T/47P

BASS BASIN, TASMANIA

Labatt 3D MSS
and
Molson 2D MSS

Seismic INTERPRETATION REPORT

Tap Oil Ltd
May 2010

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1 INTRODUCTION

The Labatt 3D & Molson 2D Marine Seismic Surveys were acquired from the last quarter of 2007 into the first quarter of 2008 on the north-western margin of the Bass Basin (Fig. 1). The Labatt 3D survey covers 525 km^2 and was designed to delineate prospects identified along the Cormorant structural inversion trend in the south-western corner of Petroleum Exploration Permit T/47P**.** The Molson 2D survey consists of 530 full fold km and lies on the central-northern part of T/47P.

The exploration permit T/47P was awarded on 14 March 2007 to the current joint venture based on a competitive work program bid for area T06-3. The T/47P joint venture consists of Tap (Shelfal) Pty Ltd (40%, Operator), Singapore Petroleum Company Ltd (35%) and Jubilant Energy Ltd (25%).

A number of leads, identified within the survey areas prior to the acquisition of the new seismic data sets, were upgraded following interpretation of the Labatt 3D. No significant leads were identified within the area of 2D seismic coverage to the east of Labatt 3D.

2 REGIONAL GEOLOGY

The Labatt 3D and Molson 2D seismic surveys are located in the Bass Basin, southeast Australia. The basin forms part of the Southern Margin Rift System that developed as a result of the separation of Australia and Antarctica. Two major rifting events are recognised, the first during the early Cretaceous is associated with the opening of the Southern Ocean and the second phase during the Turonian – Campanian results from the opening of the Tasman Sea. During the Oligocene – Miocene the northern parts of the basin, including the area of T/47P, experienced reactivation and uplift forming the Cormorant High.

The pre-rift Late Jurassic to early Cretaceous succession is typically thin to absent across the Bass Basin. Deposition began as the basin subsided following rifting associated with the opening of the Southern Ocean during the early Cretaceous and comprises fluvio-deltaic sediments of the Otway Group. The Turonian synrift succession was deposited during opening of the Tasman Sea. Fluvio-deltaic and lacustrine sediments of the Duroon Group were deposited during this phase and are referred to as the Lower EVCM. This succession has not been penetrated by wells in T/47P. Post rift sequences deposited during thermal sag phase include the middle and upper EVCM, Demons Bluff and Torquay Group. These sequences onlap the basin margins and thicken towards the central axis of the Bass Basin. Major faults and grabens predominantly trend northwest-southeast. Depocentres initially developed as major half-grabens bound by listric normal faults including the Cormorant Trough which was active from the Late Cretaceous to early Eocene.

Late Oligocene to Miocene compression within the Bass Basin was associated with collision of the northern edge of the Australian plate with SE Asia and sea floor spreading in the Southern Ocean which resulted in strike slip reactivation of basement related faults (**Smit,1988**). North-south oriented pop-up structures formed during reactivation and compressional wrenching. This reactivation is believed to have been responsible for the breaching of pre-existing traps and vertical migration of hydrocarbons from deeper source rock kitchens to upper EVCM reservoirs.

Hydrocarbons discovered to date in the Bass Basin are reservoired in fluvio-deltaic sands of the Eastern View Coal Measures (EVCM). Within T/47P the upper EVCM is considered to be the primary reservoir interval with significant hydrocarbon shows and palaeo-columns encountered within Cormorant-1. The EVCM is conformably overlain by the regionally extensive upper Eocene Demons Bluff Fm. This forms the top seal and represents the first major marine transgression within the basin.

Source rich horizons of the *L.balmei* to *M.diversus* began expelling hydrocarbons during the Oligocene, following deposition of the regional seal, the Demons Bluff Fm. (Cummings et al. 2002).

The sedimentary succession is disrupted by igneous activity relating to various episodes of volcanism associated with the different phases of structural evolution. Intrusive dykes and sills, as well as extrusive volcanics, are observed on seismic and have also been penetrated by wells in the basin. Upper Cretaceous to Palaeocene volcanics are restricted to the north-eastern part of the basin. Early Miocene and Oligocene volcanics are more extensive throughout the Bass Basin. Intrusions of this age appear to be related to reactivation structures where faults acted as feeder conduits for the volcanic material **(Lennon et al, 1999**).

3 LABATT 3D AND MOLSON 2D MARINE SEISMIC SURVEYS

3.1 Acquisition

<u>Labatt 3D</u>

The Labatt 3D Marine Seismic Survey was operated by Tap Oil Ltd and acquired between the 29 November 2007 and 01 January 2008. Water depth over the survey area varied from 73m to 82m.

Petroleum Geo-Services were contracted to conduct the survey using the M/V Pacific Explorer. The data were acquired using six 6km-long streamers and two 3090 cubic inch airgun arrays. A final total of 1,748 full fold sail line kilometres of surface coverage equivalent to 525 full fold square kilometres were recorded in a 137.9/317.9 degrees direction.

Further details and technical specifications for the survey, including operational details, can be found in the following reports:

1. Labatt 3D Final Acquisition Report by Petroleum Geo-Services
2. Labatt 3D Data Acquisition Supervision Report by Enquest

Molson 2D

The Molson 2D Marine Seismic Survey was operated by Tap Oil and acquired between 12-17 March 2008. Water depth over the survey area varied from 68m to 76m.

CGGVeritas were contracted to conduct the survey using the M/V Pacific Titan. The data were acquired using a 6km-long streamer with a 3040 cubic inch airgun array. A final total of 529.8 full fold kilometres comprising of 23 lines were recorded.

Further details and technical specifications for the survey, including operational details, can be found in the following reports:

1. Molson 2D Final Acquisition Report by CGGVeritas
2. Molson Data Acquisition Supervision Report by Enquest

3.2 Processing

Labatt 3D

The processing for the Labatt 3D survey was conducted by CGGVeritas in their Singapore office. The processing flow is summarised as follows:

- Reformat from SEG-D tapes
- 3D Seismic/navigation Merge
- Shots and Trace Edits Low Cut filter (3Hz/18 dB/ Octave)
- De-Signature Filter Resample to 4msec System delay correction -58 msec
- Apply Spherical Divergence (Regional Velocity)
- Swell Noise Attenuation (FXEDIT) in shot domain
- High resolution radon linear noise attenuation
- NMO correction, high frequency noise attenuation on selected offset range (2100 to 6100)
- Reverse NMO
- Tidal static correction
- Tau-P deconvolution
- First pass Velocity Analysis on 1000m x 1000 m grid
- NMO correction with 1st passes velocity
- Alternate trace drop
- Interpolate one trace in CDP domain
- High resolution radon demultiple
- Remove interpolated trace

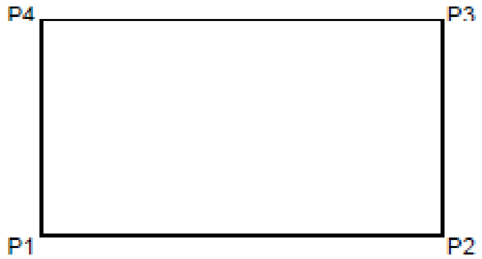
- Channel Scaling
- Post radon Despiking
- Linear noise attenuation (PRAISE)
- 3D offset Binning (12.5 X 25m grid)
- Fourier Regularization of Irregular data (RALFT3D)
- Reverse NMO Remove spherical divergence
- Target line migration
- Second pass Velocity Analysis on 1000m x 1000m grid
- Pre – Stack Time Migration
- Residual Velocity Analysis on a 500m X 500m grid
- NMO with residual velocity
- High resolution radon demultiple
- PRAISE
- FLAT3D Footprint removal
- Offset Weighting
- PRAISE (to remove radon artifacts)
- Mute
- Stack
- Q compensation
- QWAVE
- Time variant filter
- Residual zero phasing
- SSD Correction
- SEG – Y

Processing inline numbering was different from acquisition inline numbering. The relationship between two inline numbering is given below:

Acquisition inline = 2820 – Processing inline

POINT	ACQUISITION INLINE	ACQUISITION CROSSLINE	PROCESSING INLINE	PROCESSING CROSSLINE	NORTH	EAST
P1	1314	900	1006	900	5631729.5000	349923.21875
P2	995	900	1825	900	5645451.0000	355119.96875
P3	995	4800	1825	4800	5609268.5000	397790.62500
P4	1314	4800	1006	4800	5596546.5000	382593.87500

Bin Width (X) : 12.5 m
Bin Width (Y) : 25 m
Nominal Fold : 80



A full report of the Labatt 3D processing has been supplied by CGGVeritas.

Molson 2D

The processing for the Molson 2D survey was conducted by Fugro Seismic Imaging in their Perth office. The processing flow is summarised as follows:

- Transcription
- Bulk shift
- Zero phase source designature
- Seismic / navigation merge
- Gain recovery
- Swell noise attenuation / despike
- Resample to 4 ms
- SRME
- Taup linear noise attenuation & deconvolution
- Adjacent trace summation
- First pass velocity analysis (2 km)
- Parabolic & linear radon demultiple
- Inverse q – phase only
- Drop interpolated traces
- Remove t squared gain
- Spherical divergence
- Kirchhoff migration (1st pass)
- Second pass velocity analysis (1 km)
- Kirchhoff migration (2nd pass)
- Third pass velocity analysis (0.5 km)
- Nmo correction
- Parabolic radon demultiple
- Gather flattening
- Trace offset weighting
- Outer trace mute
- Cdp stack
- Gun & cable static corrections
- Inverse q – amp only
- Tvf
- Phase matching

A full report of the Molson 2D processing has been supplied by Fugro Seismic Imaging.

3.3 Data Quality

The 3D seismic data quality over the Labatt 3D and Molson 2D is generally good. A composite tie line from the Labatt 3D to the Molson 2D is shown in Figure 2. The 3D survey, in particular, provides excellent control on the spatial distribution of different fault trends in the area. The upper Eastern View Coal Measures (EVCM) objective is readily discernable over the survey areas.

The presence of high velocity Miocene volcanics dispersed throughout T/47P significantly affects underlying seismic data. Data quality deteriorates with depth due to signal attenuation in the highly reflective upper EVCM, a sequence of interbedded coals, shales, sands, and intrusive igneous sills.

The Molson 2D and other available seismic data were utilized to tie into the nearby wells outside of the 3D area. It was also used to extend the velocity grid into that area.

