



# STAG2022

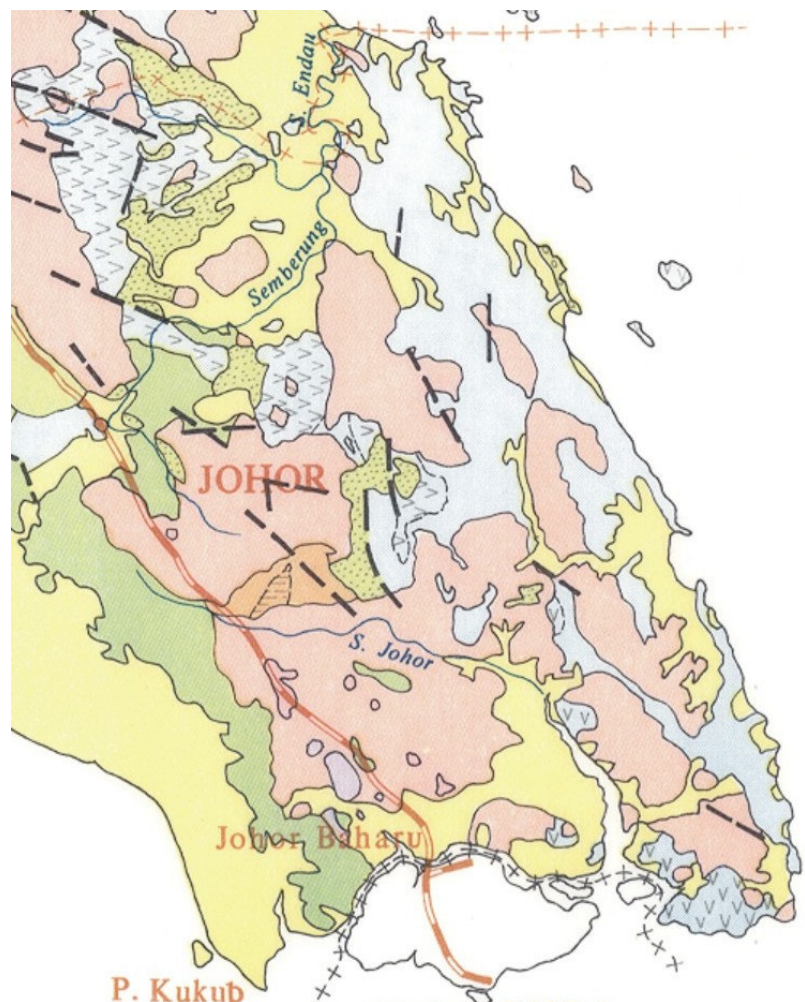
## Stratigrafi Malaysia

Stratigrafi Semenanjung Malaysia

# Geologi Johor Timur

Kamal Roslan Mohamed, Geologi UKM

## GEOLOGI JOHOR TIMUR



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# A review on Palaeozoic lithostratigraphy of east Johor, Malaysia

by :

SUGENG S SURJONO <sup>1,2</sup>  
MOHD. SHAFEEA LEMAN<sup>1</sup>  
CHE AZIZ ALI<sup>1</sup>  
KAMAL ROSLAN MOHAMED<sup>1</sup>

<sup>1</sup>School of Environmental Science and Natural Resources,  
Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, MALAYSIA  
<sup>2</sup>Geological Engineering Department, Faculty of Engineering,  
Gadjah Mada University, Yogyakarta, INDONESIA

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## INTRODUCTION

Some controversies on Palaeozoic stratigraphy in east Johor :  
lithostratigraphic order and age of Metamorphic rock,  
Murau conglomerate as well as volcanic rocks.

The Palaeozoic stratigraphy of East Johor is still obviously  
poorly understood (thus needed a revision)

A comprehensive study on stratigraphic correlation of  
Palaeozoic rocks of east Johor in relation with the whole  
eastern belt of Peninsular Malaysia is needed.

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## OBJECTIVES :

To review lithostratigraphy of Palaeozoic rocks in eastern Johor

To re-establish the stratigraphic order of Palaeozoic rocks in eastern Johor

To understand the depositional mechanism of each Palaeozoic rocks unit in eastern Johor in the scale of basin

To relate the depositional mechanism with basin setting

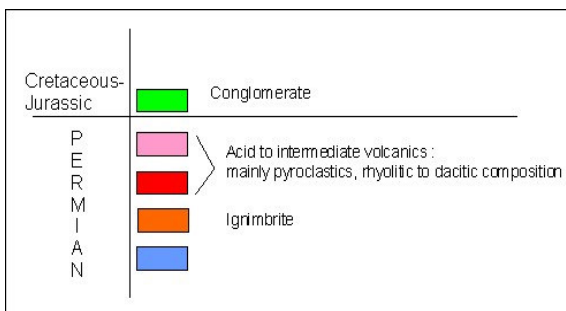
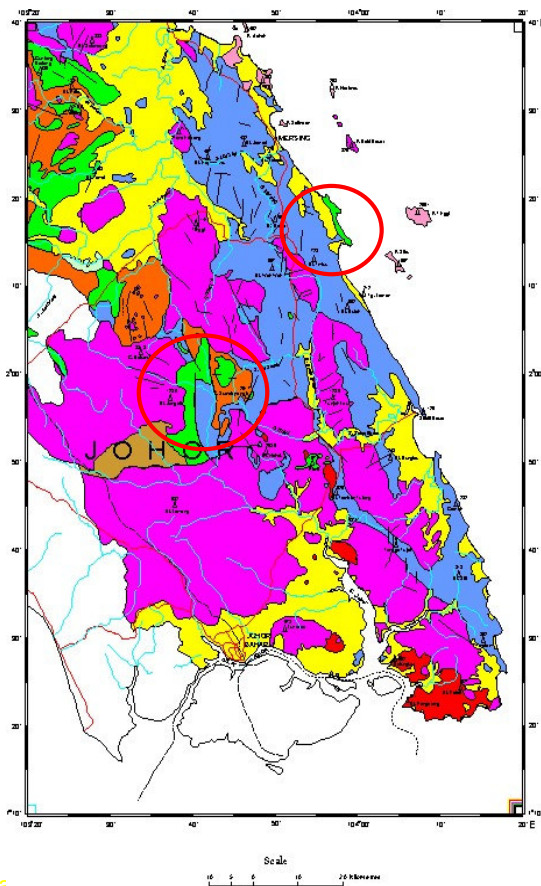
To understand the basin development in eastern Johor during the Palaeozoic

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## Geological map of east Johor :



Source : Peta Geologi Semenanjung Malaysia  
Cetakan ke-8, 1985.  
Jabatan Penyiasatan Kajibumi,  
Malaysia (D. Santokh Singh).

