New Understanding of the Mesozoic Tectonostratigraphy of Eastern Indonesia

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ABSTRACT

The tectonic history of Eastern Indonesia has been a major interest since the successful hydrocarbon discoveries within the Mesozoic section in the Northwest Shelf of Australia, Timor Sea (Abadi Field), Bintuni, Berau and Seram. There have been numerous studies to understand the complex tectonic history and stratigraphy of the area. Sequence stratigraphic approach has proven to be the only effective method to unravel this vast area and this paper attempts to put previous studies and findings in perspective. Furthermore, this paper proposes a regional tectonostratigraphic chart to be utilized, hopefully, as a tool to work on underexplored Pre-Tertiary stratigraphic sections of Eastern Indonesia.

The geology of Eastern Indonesia started with the separation of microcontinents from Gondwanaland in the Late Paleozoic, including fragments rifting and drifting from the Australian Continental Margin during the Mesozoic. Three major megasequences were identified and are related to the fragmentation of the Australian Continental Margin, which consist of Pre-rift, Syn-rift and Post-rift megasequences. The timing of each megasequence was different, especially between the southern area (Timor Sea, Abadi-Tanimbar and West Arafura area) and the northern area (Aru-Kumawa, Bintuni, Berau, Semai and Papua). The northern area was separated from the Australian mainland by Middle-Late Triassic, while the southern area separated from the Australian Continent by Late Jurassic. This implies that the syn-rift sediments in the north-eastern Indonesia are older (Late Permian-Triassic) than those to the south (Early Triassic-Late Jurassic). In other words, same-aged formation in the north is genetically different from the southern part of the area. As an example, the Jurassic reservoir sands at Bintuni Basin belong to a different megasequence than the Jurassic sands in the Timor Sea and Tanimbar area. The syn-rift reservoirs in Bintuni Basin remain underexplored.

The new tectonostratigraphic chart and proposed paleo-depositional environment hopefully brings clarity and efficiency for hydrocarbon exploration in the area.

Keywords: *Tectonostratigraphy, Sequence Stratigraphy, Eastern Indonesia*

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INTRODUCTION

The successful hydrocarbon discoveries within the Mesozoic section in Eastern Indonesia have instigated much interest in oil and gas exploration in the area. The complex tectonic history of the area is attributed to the dynamics of three tectonic plates, resulting in stacking of multiple basin types depending on the tectonic environment in each geologic time. This complexity demands a closer analysis to understand the development of each basin and how these basins are correlated through each tectonic event to build an integrated tectonostratigraphic chart of Eastern Indonesia. Most published papers have discussed parts of the area and only a few authors have compiled the tectonostratigraphy of Australian Basins and some areas in Eastern Indonesia.

Eastern Indonesia is approximately 3,000,000 km^2 in size, covering a vast area of Timor Sea, Arafura Sea, Papua, Seram Island and Halmahera Island to the north (Figure 1). There are 977 wells available in the area. Regional 2D seismic volumes were available, namely the Arafura SPAN vintage, which was acquired in 2009. This volume is nearly 7000 kms long, consisting of 15 mega-regional lines with a total of approximately 7200 kms. Non regional 2D seismic lines, consisting of 452 vintages, are available, approximately 9428 kms in total length, where the oldest survey is from 1969 (Figure 2). The post drill analysis of some key wells used in this paper are shown in Figure 3. All seismic data are available and accessible in Migas Data Repository (MDR).

This paper proposes a new, consolidated chronostratigraphic chart for Eastern

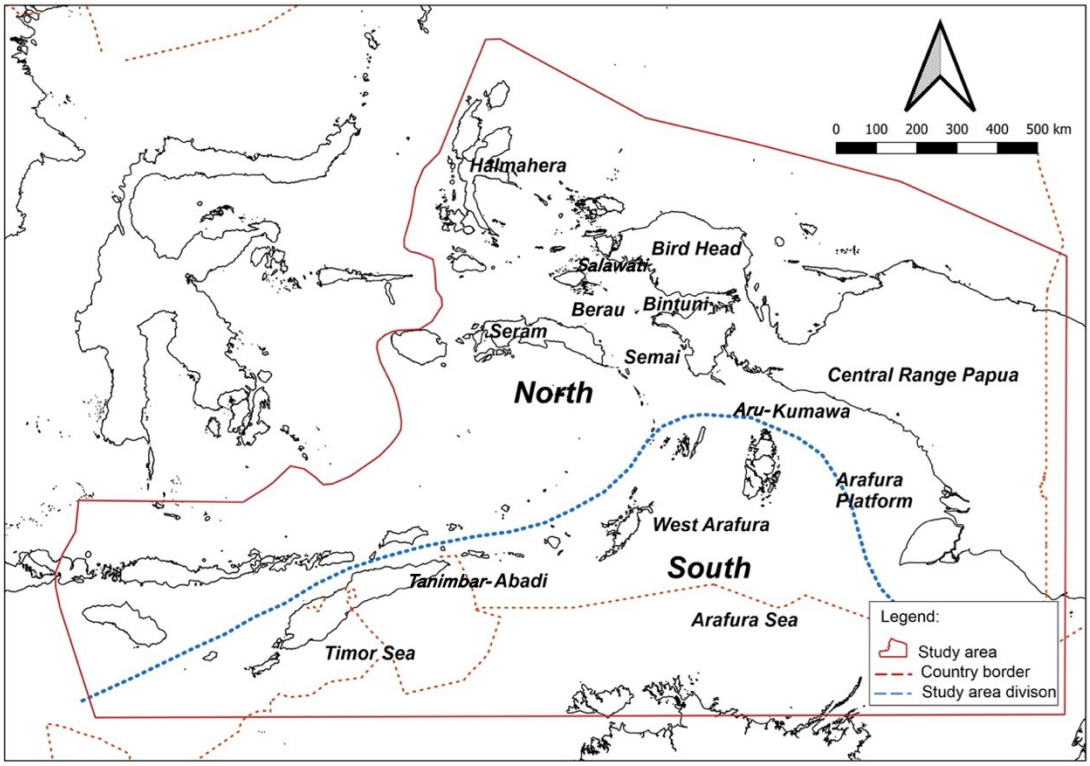


Figure 1: *The Papua Maluku area of study and the names of the areas used in this study.*

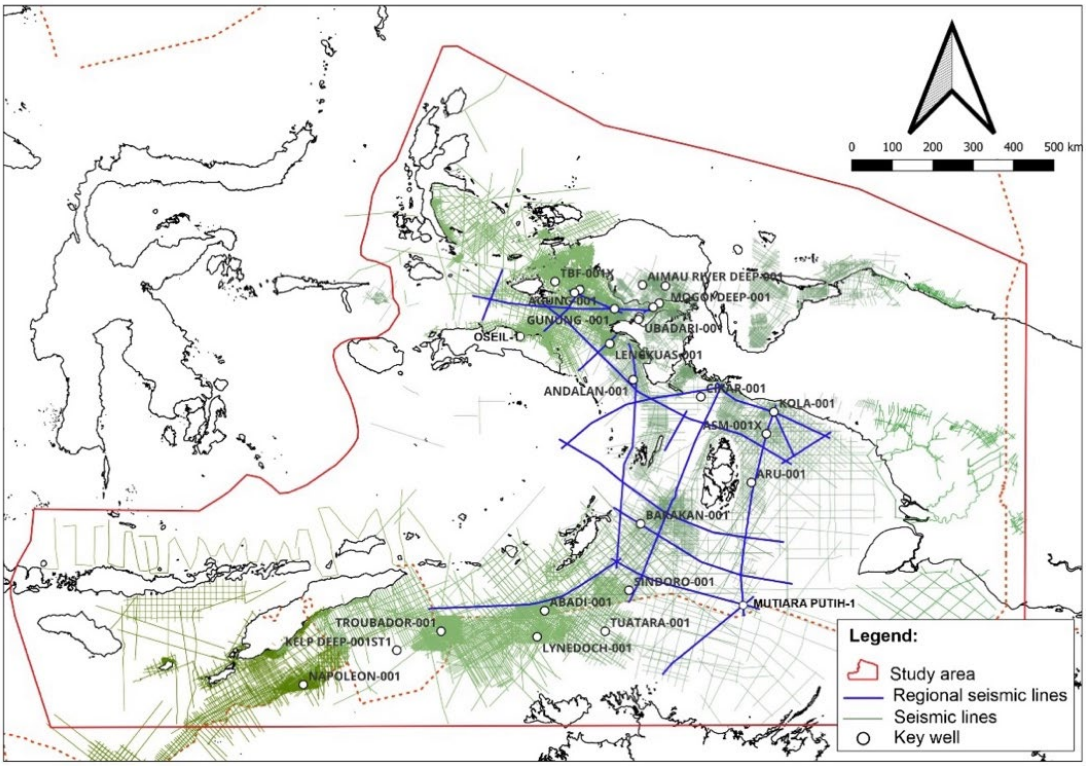


Figure 2: *Seismic coverage map and important key wells.*

Indonesia. Lithostratigraphic names are kept in the chronostratigraphic chart, and they refer to previous authors such as Fakhrudin (2019), Charlton et al. (1991 and 2012a and b), Longley (2002), Norvick (2012), Kihara et al. (2012); and Yudhantoro and Pasaribu (2012).