4 SEISMIC INTERPRETATION

The 3D and 2D seismic data were loaded into Paradigm's EPOS software and interpreted using the 3D Canvas module. The seismic database used in the interpretation is shown in Figure 3. Seven horizons were interpreted as shown in Figure 4 and Table 1. The upper horizons were used for the interval velocity depth conversion.

Table 1 Horizons Interpreted

Horizon Interpreted	Seismic Character	Purpose
Lower Mid Miocene (0100)	Peak	Interval velocity Depth Conversion
Base Volcanics (0200)	Trough	Interval velocity Depth Conversion
Near top EVCM (0350)	Trough	Secondary Target
Near top Aroo Fm (0450)	Peak	Primary Target
Near base Aroo Fm (0500)	Peak	Primary Target
L. balmei event (Lbal)	Trough	Secondary Target - reservoir section in Yolla Field

Well-to-seismic correlation was conducted via synthetic seismograms for key wells within and adjacent to T/47P. Well-to-seismic ties were generally of good quality, providing confidence in seismic event correlation.

Time structure maps were produced for all horizons shown in Table 1. The 3D data were generally picked using the horizon auto-tracker available in 3D Canvas, and infilled in poor data quality areas with interpretation on a grid of in-lines and cross-lines. Time picks for the horizons from the 2D data were gridded together with the corresponding 3D horizon in order to generate permit-wide maps. Time maps for the horizons are shown in Figures 5 to 10, and for the EVCM target horizons in Enclosures 1-4.

Fault interpretation within the 3D area was assisted by using a coherency volume, which provides accurate interpretation of fault/structural geometries by highlighting dissimilarities in the seismic data. Both faults and dykes are clearly identified on the coherency volume (Fig. 11).

5 DEPTH MAPPING

Permit-wide depth conversion was accomplished using stacking velocities from the Labatt 3D, Molson 2D and other available vintage 2D data and tying to regional well control. Petrosys' mapping software was used to generate the velocity fields and in the gridding and map generation. A summary of the depth conversion approach applied is given below:

1. Layer based depth conversion using layers
   - MSL Datum to 0100
   - 0100 to 0200
   - 0200 to 0350
   - 0350 to 0450
   - 0450 to 0500
   - 0500 to L. balmei
2. Stacking velocities were used to generate interval velocities using the Dix equation. The interval velocities were then gridded and smoothed.
3. Interval TWT and interval velocity grids for each interval were arithmetically combined to create a depth map to each horizon of interest.
4. Average velocity grids were backed out from the calculated depth and TWT.
5. Average velocity grids were scaled and well tied to create a final average velocity grid.
6. Final depth grids were generated from the horizon TWT and final average velocity grids.

Although volcanics were considered to have an impact on depth conversion, interpreting a "top volcanics" horizon was not possible as the volcanics occurred at variable stratigraphic levels across the permit, but mostly within the 0100 to 0200 interval. Therefore, the impact of velocities within the volcanics was addressed by the depth conversion approach applied.

Depth maps for the target horizons are shown in Figures 12 to 15, and in Enclosures 5-8. The average velocity map to the base Aroo Fm (0500) horizon is shown in Figure 16.

6 REFERENCES

Cummings, A.R., Hillis, R.R. and Tingate, P.R. 2002 Structural evolution and thermal maturation modelling of the Bass Basin, APPEA Journal, 43 (2) 175-91

Lennon, R.G., et al. 1999 The renewed search for oil and gas in the Bass Basin: results of Yolla-2 and White Ibis-1. APPEA Journal, 41 (1), 248-62

Smit, R., 1988 A new tectonic model for the Bass Basin. Exploration Geophysics, 19, 163-168

