

# **Tectonic Setting of Ophiolite Belts in Myanmar\***

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## **Abstract**

The Myanmar region is characterized by N-S trending major tectonic domains. From west to east: the Rakhine coastal strip as an ensimatic foredeep, Indo-Burman Ranges as an outer arc or fore-arc, Western Inner-Burma Tertiary Basin as an inter-arc basin, Central volcanic belt (Centre volcanic Line) as an inner magmatic-volcanic arc, Eastern Inner-Burman Tertiary Basin as back-arc basin, and Shan-Tenasserim massif as ensialic, Sino-Burman Ranges. Among these tectonic domains, ophiolitic rock associations can be classified as three belts from west to east: Western Ophiolite Belt (WOB), Central Ophiolite Belt (COB), and Eastern Ophiolite Belt (EOB). They are parallel with each other and trending nearly N-S. Among these belts, the Western Ophiolite belt (WOB) is the longest one extending from the northern part of Myanmar to the southern part of Myanmar exposing at the eastern hills of Naga, Chin, and Rakhine ranges. There are two ophiolite lines in Myanmar, namely Naga Hill Line and Mandalay Line. The Naga Hill Line is coincided to the Western Ophiolite Belt in this paper and the Mandalay Line is the combination of Central Ophiolite Belt and Eastern Ophiolite Belt. The southern continuation of the Mandalay Line is uncertain due to lack of information, and those two belts are geographically distinct and herein treated separately.

## **Selected References**

Acharyya, S.K., K.K. Ray, and S. Sengupta, 1990, Tectonics of Ophiolite Belt from Naga Hills and Andaman Islands, India, *in* K. Naha, S.K. Ghosh, and D. Mukhopadhyay (eds.), *Structure and Tectonics, The Indian Scene: National Academy of Science India (Earth and Planetary Science)*, v. 99. p. 187–199.

Chhibber, H.L., 1934, *The Mineral Resources of Burma*, MacMillan, New York, 320 pp.

Crook, K.A.W., and E.A. Felton, 1975, Tasman Geosyncline Greenstones and Ophiolites: *Journal of the Geological Society of Australia*, v. 22, p. 117-131.

Curry, J.R., D.G. Moore, L.A. Lawver, F.J. Emmel, R.W. Raitt, M. Henry, and R. Kieckhefer, 1978, Tectonics of Andaman Sea and Burma, *in* J.S. Watkins, L. Montadert, and P. Dickerson (eds.), Geological and Geophysical Investigations of continental Margins: American Association of Petroleum Geologists Memoirs, v. 29, p. 189-198.

Sengupta, S., K.K. Ray, S.K. Acharyya, and J.B. de Smeth, 1990, Nature of Ophiolite Occurrence along Eastern Margin of Indian Plate and Their Tectonic Significance: *Geology*, v. 18, p. 439-442.

**The Second AAPG / EAGE / MGS Conference**

**Tectonic Setting of Ophiolite Belts  
in Myanmar**

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**Myanmar**

**20<sup>th</sup> , November, 2015**

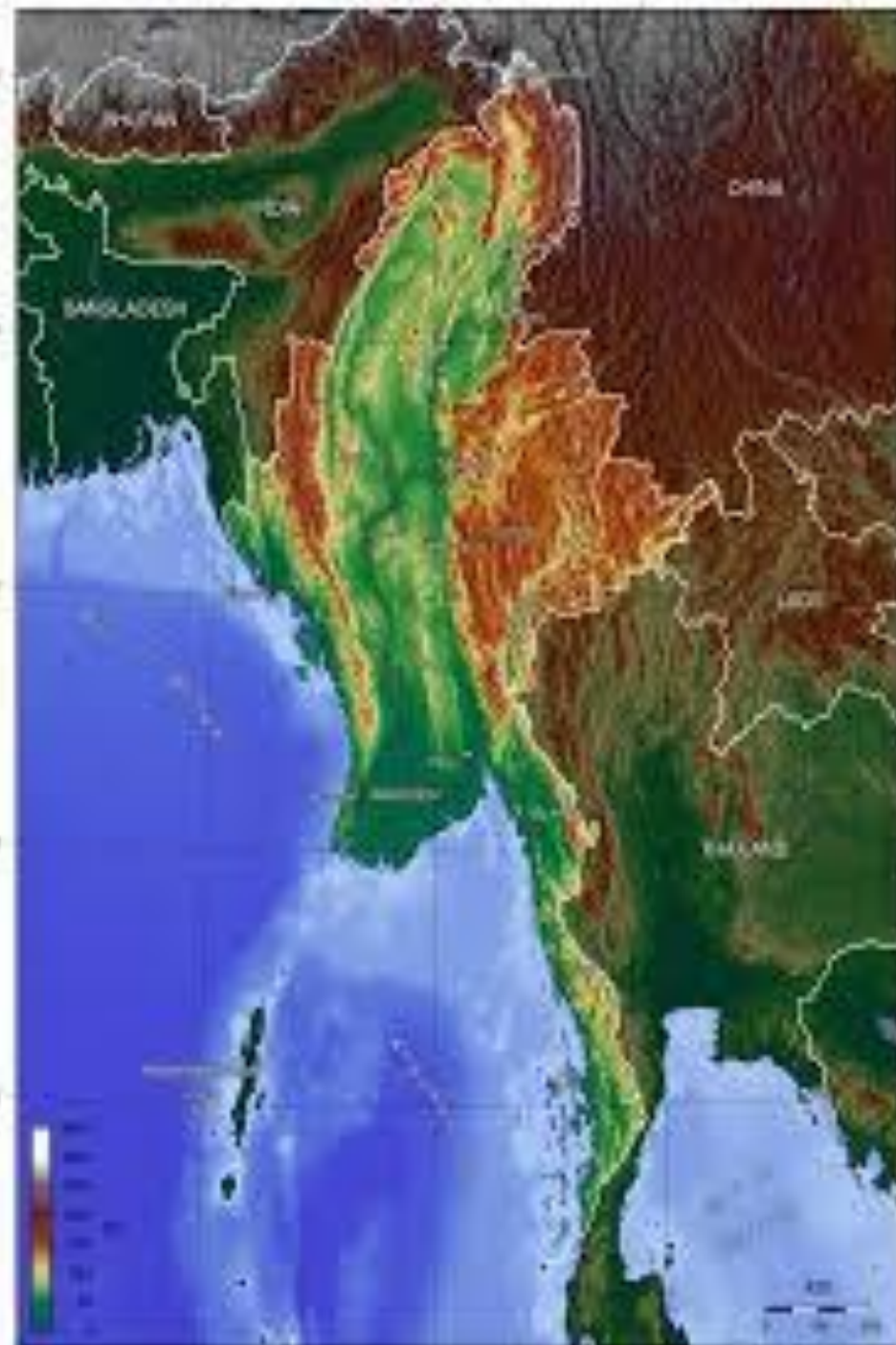
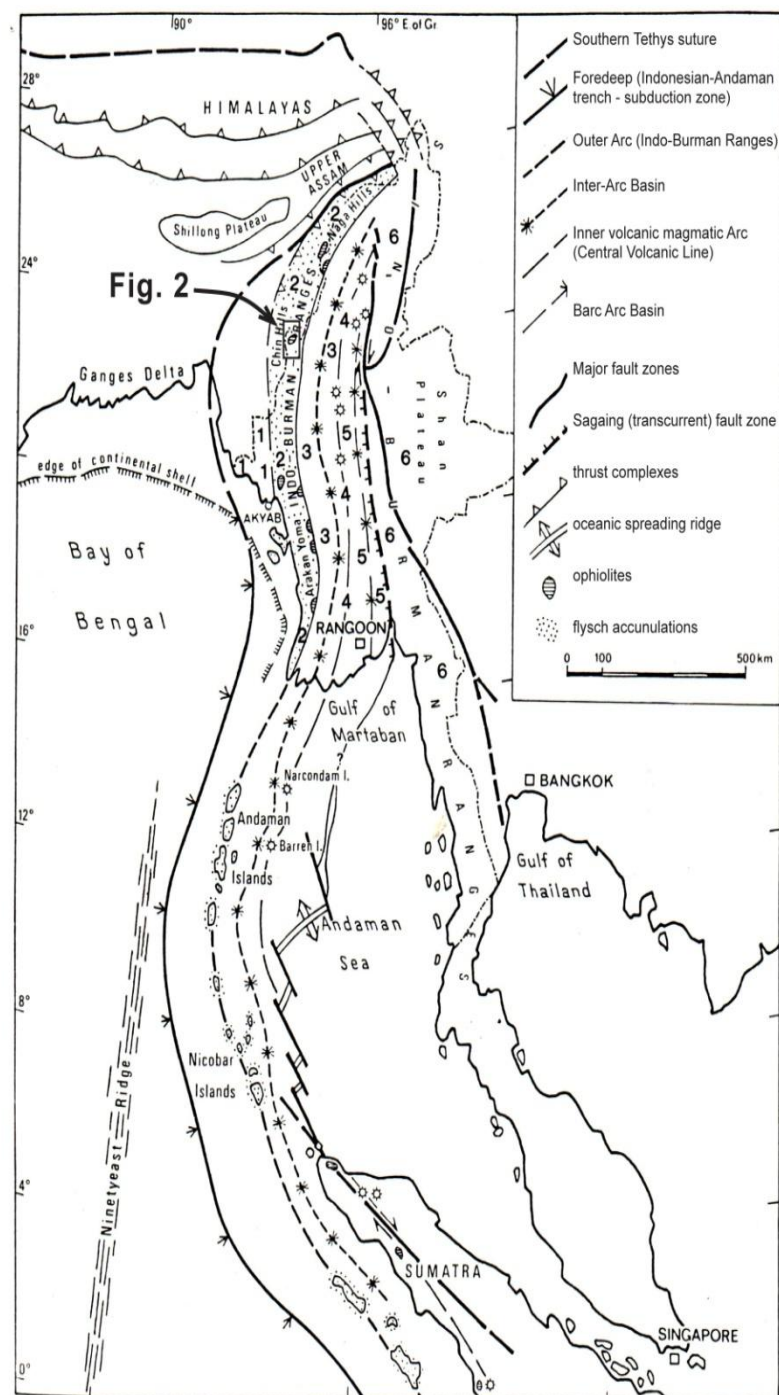
**Yangon , Myanmar**

# Discussion Topics

1. Tectonic Domains of Myanmar.
2. Ophiolite Belts of Myanmar.
3. WOB belt and its mineralization.
4. COB belt and its mineralization.
5. EOB belt and its mineralization.
6. Comparison of three Ophiolite belts.
7. Tectonic Setting of Ophiolite belts.
8. Conclusions

# Tectonic Domains of Myanmar

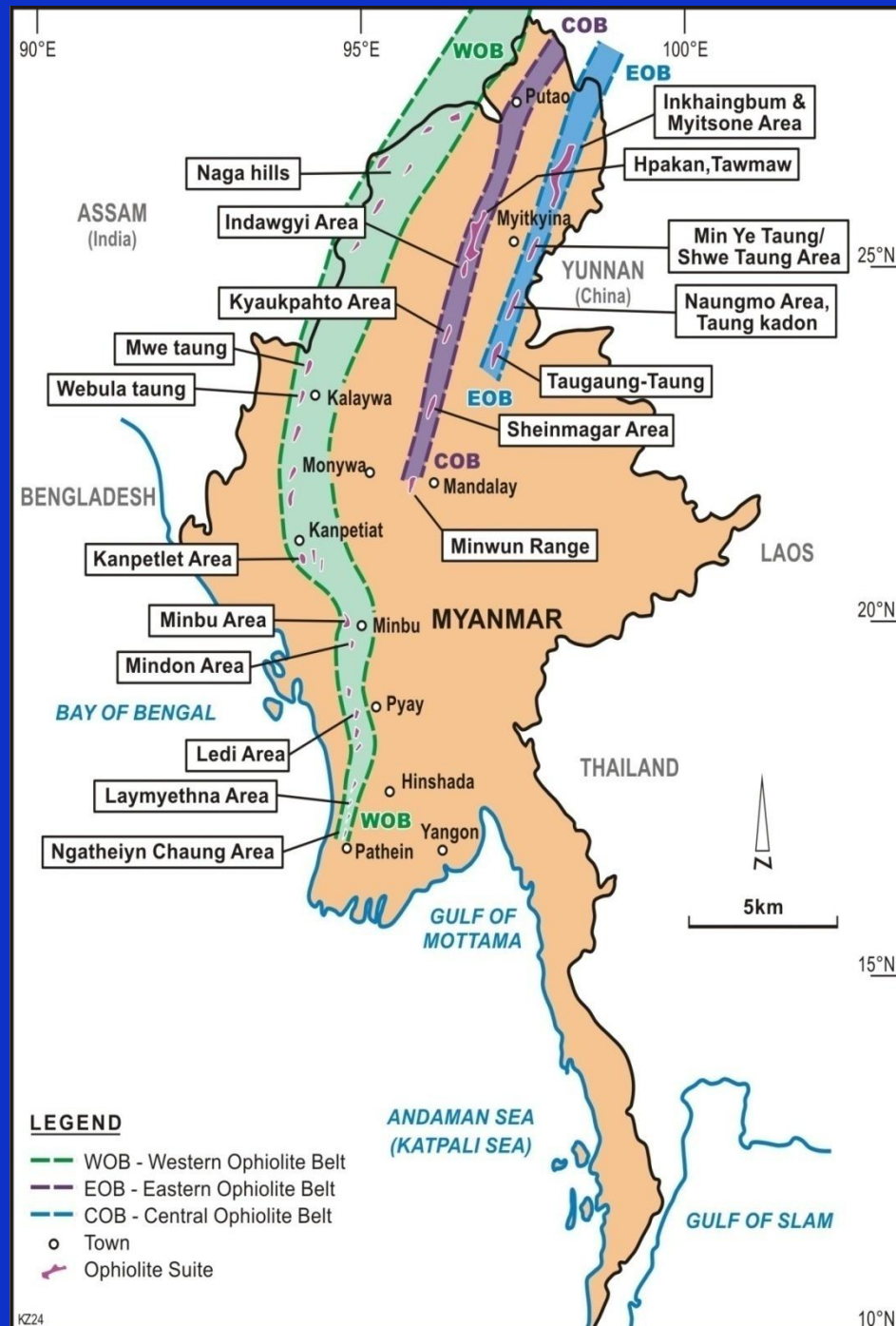
- Myanmar can be subdivided into (6) tectonic domains .
  - (1) Rakhine Coastal Strip.
  - (2) Indo-Burman Ranges.
  - (3) Western Inner-Burma Tertiary Basin.
  - (4) Central Volcanic belt
  - (5) Eastern Inner- Burma Tertiary Basin.
  - (6) Shan-Tenasserim massif