The regional chronostratigraphy of Western Australian continental margin and Eastern Indonesia has been published by Falvey and Mutter (1981), Peck and Soulhoul (1986), Barber (2013), Audley-Charles et al. (1988), Charlton (2001), Longley et al. (2002), Norvick (2002) and Gold et al. (2017) to mention a few. The proposed chronostratigraphic chart is also expected to be a tool for hydrocarbon exploration in the underexplored Paleozoic syn-rift section in the Berau, Papua area.

METHOD

To understand the complex regional setting and the basin history of this vast area, sequence stratigraphic method was used to interpret the seismic data and correlate each of the areas. This method allowed us to independently understand the geological relationship of each of the areas, starting from the pre-break up of Gondwanaland, the breakup, post break up and the influence of other tectonic events and plate movements that changed the configuration of the basins.

Good quality regional 2D seismic lines have been the key to map the main sequence boundaries distinguishing the three megasequences; pre-rift, syn-rift and post-rift megasequences.

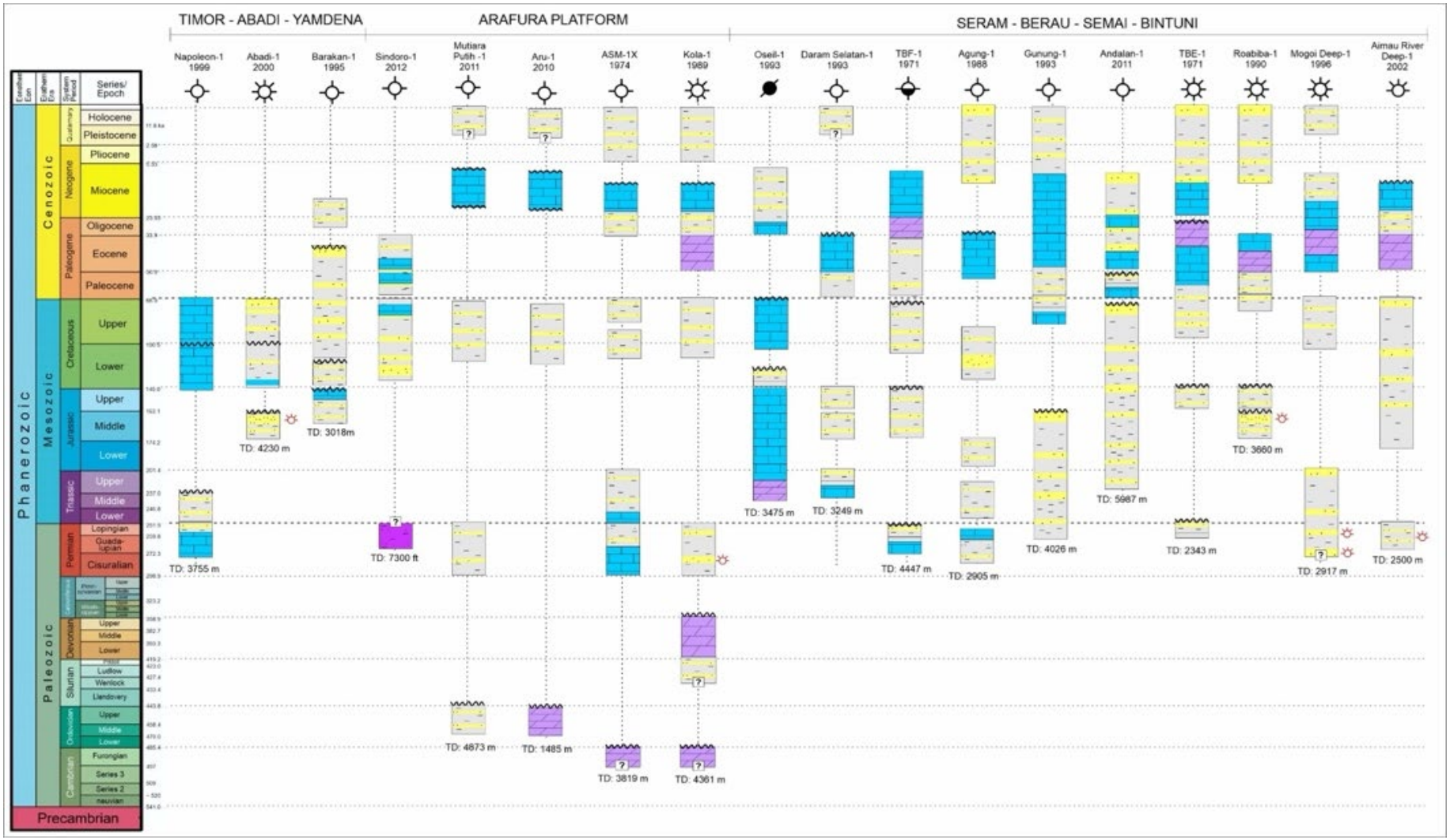


Figure 3: *Key wells penetration chart. The well locations are shown in Figure 1.*

Furthermore, these megasequences can be sub-divided based on the local tectonics and the quality of the seismic lines. Understanding and defining the age of each megasequence, especially the syn-rift package, is crucial for explaining the tectonic reconstruction and to interpret the depositional environment, hence the target of exploration can be more precise.

The sequence boundaries were first mapped to recognize the distinctive packages. Seismic stratigraphy was fully applied to avoid age-driven horizon mapping. The purpose was to avoid any bias from previous perception regarding the age of the horizons. This meant carefully identifying sequence boundaries such as onlap, toplap and downlap surfaces and mapping the continuation of the surfaces without the influence of the age information from the well data. After defining the major horizons, which are the top pre-rift and the top syn-rift, the ages were then tied and assigned using the age data from available wells. This method was used to avoid bias in determining the age of the sequence boundaries.

The findings from the seismic interpretation were used as an input for tectonic reconstruction of the area, which was tied to the major regional tectonic events in the area and the regional depositional environment. The main product of this study is a tectonic calendar and tectonostratigraphic chart of Eastern Indonesia.

STRATIGRAPHIC MEGASEQUENCES: INTERPRETATION AND OBSERVATION

Starting from the Late Permian, the northern part of the study area was subject to more complex tectonic activities than the southern part of the area. Based on this reason, the study area is divided into two major areas (Figure 1), which are: (1) The South Papua-Maluku comprising the Timor Sea, Babar-Selaru, West Arafura Sea, and (2) The North Papua-Maluku, which is north of the Tarera Aiduna fault, including Bintuni, Berau, Papuan Bird's Head, MOKR and Seram. The break-up of the Northwest Shelf of Australia has been previously discussed by Falvey and Mutter (1981), Peck and Soulhoul (1986), Barber, (2013), Audley-Charles et al. (1988), Charlton (2001), Longley et al. (2002) and Hall (2012) while the tectonism of Papua has been widely studied and documented by Visser and Hermes (1962), Dow (1977), Pigram and Panggabean (1981 and 1984), Pieters, et al. (1983) and Cloos et al. (2005) to mention a few.

The three major tectonic sequence boundaries were easily mapped in the South Papua-Maluku area and more difficult to interpret in the North Papua-Maluku area. This is more likely due to the more complex tectonic history at the North Papua-Maluku area and the data quality of the onshore seismic lines.

Pre-rift Megasequence:

The intracratonic rifting of Western Australia commenced in the early Paleozoic, creating northwest-southeast trending depositional basins such as the Fitzroy trough, Petrel sub-basin and Money Shoal graben (Falvey and Mutter, 1981; Peck and Soulhoul, 1986; Longley et al., 2002). The remnants of the early Paleozoic basins are

