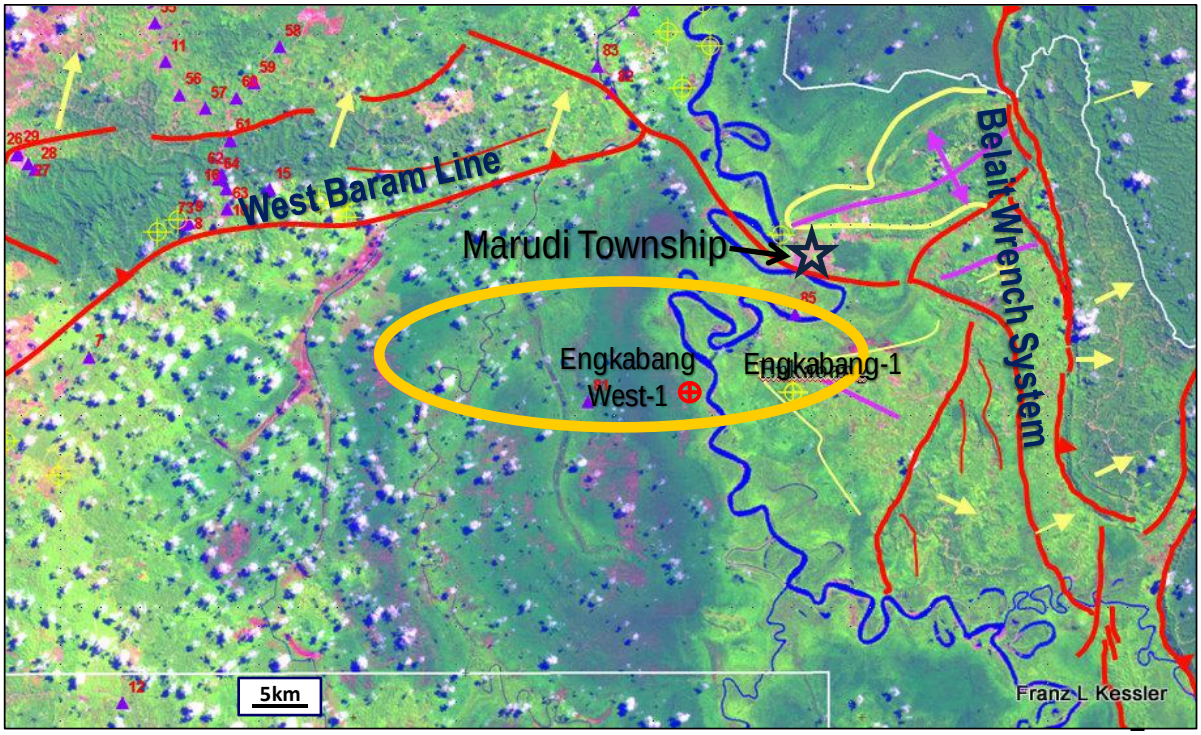
Baram Line or West Baram Line?
A discussion with late Prof. H.D. Tjia on its nomenclature in Jong et al. (2016)

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CORRESPONDENCES

This note summarises the unedited correspondence and discussion we had with late Prof. H.D. Tjia on the above topic, starting with an initial email received by the corresponding author of the article "Structural Development, Deposition Model and Petroleum System of Paleogene Carbonate of the Engkabang-Karap Anticline, Onshore Sarawak" by Jong et al. (2016) published in Berita Sedimentologi, Vol. 34, p. 5-25:



The mentioned "Figure 2" in Jong et al. (2016) with the annotation of "West Baram Line". The tectonic overview map of the Greater Engkabang-Karap area (enclosed in yellow oval) near Marudi shows converging regional structural lineaments of Baram Line and Belait Wrench system.

"Dear Dr. Jong,

On Figure 2 of your joint article on the Engkabang area shows a "West Baram Line" striking sub parallel to the current Sarawak shore line. Its caption refers to a "Baram Line". The WEST BARAM LINE is an established tectonic expression striking NNW approximately from Tanjung Bungai (Bekenu area) far into the offshore of the Sarawak basin. We may still bicker about its significance, however, your joint article does a disservice by introducing another 'West Baram Line'. That particular line of figure 2 needs another name. A Badas Syncline runs parallel to it. The Lambir structure strikes likewise.

I believe a correction will be necessary.

Regards,

H.D. Tjia"

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A reply dated the same day was given by Dr. F.L. Kessler:

"Dear Professor Dr. Tjia,

Dr. Jong was kind to forward me your question regarding West Baram Line (WBL) and its course onshore. As you rightfully say, there is a lot of bickering about it. Firstly, the West Baram Line and the Baram Line as quoted by a few authors are one and the same, so I believe. In respect of the course of this lineament, let me explain a little more. During my years in Shell and later in Curtin University Sarawak I was very keen to find an answer to the question whereto the WBL was heading in the onshore area. I spent several weekends myself and later with students mapping folds, using also older data such as Liechti et al., 1960.