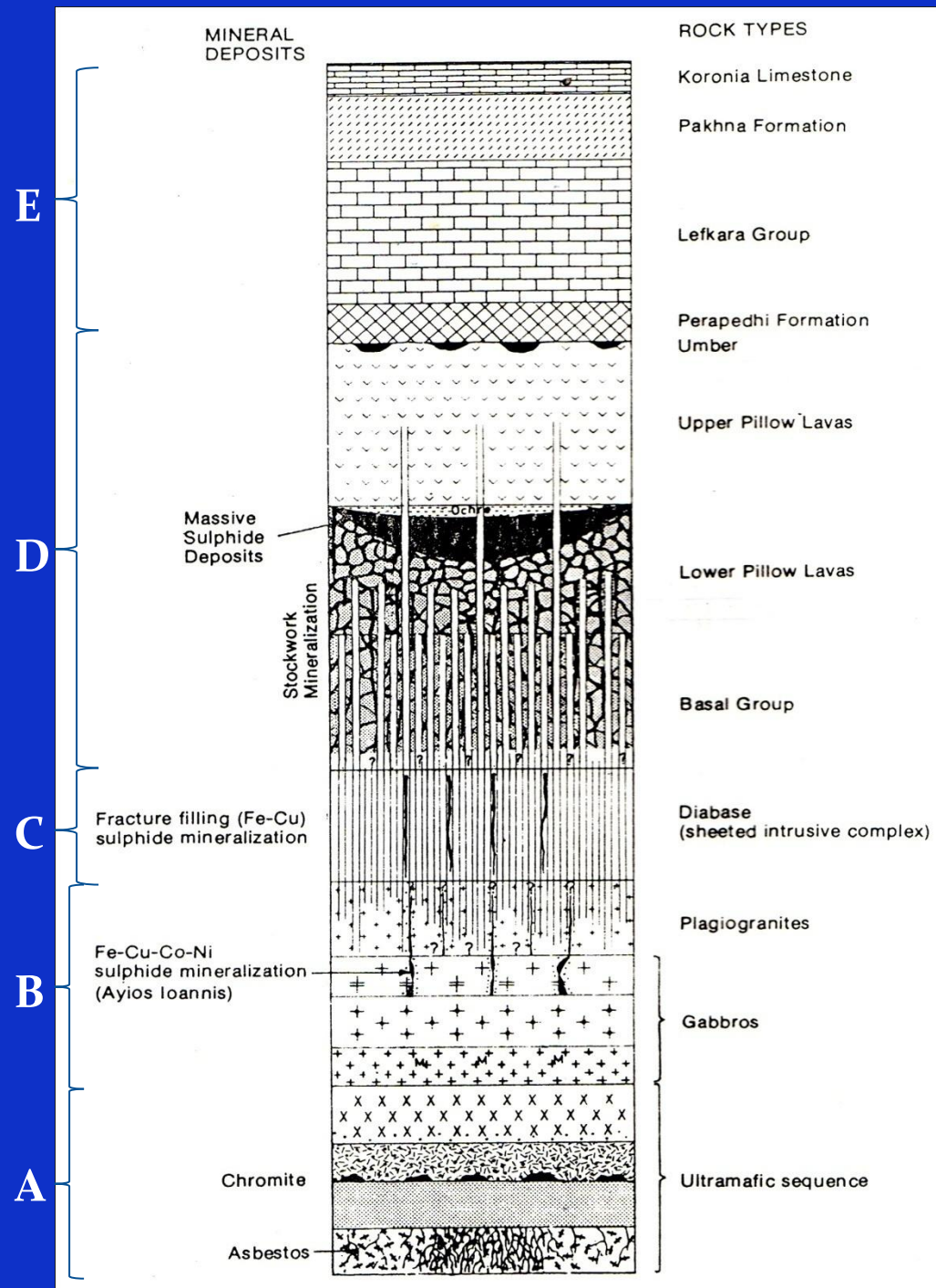
# Ophiolite belts in Myanmar

- Among these domains, Ophiolitic rock association can be classified as three belts.
- Western Ophiolite belt (WOB)  
Central Ophiolite belt (COB)  
Eastern Ophiolite belt (EOB)
- They are parallel with each other and trending nearly N-S.

Fig. Location map of Ophiolite Belts in Myanmar



- According to Penrose Conference (1972), there are four associated members in a typical ophiolite profile from A to D.
- D - Mafic volcanic complex.
- C - Mafic sheet dyke complex
- B - Gabbroic Complex.
- A - Ultramafic Complex.
- Due to the Strong and intense deformation affect, the complete rock sequence of Ophiolite cannot be established.
- Crook & Felton (1975) can be applied for the classification of Ophiolite in Myanmar.



Co-stratigraphy of Troodos Igneous Complex

Table 1. Classification diagram for the ophiolitic sequences in Myanmar  
(Modified from Crook & Felton 1975).

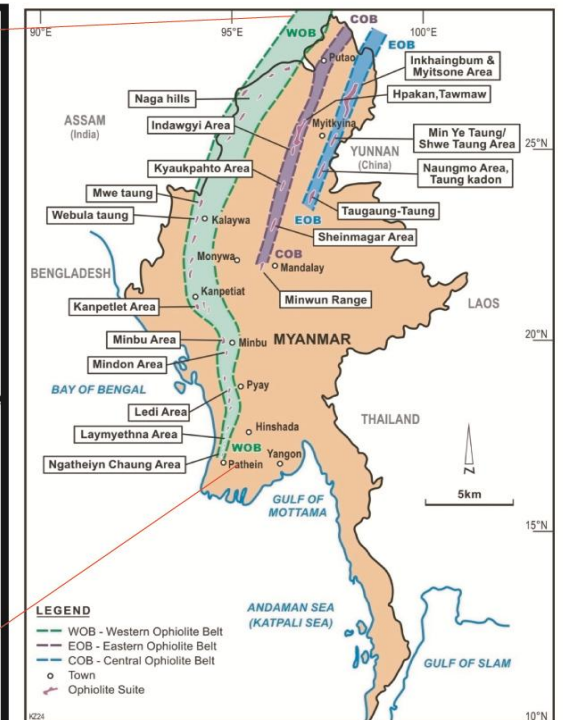
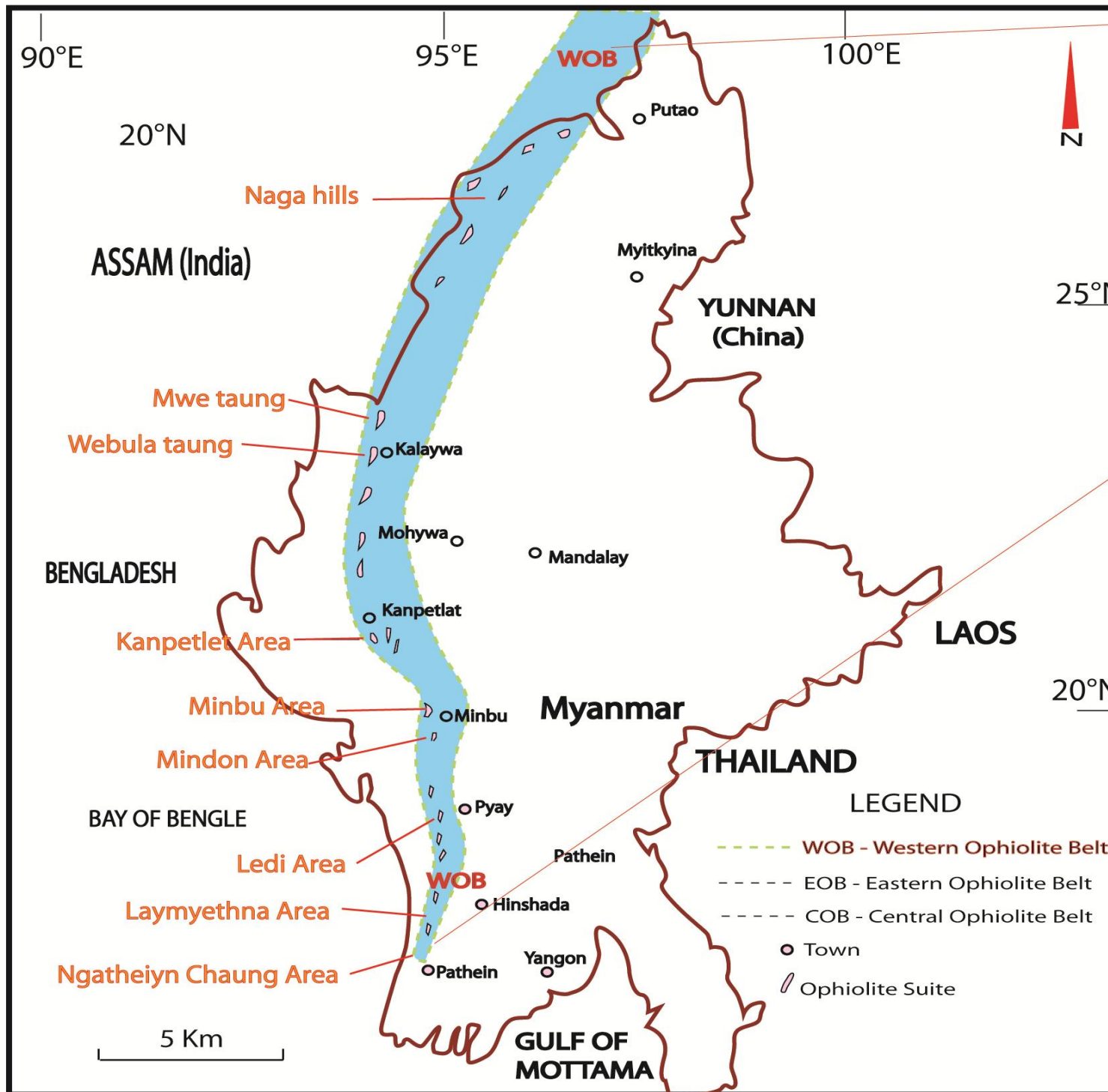
Sr. No.	Field Criteria	Present Members	Interpretation	Grade of data
1	All members are found in area, but, not sequential order and they are faulted and sheared.	A, B, C, D	Dismembered Ophiolite	I grade data
2	One unit of associated rock type is missing, but, sequential order can be observed.	(A, B, C) (B, C, D) (A, C, D)	Incomplete Ophiolite	I grade data
3	One unit of associated rock type is missing and they are not in sequential order.	(A, B, D) (A, C, D) (C, B, D)	Dismembered incomplete Ophiolite	II grade data
4	Two units of associated rock types are missing and they are not in sequential order.	usually (A, D)	Possible Ophiolite (incomplete)	III grade data

**Explanation:**

- A - It represents the lower most portion of the Ophiolite comprising ultramafic complex, metamorphic fabric and podiform chromite.
- B - It represents the gabbroic complex. Commonly cumulus peridotite pyroxenite.
- C - It represents the mafic sheet dyke complex comprising diabase dykes and gabbroic dykes.
- D - It represents mafic volcanic complex (felsic intrusive and extrusive).

# WOB belt and its mineralization

- Situated between Indo-Burman Ranges and western part of Central Tertiary Basin.
- Discontinuous linear patches from Naga hill, Chin hill and Rakhine ranges.
- Dismembered, incomplete Ophiolite belt.
- Nickel and Chromite mineralization in the north and Sulphide mineralization abundant in the South.