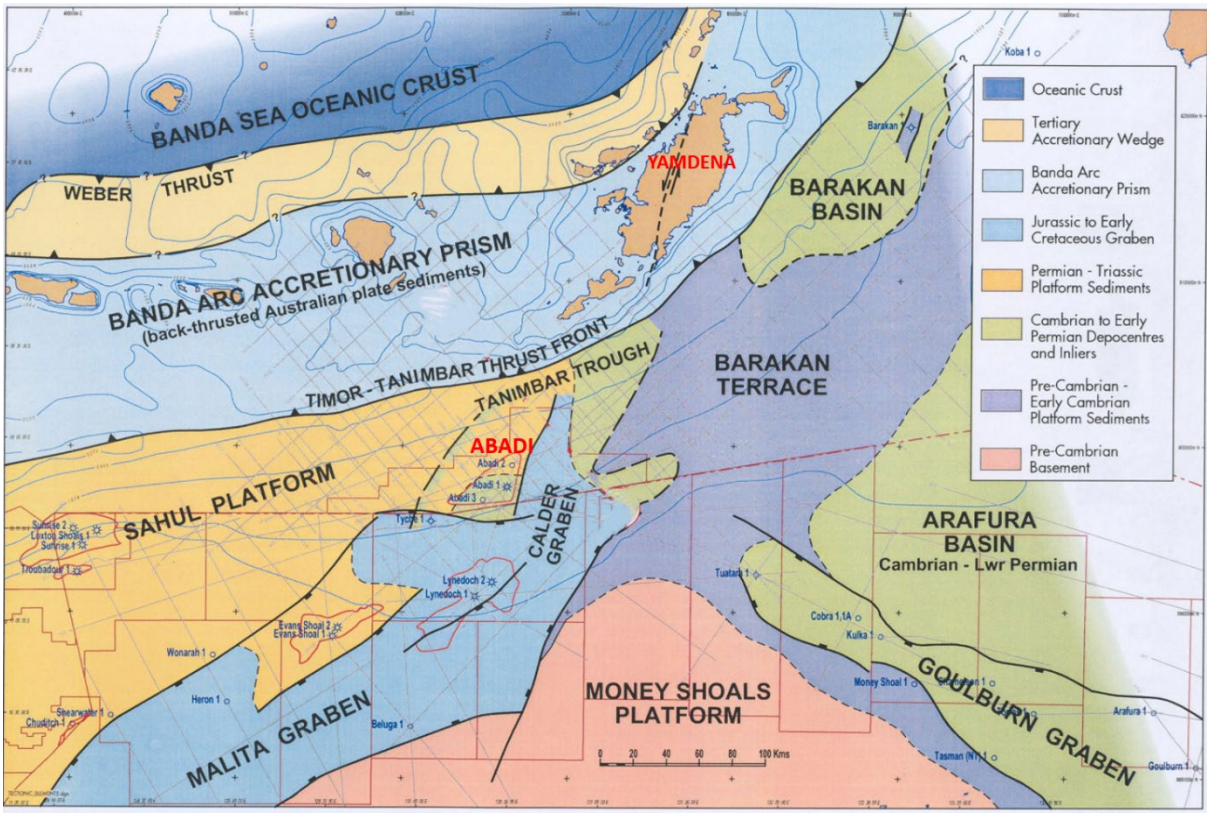


Figure 4: *Eastern Indonesia (Timor Sea – Tanimbar) and Northern Australia continental margin tectonic elements (modified from Barber et al., 2003).*

thought to underlie Barakan basin at the South Papua Maluku area (Figure 4, Barber et al., 2003). This trend is later overlapped by the Mesozoic trend, which is in a northeast-southwest direction.

The top of the pre-rift marks the initiation of the rifting of the north and northwest Australian continental margin. The pre-rift package is poorly imaged from the seismic sections, except in the Arafura Platform, which is the extension of the Australian stable continent into Indonesian waters. A regional seismic cross section across the platform shows Paleozoic beddings and some older structures, which are later eroded in the Early Cretaceous (the sequence boundary is also known as the "Base Cretaceous Unconformity", as shown in Figure 7). The top of the pre-rift is best mapped at the South Papua-Maluku area, such as in Timor Sea and West Arafura Sea, while it is highly interpretative at the North Papua-Maluku area.

Several wells penetrated the top of the pre-rift megasequence, such as Napoleon-1 in the Timor Sea and Barakan-1 in West Arafura but is best documented at the Arafura Platform, such as Kola-1, ASM-1X, Aru-1 and Mutiara Putih-1. In the North Papua-Maluku area, wells such as CS-X, TBF-1X (Papua Bird's Head), Cross Catalina-1 and Jaosakor-1 (Central Range Papua) and possibly Aimau River Deep-1 in the Bintuni Basin penetrated the Top Pre-rift. The Top Pre-rift was tied to the wells to obtain the date of the mapped sequence boundary.

Syn-rift Megasequence:

The syn-rift megasequence is identified by basin filling sequences, followed by a transgressive sequence. This megasequence marks the opening of the Meso-Tethys and the continued movement of the Australian continent in the north-northwest direction (Metcalfe, 2013). The dispersion of the northern and northwest margin of east Gondwana took place non-simultaneously as explained by Metcalfe (1998) and Norvick, (2001). The seismic interpretation suggests that the onset of rifting is getting younger from north to south, therefore, the northern Papua-Maluku area has started the rifting process earlier than the southern Papua-Maluku area.

In the South Papua-Maluku area, the western part of the continental margin started to rift from the mainland in the early Mesozoic. The rifting process at the Abadi-Tanimbar area commenced slightly earlier than in the Timor Sea area. The syn-rift megasequence in Abadi-Tanimbar started as early as Late Permian to Late-Middle Jurassic, while the syn-rift megasequence in the Timor Sea started in the Middle Triassic to Late Jurassic.

The fluvio-deltaic environment along the shelf filled the newly developed northeast-southwest trending syn-rift basins. As the seafloor spreading continued, the area underwent transgression, which culminated sometime in the early Late Triassic. This is marked by the deposition of deeper marine sediments (Aitutu Formation, Timor Sea). By the end of the Triassic, a relative sea-level fall was marked by deposition of the Nome red beds and mixed shallowing upward clastics in the Timor Sea area.

Transgression occurred in the South Papua-Maluku area due to the continued rifting, allowing marine shelf deposits to develop along the coastlines such as the Plover and Elang Formations and Wailuli shales at the basinal part. The end of the rifting stage is marked by the deposition of regional deep-water shale in the Late Jurassic or a non-depositional hiatus (downlap surface) – Figures 5 & 6. The Late Jurassic is often very thin and often overlaps with the regional unconformity known as the Base Cretaceous Unconformity (BCU). The geometry of each syn-rift basin was easily identified, and the major faults are easily mapped in the Timor, Abadi-Tanimbar and West Arafura Sea (Figures 5 and 6).

The northern Papua-Maluku area has gone through more complicated tectonics due to the influence of the subduction at the north-northeastern margin of the Indo-Australian plate. The shallowing up and unconformities in the Middle Triassic were caused by the subduction of the Paleo-Pacific plate to the Australian shelf, which caused uplift, volcanism, and metamorphism (Longley et al., 2002). By the Middle Triassic, the Bird's Head and Bintuni-Berau areas had moved close to Papua due to a dextral strike-slip fault and Seram Island was a separate microcontinent together with Misool, Buru, Sula Spur, Buton, SE Sulawesi and East Sulawesi (speculative configuration proposed by Norvick, 2001 and 2002). The remnant of the middle Triassic uplift can be seen in the seismic cross section across ASM-1 to Kola-1 wells (Figure 8).

The deepening and shallowing to the Middle Triassic is also noted in Seram, starting from deposition of the Kanikeh Formation, shallowing up to the deposition of the Bogal limestone. This was followed by the rise of

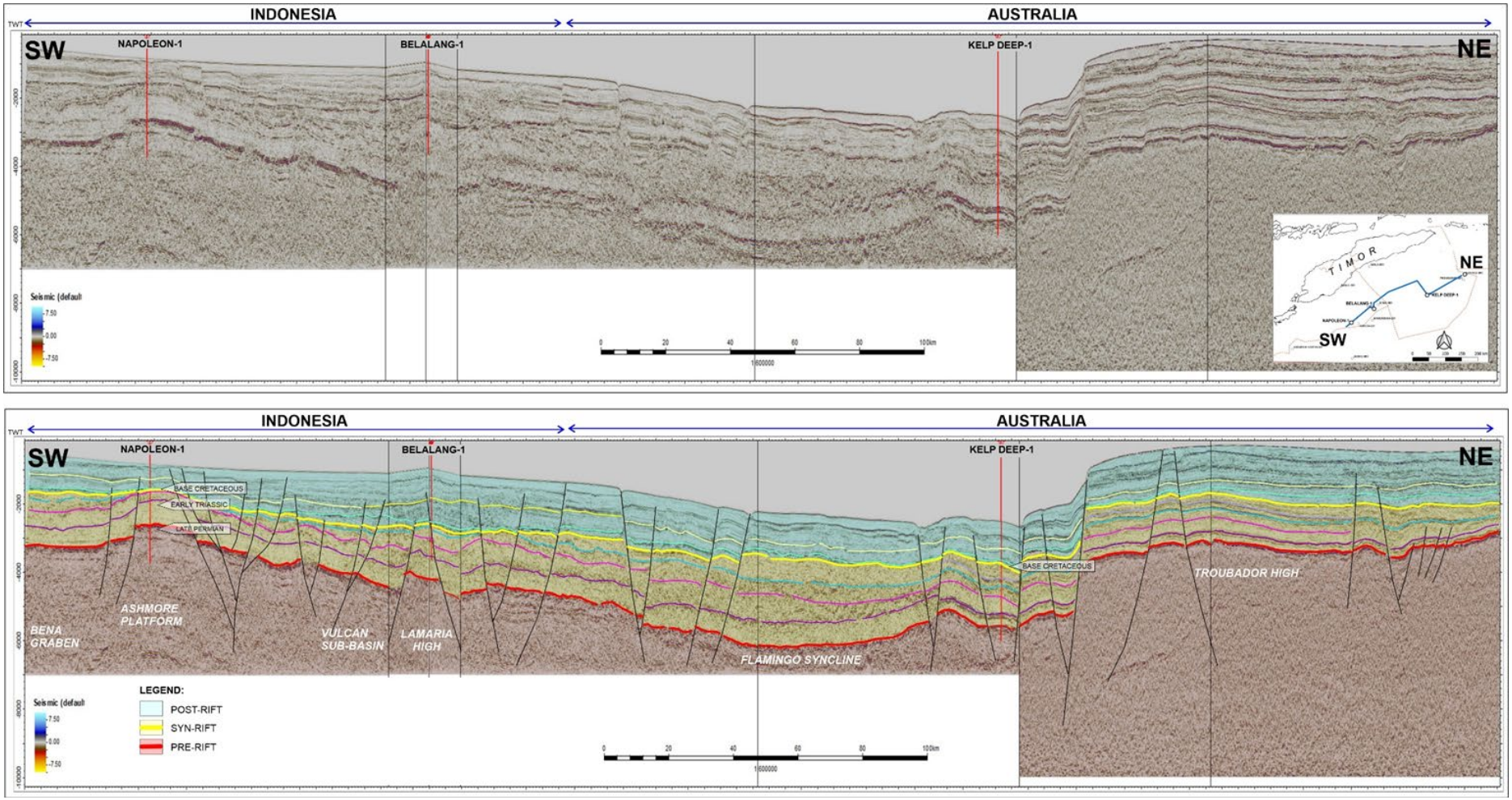


Figure 5: *Composite seismic section across Timor Sea, showing the major tectonic elements and megasequences.*