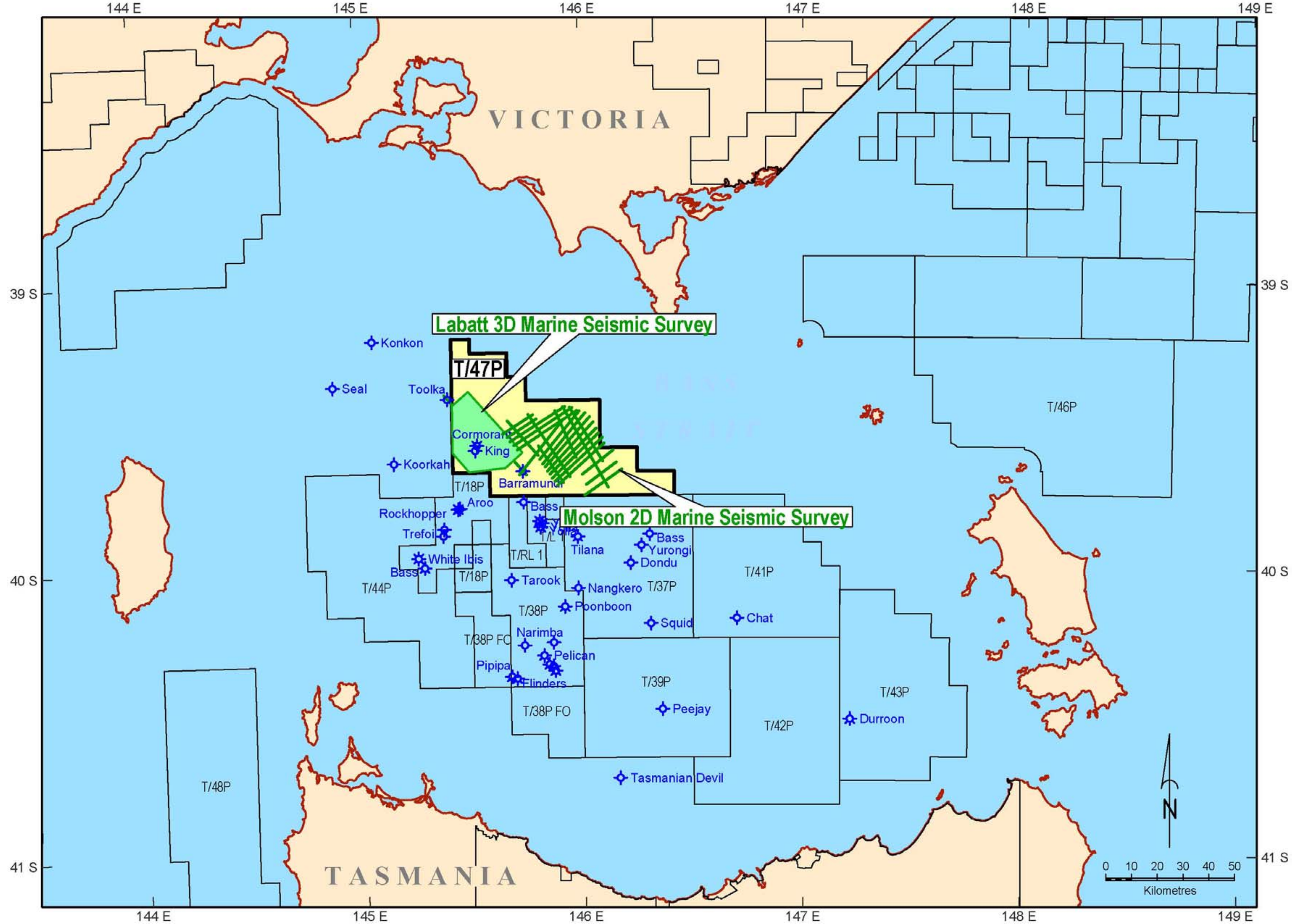


Figure 1: Labatt 3D and Molson 2D Location Map

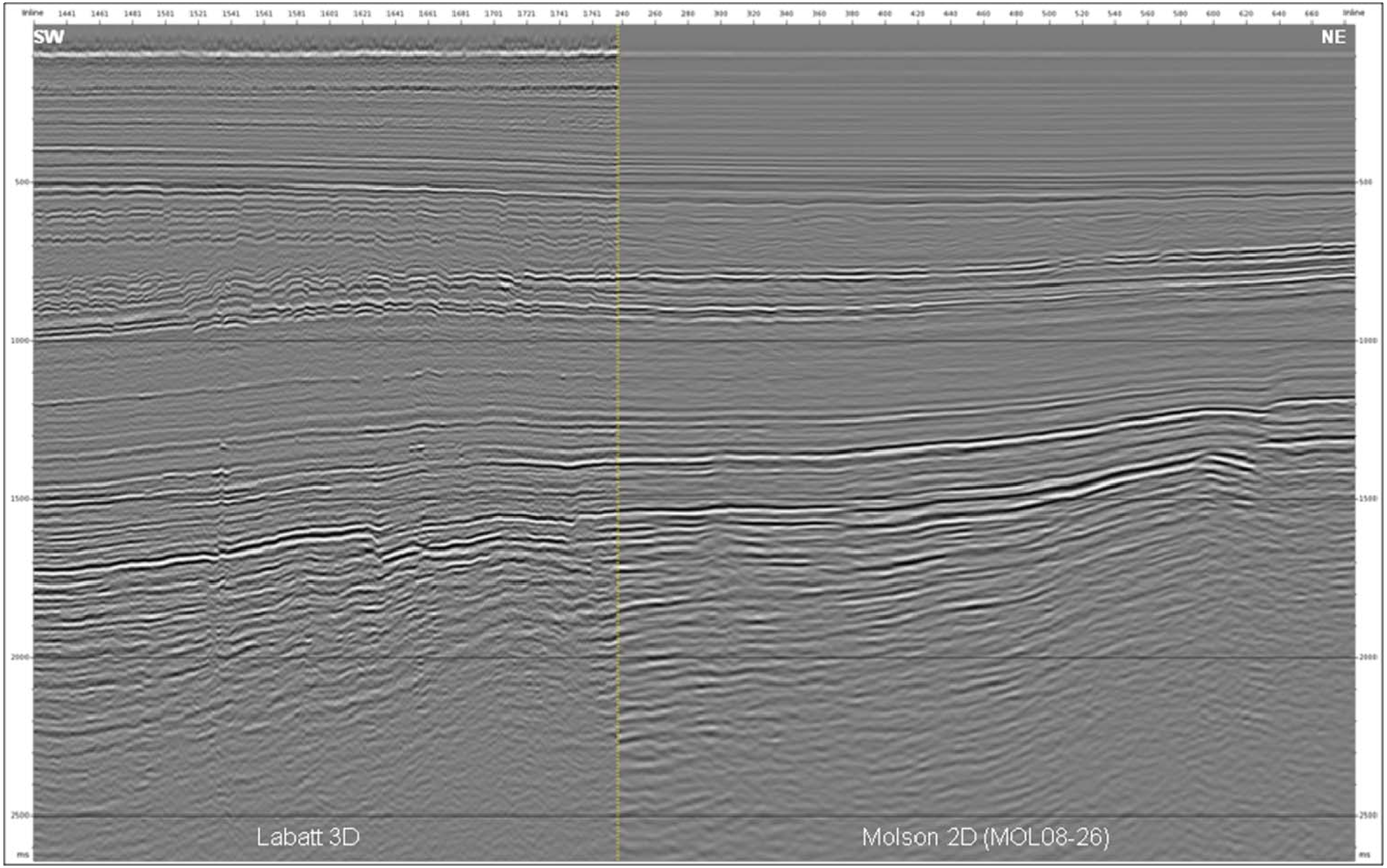


Figure 2: Composite Labatt 3D / Molson 2D Line

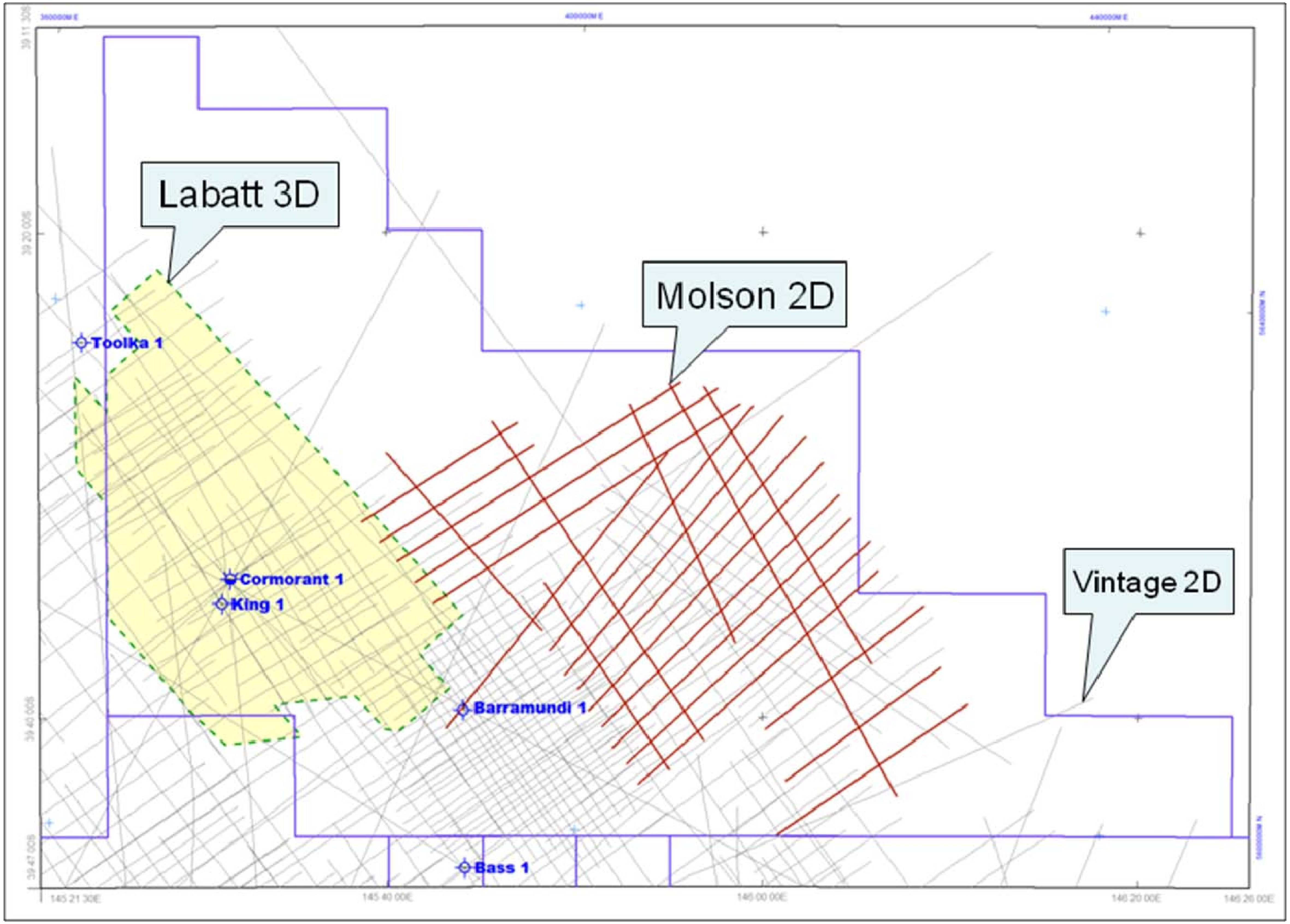


Figure 3: Seismic Database

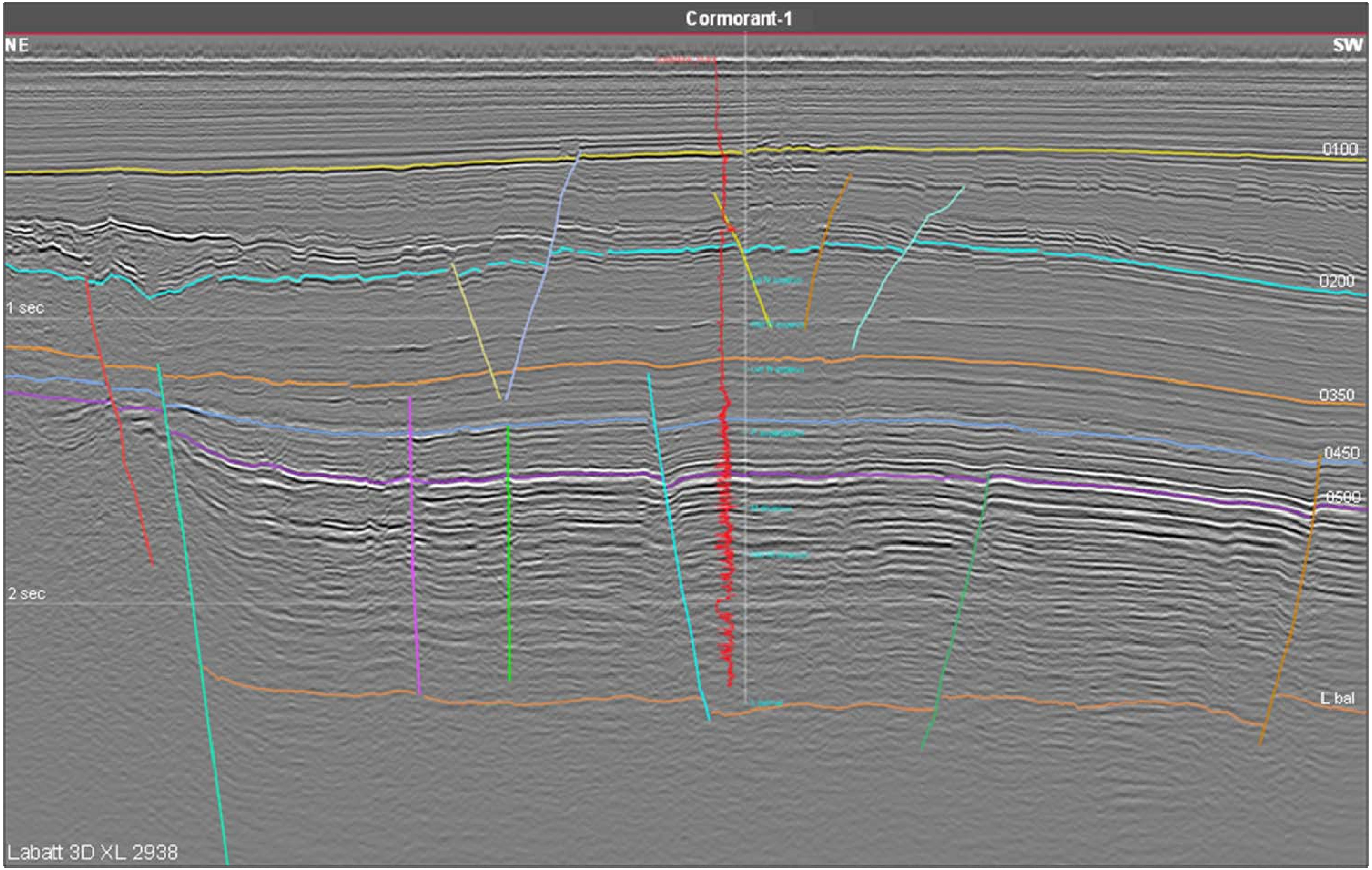


Figure 4: Seismic Section through Coromorant-1 Showing Interpretation

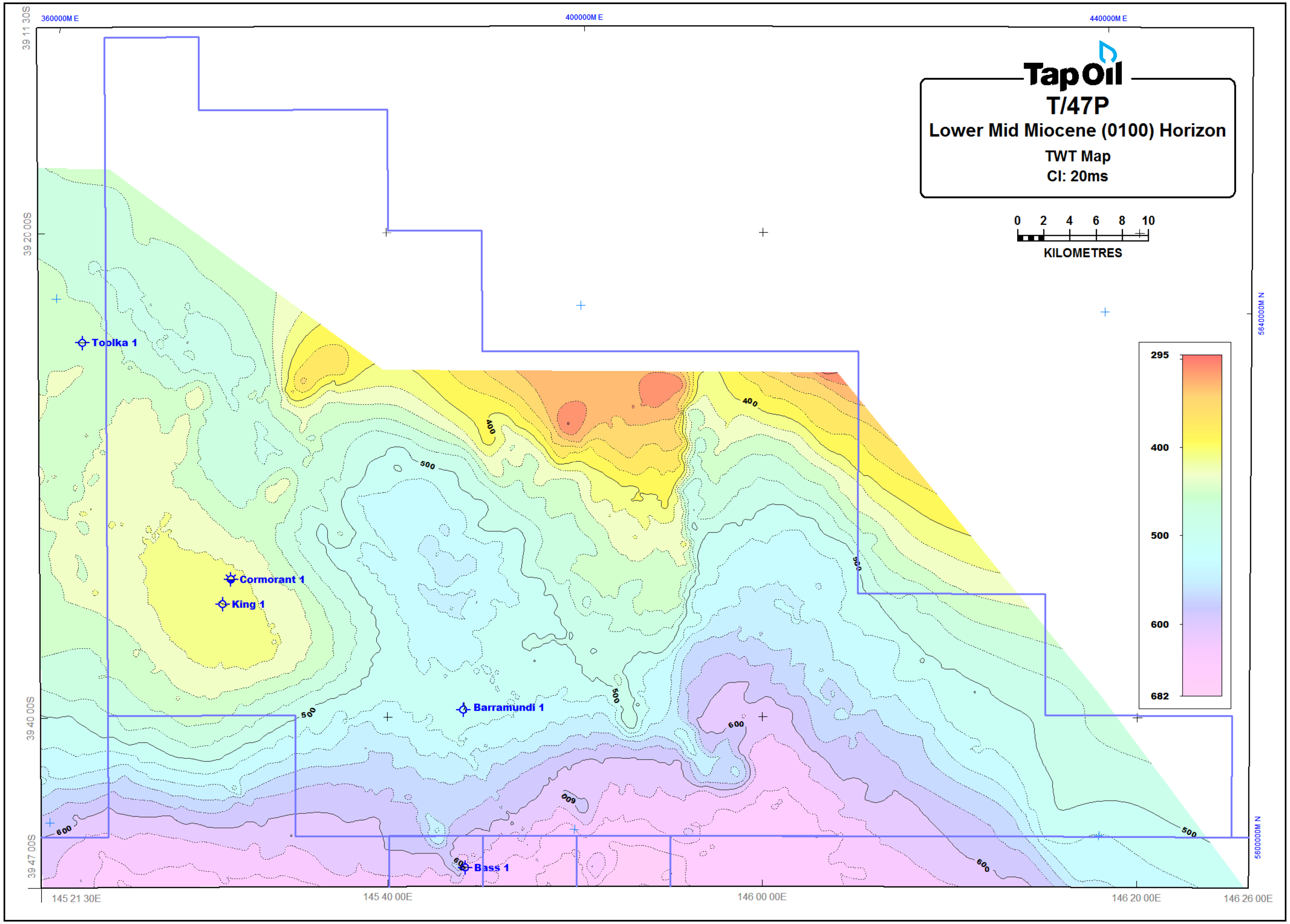


Figure 5: Time Structure Map Lwr Mid Miocene (0100) Horizon

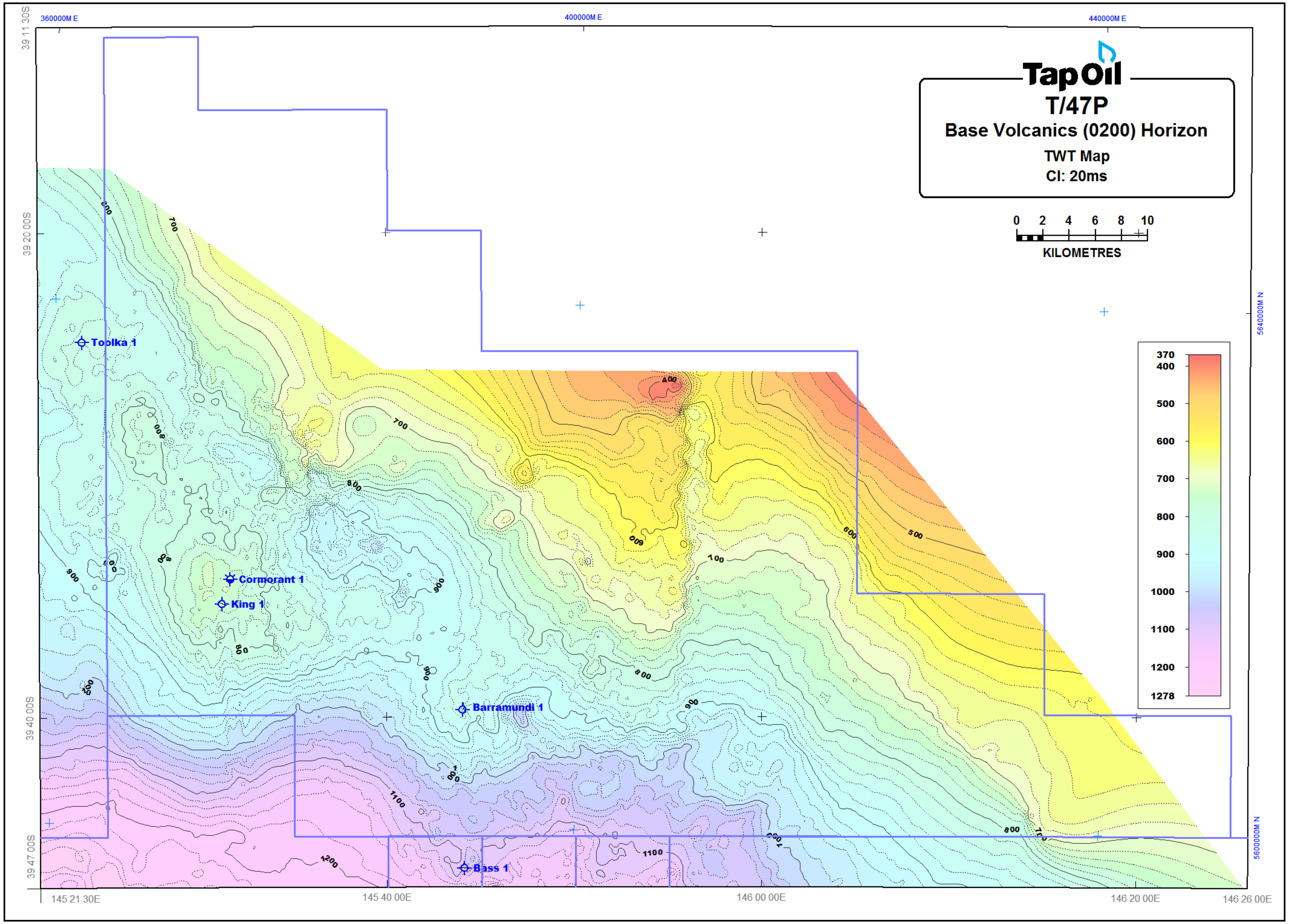


Figure 6: Time Structure Map Base Volcanics (0200) Horizon

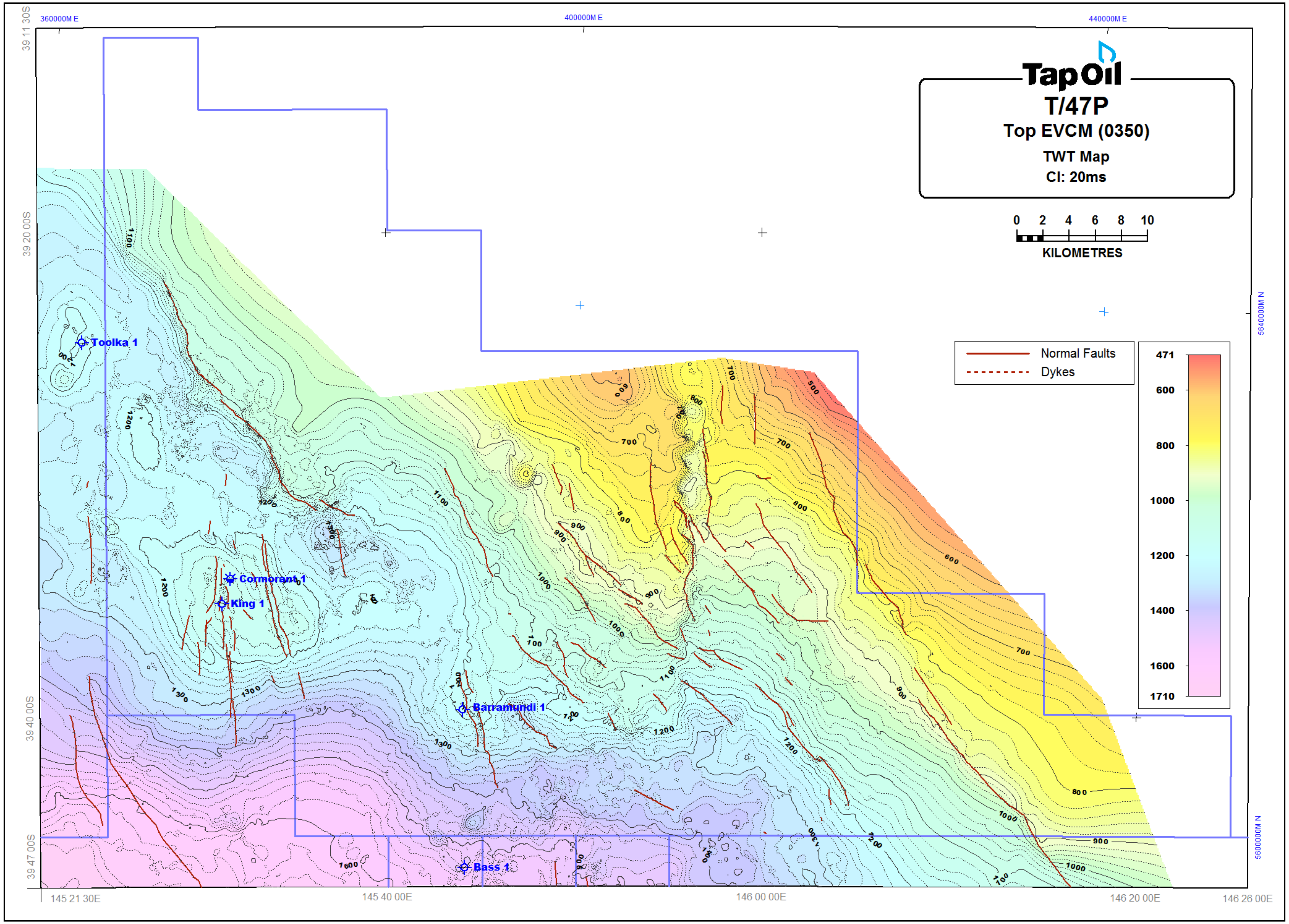


Figure 7: Time Structure Map Top EVCM (0350) Horizon

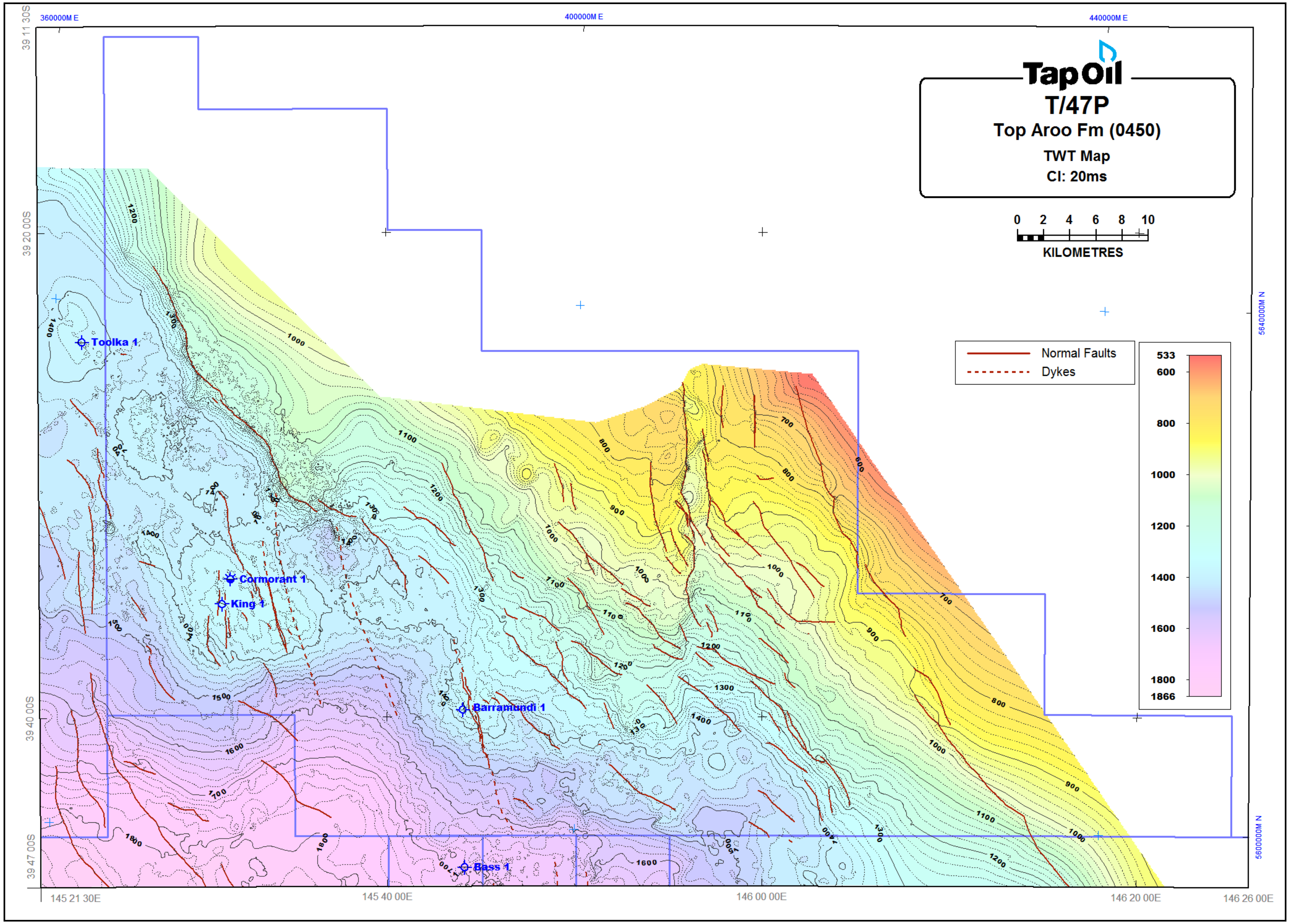


Figure 8: Time Structure Map Top Aroo Fm (0450) Horizon

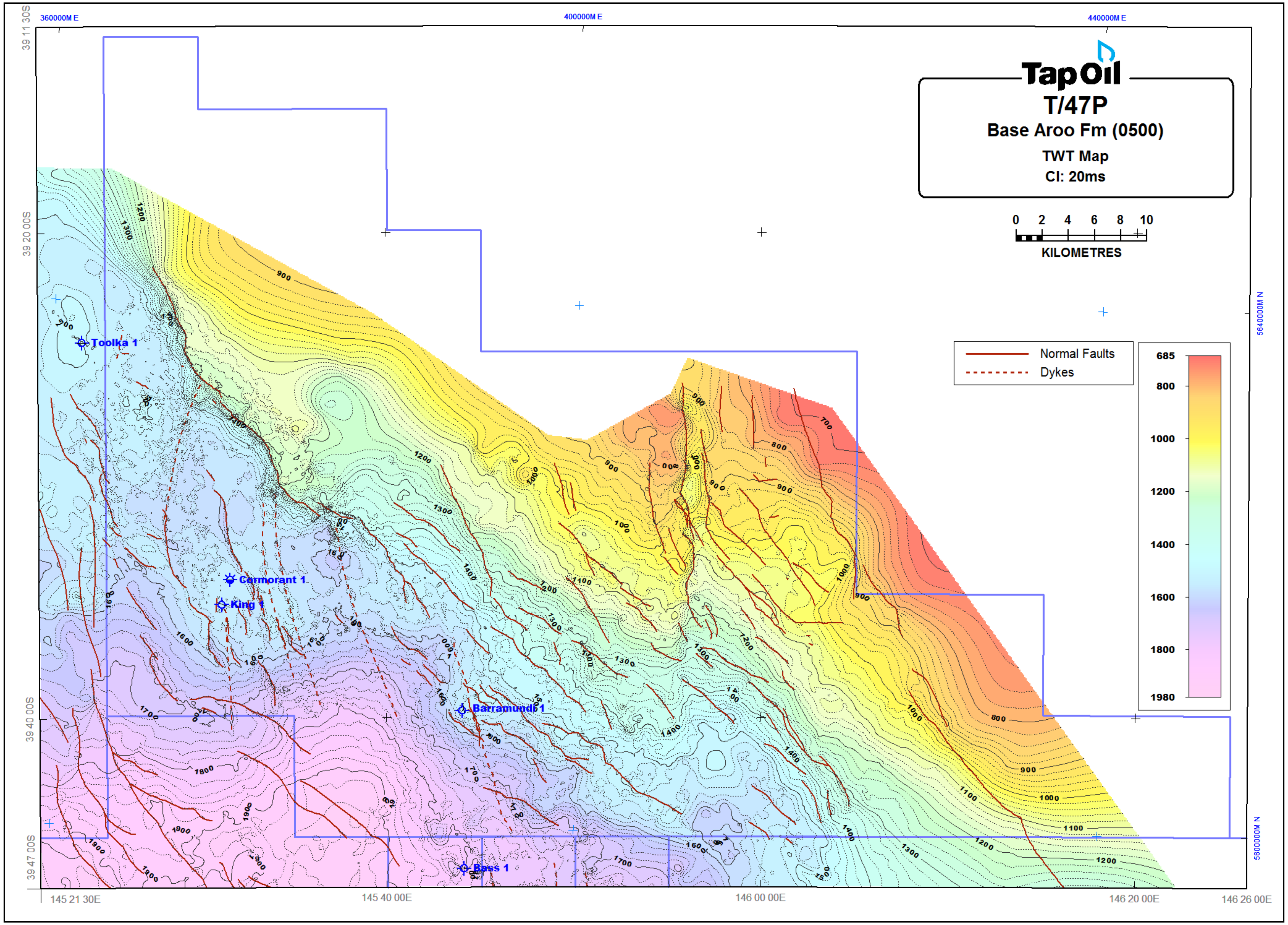


Figure 9: Time Structure Map Base Aroo Fm (0500) Horizon

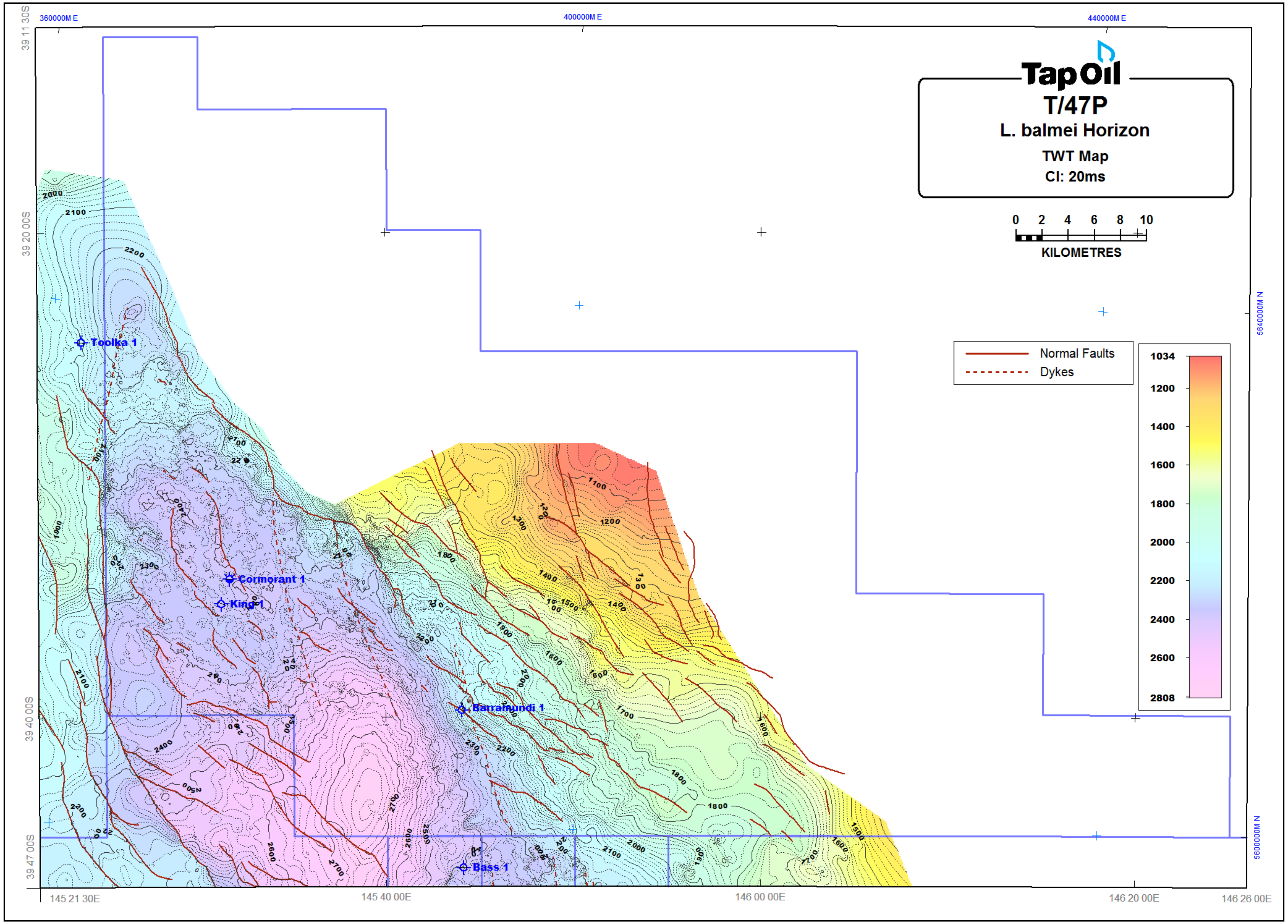


Figure 10: Time Structure Map L. balmei Horizon

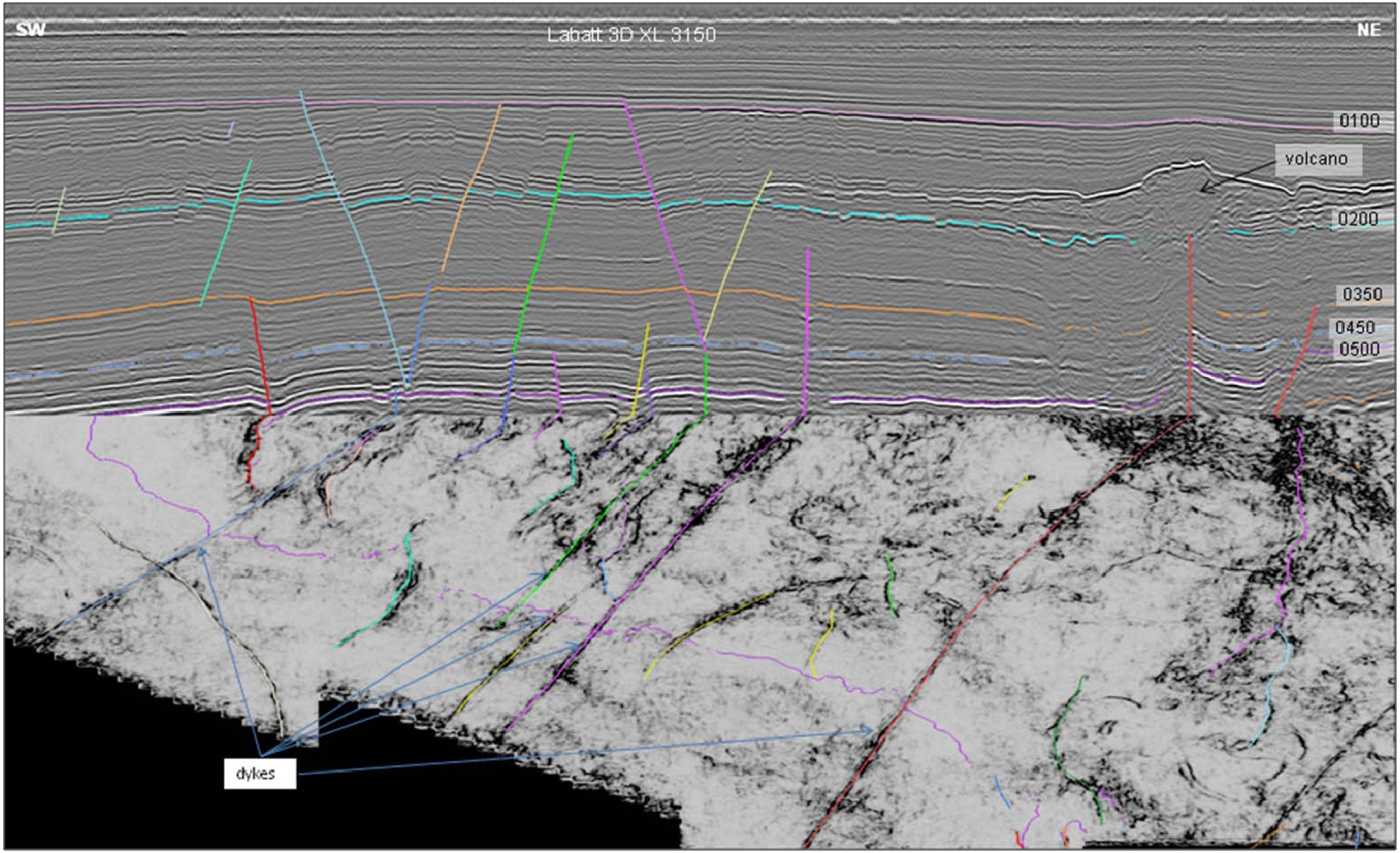


Figure 11: 3D View – Labatt 3D Cross-Line and Coherency Timeslice