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# Mersing Formation:

- Widely distributed in eastern Johor and southeastern Pahang
  - The oldest rock in eastern Johor, overlain unconformably by all other sedimentary rocks formations
  - Composed by metamorphic rocks such as schist, phyllite and quartzite, some interbedding of slate and metaquartzite
  - Folded, faulted and intruded by granite; quartz vein is common as crack filling

The depositional environment :

- shallow marine to mixed condition (Foo, 1983)
- deep sea clastic sediment (Suntharalingam, 1991).
- this study : shallow marine environment.

Age:

- Carboniferous-Permian (Drummond, 1962)
- Permian (Suntharalingam, 1991).
- Pre-Permian (this study)

Previous denomination :

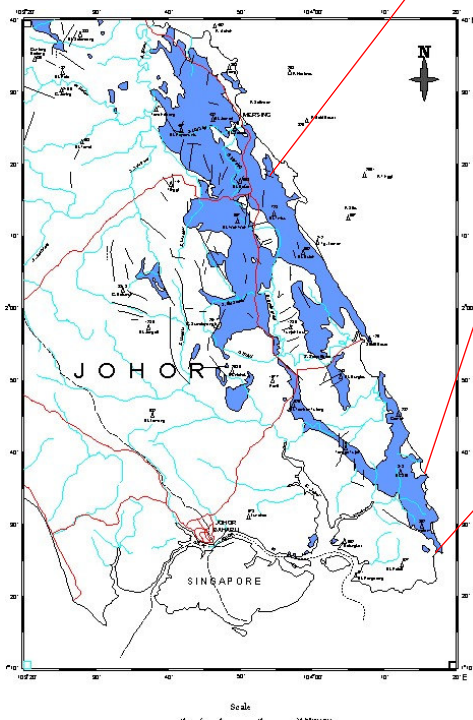
- Mersing beds (Cook and Suntharalingam, 1970 )
- Mersing Group (Suntharalingam, 1991)

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## Distribution of Mersing Formation



Tg. Murau

Alternating of shale-slate and metasediment rock



Tg. Balau

Schist-phyllite and quartzite interbedding



Tg. Pungai

Metasediment with cross-bed sedimentary structure

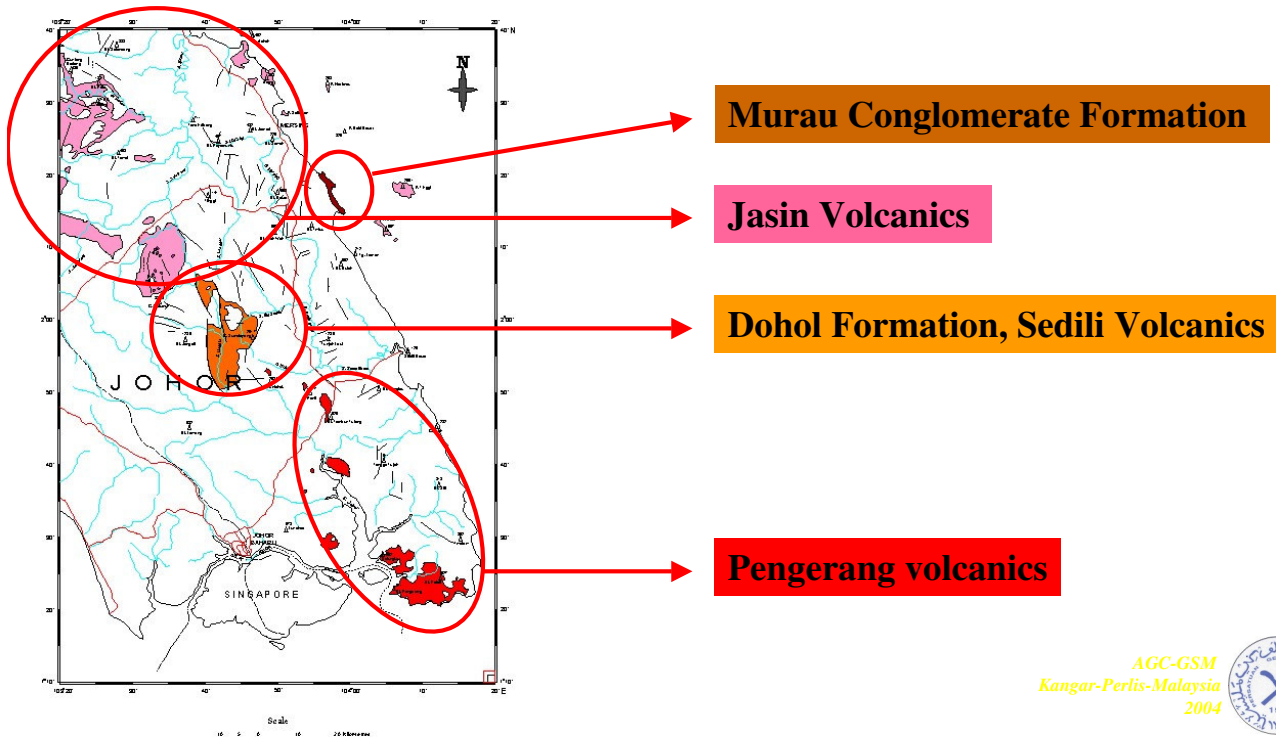
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## Post Mersing rocks/Formation