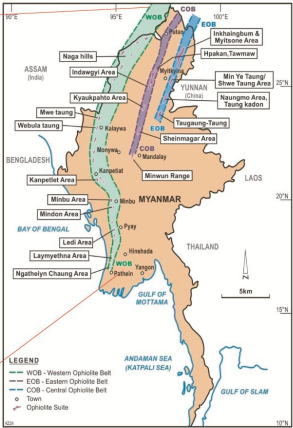
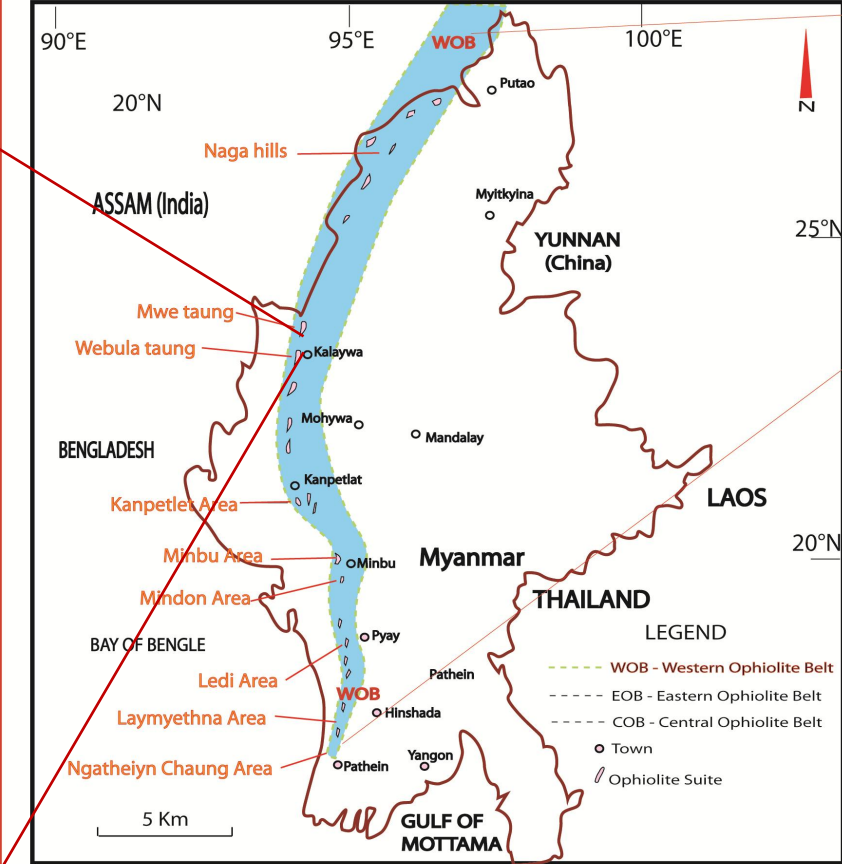
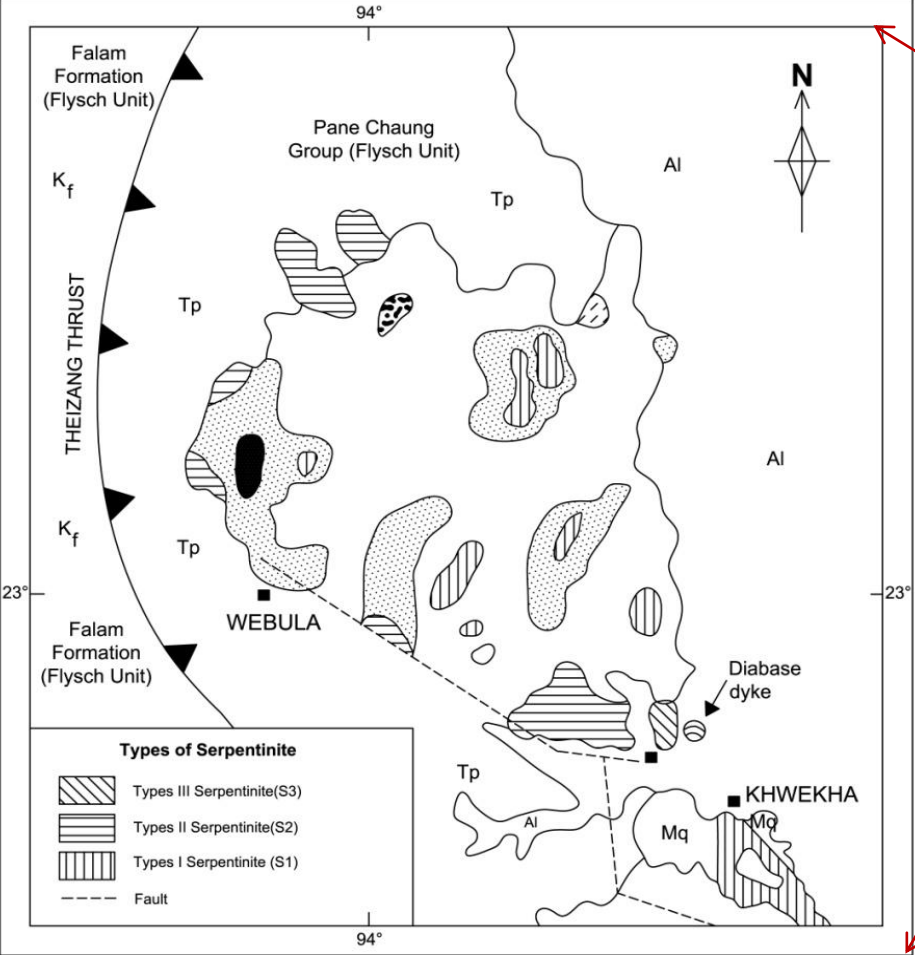


## Western Ophiolite Belt of Myanmar

Table 2. Ophiolitic rock suites in Western Ophiolite Belt (WOB) of Myanmar.

Characteristics of ophiolitic sequence		Laymyethna area	Ledi Area, Padaung Township	N-W of Mindon area	Mindon area	Minbu area	Kanpetlett area	Webula area	Mwe taung area
Member	Rock Types	Chhibber (1926), Large (1986), Hla Htay (1995)	Hla Htay (2000)	Mg Mg Gyi(1983)	Myint Aung (1982)	Khin Mg Wai (1985)	Ohn Thwin (1993)	Hla Htay (1985)	Ngaw Cin Paw (1969), Thida Win (2014)
E	Sedimentary Section: Ribbon chert, thin shales & minor limestone	Chert, shale, bioclastic limestone, micritic limestone, volcanic lithic arenite & Eocene Flysch	Undifferentiated flysch (Cretaceous)	Kabaw Fm. Shale & sandstone (Cretaceous)	Thanbaya Fm. (Triassic)	Thanbaya Fm. (Triassic)	Thanbaya Fm. (Triassic) Unnamed flysch (Cretaceous)	Chin Flysch, Falam Mudstone, Micritic Fm. (Cretaceous) Pane Chaung Group (Triassic)	Chin Flysch (Cretaceous) Greywacke with radiolarian chert
D	Mafic volcanic complex (felsic intrusive & extrusive)	Pillow lava, tuff	Spilitic basalt		Pillow lava	Pillow lava (?)	Greenstone (schist, slate)		Basalt & amygdaloidal basalt
C	Mafic sheet dyke complex	Diabase dyke	Diabase dyke		Diabase dyke, gabbroic dyke		Diabase dyke, gabbroic dyke	Diabase dyke	Diabase dyke?
B	Gabbro Complex commonly cumulus peridotite, pyroxenite					Cumulus Peridotite			Noritic gabbro & Plagiogranite
A	Ultramafic Complex	Harzburgite, dunite, serpentinite	Harzburgite, serpentinite	Lherzolite, Dunite, Serpentinite	Serpentinite	Harzburgite, Lherzolite, Dunite, serpentinite	Harzburgite, Lherzolite, wehrlite, Peridotite, Peridotite, olivine-websterite serpentinite	Harzburgite, Lherzolite, wehrlite, dunite, serpentinite	Peridotite, dunite, harzburgite, serpentinite
	Metamorphic Fabric	Talc chlorite Schist	Talc chlorite schist		Kanpetlet Schist (Green schist)	Kanpetlet Schist Amphibolite	Kanpetlet Schist (Green Schist)	Khwe Kha Metamorphic: hornblende-Schist, amphibolite	Yazagyo Metamorphics: Talc chlorite schist, marble, quartzite
	Podiform Chromite	Present	Present	Present	Present in Microscopic	Present	Present	Present	Present

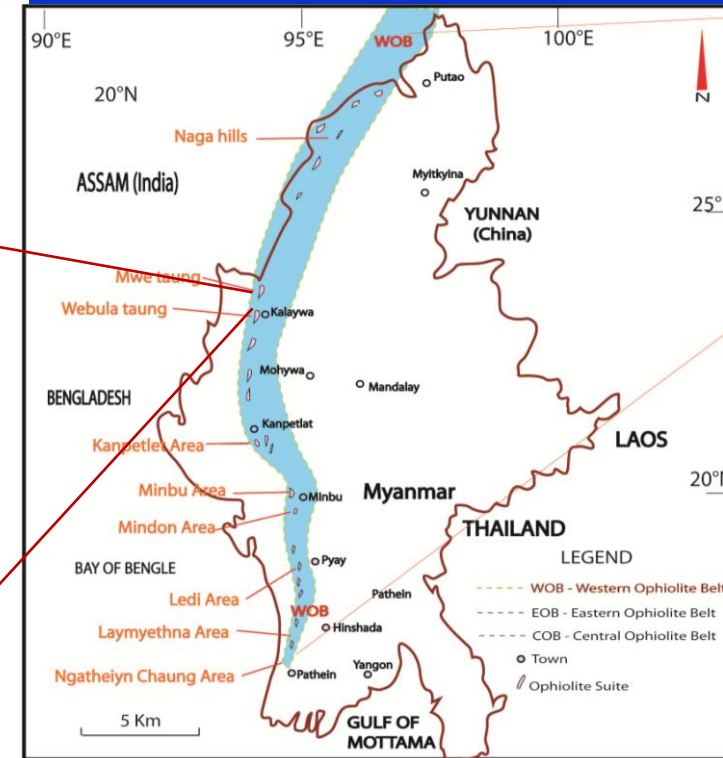
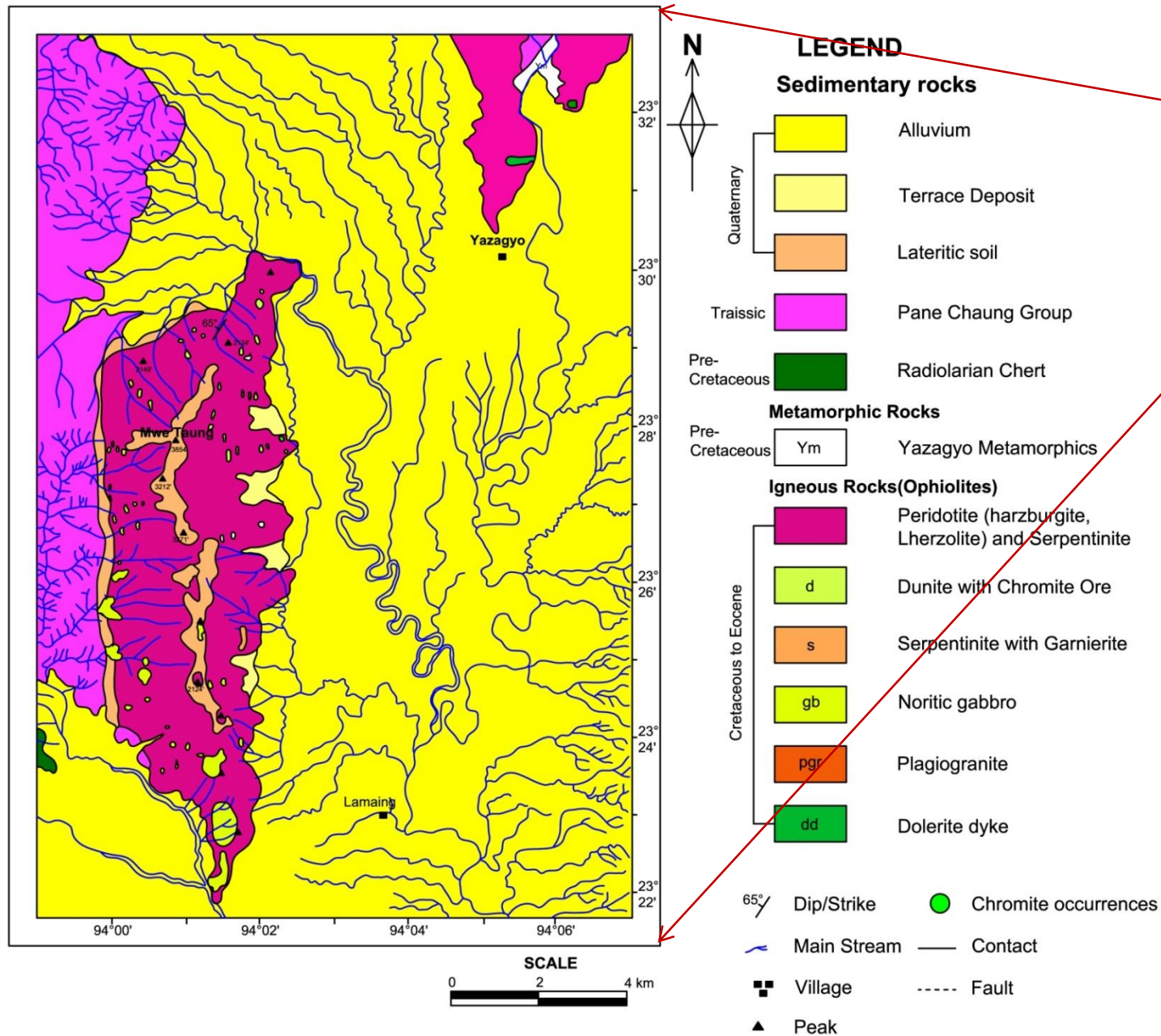
Fig. (2) Geological Map of the Webula and Khwekha area (After Hla Htay, 1985)



Legend

- |                |   |                           |
|----------------|---|---------------------------|
| Al             | Alluvium - Quaternary                     | Serpentinized Lherzolite  |
| K <sub>f</sub> | Falam Formation - Upper Cretaceous        | Serpentinized Harzburgite |
| Tp             | Panchaung Group - Middle to Upper Trassic | Serpentinized Dunite      |
| Mq             | Metamorphic rocks - Triassic or older     | Lherzolite                |
|                |   | Harzburgite               |
|                |   | Dunite                    |
|                |   | Diabase Dyke              |

Fig. (6) Geological Map of Mwe Taung Area(After Thida Win, 2014)