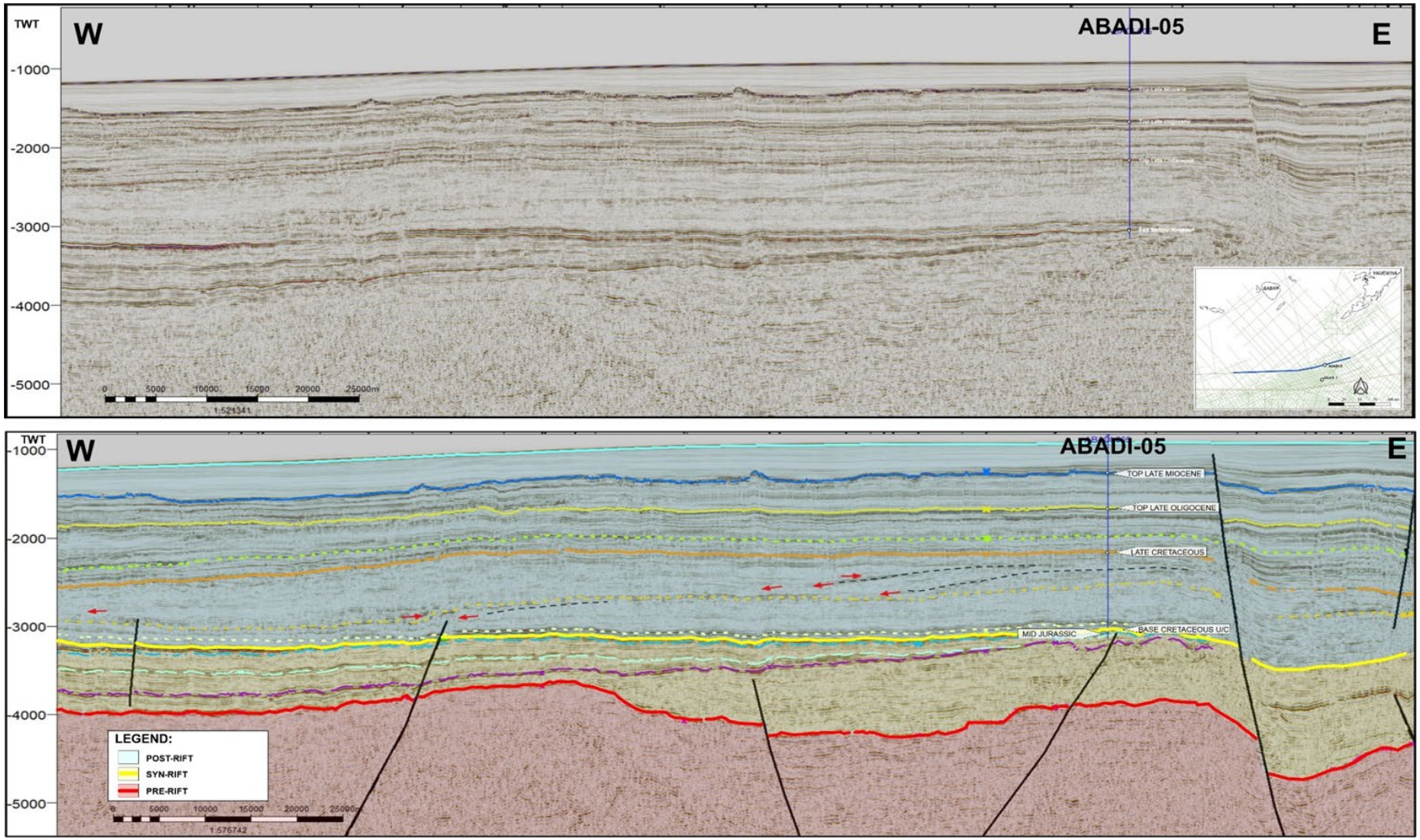


Figure 6: *Seismic line across Abadi-05 well. Note several downlapping sequences in the post-rift megasequence.*

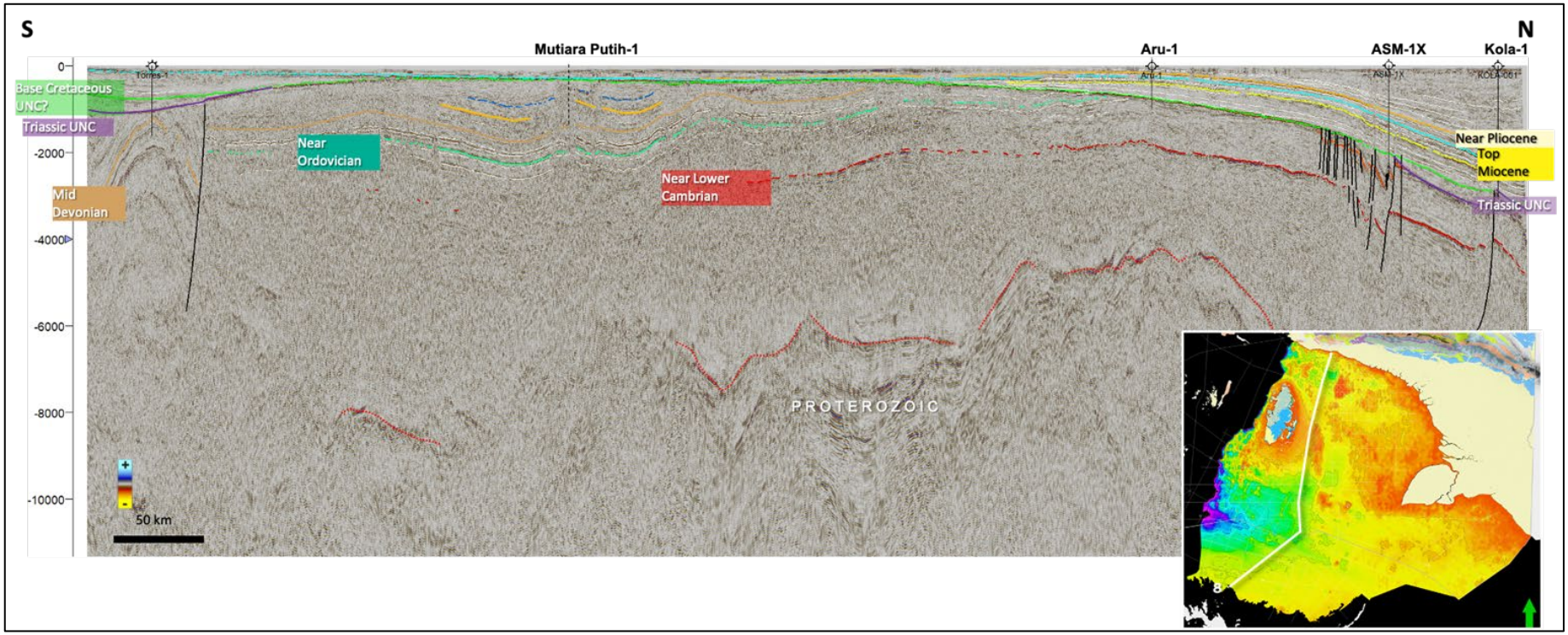


Figure 7: *Regional 2D seismic cross section with interpretation. Below Base Cretaceous Unconformity (green) is an intracratonic basin, overlain by a continental platform basin.*