Unconformable deposited above the Mersing Formation are clastic sediment (Murau Conglomerate Formation, Dohol Formation) and volcanic rocks (Sedili, Jasin and Pengerang volcanics)



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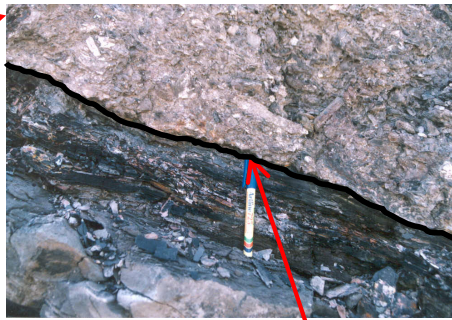
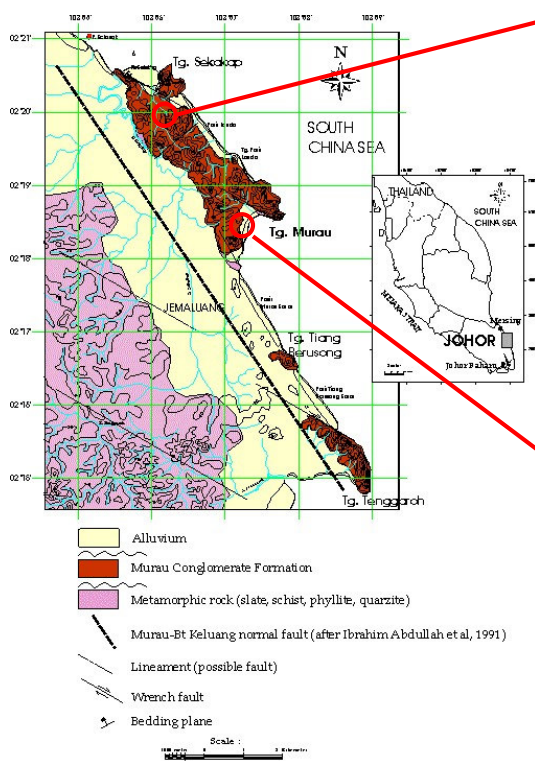
## Murau Conglomerate Formation



- Formerly included as member of the Tembeling Formation (Koopmans, 1968). Burton (1973) and Khoo (1977) excluded Murau Conglomerate from Tembeling Formation because of its geographic isolation. Ahmad Jantan *et al*, (1988) supposed to upgrade as a Formation
- Distributed along the east coast from Tg Sekakap- Tg Tenggara, and at Pulau Batu Chawang, Mersing (Ibrahim Abdullah, *et al*, 1991) and Tg Leman (Suntharalingam, 1991).
- Composed of disorganized thick bedded breccia, gravelstone and sandstone series forming a sequence deposited by fan-delta system (Surjono *et al*, 2003)
- Unconformably overlying the Mersing Formation with the provenance from Mersing Formation itself.
- The volcanic elements was absence.



# Geological map of Murau area :



Basal conglomerate with clasts of slate and metaquartzite of Merising Formation

disconformity



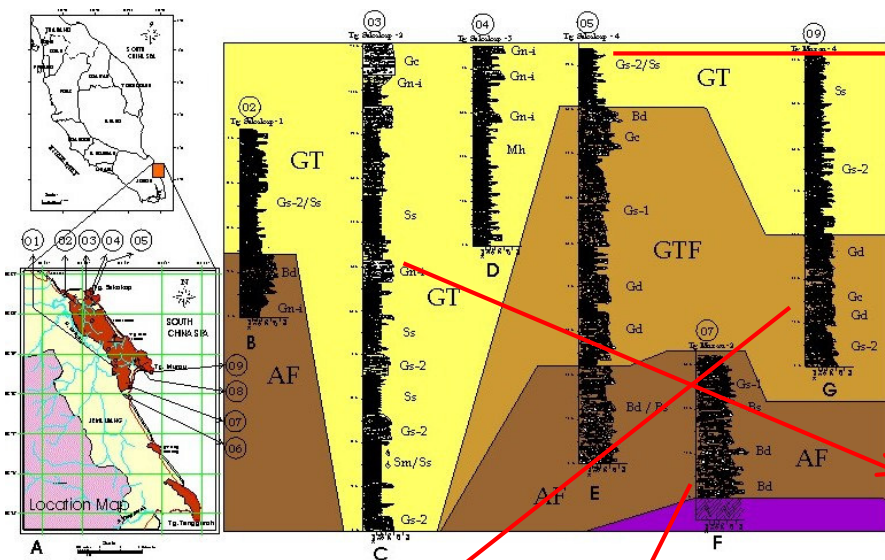
angular unconformity

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## Lithological logs of Murau Conglomerate Formation