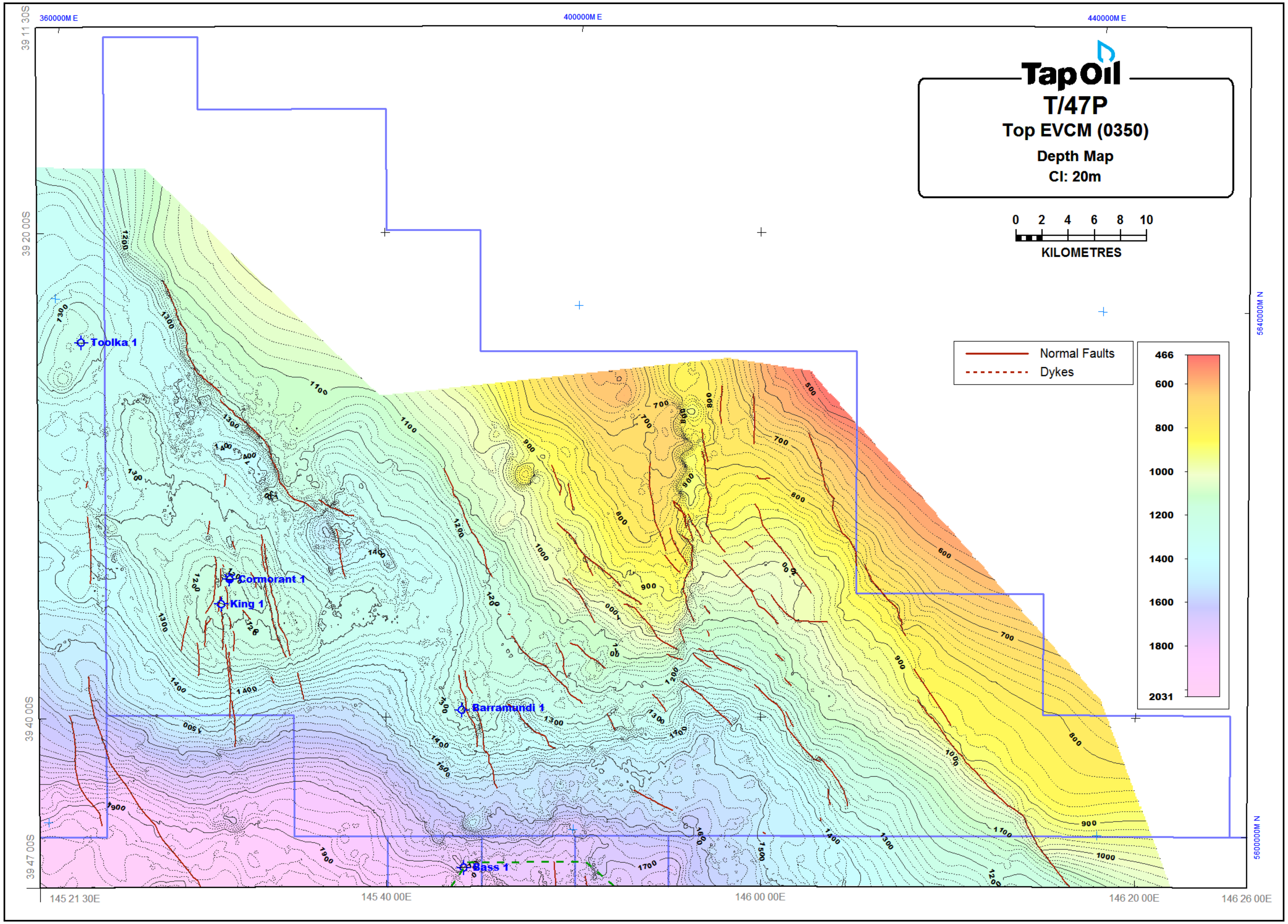


Figure 12: Depth Structure Map Top EVCM (0350) Horizon

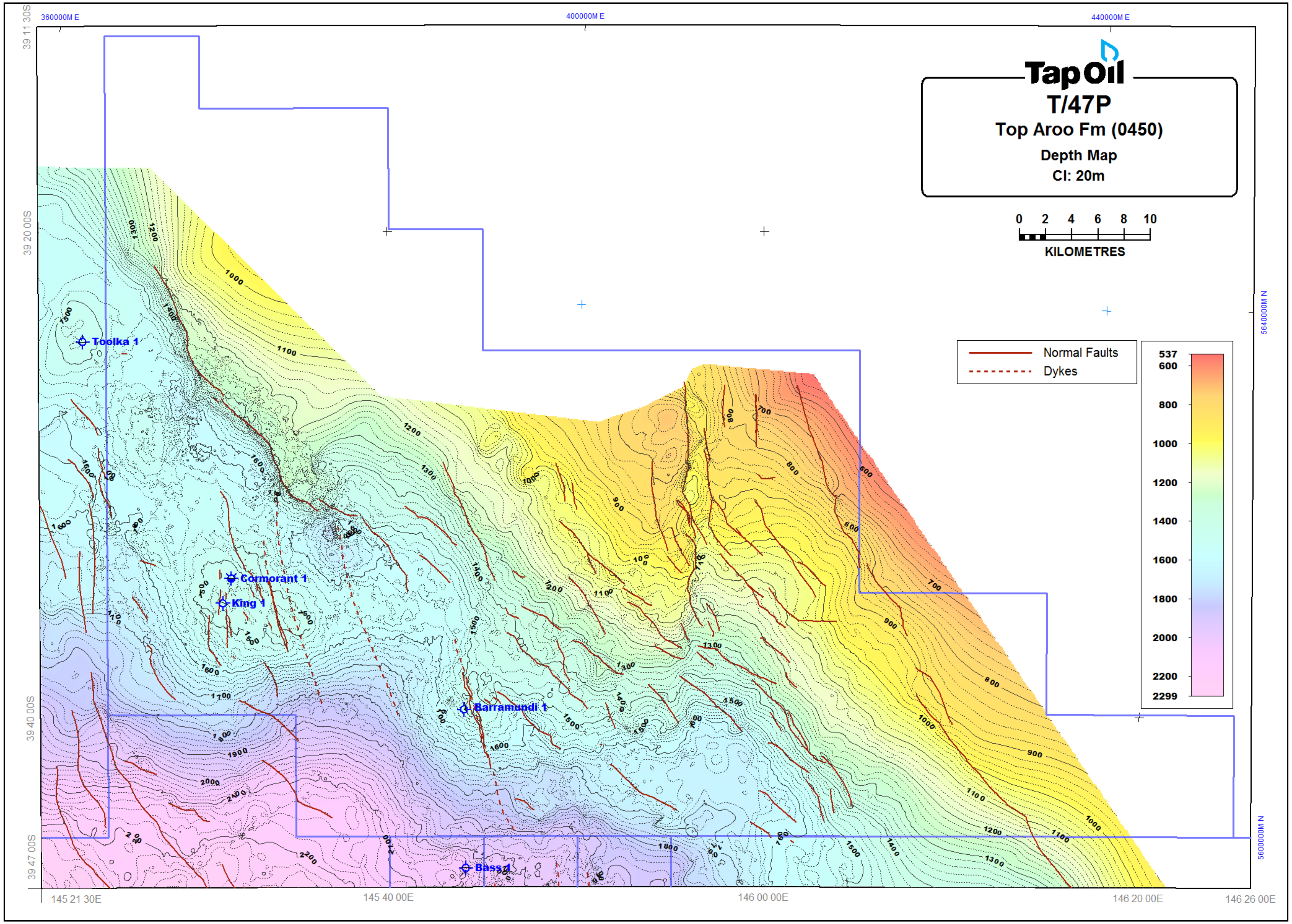


Figure 13: Depth Structure Map Top Aroo Fm (0450) Horizon

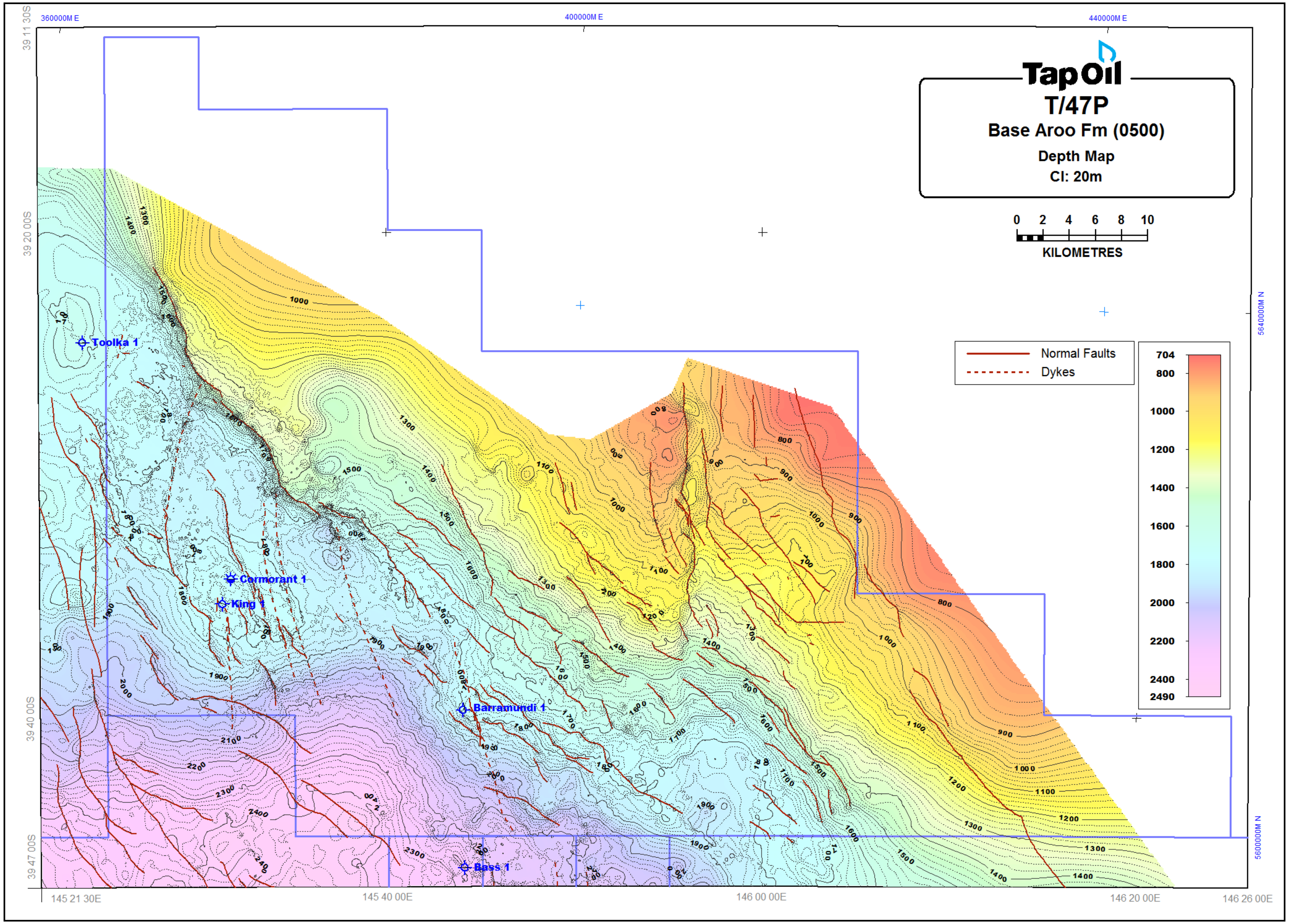


Figure 14: Depth Structure Map Base Aroo Fm (0500) Horizon

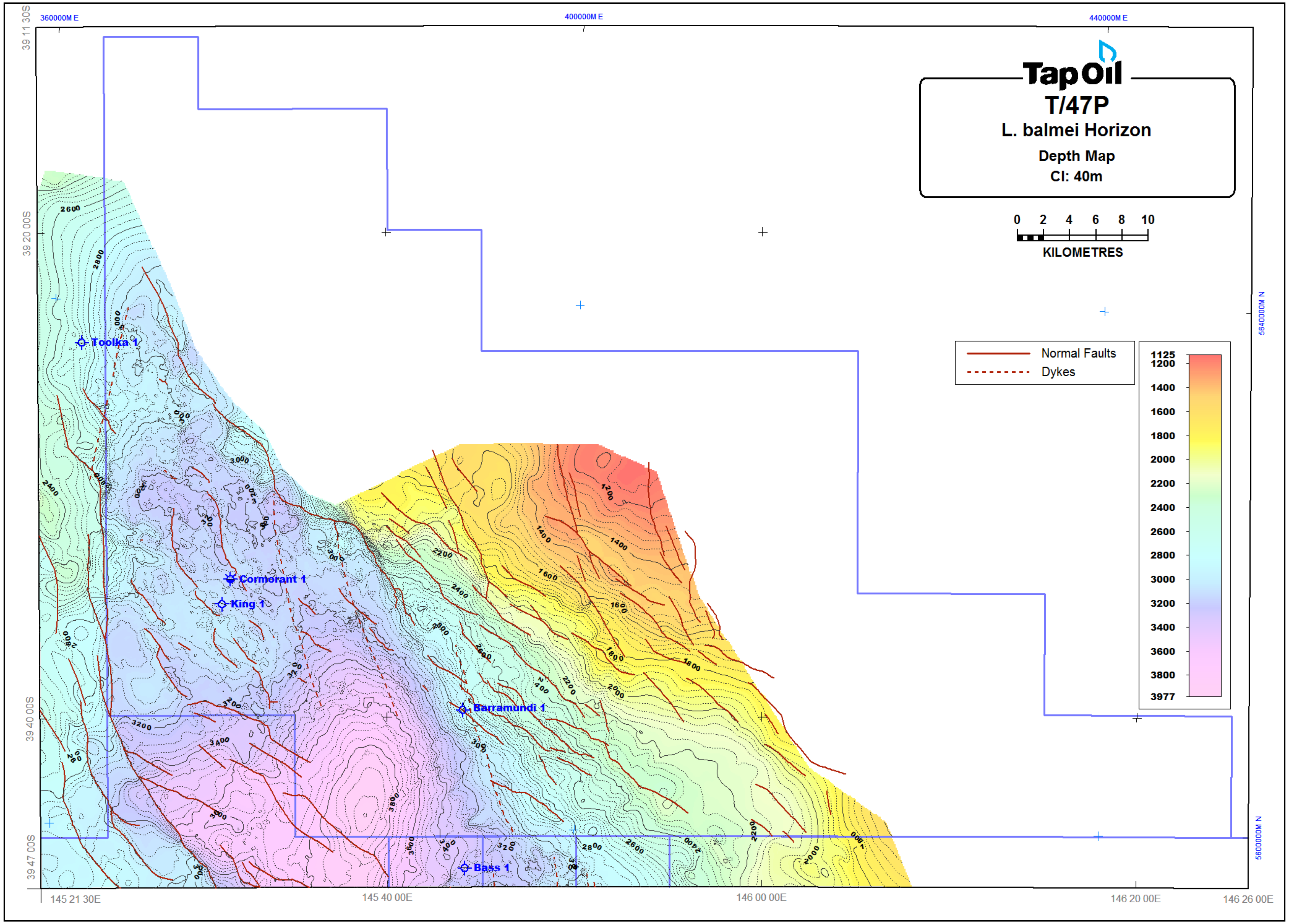


Figure 15: Depth Structure Map L. balmei Horizon

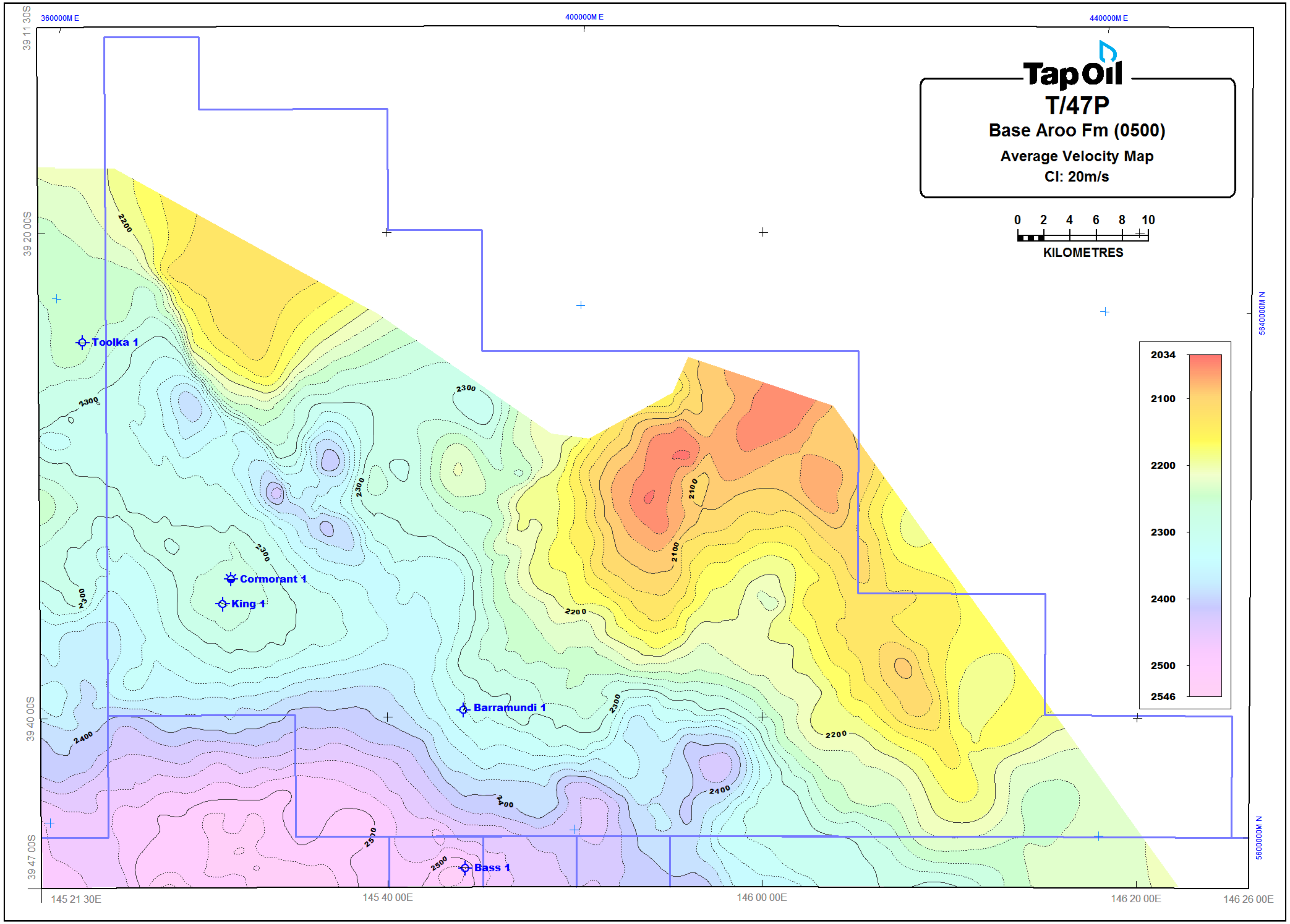


Figure 16: Average Velocity Map Base Aroo Fm (0500) Horizon


Tap Oil
T/47P
Top EVCM (0350)
TWT Map
CI: 20ms
Enclosure: 1
Date: May 2010
N
0 2 4 6 8 10
Kilometres
GDA94 / MGA zone 55 (EPSG 28355)
Transverse Mercator
GRS 1980 spheroid
Natural origin: [147 00 00E, 0 00 00N]
Normal Faults
Dykes
471
600
800
1000
1200
1400
1600
1710
T/47P
Labatt 3D Survey Area
Toolka 1
Cormorant 1
King 1
Barramundi 1
Bass 1
360000M E
380000M E
400000M E
420000M E
440000M E
5660000M N
5640000M N
5620000M N
5600000M N
39 11 30S
39 20 00S
39 30 00S
39 40 00S
39 47 00S
145 21 30E
145 30 00E
145 40 00E
145 50 00E
146 00 00E