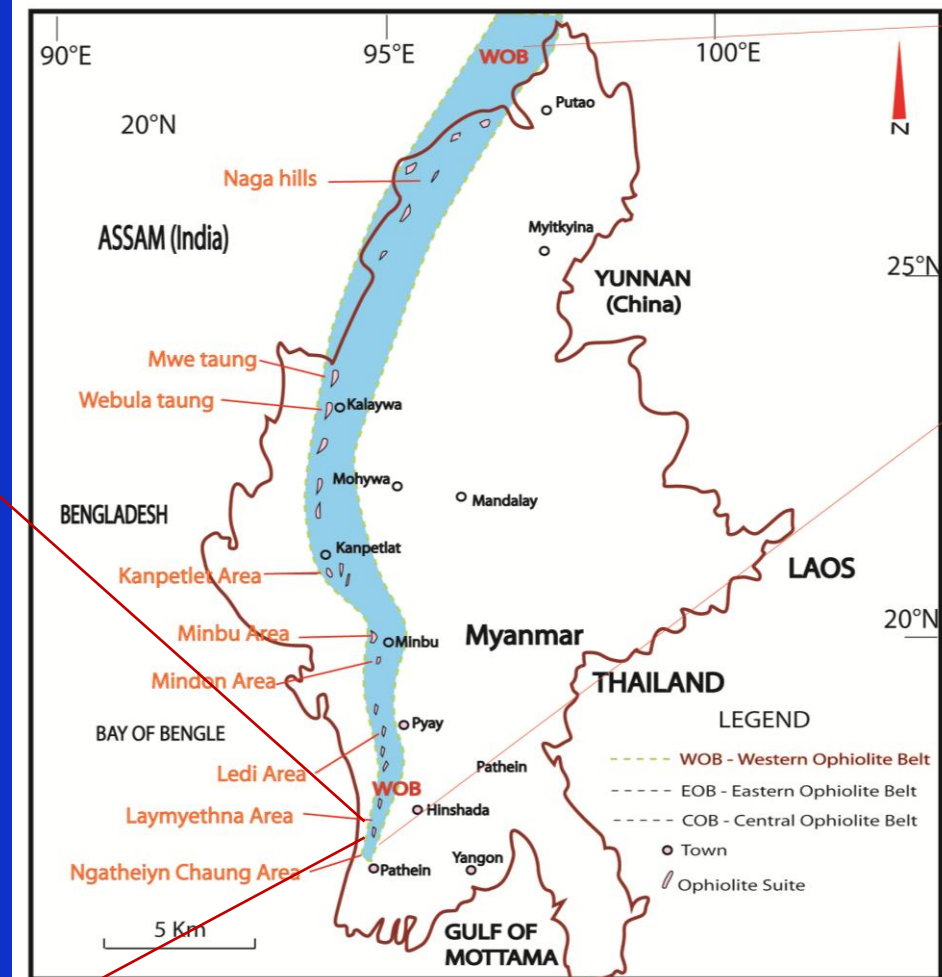
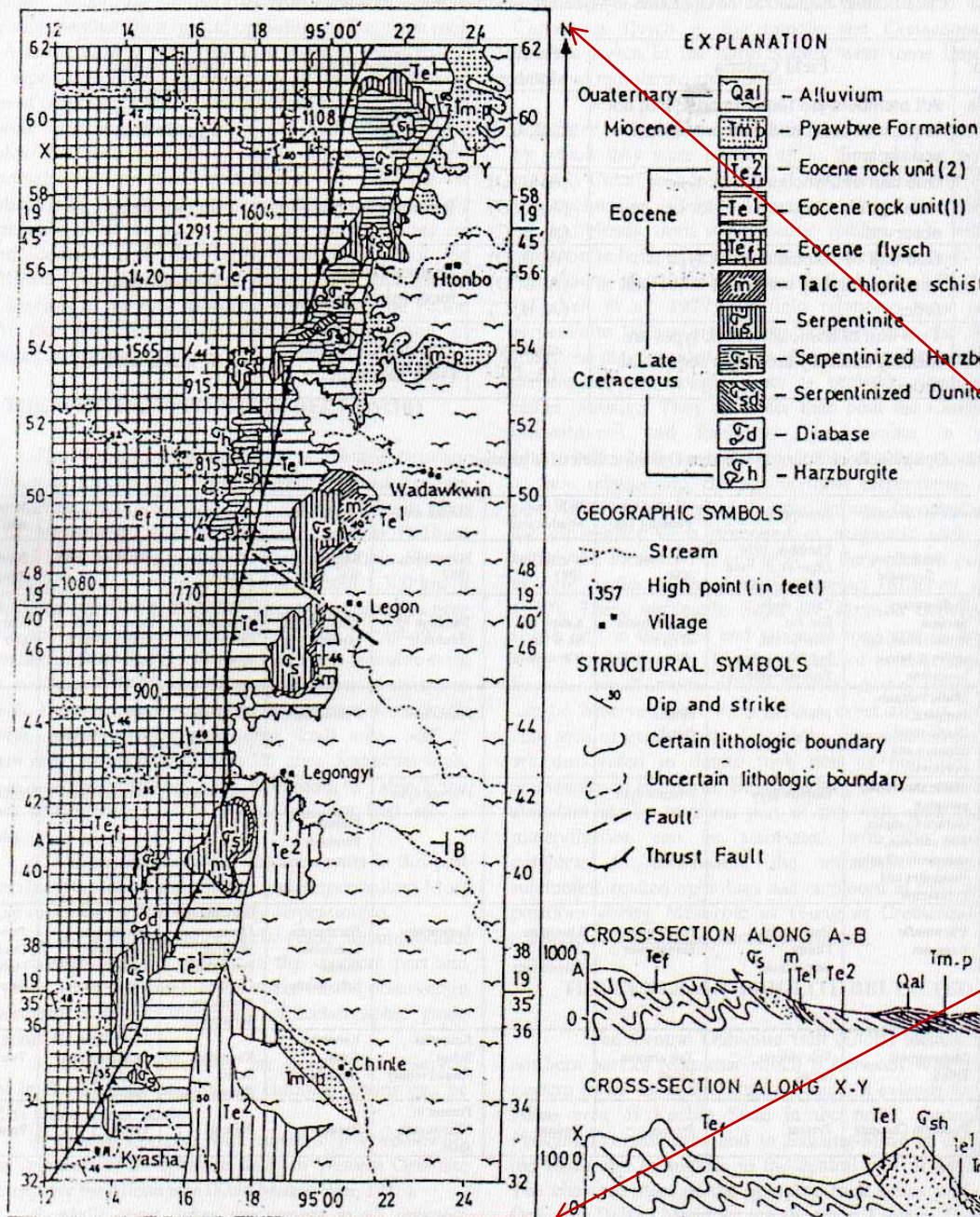


Table 5. Chromite occurrences and their potential in WOB, Myanmar.

No.	Locality	Map Index	Associated Rocks	Cr <sub>2</sub> O <sub>3</sub> %	Tonage	Level of Ore grade	Reference
1	Laymyethna area	85 k/ 14	Podiform type with dunite & serpentinite	49.21%	32.8	P – 2	Kyaw Lwin (1983)
2	Ledi area, Padaung Township	285 J/ 13	Chromite floats can be observed	-	-	-	Hla Htay (1997)
3	N. W of Mindon	285 J/ 14	Chromite floats can be observed	-	-	-	Myint Aung (1982)
4	Mindon Area	85 I/ 11 T 780568	Podiform with dunite & serpentinite	35.69%	79.5	P – 2	Aung San (1980), Kyaw Lwin (1983)
5	Minbu Area	85 I/ 5 and 84 L/ 8	Podiform with dunite and serpentinite	-	-	-	Khin Maung Wai (1985)
6	Kanpetlett Area	84 k/ 4	Podiform with dunite & serpentinite	39.89%	30*30*10 Cm	-	Ohn Thwin (1993), Aye Maung (1980)
7	Webula &Falam Area	84 E RU 3845	Podiform type with dunite	30.68%	50	P – 4	Hla Htay (1973, 1985)
8	Bumpivum Kalay Area	84 E RU 3884	Podiform type with dunite	-	60	P – 4	Hla Htay (1973)
9	Mwetaung, Kalay Area	94 E/ 16 430780	Podiform type with dunite	28.95%	3819.65	P – 2	Hla Htay (1973)
10	Mwetaung, Kalay Area	89 I/ 3 483999	Podiform type with dunite	49.42%	4643.77	P – 2	Ngaw Cin Paw (1969), Hla Htay (1973)
11	Maw Wai Lut& Thu Zan Area	84 I 2 RP 515276	Podiform type with dunite		3526	P – 4	Myint Swe (1974)

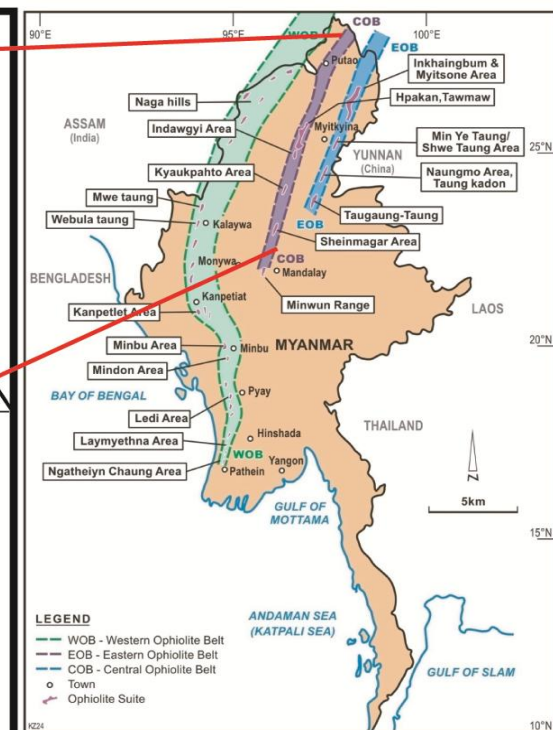
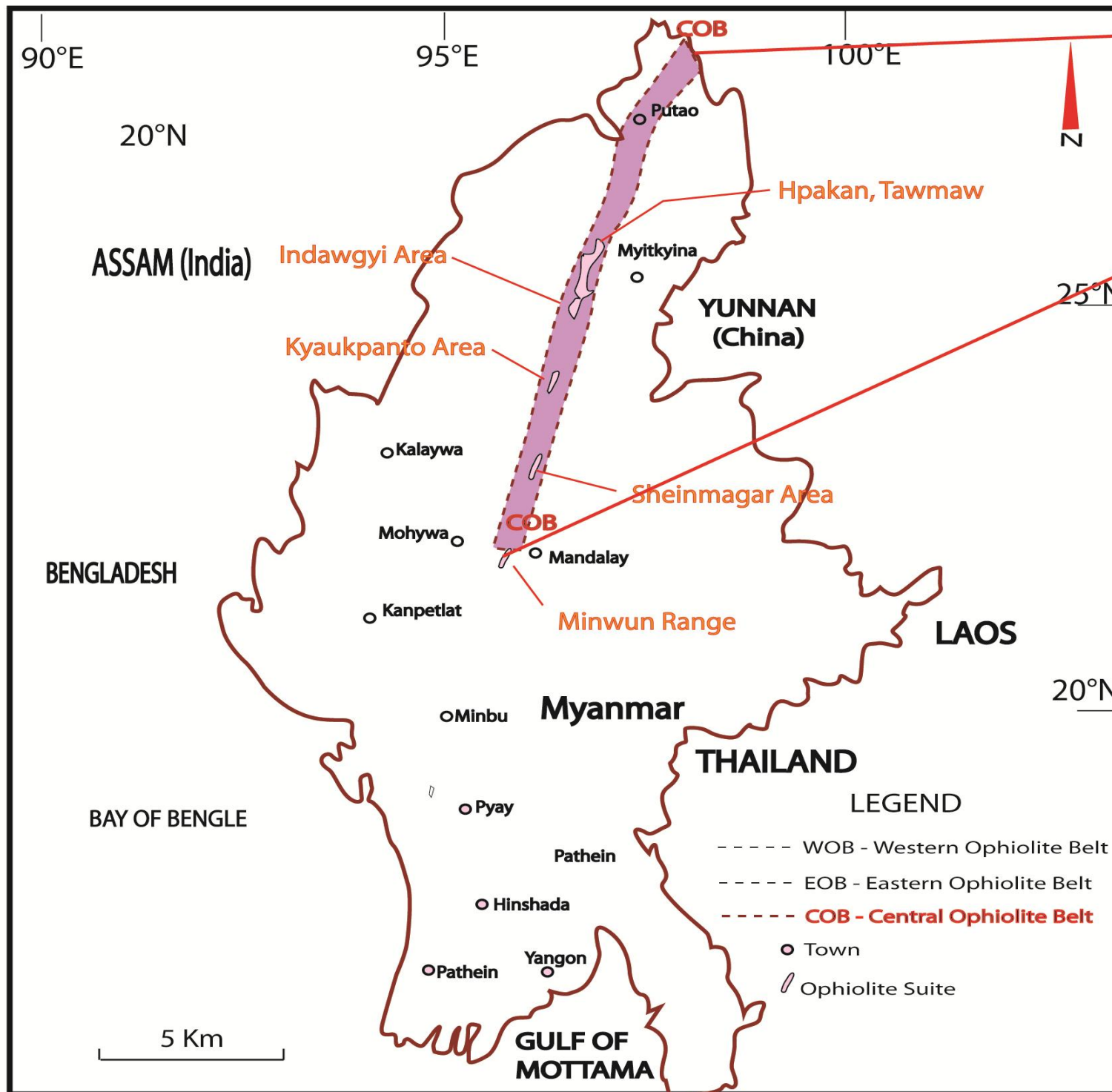
Remarks - P-1= Positive Ore Reserve, P-2 = Probable Ore Reserve, P-3 = Possible Ore Reserve, P-4 = Potential Ore Reserve.

Table 6. Type of sulphide mineralization in Laymyethna area (Modified from Large 1986).