1. *The first important finding was, that there is an area with weak or no folding at all a few km inland from the Bungai Beach (Pantai Bungai). Hence, a straight line from Pantai Bungai inland won't work, since neither folding nor faulting can be identified. I mapped the area as well as possible, and gave a talk in 2006 at the Geosea. To confirm the "best candidate" for the WBL, I followed the southern limit of the Lambir inversion feature by criss-crossing the suspected course of line on my motorbike. Heading inland I saw folded clastics of the Lambir to my left, and flat-lying to mildly folded Setap Shale to my right. My latest thinking is that the WBL might splits in two branches around the Bukit Lambir inversion block, and the latter may hence be a pop-up structure between the two branches. The northern branch can be seen in 2-3 outcrops along the coastal road between Tusan and Kpg Beraya.*

2. *2009 saw the acquisition of gravity, magnetics and seismic. Particularly on gravity one can distinguish clastic-dominated areas belonging to the greater Baram Delta and a block to the SW, (I call Luconia/Tinjar) with many carbonate area signatures. Seismic in the area of Bukit Engkabang also shows a clastic Baram depocentre to the NE and a very tectonized platform edge to the SW. This fits well with my fieldwork findings.*

Accordingly, we believe evidence for the S-shaped course of the line is rather solid, but there remain questions in which direction it continues from the Long Lama area. I do not have good data on this, so I have to speculate. The perhaps most likely continuation might run towards Batu Gading, then Mulu, and from there via Klias to Northern Sabah, were there is again plenty of evidence on seismic for a tectonic suture. Should this rather speculative interpretation turn out to be correct in the light of future data, then it would mean that the lineament might be the boundary which divides areas of clastic depocentres (on strongly attenuated crust) from carbonate-dominated platform areas (on less attenuated crust). Some of the course in the Borneo hinterlands may be masked by the Rajang metamorphics, which seem to overthrust the foreland.

Respectfully and kind regards,
F.L Kessler"

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An immediate follow-up reply by Prof. Dr. H.D. Tjia:

"Dear Dr Kessler,

Thank you for the explanation. I am not disputing your interpretation as such as I consider that an interpretation and I am not that familiar with the <u>new</u> subsurface onshore data that you refer to. My main unease is about the name of using WBL that by virtue of its linearity and length most probably has had significant strike-slip displacement component and extending that name to an interpreted segment of different trend and (interpreted) reverse displacement. Should not the entire interpreted structure be named something like "West Baram Line – XXX structure" and not just West Baram Line or Baram Line? It is not a matter of semantics, and a new or combined designation of the structure would avoid unnecessary confusion and alert the reader of the different kinematics of the two segments.

Thank you again for your time and explanation.

Sincerely,

H.D. Tjia"

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Subsequent correspondence by Dr. John Jong, Apr 5, 2016:

"Thanks Franz for the response to Dr. Tjia. I believe the seismic data acquired by JX Nippon in 2009/2010, in conjunction with the gravity data will help in some way to detail the onshore continuation of the WBL. There will be some regional sections, in both strike and dip direction interpreted by Dr. Peter Barber for us that will be included in our onshore Baram Delta publication for GSM50. It's now a joint project with MPM. John"

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Final reply/clarification by Dr. F.L. Kessler, Apr 5, 2016:

"Dear Prof. Dr. Tjia,
Thanks for your quick reply and I just forwarded it to Dr. Jong for his views on this. Your concern is fully understood, and let us perhaps look for an appropriate solution together with Dr. Jong.

I believe there are again 2 aspects to the problem:

1. *The question of the contiguity of the WBL offshore portion with any lineament onshore.*
2. *Clarity of concept and appropriate wording.*