146 10 00E
146 20 00E
146 26 00E

Tap Oil
T/47P
Top Aroo Fm (0450)
TWT Map
CI: 20ms
Enclosure: 2
Date: May 2010
N
0 2 4 6 8 10
Kilometres
GDA94 / MGA zone 55 (EPSG 28355)
Transverse Mercator
GRS 1980 spheroid
Natural origin: [147 00 00E, 0 00 00N]
Normal Faults
Dykes
533
600
800
1000
1200
1400
1600
1800
1866
T/47P
Labatt 3D Survey Area
Toolka 1
Cormorant 1
King 1
Barramundi 1
Bass 1
360000M E
380000M E
400000M E
420000M E
440000M E
5660000M N
5640000M N
5620000M N
5600000M N
39 11 30S
39 20 00S
39 30 00S
39 40 00S
39 47 00S
145 21 30E
145 30 00E
145 40 00E
145 50 00E
146 00 00E
146 10 00E
146 20 00E
146 26 00E

Tap Oil
T/47P
Base Aroo Fm (0500)
TWT Map
CI: 20ms
Enclosure: 3
Date: May 2010
N
0 2 4 6 8 10
Kilometres
GDA94 / MGA zone 55 (EPSG 28355)
Transverse Mercator
GRS 1980 spheroid
Natural origin: [147 00 00E, 0 00 00N]
Normal Faults
Dykes
685
800
1000
1200
1400
1600
1800
1980
T/47P
Labatt 3D Survey Area
Toolka 1
Cormorant 1
King 1
Barramundi 1
Bass 1
360000M E
380000M E
400000M E
420000M E
440000M E
5660000M N
5640000M N
5620000M N
5600000M N