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## Dohol Formation

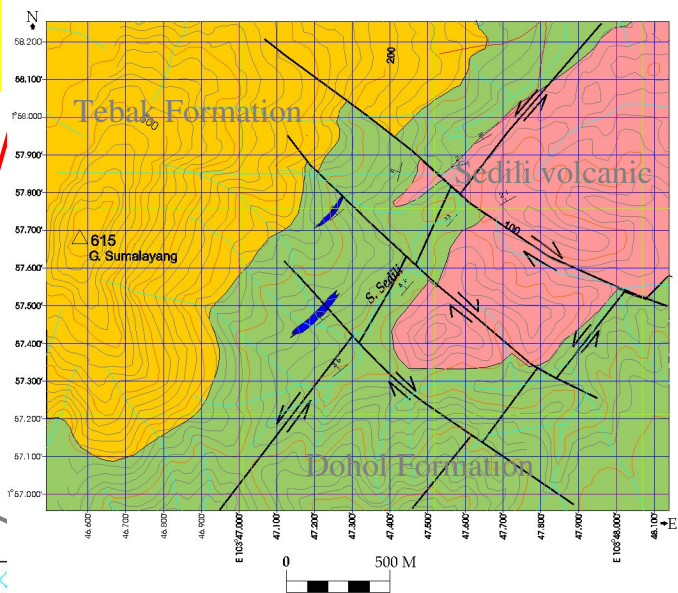
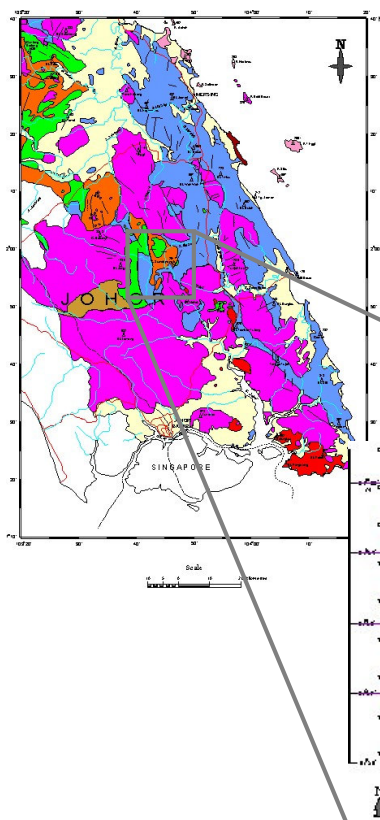
- Distributed in eastern part of G Sumalayang, mainly in the upper reaches of Sungai Sedili, associated with Sedili volcanic.
- Composed of shale-siltstone-fine sandstone interbedding, thickly bedded claystone and thin bed of tuffaceous sandstone
- In the middle part limestone unit named as the Sumalayang limestone member is deposited
- Dohol Formation and Sedili Volcanic are interpreted as a shallow marine origin
- In Gunung Belumut, Kon'no et al., (1970) and Rajah, (1986) confirmed that Linggiu Formation was unconformably deposited above the Dohol Formation
- Dohol Formation was grouped together with Linggiu Formation into Mersing Group by Suntharalingam, (1991)

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### The distribution of Dohol Formation and Sedili volcanic



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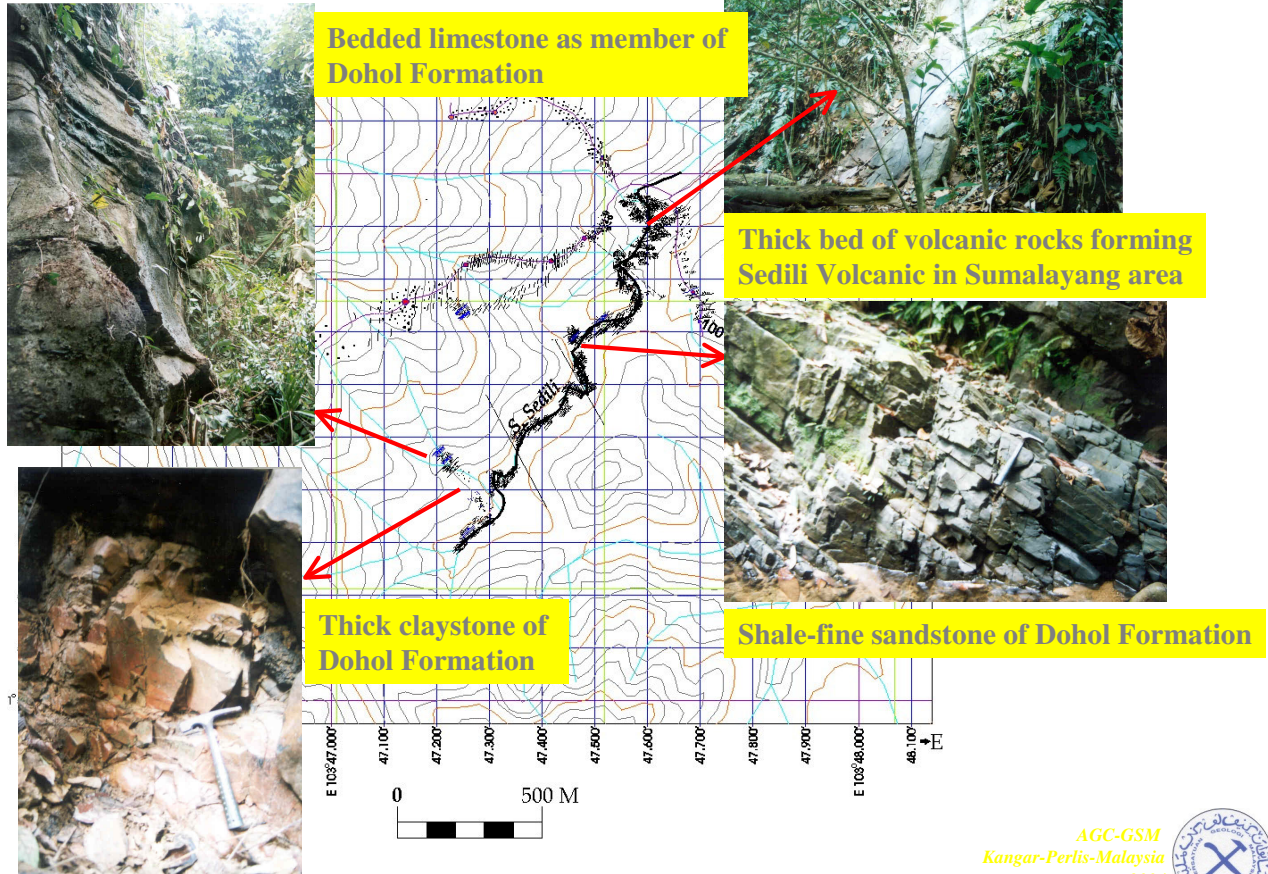
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**Sungai Sedili traverse:**

