. Two-dimensional cross section along a northeast-southwest trending transect line. Apparent dips were calculated with trigonometry using a section azimuth of 053 degrees. North-south compression combined with somewhat ductile dolomite leads to a complexly folded and apparently thick package of rocks. ... 29
- Figure 14. Trephina Gorge Transect. Two-dimensional cross section along a northeast-southwest trending transect line with a section azimuth of 053 degrees. The section shows a back-thrust with a great enough vertical throw to exhume the Heavitree Quartzite, which has been made possible by grounding due to a lack of salt between competent layers in the Bitter Springs Formation and Heavitree Quartzite – see Discussion. 30
- Figure 15. a) Seismic line M94-PV04R with the structural interpretation (b) illustrating 1B fold style (Ramsay 1967). This interpretation also illustrates the nature of salt in the core of an antiform. 31
- Figure 16. Seismic lines from the Amadeus Basin with interpreted structural geometry they illustrate. a) Line 0-7. b) Interpreted section showing angular antiformal hinge surrounded by larger wavelength synforms. c) Line P82-GE41. d) Interpreted section showing a large amplitude antiform-synform pair with a very slight southward vergence. e) Line P81-U4. f) Interpreted structure showing a large north-dipping thrust fault that cuts through the hinge of an antiform, forming a fault-bend fold on the hanging wall. g) Line P80-2. h) Interpreted structure showing a force-fold antiform on the northern limb of a synform with large wavelength ~ 15 – 20 km. A blind thrust is responsible for the antiform. 34
- Figure 17. Paleo-detachment layer in outcrop along the Arltunga Road transect (Figure 7b). This unusual lithology was encountered between competent layers of dolomite in the Bitter Springs Formation. The rock is very fine grained, smooth, and has a very different appearance to the surrounding rocks. 37
- Figure 18. The effect of salt thickness on fold geometry derived from seismic. a) Scatter plot showing the linear relationship between the fold geometry of an antiform and the thickness of salt in its core. The aspect ratio appears to increase as the thickness of salt increases. b) Scatter plot showing the linear relationship between the breadth of an antiform and the thickness of salt in its core. The arc length appears to decrease (as it is inversely proportional to the aspect ratio) as the thickness of salt increases. From these

graphs it can therefore be assumed that salt thickness has an influence on fold amplitude, wavelength and arc length.	43
Figure 19. The effect of a detachment layer proximity on fold geometry derived from seismic. a) Scatter plot showing the linear relationship between the fold geometry of an antiform and the proximity of the measured layer to the detachment horizon. The aspect ratio appears to increase as the distance between the measured layer and detachment layer increases. b) Scatter plot showing the linear relationship between the breadth of an antiform and the thickness of salt in its core. The arc length appears to decrease as the thickness of salt increases. From these graphs it can be assumed that detachment proximity has an influence on the amplitude, wavelength and arc length.	44
Figure 20. The effect of detachment proximity on amplitudes derived from field data. The x-axis is comprised of fold codes, and can be found on the cross-sections (figure 12, 13). The scatter plot shows the relationship between fold amplitude and detachment proximity from measurements of folds in cross sections. Fold amplitude appears to exponentially decrease as the detachment layer is approached.	45
Figure 21. The effect of detachment proximity on fold geometry derived from field data. The x-axis is comprised of fold codes and can be found on the cross-sections (figure 12, 13). a) Scatter plot showing the relationship between fold geometry and detachment proximity. Wavelengths appear to decrease as the distance to detachment is increased. b) Arc length aspect ratios yield a similar relationship to amplitude aspect ratios. Whereby rocks closer to the detachment will have shorter arc lengths.....	46
Figure 22. An illustrative method of the process of calculating shortening from field photos. A sequence of rocks will have an initial length, L_0 , which can be measured and compared with the shortened length L_1	47
Figure 23. Shortening amounts with respect to the geographical distribution of seismic lines in the Amadeus Basin (7a). Seismic lines are arranged from northwest, to northeast, to central south areas of the Amadeus Basin. Competent layers in the northwest and central north parts of the basin exhibit greater amounts of shortening than other areas of the basin. Seismic lines labelled with (*) represent the presence of salt-cored antiforms.	48
Figure 24. Shortening amounts with respect to salt thickness and proximity from seismic data. a) Scatter plot illustrating the linear relationship between salt thickness and the amount of shortening. A thick layer of salt will cause greater shortening in the overlying layers. b) Scatter plot illustrating the linear relationship between salt proximity and the amount of shortening.....	48
Figure 25. The relation between shortening and distance to detachment from field outcrops. Although there is a large distance gap (6 km), it can be assumed that shortening amounts are not affected by the detachment until 1 km proximity is reached. Section averages of Loves Creek (6 %) and Arltunga Road (37 %) supports the relationship that rocks closer to a detachment layer will express greater amounts of shortening.	49
Figure 26. Shortening estimates from filed data for within 1.5 km proximity to detachment layer.....	52