39 11 30S
39 20 00S
39 30 00S
39 40 00S
39 47 00S
145 21 30E
145 30 00E
145 40 00E
145 50 00E
146 00 00E
146 10 00E
146 20 00E
146 26 00E

Tap Oil
T/47P
L. balmei Horizon
TWT Map
CI: 20ms
Enclosure: 4
Date: May 2010
T/47P
Labatt 3D Survey Area
Toolka 1
Cormorant 1
King 1
Barramundi 1
Bass 1
0 2 4 6 8 10
Kilometres
GDA94 / MGA zone 55 (EPSG 28355)
Transverse Mercator
GRS 1980 spheroid
Natural origin: [147 00 00E, 0 00 00N]
Normal Faults
Dykes
1034
1200
1400
1600
1800
2000
2200
2400
2600
2808
360000M E
380000M E
400000M E
420000M E
440000M E
5660000M N
5640000M N
5620000M N
5600000M N
39 11 30S
39 20 00S
39 30 00S
39 40 00S
39 47 00S
145 21 30E
145 30 00E
145 40 00E
145 50 00E
146 00 00E
146 10 00E
146 20 00E
146 26 00E

Tap Oil
T/47P
Top EVCM (0350)
Depth Map
CI: 20m
Enclosure: 5
Date: May 2010
N
0 2 4 6 8 10
Kilometres
GDA94 / MGA zone 55 (EPSG 28355)
Transverse Mercator
GRS 1980 spheroid
Natural origin: [147 00 00E, 0 00 00N]
Normal Faults
Dykes
466
600
800
1000
1200
1400
1600
1800
2031
T/47P
Labatt 3D Survey Area
Toolka 1
Cormorant 1
King 1