**Dohol Formation**



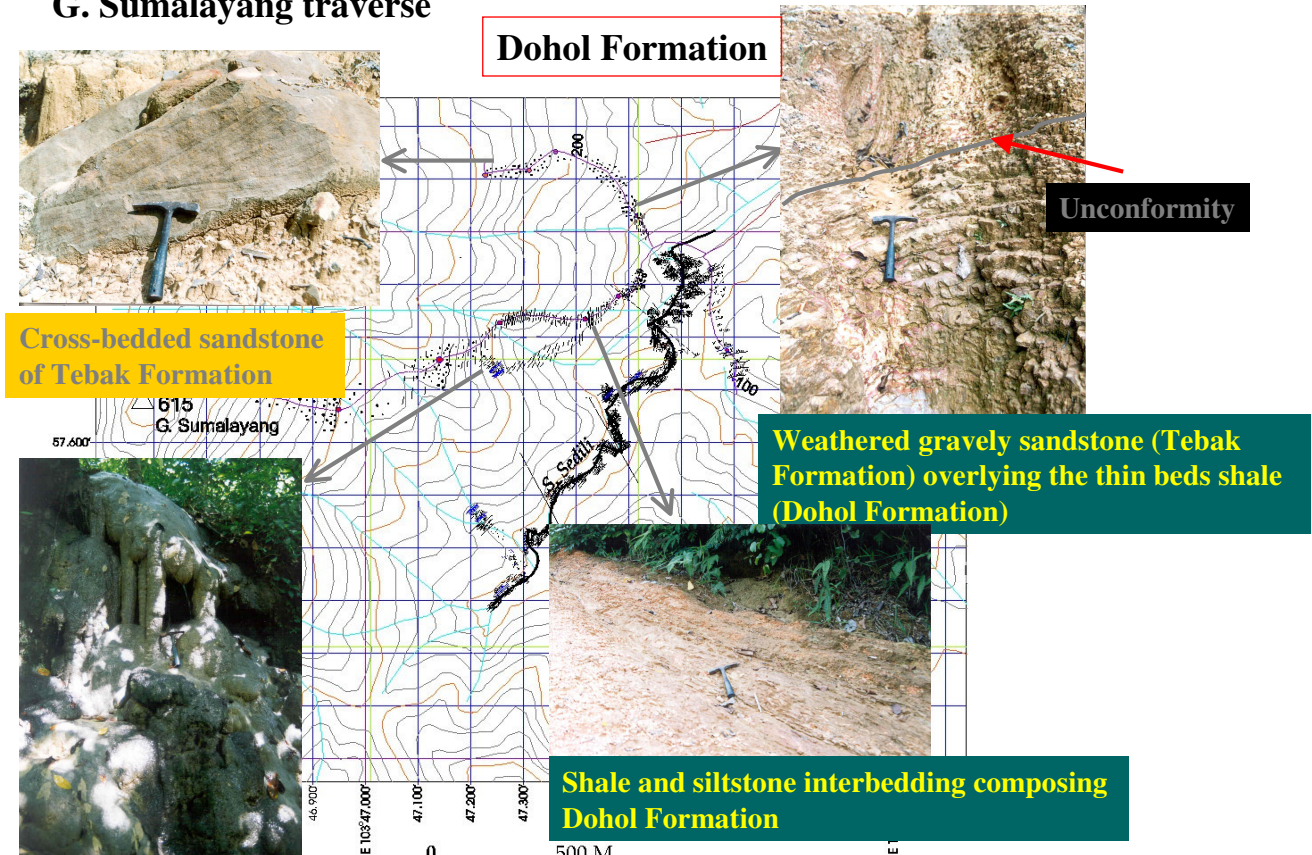
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**G. Sumalayang traverse**

**Dohol Formation**



Stalactite, resulted by precipitation of limestone member of Dohol Formation

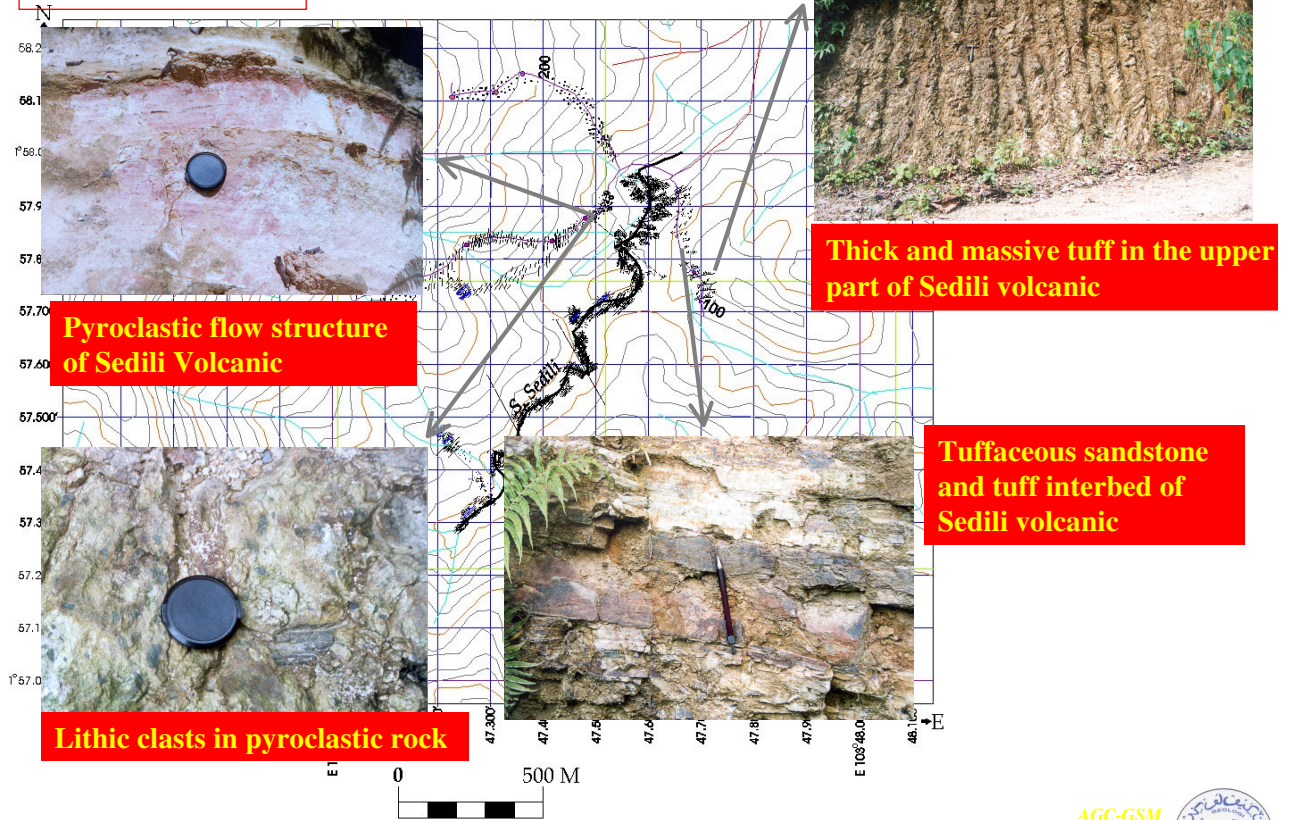
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## G. Sumalayang traverse