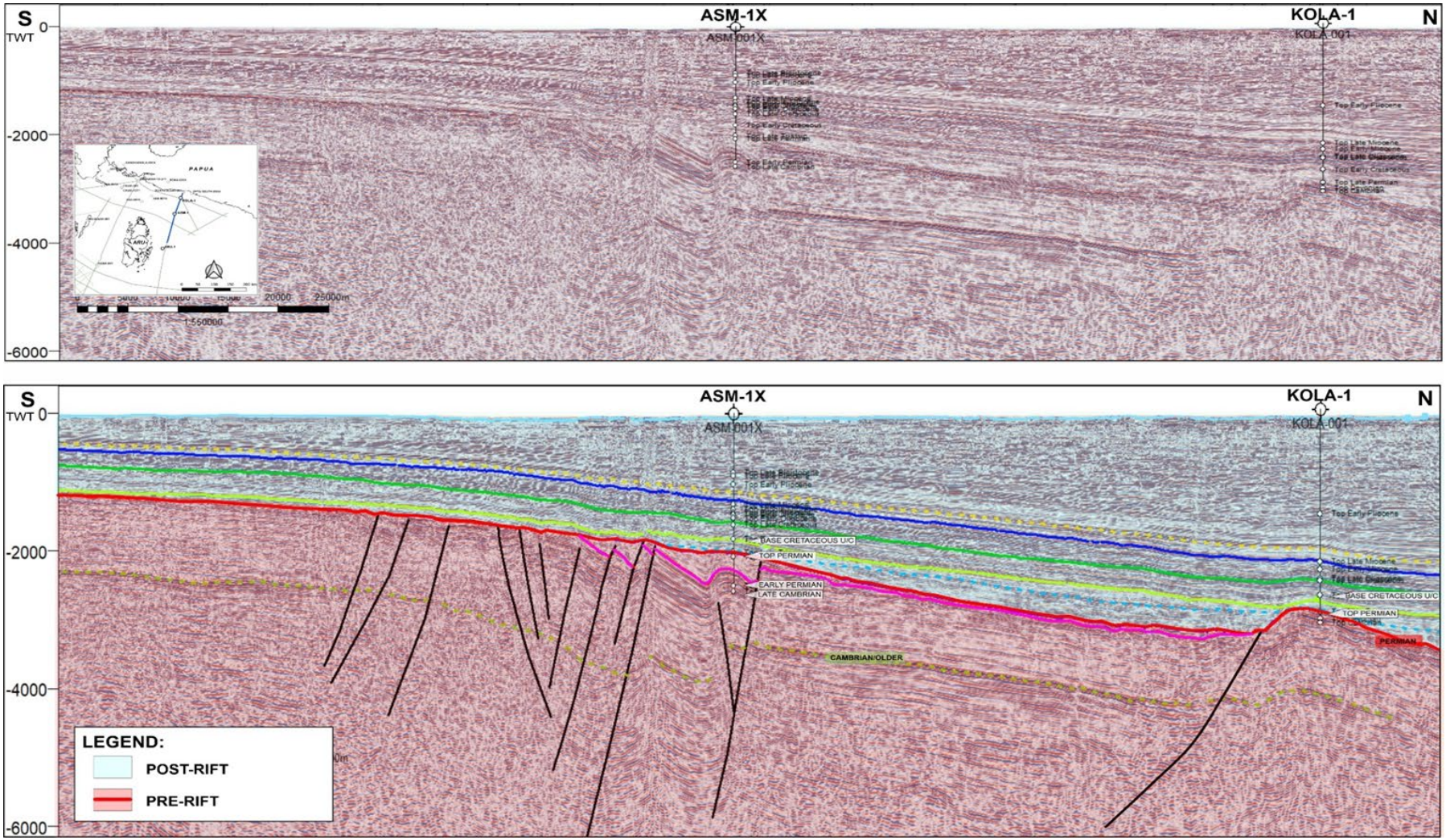


Figure 8: *Composite seismic lines across Arafura Platform through ASM-1X and Kola-1 wells. Note that there is no syn-rift section in the Arafura Platform.*

sea level in the Jurassic, with the development of carbonates of the Saman-saman, Yefbie shales and the oolitic Manusela Formation. In the Central Range of Papua, the Triassic sediments comprise the Tipuma Formation.

Seismically, the top of the syn-rift can be mapped, and the geometry is well observed in the regional cross-sections at the Semai and Berau areas. Most of the wells were drilled on the paleo-highs, where the early Mesozoic sediments are missing, therefore the top of the syn-rift. and the onset of break-up are difficult to be separated from the Late Permian unconformity. However, a seismic section across the Andalan-1 well (South Semai) shows the Top Syn-rift is Triassic or older (Figure 9).

In other areas, the top syn-rift at Berau and Semai coincides with the regional Permo-Triassic unconformity. This horizon is tied to the Gunung-1 well (Figures 10 and 11) and most wells were drilled at the Late Permian paleo-highs. However, the top syn-rift horizon ties at Late Triassic in the Agung-001 well. It is likely that the earlier Triassic section has been eroded at the paleo highs, therefore the syn-rift sediments in the Northern Papua-Maluku area ranged from Late Permian to Late Triassic. This is also the case in Aimau River Deep-1 and Mogoi Deep-1, which imply that the top of the syn-rift is in Late Triassic. This indicates that the break-up from the Australian continent was completed before the southern part, sometime in the Late Triassic.

Post-rift Megasequence:

At the final stage of the breakup of the continental margin of the Northwest Shelf of Australia and the opening of Neo-Tethys, the South Papua-Maluku area experienced basin deepening and starvation at the most distal part of the area. During the Cretaceous, deep-water sediments were deposited, which later became the major seal for the Mesozoic play in the area. Seismic cross sections imply that the post-rift megasequence records the fluctuation of relative sea-level, represented in several packages of sequences.

Major transgression caused deprivation of sediment in the basinal areas (towards the present-day Tanimbar trough, Figure 4), followed by a series of relative sea-level falls and rises indicated by several progradation sequences and sequence boundaries.

The depocenter shifted landward towards the Arafura Platform (E-SE), allowing deep water sediments to be deposited at the former depocenter, such as the Flamingo and Echuca Shoals Formations. The Puffin sands are found at the more proximal part of the basin in the Late Cretaceous.

The latest stratigraphy of the outcrop from Tanimbar Island was documented by Fakhruddin (2019). These outcrops are the Arumit Formation and the Ungar Formation, which are Cretaceous outcrops. The Arumit Formation was interpreted as a tidal deposit marked by chert and radiolaria while the overlying Ungar Formation was interpreted as a high-energy shelf-deposited sandstone. However, an older field study implied that the Ungar succession is shallowing upward, where the Arumit Formation was deposited in the outer shelf to bathyal environment influenced by storm reworking towards the shallow part and the Ungar Sandstone was deposited on a high energy shallow marine environment.

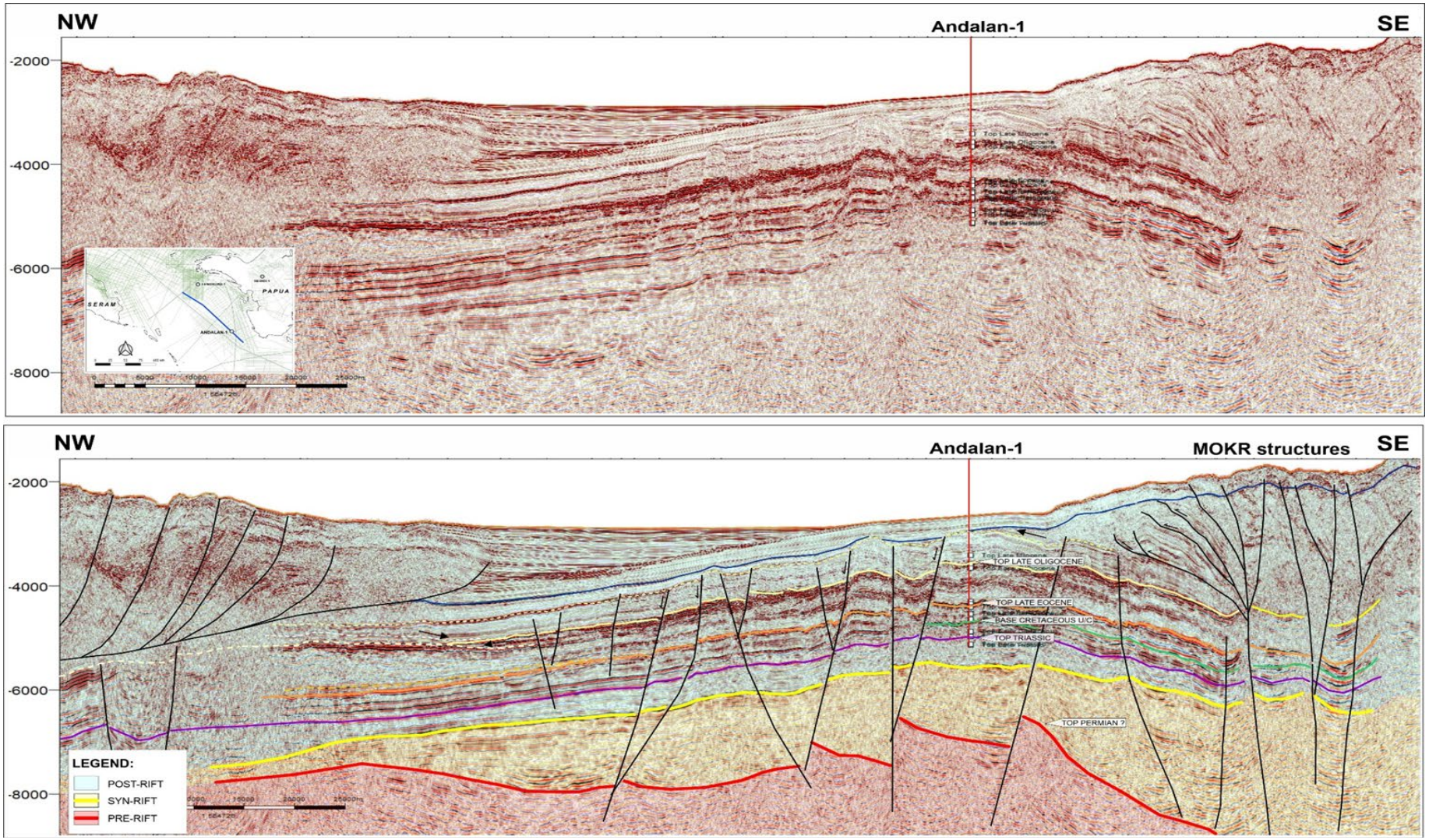


Figure 9: *Seismic cross section in South Semai area across Andalan-1 well. The well TD-ed in Triassic and did not penetrate the Top Syn-rift (yellow).*