No.	Type of host rocks	Geometry & texture	Ore mineral	Cu content	Localities	Remarks
1	Mineralized volcanic Dyke Complex	Mm to cm wide sulphide-quartz veinlets which follow the dyke contact	Pyrite Chalcopyrite Sphalerite Pyrrhotite	1000 ppm	Hpetsalet Chaung, PangonChaung, Kunnangyi- Kunnannalay Chaung	Only Potential
2	Stock work mineralization in brecciated lava flows and pillow lavas	- Irregular features-cm wide to several dm wide in breccia zone - Multiple fracturing and subsequent cementing with quartz	Chalcopyrite,pyrite,bonite,sphalerite	1000 ppm to a few %	Thida hill, Chin Chaung Chanpyo Chaung Nayaung Chaung	Promising
3	Massive sulfide lenses between pillow lava units	- Lense-shaped to rod-shaped sulfide bodies of several cm to several dm across	Chalcopyrite,pyrite,sphalerite,pyrrhotite	20%	Thida Chaung, Kyauk Kyi Chaung, Kunsan Chaung, Nyaung Chaung	Probably target area of 1-10 million tons
4	Sedimentary-exhalative massive sulfide lenses at the volcanic-sea water interface	- Sulphide lenses are several meter long, up to about 10m and a few m thick	Pyrite, chalcopyrite,marcasite,sphalerite	- a few % of Cu - gold< 1 ppm	Doghta Chaung	Most Promising
5	Sediment-hosted stratabound sulphide mineralization in sediments (shale and mudstone)	- The Sulfides occur as laminae or in discontinuous layers in scattered occurrences	Pyrite,chalcopyrite,sphalerite,galena,marcasite	- a few of Cu	Dokhta Chaung, Kyaukkyi Chaung	Only Potential

# COB belt and its mineralization

- Located in the northern part of Myanmar to the central part of Myanmar.
- Between W and E part of Inner Myanmar Tertiary basins.
- Putao-Phakant- Tawmaw- Sagaing ranges.
- They are dismembered incomplete Ophiolites.
- Jade mines are present in the N of this belt particularly Phakant-Tawmaw area.
- Small amount of Chromite, Magnetite, Gold and Platinum group minerals are found in the S part of this belt.

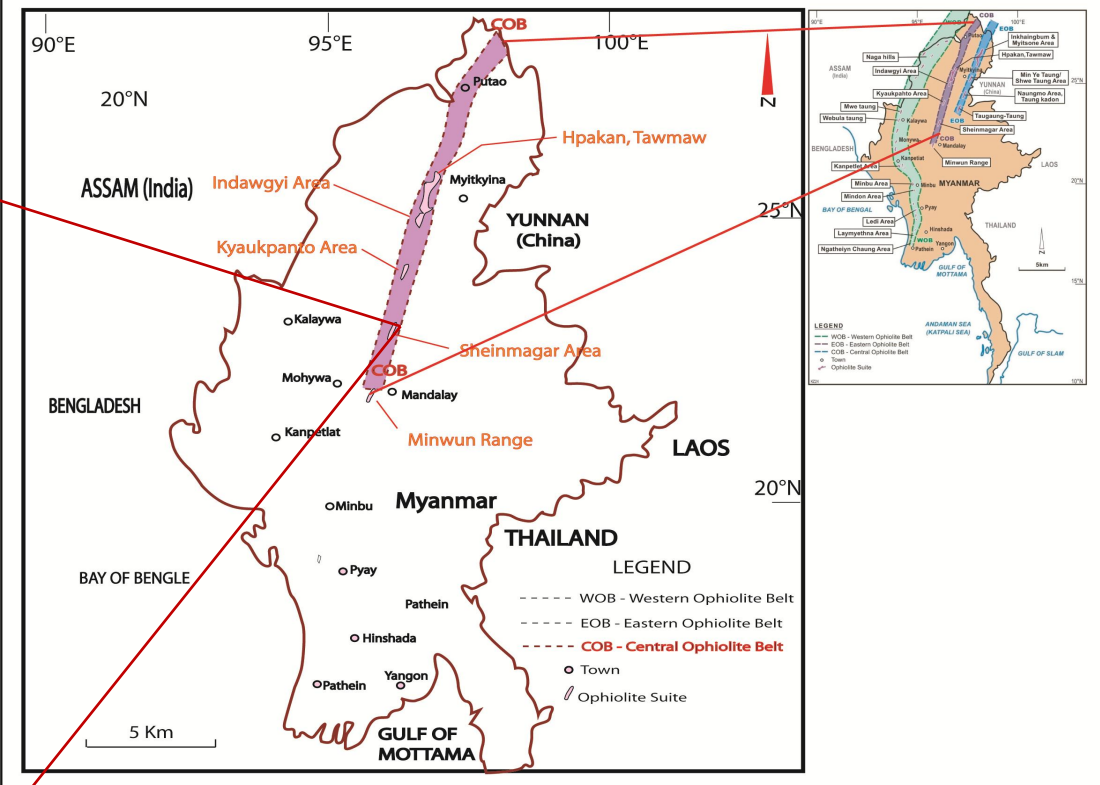
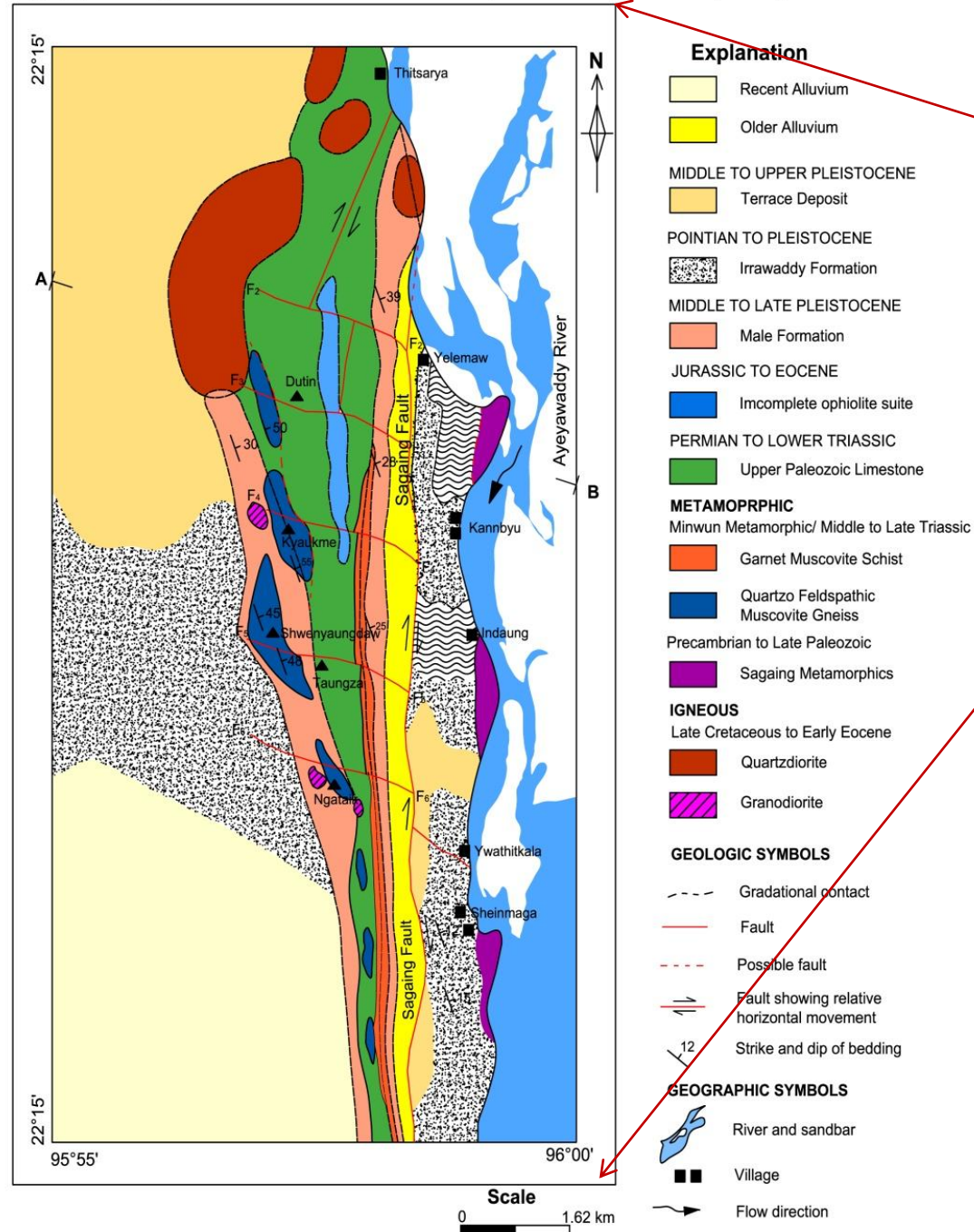


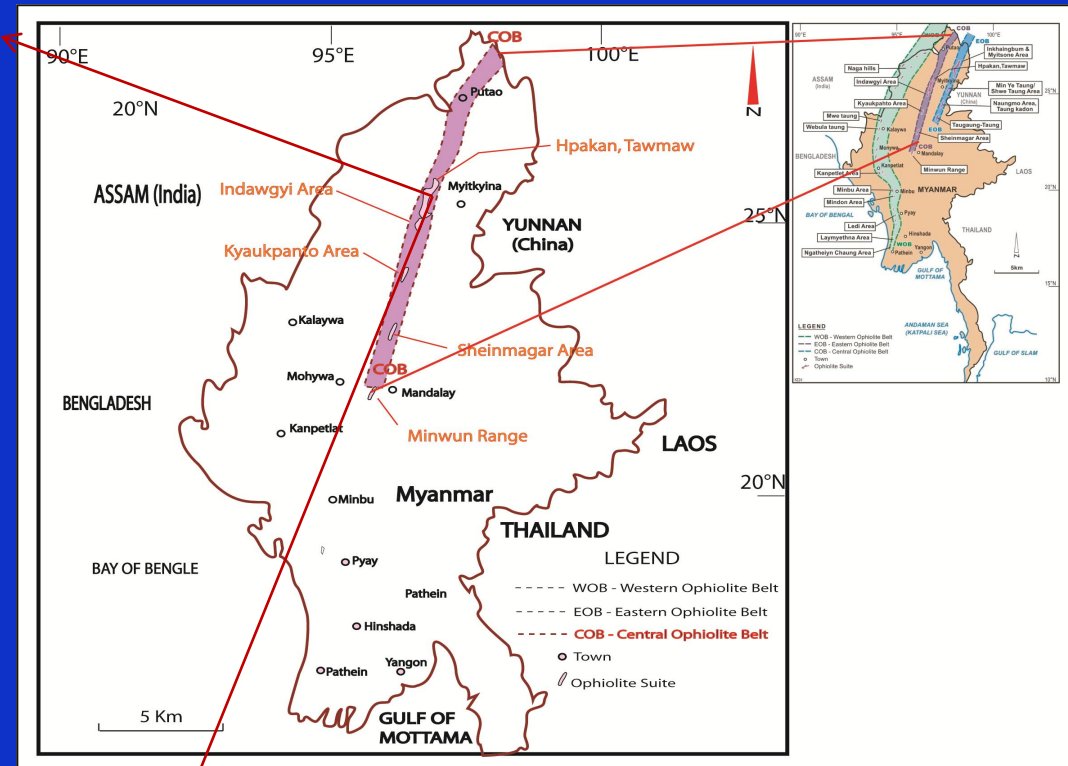
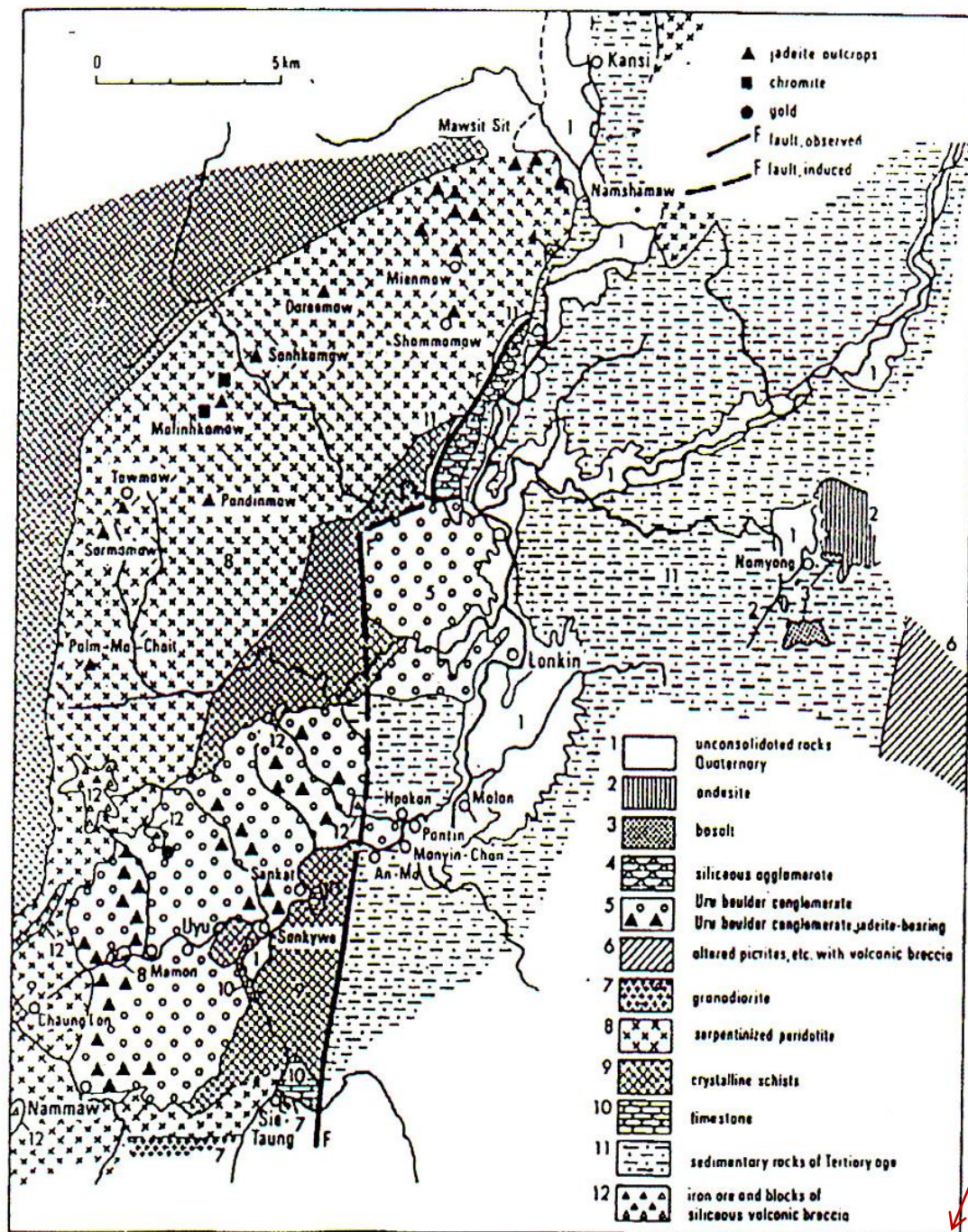
## Central Ophiolite Belt of Myanmar

Table 7. Ophioliticrock suites in Central Ophiolite Belt (COB) of Myanmar.