Barramundi 1
Bass 1
360000M E
380000M E
400000M E
420000M E
440000M E
5660000M N
5640000M N
5620000M N
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39 30 00S
39 40 00S
39 47 00S
145 21 30E
145 30 00E
145 40 00E
145 50 00E
146 00 00E
146 10 00E
146 20 00E
146 26 00E

Tap Oil
T/47P
Top Aroo Fm (0450)
Depth Map
CI: 20m
Enclosure: 6
Date: May 2010
N
0 2 4 6 8 10
Kilometres
GDA94 / MGA zone 55 (EPSG 28355)
Transverse Mercator
GRS 1980 spheroid
Natural origin: [147 00 00E, 0 00 00N]
Normal Faults
Dykes
537
600
800
1000
1200
1400
1600
1800
2000
2200
2299
T/47P
Labatt 3D Survey Area
Toolka 1
Cormorant 1
Kiwi 1
Barramundi 1
Bass 1
360000M E
380000M E
400000M E
420000M E
440000M E
5660000M N
5640000M N
5620000M N
5600000M N
39 11 30S
39 20 00S
39 30 00S
39 40 00S
39 47 00S
145 21 30E
145 30 00E
145 40 00E
145 50 00E
146 00 00E
146 10 00E
146 20 00E
146 26 00E

Tap Oil
T/47P
Base Aroo Fm (0500)
Depth Map
CI: 20m
Enclosure: 7
Date: May 2010
0 2 4 6 8 10
Kilometres
GDA94 / MGA zone 55 (EPSG 28355)
Transverse Mercator
GRS 1980 spheroid