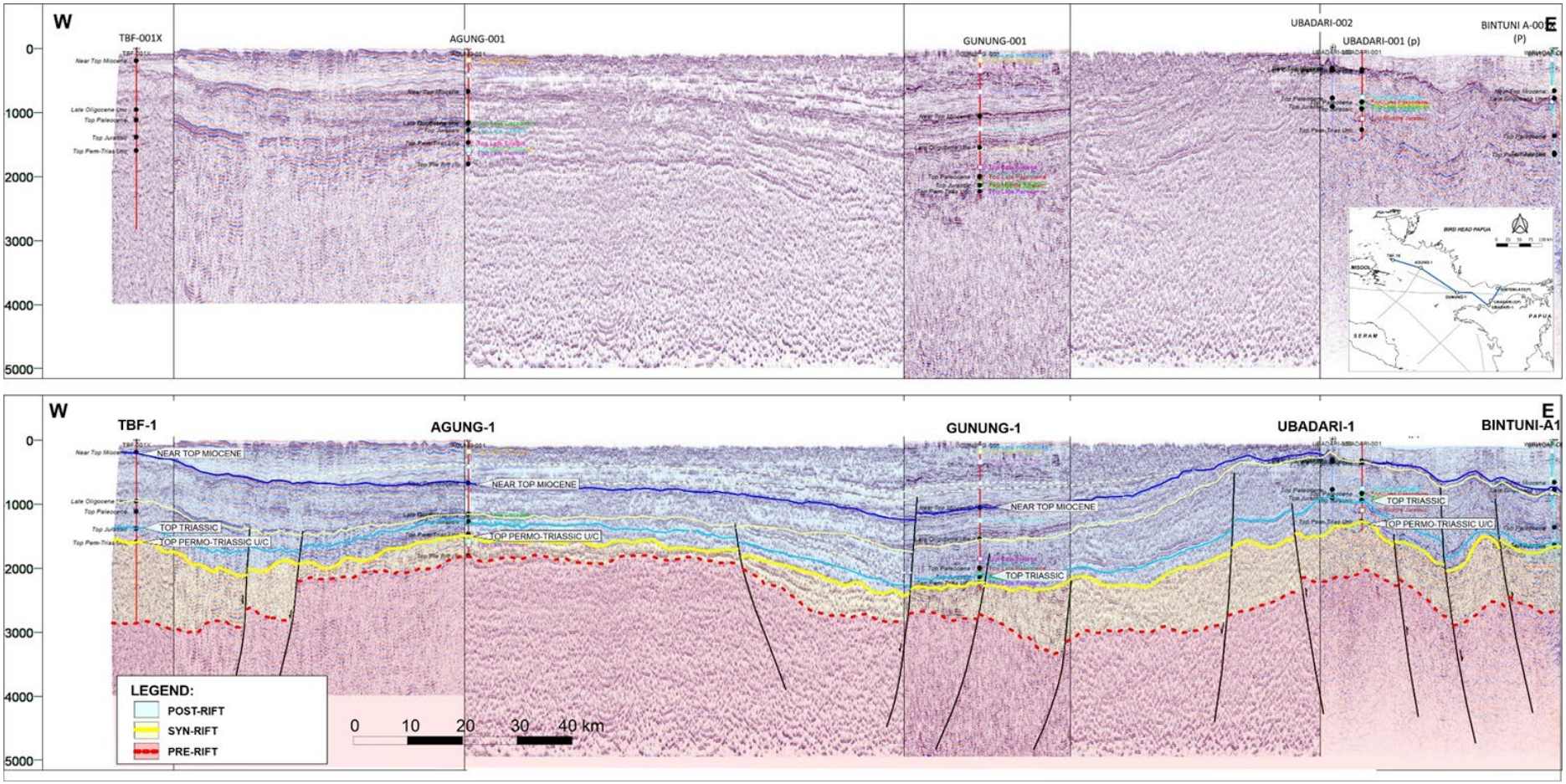


Figure 10: *Seismic cross section across the Semai to Bintuni area. Note that most wells were drilled on paleohighs. The top syn-rift is Top Late Triassic in Agung-01 well and Top Late Permian in Gunung-01 well. The top syn-rift is interpreted to coincide with the Permo-Triassic unconformity.*

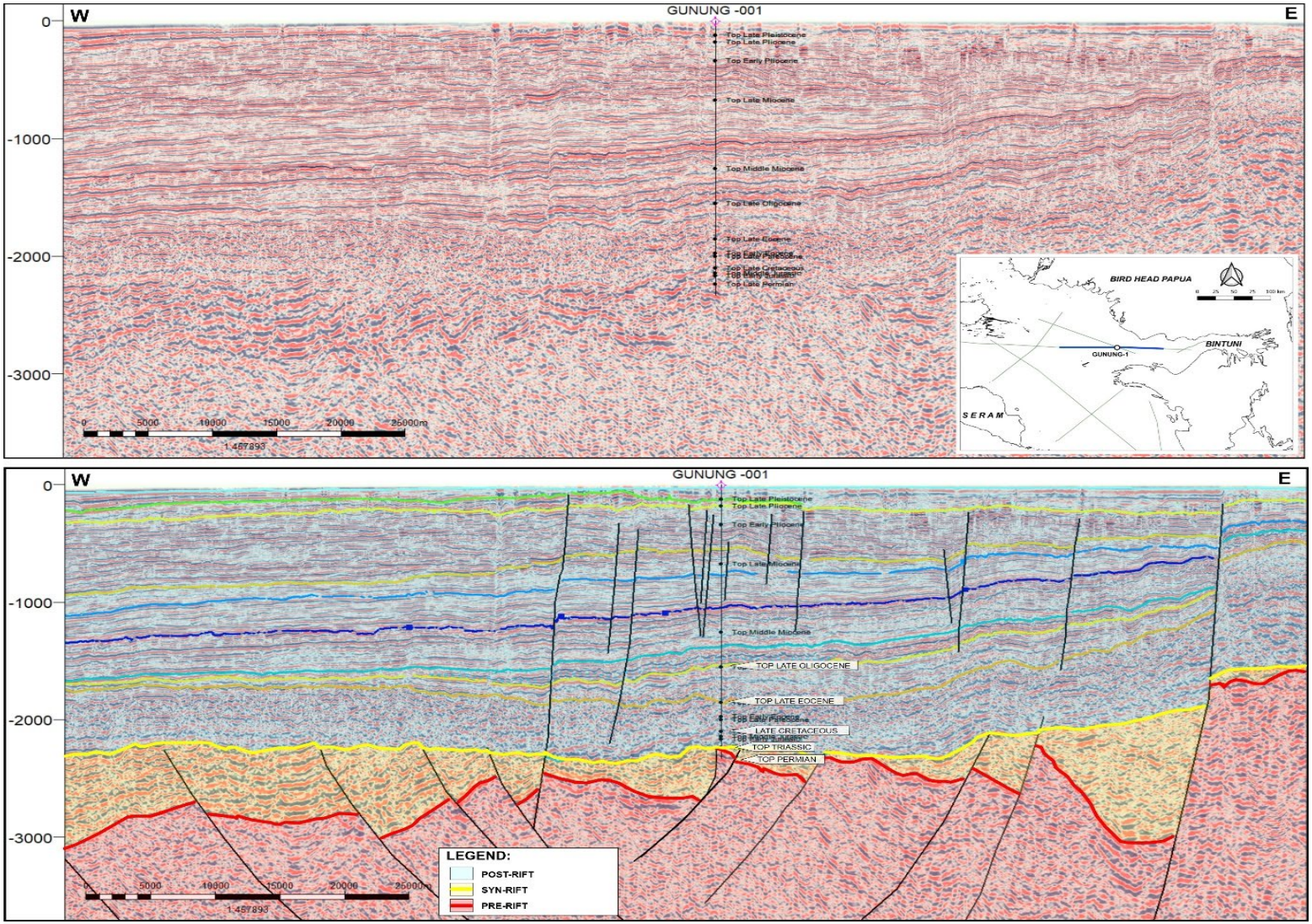


Figure 11: *Close up of seismic cross section across the Gunung-01 well, showing the interpretation of the megasequences. The top syn-rift ties to Late Permian in the well.*

The Ungar Sandstone may be the equivalent of the Puffin Sandstone of the Timor Sea (sand in a shallowing upward sequence in the Late Cretaceous, Norvick, 2002) – see Figure 14.

Little was documented from the seismic cross-sections on the early post-rift sequence at the North Papua-Maluku area. As discussed previously, the top of the syn-rift is often seen as a regional unconformity, known by operators as the Permian unconformity. Some wells have penetrated thin Late Triassic section such as ASM-1X, Agung-1, TBE-1X and Aimau River Deep-1. Most of the wells in Bintuni targeted the Jurassic section and were drilled on the paleo-highs, where the Triassic section was mostly eroded (Figure 12). This Permo-Triassic unconformity was possibly related to the subduction of the Paleo-Pacific oceanic plate beneath the Australian continental margin. The post-rift sequence in this area mainly consists of the New Guinea limestone group.

In the Middle Jurassic (Callovian), local extension occurred in the Papua region, causing transgression at the Bird's Head and Papua. This extension is most likely related to the effect of the spreading of the Neo-Tethys, which some authors recognized as another syn-rift sequence (Norvick, 2002), which resulted in the deposition of anoxic shales in Papua such as the Kopai shales. The deep-water sediments were also noted in the Semai, Bintuni and Berau basins. This should not be confused with the syn-rift event resulting from the Australian break-up (West Burma block II rift onset, Longley et al., 2013). This indicates that the Jurassic sediments at the Timor Sea (i.e. Plover sandstone) are not correlated to those at the northern Papua-Maluku area (e.g. Roabiba sandstones) because they were deposited in completely different tectonostratigraphic events (see Figure 12).