### Sedili Volcanic

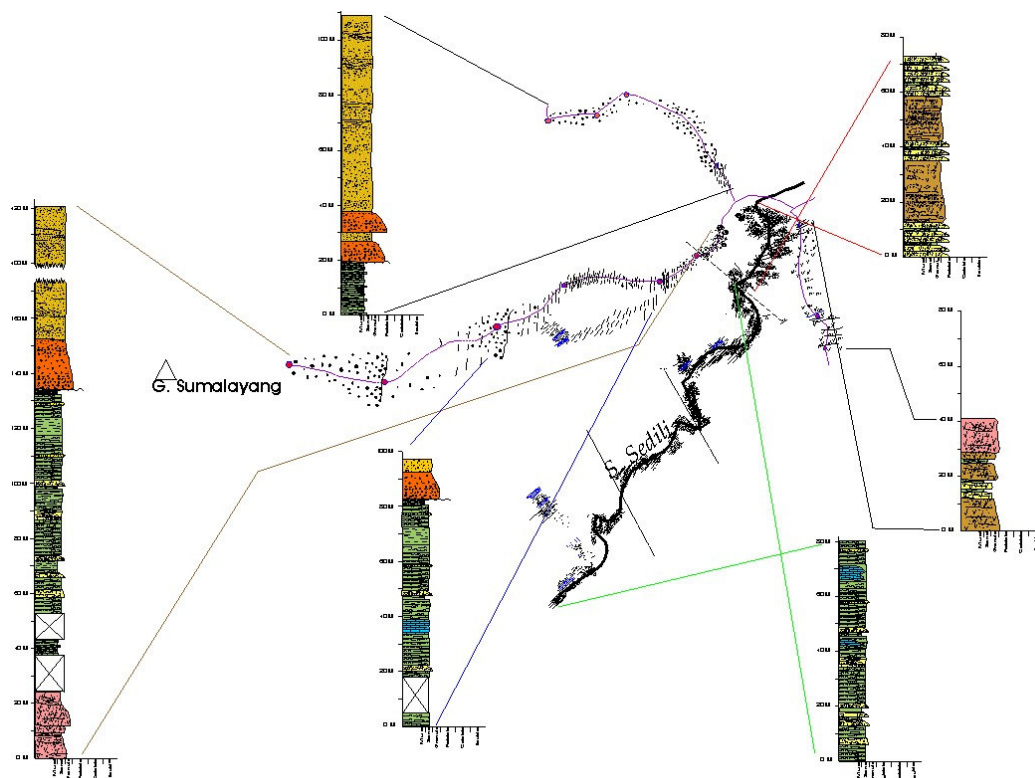


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## Lithological columns from several trverses of G. Sumalayang