Characteristics of Ophiloite Sequence		Minwun Range	Shein Makar area	Kyaukpahto Area	Indawgyi Area	Hpakan, Tawmaw Area
Me m ber	Rock Type Sequence	Myint Thein et al. (1982)	Than Htut Lwin (2008)	Ye Myint Swe (1990)	Soe Thura Htun (1998)	Chhibber (1934b), Soe Win (1968), Nyan Thin (1991)
E	Sedimentary Section Robbion chert, thin shale & Minor Limestone	Ngapyawdaw Chaung Fm.	Limestone,red chert, greywacke	Greywacke, argillite chert (Ngapyawdaw Chaung Fm.) (Middle To Upper Trassic?)	Kyaukphyer Sandstone (Miocene-Pliocene)	Namting Series (Mio-Pliocene) Hkuma Series (Oligo-Miocene)
D	Mafic Valcanic Complex (Sodic felsic intrusive and entrusive)	Pillow basalt associated with radiolaria-bearing bedded chert	Pillow basalt	Basalt	Quartz diorite, foliated granodiorite	
C	Mafic sheet dyke complex		Dolerite dykes			
B	Gabbro Complex, with cumulus, commonly cumulus eridotites and pyroxenites				1. Orthopyroxene gabbro 2. Hornblende gabbro 3. Plagioclase- dillage Cumulate 4. Olivine Gabbro 5. Layered gabbroic complex	Gabbro
A	Ultramafic Complex	Serpentinized Peridotite Serpentinite (Sheared) (Triassic?)	Serpentinized Peridotite	Sepentinite Peridotite Triassic(?)	Serpentinite	Peridotite Dunite-peridotite Hb-peridotite Dillege-peridotite Serpentinite
	Metamorphic Fabric	Minwun Metamorphics:(Triassic)	Katha Metamorphics: (Triassic)		Amphibolite, schist	Glaucophene schist
	Podiform Chromite	Present?	Present	Present	Present	Present

Fig. (7) Geological Map of Sheinmakar area. (After Than Htut Lwin, 2008)





Geological sketch map of Jade Mines (modified after Chhibber, 1934)

Table 8. Some important Jade Mines occurrence in COB (Modified from Chhibber 1934b).

No.	Area	Local Mine Name	Mode of occurrence	Important geological features
1	Tawmaw	1. Khaisumaw 2. Konthemaw 3. Kadondwin	Albite-Jadeite dyke trending NE	The country rock is serpentinites and the jadeite occurs in the albite-jadeite dykes. Jade occurs as lenses with amphibolites and albitite intervening areas.
2	Mienmaw	1. Shammonmaw 2. Mienmaw 3. Sharoinawngmaw	Albite-Jadeite dyke trending WNW-ESE	chrome-epidote, the indicator of green jadeite, was found in Mienmaw area.
3	Pangmaw	1. Pangmaw 2. Wikhomaw 3. Kyobatmaw	Albite-Jadeite dyke trending NW-SE	Jadeite and abitite are both found as inclusions in amphibolite. The serpentine is fibrous near the contact.
4	Namshammaw	1. Namshammaw 2. Mawsitsit 3. Wayntmaw Shommomaw	Albite-Jadeite dyke trending NE dipping 45° to 90°	Jadeite of irregular shapes occurs in serpentinite. Mawsitsit (chrome-Jadeite) is valuable.
5	Tawmaw	1. Pan Dinmaw 2. Paim-ma-chait	Detrital boulders of jades	The jadeites found as partially won boulders with serpentinites are embedded in red earth
6	Kansi	1. Pangmawmaw 2. Mutanmaw 3. Samhtanmaw 4. Sanimaw 5. Shilamaw 6. Aunghilemaw	Secondary deposits in Tertiary rocks	Jadeite boulders ae found in the Tertiary rocks of sandstone, shale, grits and conglomerates

Table 8. Some important Jade Mines occurrence in COB (Modified from Chhibber 1934b).

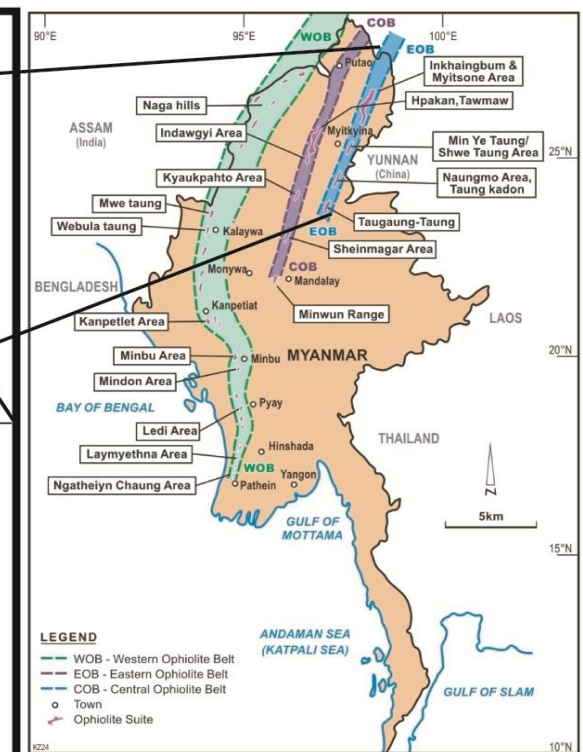
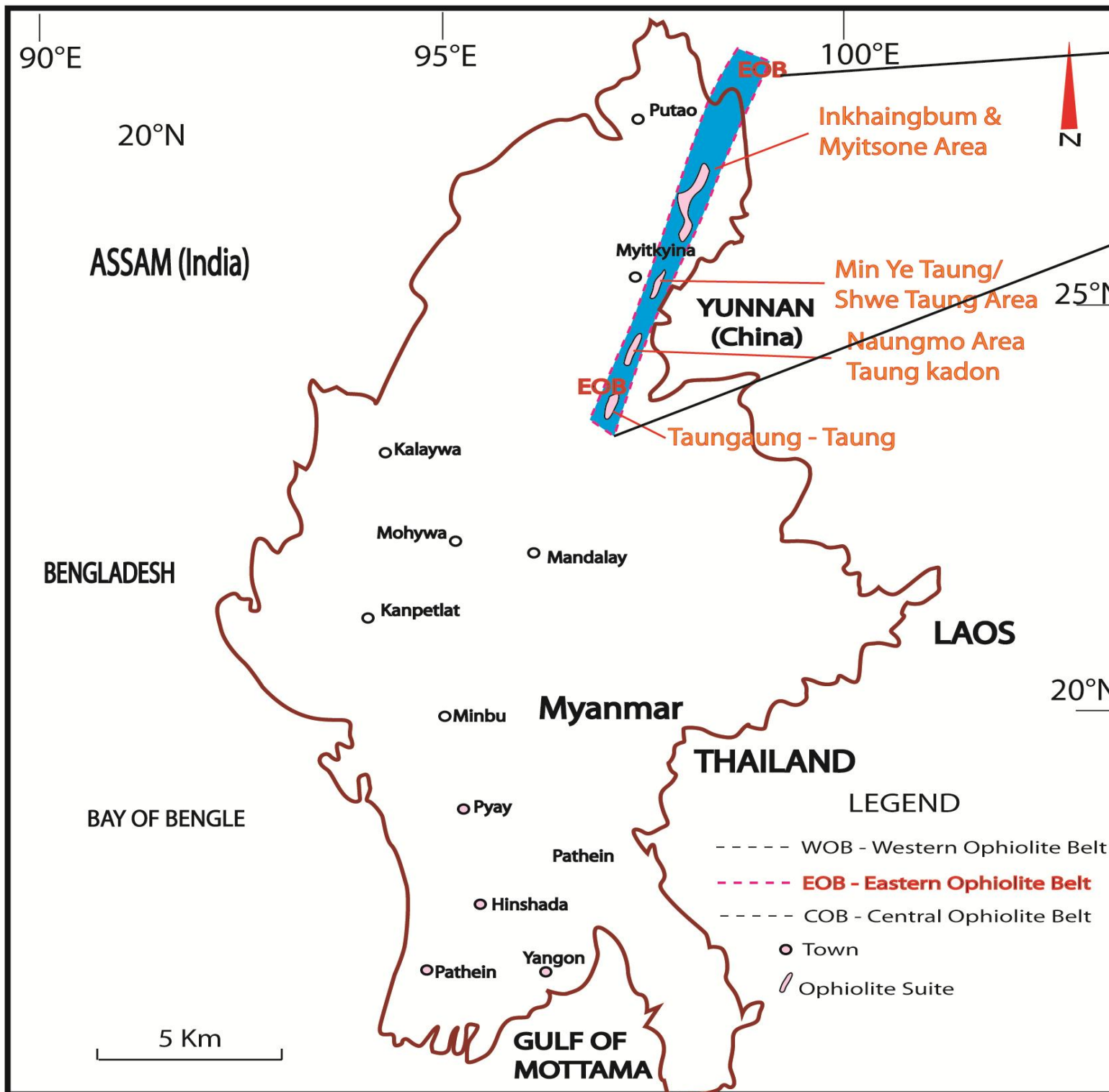
No.	Area	Local Mine Name	Mode of occurrence	Important geological features
7	Lonkin	1. Kademaw 2. Mawmeik-ak 3. Masamaw 4. Maraw-maw 5. Maw-sisa 6. Saung cheinmaw 7. Ngopinmaw 8. Sanhkamaw	Secondary deposits in Tertiary rocks	The deposition of Tertiary-Jade bearing conglomerate by torrential streams from adjoining streams to Uru Chaung
8	Hwekha	1. Kadonyat 2. Hwehka 3. Makapin 4. Mawka Lon	Secondary deposits in Tertiary rocks	At Makapin, following section: 5. Tertiary conglomerate 4. weathered sand stone 3. clay with pebbles 2. Jadeite bearing conglomerate 1. Hard coarse sandstone
9	Hpakan	1. Anma 2. Monyin chan 3. Mowmoan 4. Hpakangyi 5. Yuma at least (4) maw at least (3) maw at least (5) maw at least (4) maw at least (3) maw	Secondary deposits of Uru boulder conglomerates Two working types 1. Stream bed working (year around) 2. Hill side working (during Rainy season)	5. Alluvium at the top, variable thickness 4. A layer of pebbles and gravels ( <u>kadikyaw</u> ) 3. Boulder conglomerate ( <u>kyauk kyaw</u> ) 2. Sand rock with boulders ( <u>Thai kyaw</u> ) 1. Bed rock ( <u>Phah</u> ) * Jadeite boulders are found at 2 and 3.

Table 9. Pt-Au mineralization of COB in Indawgyi Area (Modified from Kyi Tun 1994; Soe Thura Tun 1998)

No.	Area	Type of mineralization	Host Rock	No of sample	Pt(ppm)		Au(ppm)		Cu%		Ni%		Remarks
					Range	Average	Range	Average	Range	Average	Range	Average	
1	Nga chaung	Disseminated	Gabbro	43	1.34-0.1	0.91	0.37-0.02	0.04	5-0.53	1.28	0.64-0.13	0.2	* Pt-mineralization at Gabbro and Serpentinite * Au-mineralization develop at layered type Ultramafic rock. * Ni-mineralization accumulate in Serpentinite zone
2	Maw Khan	Disseminated	Serpentinite	8	1.3-0.13	0.7	0.43-0.03	0.17	0.126-.007	0.014	0.24-0.22	0.22	
3	Maw Khan	Disseminated	Layered ultramafic	2	0.24-0.08	0.16	3.67-0.02	1.85	0.13-0.012	0.07	0.23-0.103	0.17	
4	Kyun Taw Khon	Disseminated	Sperpentinite	8	1.0-0.6	0.83	1.11-0.03	0.39	0.25-0.001	0.13	0.23-0.17	0.19	
5	Nant Sa Kyin	Disseminated	Layered Ultramafic Rock	3	0.5-0.16	0.27	1.12-0.3	0.71	0.02-0.002	0.01	0.24	0.24	
6	Ngwe Taung	Disseminated	Serpentinite	3	1.2-0.13	0.84	ND	-	-	5	-	0.25	
7	Nant Ma Tar	Disseminated	Gabbro	1	-	0.6	-	-	-	-	-	-	
8	Nant Yin Kha	Disseminated	Serpentinite	1	ND	-	-	-	-	-	-	-	

# EOB belt and its mineralization

- situated along the western periphery of the Sino-Myanmar Ranges.
- located at Sumpratum - Myitkyina-Bhamo-Shwegu-and-Tagaung
- Dismembered incomplete Ophiolite.
- Chromite and Nickel mineralization at Tagaung area in the S.
- Iron mineralization and Gold mineralization in Bhamo-Shwegu area.
- Asbestos and Gold mineralization in Myitkyina area.