In contrast with the Southern Papua-Maluku, the post-rift sequence during the Tertiary is more complex in the Northern Papua-Maluku area due to the influence of the movement of the Pacific crust to the west and the convergence of the Indo-Australian and Eurasian plates (Hall and Spakman, 2003, Hall, 2012; Hinschberger et al., 2005; Watkinson et al., 2012). Two major erosional surfaces were identified in the Bintuni area, during the Oligocene and Early Pliocene, also recognized by Yudhanto and Pasaribu (2012). These unconformities are associated with the formation of the Misool-Onin-Kumawa Ridge (MOKR) in a transpressional regime in the Semai-Berau area, the commencement of the dextral Seram area. Seismic line on Figure 12 clearly shows this feature, showing that the "Sekak Ridge" was uplifted and eroded in the Early Pliocene. These compressional events have also reactivated pre-existing structures, creating positive structures that became the exploration targets in the Bintuni and Onin-Kumawa, Central Range Papua and the Seram areas. The Tangguh and Asap fields are producing from these structures in the Bintuni area (BP and Genting Oil), while Andalan-01 in the South Bintuni area targeted a similar aged structure in the offshore area.

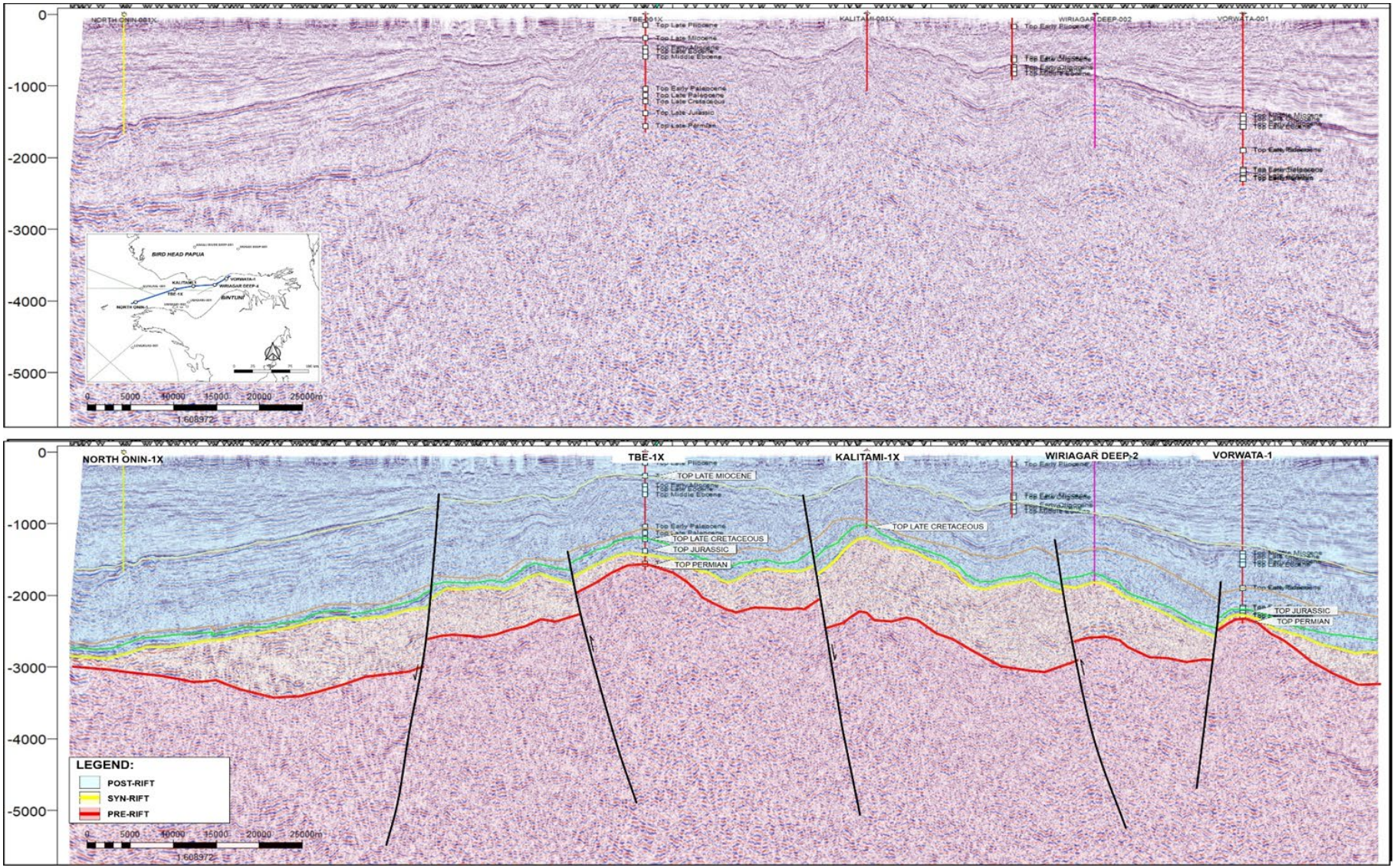


Figure 12: *Seismic cross section across Sekak Ridge.*

TECTONIC RECONSTRUCTION

A comprehensive knowledge of timing and character of the major tectonic events is crucial to confirm the tectonic history of Eastern Indonesia. This involves the timing of the break-up of Gondwana, which is incorporated into present day Sundaland. The tectonic history of Eastern Indonesia commenced in the Paleozoic; much earlier than in Western Indonesia.

Tectonic reconstruction in this study incorporated previous studies such as Peck and Soulhoul (1986), Panggabean and Pigram (1984), Barber et al (2003), Struckmeyer (2006), Kusnama (2008), Norvick (2002), Charlton, (2001, 2012a and b), Zhan and Mory (2013), Metcalfe (2013), Torsvik and Cocks (2013), Zhao et al., (2018), Fergusson (2019), to mention a few. The reconstruction of the tectonic history was carried out with the input from the new findings from seismic interpretation.

The main finding from the seismic interpretation is that the breakup of the Australian Continental Margin happened in parts, which is summarized in the Tectonic Calendar Chart (Figure 13). The North Papua Maluku area started to break up as early as early Permian as the Meso-Tethys opened. The completion of the break-up may have been completed in the Early Triassic. The syn-rift megasequence in Berau is Permo-Triassic and has been penetrated by the Agung-1 and Gunung-1, TBE-1 and possibly Ubadari-2 wells, showing the syn-rift sediments can be as old as Permian-Triassic. In the Semai area, the top syn-rift is older than Middle Jurassic (Andalan-1 well TD-ed in Middle Jurassic), therefore the precise age of the syn-rift sequence is unknown.

In the South Papua-Maluku area, the interpretation suggests that the rifting process at the Babar-Selaru area has commenced slightly earlier than in the Timor Sea area. The syn-rift megasequence in the Timor Sea started in the Middle Triassic to Late Jurassic, while at the Abadi-Tanimbar area the syn-rift may have started earlier as in the Late Permian.

EASTERN INDONESIA TECTONIC CALENDAR AND TECTONOSTRATIGRAPHIC CHART: DISCUSSION

Based on the new understanding of the regional tectonics and the tectonostratigraphy of Eastern Indonesia, a new tectonostratigraphic chart was produced in this study. As previously explained, this new tectonostratigraphic chart shows the lithostratigraphy of each area and their relationship to each of the megasequences (Figure 14). For example, the Timor Sea formation names are those commonly used by previous authors when explaining the stratigraphy of the Northwest Shelf of Australia and Timor Sea (McLennan et al., 1990; Norvick, 2002; Longley et al., 2002 Barber, 2013;).

In the Abadi-Tanimbar area, Kihara et al. (2012) used the lithostratigraphy from the Northwest Shelf of Australia. Local lithostratigraphic names were applied when possible. For example, taken from previous fieldwork (Charlton et al., 1991; Charlton, 2012b; Fakhruddin 2019).

It is important to note on the Cretaceous section of the Tanimbar islands, the Ungar sandstone has been of special interest to many explorers. The Ungar sandstone