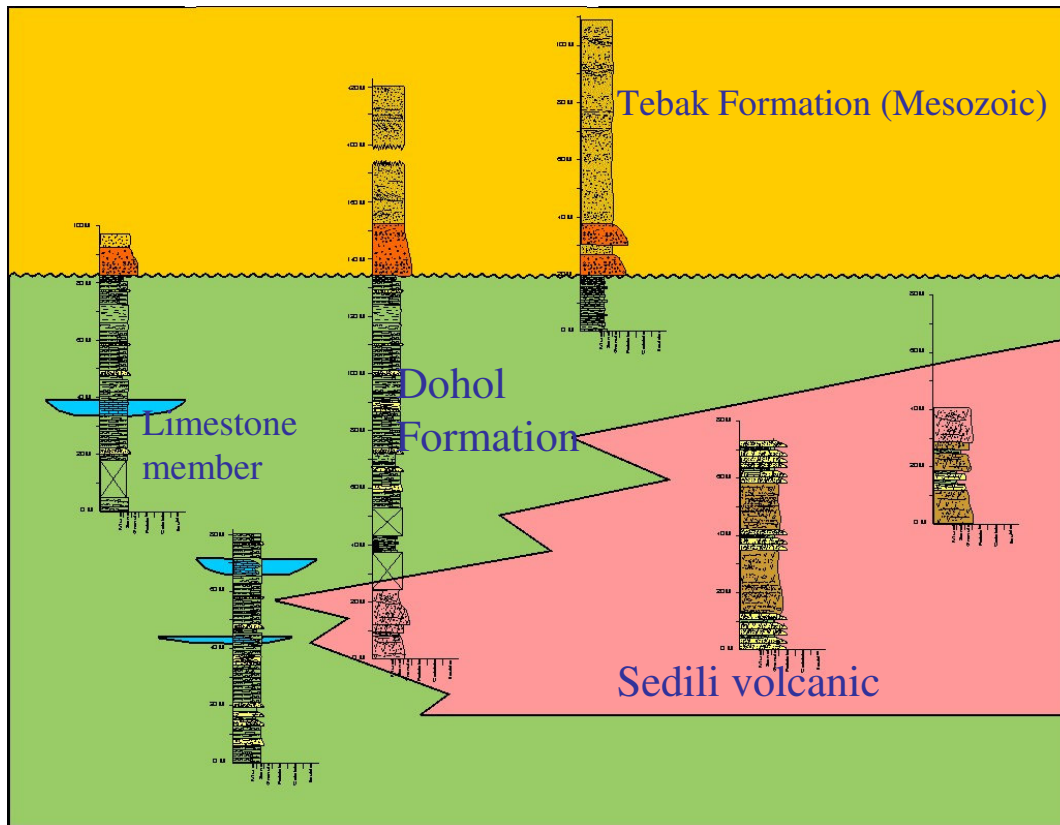


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# Stratigraphic correlation of G. Sumalayang area

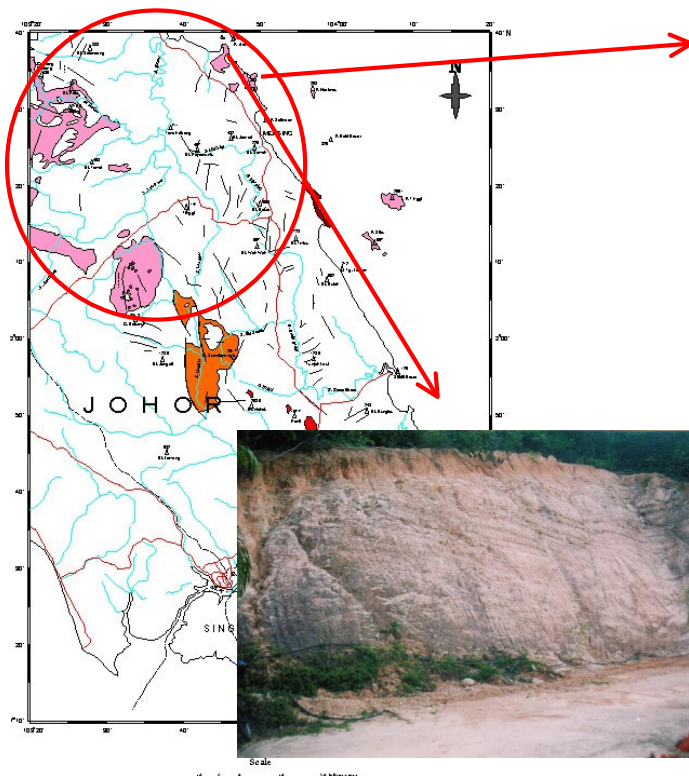


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## Jasin Volcanic



Bomb as pyroclastic fall product at Tg. Arong Baharu



Pyroclastic rocks (volcanogenic) of tuffaceous shale and clastone. Upper part of Tg Penyabung

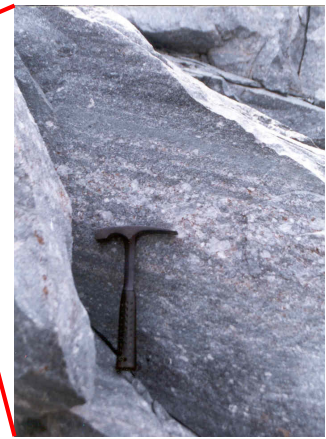
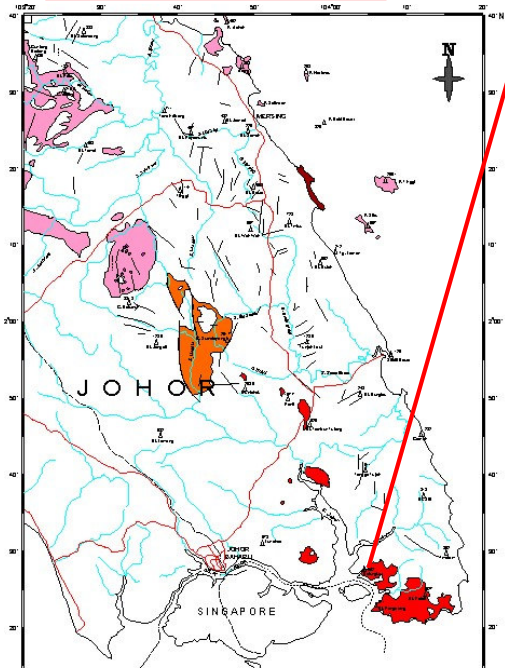
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# Pengerang Volcanic

## Tanjung Belungkur



Rocks show pyroclastic flows, forming thick bed succession. The clasts composed of lapili, lithic and re-sedimented of pyroclastic rocks

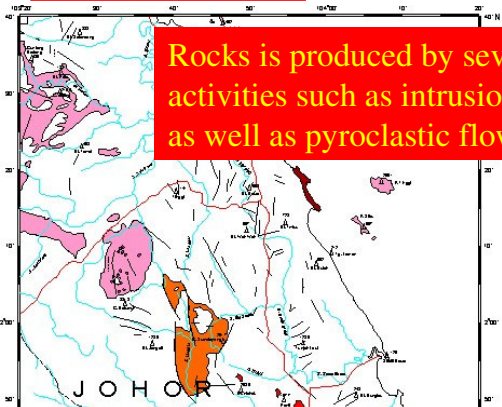
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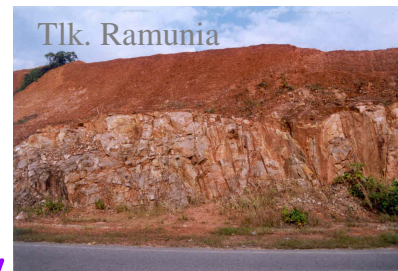