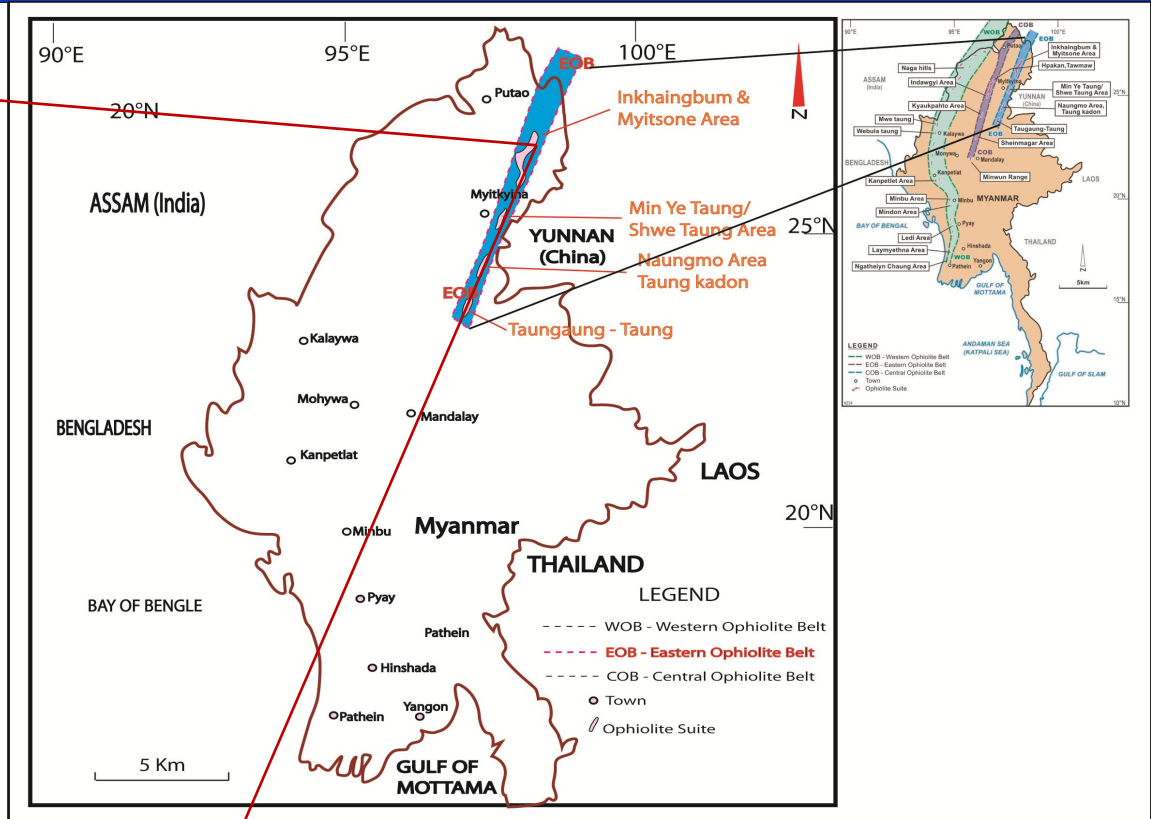
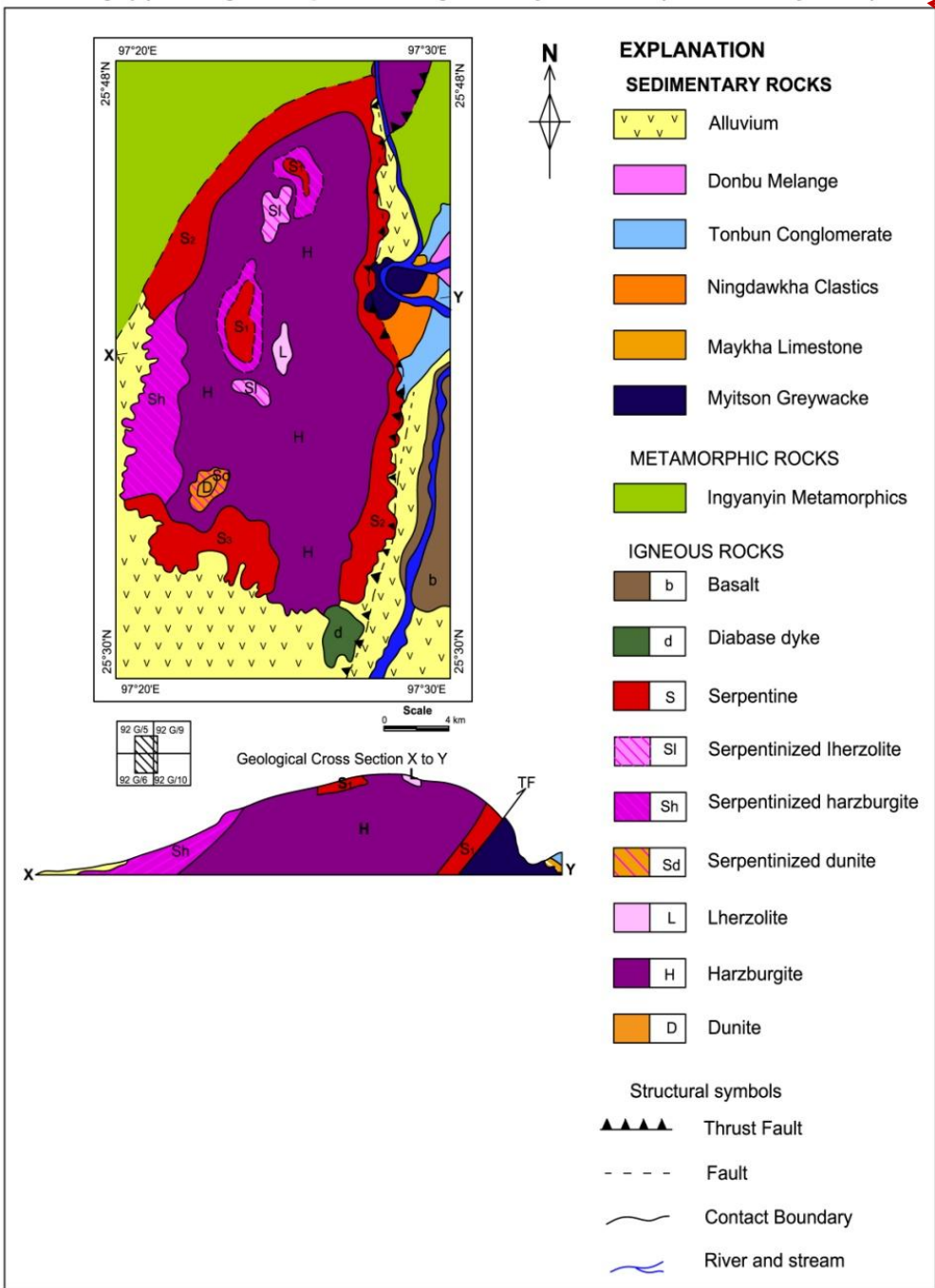


## Eastern Ophiolite Belt of Myanmar

Table 10. Ophioliticrock suites in Eastern Ophiolite Belt (EOB) of Myanmar.

Characteristics of ophiolitic sequence		Taugaung-Taung	Bhamo-Shwegu Area			Inkhaingbum&Myitsone area, Myitkyina
			Naungmo area	Taung Kadon	Min Ye Taung/ Shwe Taung	
Member	Rock Type Sequence	Geoistrazivanja (1958), LA-Ja (1984), Shwe Zin Oo (1994), Maung Maung Htwe(1997)	Einflat & Than Htay (1989)			Hla Htay (2006)
E	Sedimentary Section Ribbon chert, thin shale & Minor Limestone	Thet-Tu bedded chert, greywacke, argillite with minor limestone (Cretaceous)	Orbitolina) { <ul style="list-style-type: none"><li>- Indurated sandstone and shale with slate</li><li>- Fossiliferous massive limestone (with &amp; bedded limestone</li><li>- deep-sea sediments of radiolarian chert</li></ul>			Melange conglomerate, clastics , limestone & greywacke
D	Mafic Volcanic Complex (Sodic felsic intrusive and extrusive)	Spilite and pillow basalt	Hb. Andestie Ol. Tholeiite Plagiogranite	Leucocratic tuff	Olivine tholeiite, andesite	Vesicular basalt,amygduloidal basalt, pillow basalt
C	Mafic sheeted dyke Complex	Gabbroic rock, Orthopyroxenite, doleritic rock	Gabbroic dyke, Rodingite	Gabbroic vein, clinopyroxenite, rodingite	Olivine tholeiite, andesite	Diabase dyke
B	Gabbro Complex, with cumulus, commonly cumulus periodtites &pyroxenites					Olivine gabbro complex with diorite
A	Ultramafic Complex	Harzburgite, lherzolite,dunite,werlite, serpentinites	Harzburgite lherzolite, dunite, serpentinites	Harzburgite, lherzolite, serpentinites	Harzburgite, serpentinites	Harzburgite, lherzolite, serpentinite with dunite
	Metamorphic Fabric	Twegauk Schists	Low-grade metamorphic rocks			Ingyan metamorphics: Talc chlorite schist
	Podiform Chromite	Present	Present	Present	Present	Present

Fig. (8) Geological Map of Inkhaingbum - Myitson area (after Hla Htay, 2006)



**Fig. (11) Geological Map of Tagaung Taung Area(After Than Than Oo, 2006)**

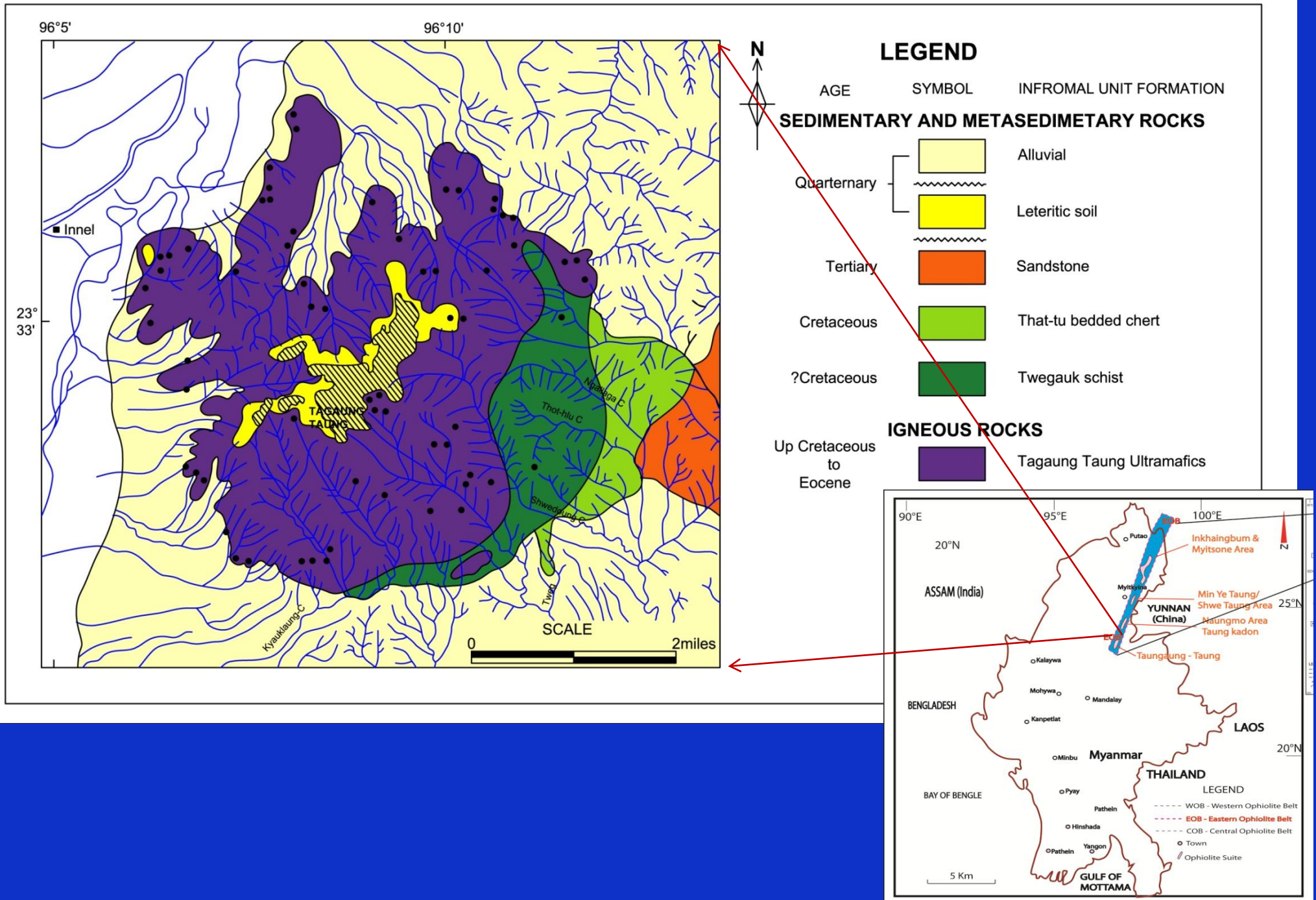


Table 11. Comparison of three ophiolitic Belts of Myanmar.