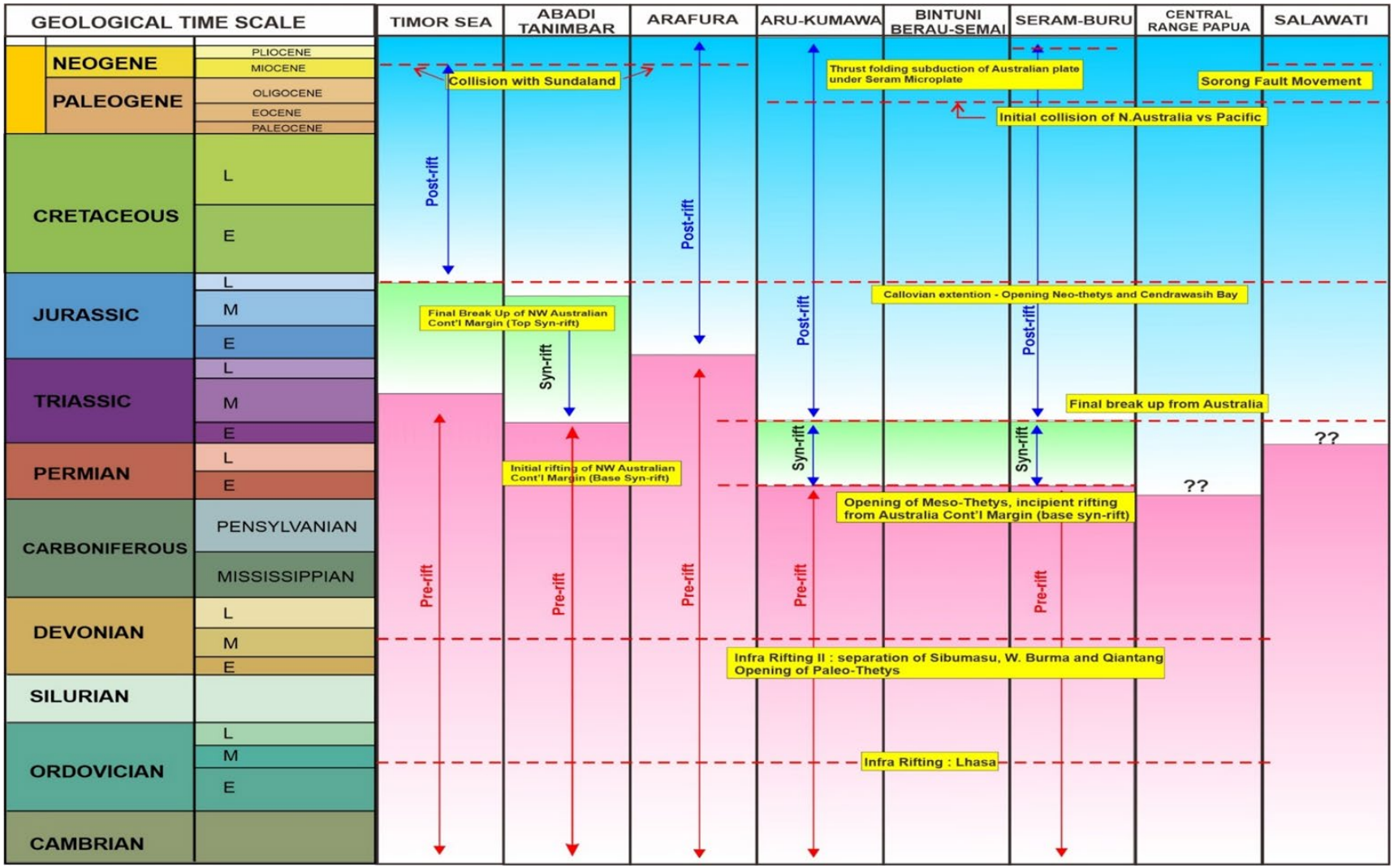


Figure 13: *Tectonic Calendar of Eastern Indonesia. Note the different timing of rifting. Arafura was a stable platform and rifting did not occur in the area.*

formation is likely to be equivalent to the Puffin Formation in the Timor Sea and Northwest Shelf of Australia.

In the Northern Papua Maluku area, the lithostratigraphic names already existed, such as in the Central Range Papua, Bintuni and Seram areas. The stratigraphic nomenclature was mostly referring to Yudhanto and Pasaribu (2012). It is important to emphasize that one of the main findings from this study is the relationship between the Jurassic Plover Formation at the Timor Sea and the Roabiba sand at the Bintuni area. This chart depicts that these two formations were deposited in tectonostratigraphically different megasequences. This indicates that these two sandstone formations are genetically different and have been sourced from different areas. Soeryowibowo et al. (2022) has also noticed that the Paleozoic (reservoir) and petroleum system is separated from the Jurassic system, with the drilling of Uba Deep-1 well which had gas shows in the Permo-Triassic and Permian section.

It is also important to note that the syn-rift section at the Semai Berau and Bintuni areas still remains a potential exploration target in the area. Most companies target the Jurassic-aged sediments, which from this study falls into the post rift megasequence. The syn-rift megasequence in this area should be as old as Middle Triassic to Late Permian. Few wells penetrated the Permian syn-rift section, namely Wiriagar Deep-4, TBE-1X, Gunung-1, TBF-1X, Ubadari-1, Vorwata-1 and Mogoi Deep-1. Vorwata-1 tested Permian sands with 0.113 MMCFGPD while Mogoi Deep-1 flowed 11.5 MMCFGPD.

In the Salawati stratigraphic chart, the megasequences cannot be determined due to the depth of the syn-rift sections, which were not penetrated by any available wells. The stratigraphic chart from the Salawati area is primarily referring to Ozza et al. (2019).

This chart is inter-related with the Tectonic Calendar Chart. When used together, these charts will show the timing of each tectonic event and what was deposited as the result of each tectonic timing.

CONCLUSIONS

The rifting of the Australian continental shelf did not happen at once. Based on the seismic data and applying sequence stratigraphic framework, the syn-rift megasequence in the North Papua Maluku is from Late Permian-Late Triassic and subsequently getting younger towards the Southwest to the Timor Sea. This shows that the breakup of the Gondwanaland happened gradually.

It is important to define the stratigraphic megasequences correctly to define geological play in Eastern Indonesia. Understanding and applying sequence stratigraphy method for regional correlation has proven to construct the tectonostratigraphy of Eastern Indonesia to better perspective.

Underexplored Syn-rift/Paleozoic play: by building tectonic calendar and tectonostratigraphic chart, it is noticeable that the Paleozoic syn-rift reservoirs (Permian-Triassic) is underexplored in the Northern Papua area. Permian reservoirs have been tested by Vorwata-1 and Mogoi -1 wells which flowed 0.113 MMCFGPD and 11.5 MMCFGPD.

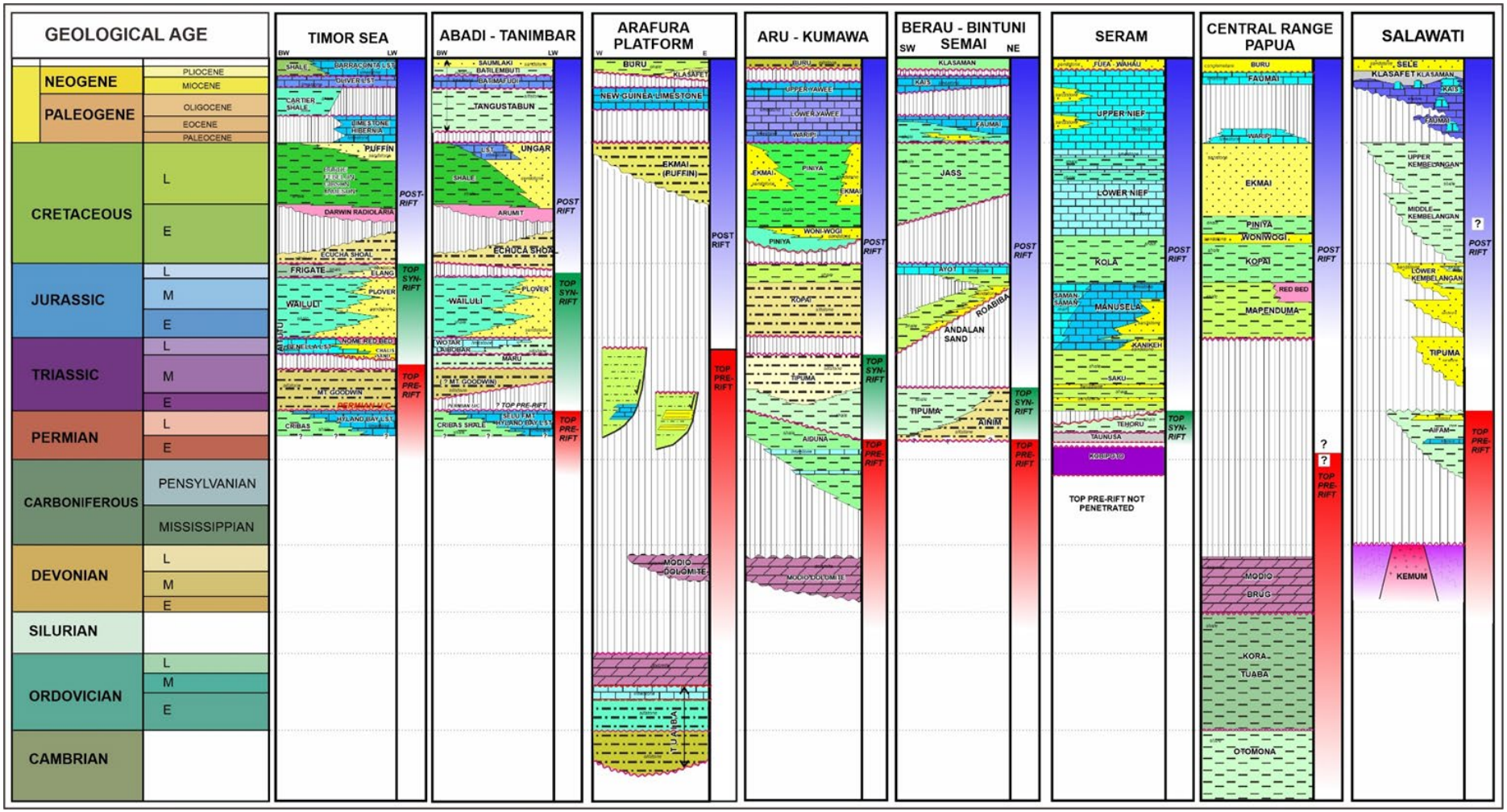


Figure 14: *Tectonostratigraphic Chart of Eastern Indonesia.*

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