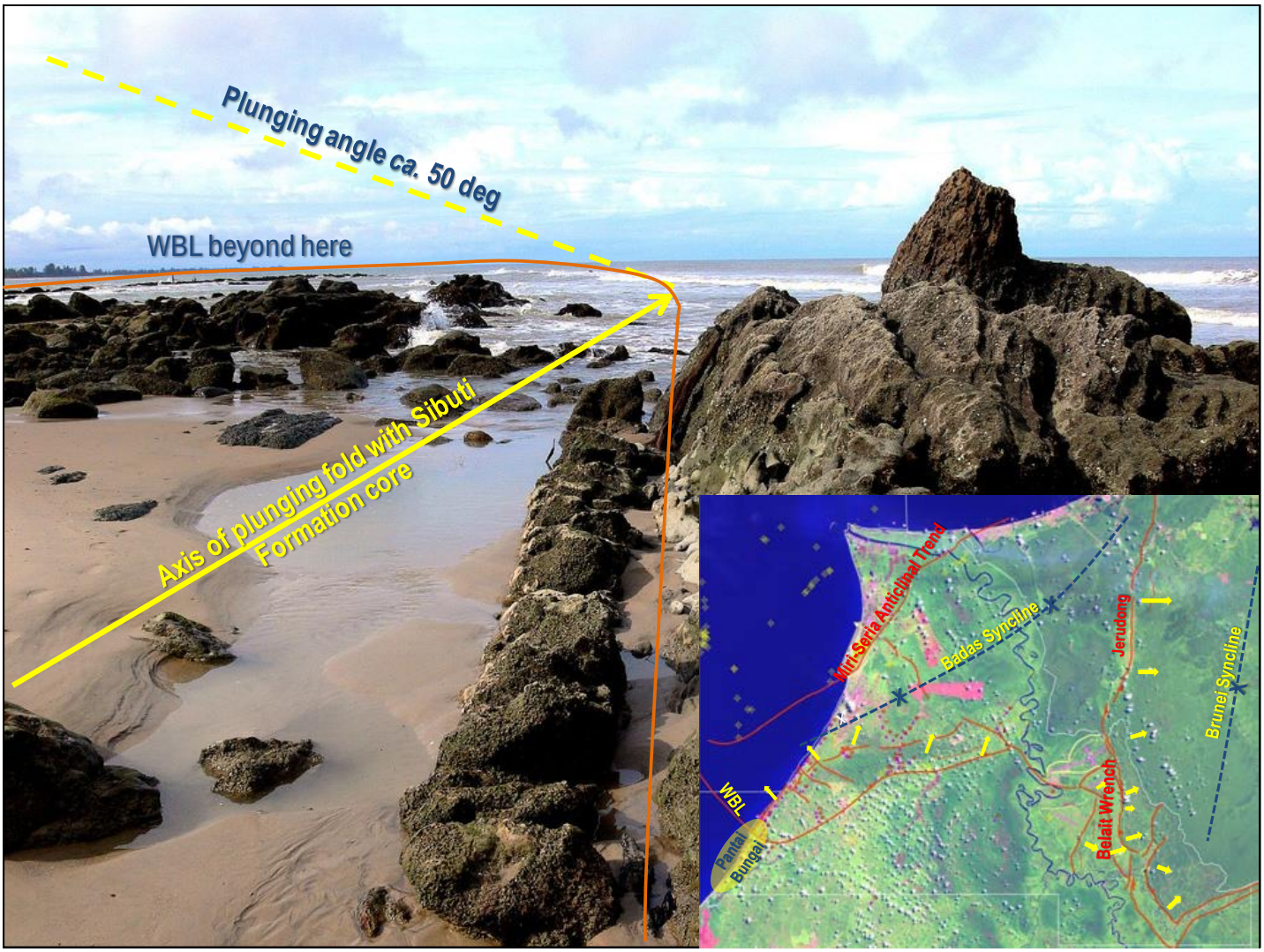
On the question of contiguity, let me first talk about the WBL in the offshore. I investigated in 2007 the course of the line on Shell 2D seismic data, and what I can say is that picking the line is far from obvious - the best description that comes to my mind is a combination of the Central Luconia platform escarpment (high shoulder West), this being mostly the one which is picked in publications, and a low angle detachment plane (low, East, Baram Delta Block), hardly imaged on seismic. The axes of structures (highs and lows), as well as regional faults are bent in the vicinity of the WBL, suggesting strike/slip.

In the onshore, the Baram Delta block is morphologically higher than the Luconia flank, and formed by a plunging anticline of Upper Setap claystone and Lambir sandstone. The anticline plunges into the WBL with an estimated angle of some 50 deg. (see picture). I believe the onshore feature is contiguous with the offshore WBL, and divide Luconia/Tinjar from the Baram Block, yet geodynamics might be different.

On the question of clarity of concept, it might indeed be preferably if a different name might be chosen for the onshore segment. However, if we rename it and some authors continue to put straight WBL extension lines through tectonically undisturbed terrain, we have achieved the contrary of our intentions, and the effect may be counter-productive. a bit of a dilemma I guess.
Respectfully and kind regards,
Franz L Kessler"

CONCLUSION

In Summary, having seen and interpreted onshore outcrops and subsurface data, we used the terms Baram Line and West Baram Line (mostly for offshore extension) interchangeably. Following this communication, it was with great sadness that we found out Prof. Dr. H.D. Tjia untimely passing on June 9, 2016, a devastating loss of a distinguished scholar in Malaysian/SE Asian geology. It was an honour and we greatly appreciated the discussion we had with the dedicated geologist. A manuscript entitled "Exploration History and Petroleum Systems of the Onshore Baram Delta, Northern Sarawak, Malaysia", is currently being prepared to further illustrate the subsurface expression of the West Baram Line (or Baram Line) in onshore northern Sarawak area, which has been accepted for publication in the Golden Jubilee edition (GSM50) of the Bulletin of the Geological Society of Malaysia. The special volume is planned to be published in early 2017.



Plunging fold at Pantai Bungai. Inset regional tectonic map shows pattern of faults and lineaments in red, syncline axis in blue dash-line, yellow arrows show direction of dip into clastic depocentres. The big Brunei Syncline on the left was over-thrusting the Baram Block, with the overthrust being the Jerudong Fault.