Natural origin: [147 00 00E, 0 00 00N]
Normal Faults
Dykes
704
800
1000
1200
1400
1600
1800
2000
2200
2400
2490
T/47P
Labatt 3D Survey Area
Toolka 1
Cormorant 1
King 1
Barramundi 1
Bass 1
360000M E
380000M E
400000M E
420000M E
440000M E
5660000M N
5640000M N
5620000M N
5600000M N
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39 30 00S
39 40 00S
39 47 00S
145 21 30E
145 30 00E
145 40 00E
145 50 00E
146 00 00E
146 10 00E
146 20 00E
146 26 00E


Tap Oil
T/47P
L. balmei Horizon
Depth Map
CI: 40m
Enclosure: 8
Date: May 2010
N
0 2 4 6 8 10
Kilometres
GDA94 / MGA zone 55 (EPSG 28355)
Transverse Mercator
GRS 1980 spheroid
Natural origin: [147 00 00E, 0 00 00N]
Normal Faults
Dykes
1125
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200
3400
3600
3800
3977
T/47P
Labatt 3D Survey Area
Toolka 1
Cormorant 1
King 1
Barramundi 1
Bass 1
360000M E
380000M E
400000M E
420000M E
440000M E
5660000M N
5640000M N
5620000M N
5600000M N
39 11 30S
39 20 00S
39 30 00S
39 40 00S
39 47 00S
145 21 30E
145 30 00E
145 40 00E
145 50 00E
146 00 00E
146 10 00E
146 20 00E
146 26 00E