# Pengerang Volcanic

## Teluk Ramunia



Rocks is produced by several volcanic activities such as intrusions, lava flows as well as pyroclastic flows



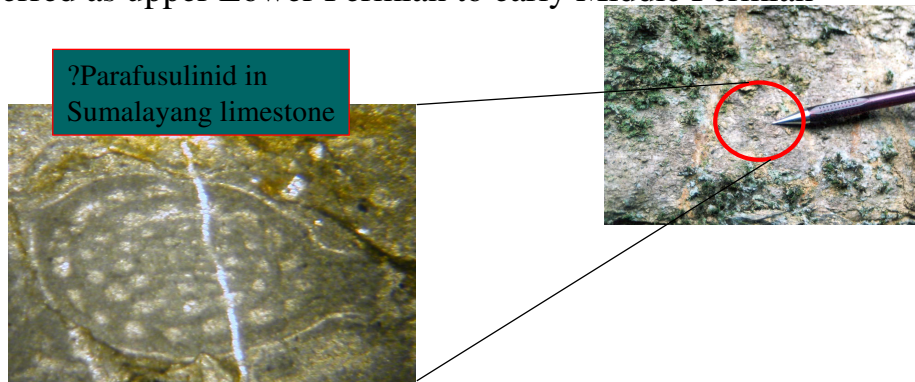
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## Age of the formations

1. The age of Dohol Formation is determined by the presence of fusulinid in the Sumalayang limestone. Suntharalingam (1991) determined the age of Dohol Formation as Early to Middle Permian. Igo *et al.*, (1979) inferred as upper Lower Permian to early Middle Permian



2. Sedili volcanic which has interfingering contact with Dohol Formation, thus was interpreted as Middle Permian in age.
3. Linggiu Formation was interpreted as a Late Permian age based on Linggiu floral assemblage (Kon'no *et al.*, 1970).

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## Age of the formations (cont)

4. Jasin volcanic is also interpreted as Permian (Cook And Suntharalingam, 1971); Late Permian to Early Triassic (Suntharalingam, 1991).
5. Pengerang volcanic is interpreted being deposited at Carboniferous-Triassic (Grubb, 1968); Early Triassic (Foo, 1983).
6. Murau Conglomerate Formation is interpreted Palaeozoic of Early Permian or older which is deposited before volcanic rocks
7. Mersing Formation is interpreted to be deposited before Murau Conglomerate Formation (Pre Early Permian). This formation served as basement rocks for all Permian Formations.
8. All of formation with Permian of age and older was intruded by Mesozoic granite and was unconformably overlain by Tebak and Panti Formations (Late Jurassic to Early Cretaceous).

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# Stratigraphic column of eastern Johor

PERIOD	EASTERN ZONE (after Foo, 1983)	GUNUNG BELUMUT AREA (after Rajah, 1986)	HULU SEDILI AREA (after Suntharalingam, 1991)	EASTERN JOHOR (This paper)
CRETACEOUS		'Tebak Formation': Massive cross-bedded sandstone with mudstone and grit	Panti Sandstone: Predominantly massive cross-bedded sandstone, minor mudstone and shale	'Tebak Formation': Pebbly sandstone, Massive cross-bedded sandstone
JURASSIC		Unconformity	Murau Conglomerates: Predominantly red polymict conglomerate interbedded with subordinate shale, sandstone and mudstone	
TRIASSIC		Tengkil Granite Lenggur Granite Belumut Granite	Jemaluang Granite Lenggur Granite Muntahak Granite	Granite intrusion
		Unconformity	Jasin volcanics: Acid pyroclastic	Unconformity
PERMIAN	Kuantan Group (Calcareous series, Pahang Volcanic Series, Arenaceous series)	DOHOL FORMATION	'Sedili Volcanic Formation': Acid to intermediate pyroclastic and lavas	Volcanics Series: acid pyroclastic and lava
		'Linggiu Formation': (i) shale, sandstone, tuff & lava (ii) sandstone, siltstone, conglomerate, shale, tuff & lava	↑? ↑?	Pengerang Volc. Jasin Volc. Sedili Volc.
		DOHOL FORMATION	Mersing group: Phyllite, slate, schist, hornfels and quartzite	Linggiu Formation ? ?
		'Dohol Formation': Shale, phyllite, slate, siltstone, sandstone, grit, metaquartzite, tuff, lava and limestone (Sumalayang Limestone Member)	↓? ↓?	DOHOL FORMATION: shale inter-bedded with siltstone, limestone
CARBONIFEROUS	SUNGAI PERLIS BED			Murau Conglomerate Formation: breccia interbedded with sandstone and mudstone
				Mersing Formation: Slate, schist, phyllite, metaquartzite
				↓? ↓?

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## Conclusions

1. A new stratigraphic chart for the Palaeozoic of east Johor is introduced in order to understand more about the basin evolution
2. The new stratigraphic chart is important for correlation with Palaeozoic rocks of the eastern belt of Peninsular Malaysia
3. Several stratigraphic denomination were revised according to the standard suggested by the Malaysian Stratigraphic Code
4. Further study is needed to established some stratigraphic units that have caused much of past uncertainties and debatable input

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## Acknowledgment

We wish to thank the Malaysian Ministry of Science, Technology and Environment for granting the IRPA 02-02-02-0012-EA186 under which the field and laboratory works were carried out. Many thanks are also due to staffs of Geology Programme UKM for their help at various stages of this research

# Thank you



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