Sr. No	Characterisitscs of Ophiolite Belts	Western Ophiolite Belt (WOB)	Central Ophiolite Belt (COB)	Eastern Ophiolite Belt (EOB)
1	The Ultramafic part	Lherzolite, harzburgite	Lherzolite, harzburgite	Lherzolite, harzburgite
2	Chromite ore	Podiform	Podiform (rare)	Podiform
3	Ultramafic cumulate & mafic cumulate	missing	present	Present
4	Associated Volcanics	Hornblende andesite to orthopyroxene basalt (pillow type), (MORB characters (Laymyethna area)	present	found as dykes of hornblende andesite-olivine tholeiite (pillow type)
5	Time of emplacement	Cretaceous to Eocene	Cretaceousto Eocene	Cretaceous
6	Metamorphism	Green schist to amphibolite	Green schist, glaucophene schist	Talc chlorite schist
7	Regional Thrust fault	Mostly present	Present	Present
8	The sedimentary host rocks	Chin Flysch (Cretaceous) Thanbaya Formation (Triassic) Kanpetlett Schist (Unknown age)	Ngapyawdaw Chaung Formation (Kyaukpahto area) (Middle to Upper Triassic)	That-Tu bedded chert(Cretaceous), Twegauk Schist(Cretaceous), Myitson greywacke (Jurassic), Maykha Limestone (Cretaceous)
9	Status of ophiolite	Dismembered, incomplete	Dismembered, incomplete	Dismembered to incomplete
10	Mineralization	Cu-Mineralization in the south, Ni-Cr in the north	Jadeite in the North; Gold and Pt group metal in Indawgyi area	Cr-Ni mineralization at Tagaung Taung; Mn mineralization in That-Tu bedded chert

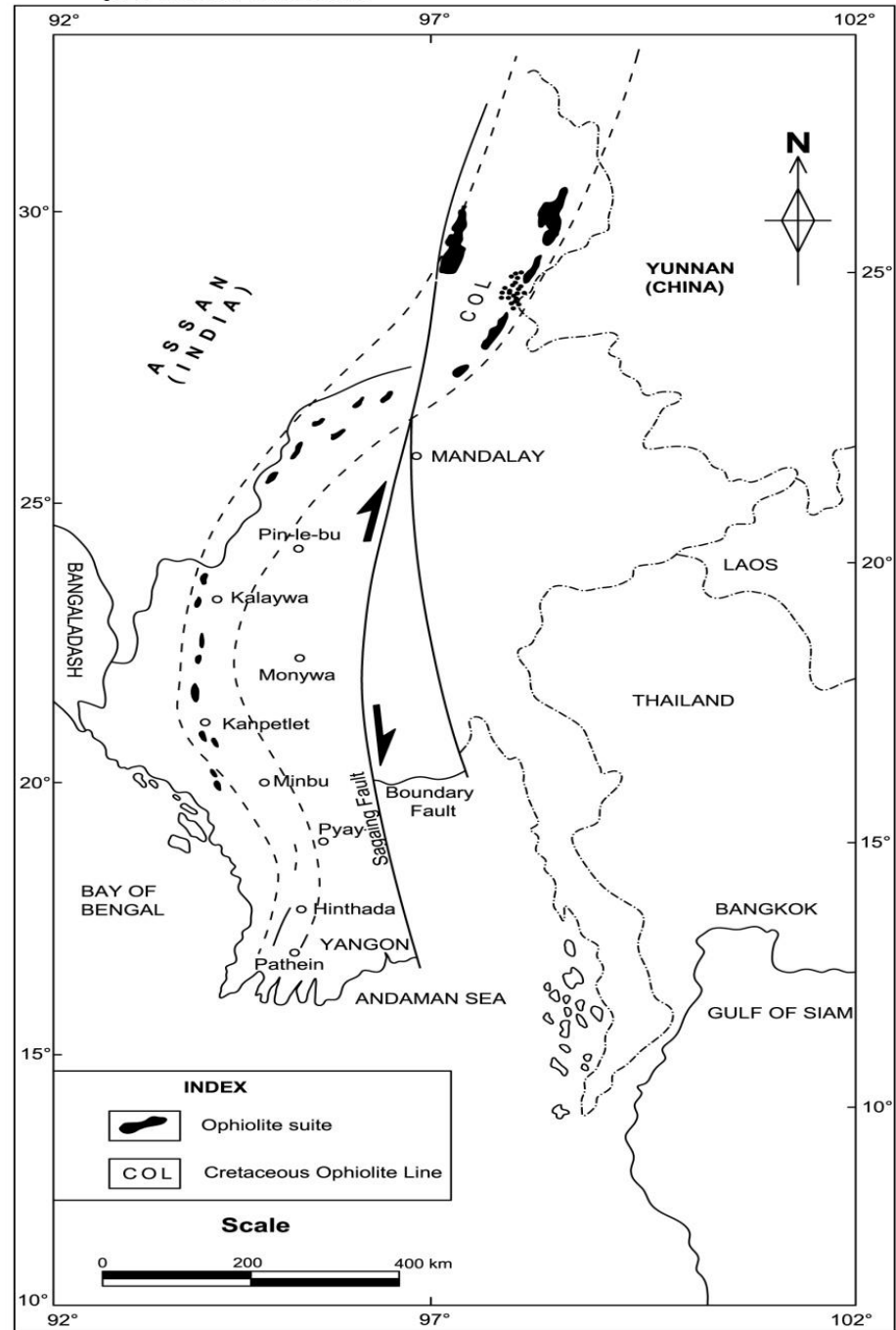
# Comparison of Three Ophiolite belts

- They have distinct similarities of rock-types and composition,
- geological history of Ophiolite association.
- mineralization and age relationship to surrounding sediments
- a single belt originally obducted along the western margin of Sinoburmalaya block.
- WOB and COB were combined as single Ophiolite line as Cretaceous Ophiolite Line (COL).

- EOB was in the eastern part of it.
- COL is originally subducted along the western rim of Sinoburmelaya block
- Following the collision of NNE moving India plate with Asia plate in the Late Eocene
- These Ophiolite suits were thrust and faulted westward as napps and detached into three linear belts.
- EOB is root zone Ophiolite has positive gravity value.

- COB & WOB are rootless Ophiolites and they have negative value forming sandwiched Slices or overlie thick sedimentary sequences as Klipens.
- In Mid-Miocene, due to the dextral movement of Sagaing fault, COB moved to very near position of Triple junction point (TTF)
- Forming Jadeite mineralization significantly developed in this belt.

**Fig. (12) Map showing the restoration of the Ophiolite Belts of Myanmar before northward dextral (right lateral) movement along the Sagaing(Transform) Fault at pre-Lower Miocene**



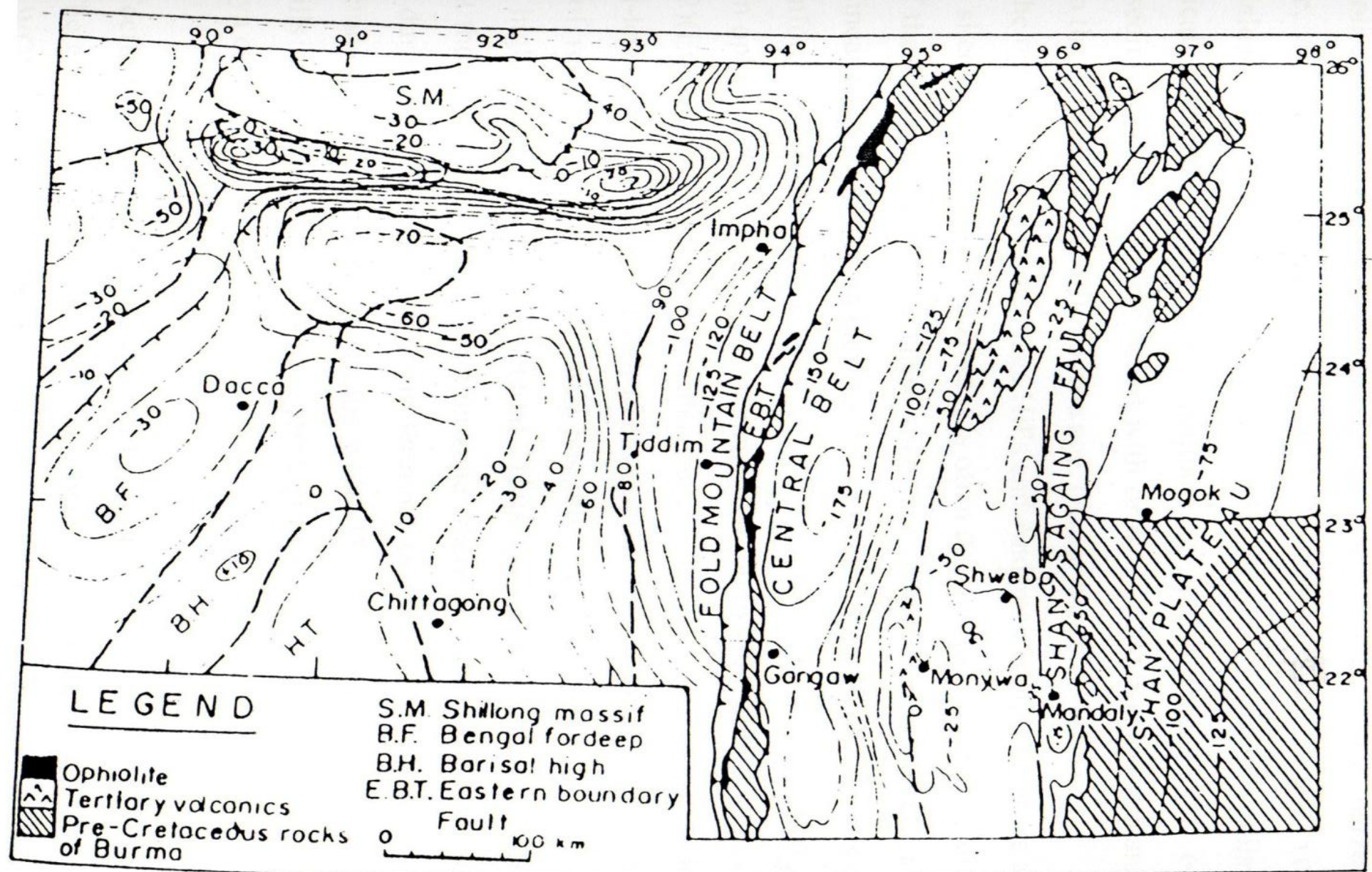


Figure (2.12) Bouguer anomaly map of Burma and adjoining area (After Kumar, 1990)

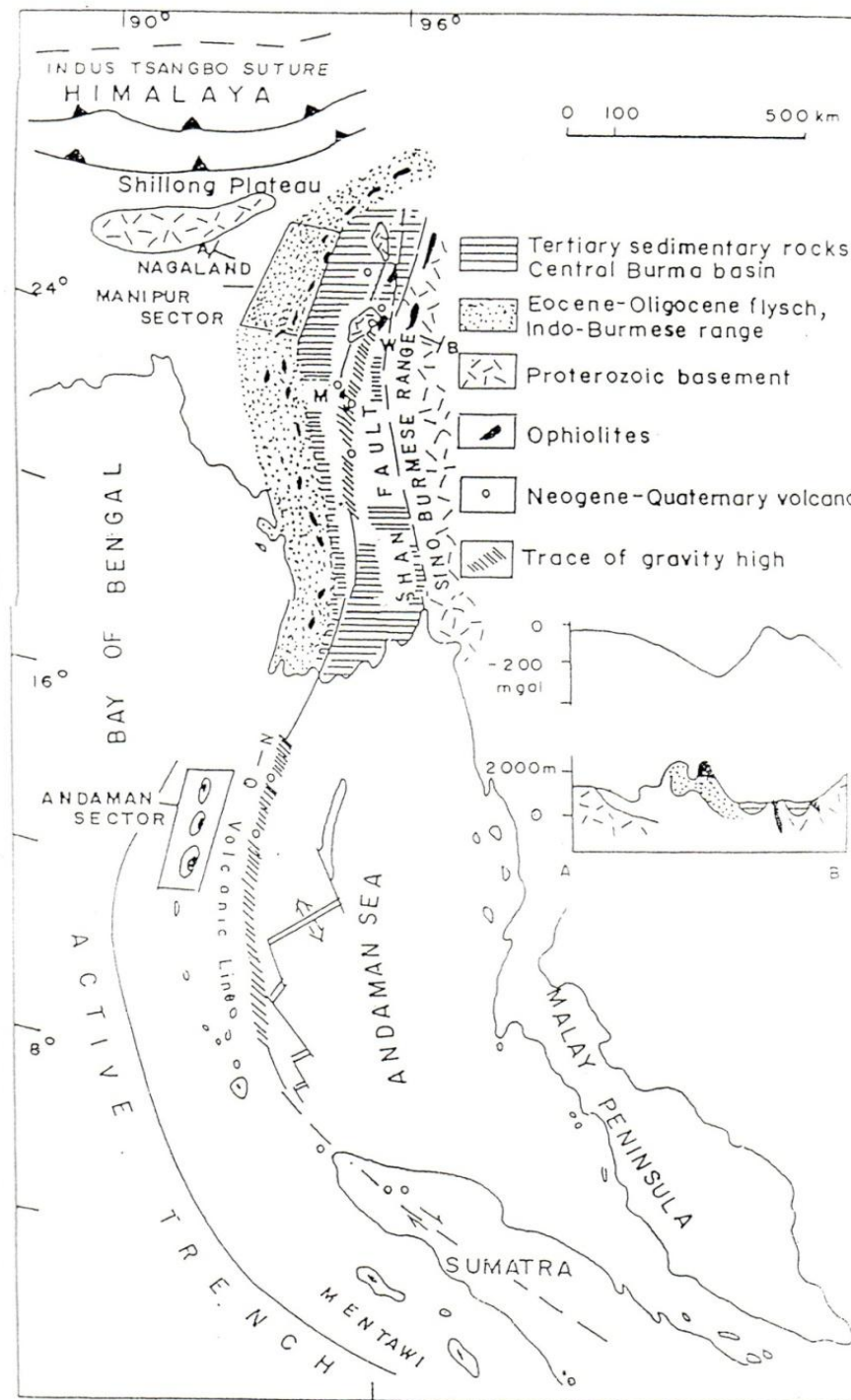


Fig. Geotectonic features of ophiolite belts (After Sengupta et al., 1990)

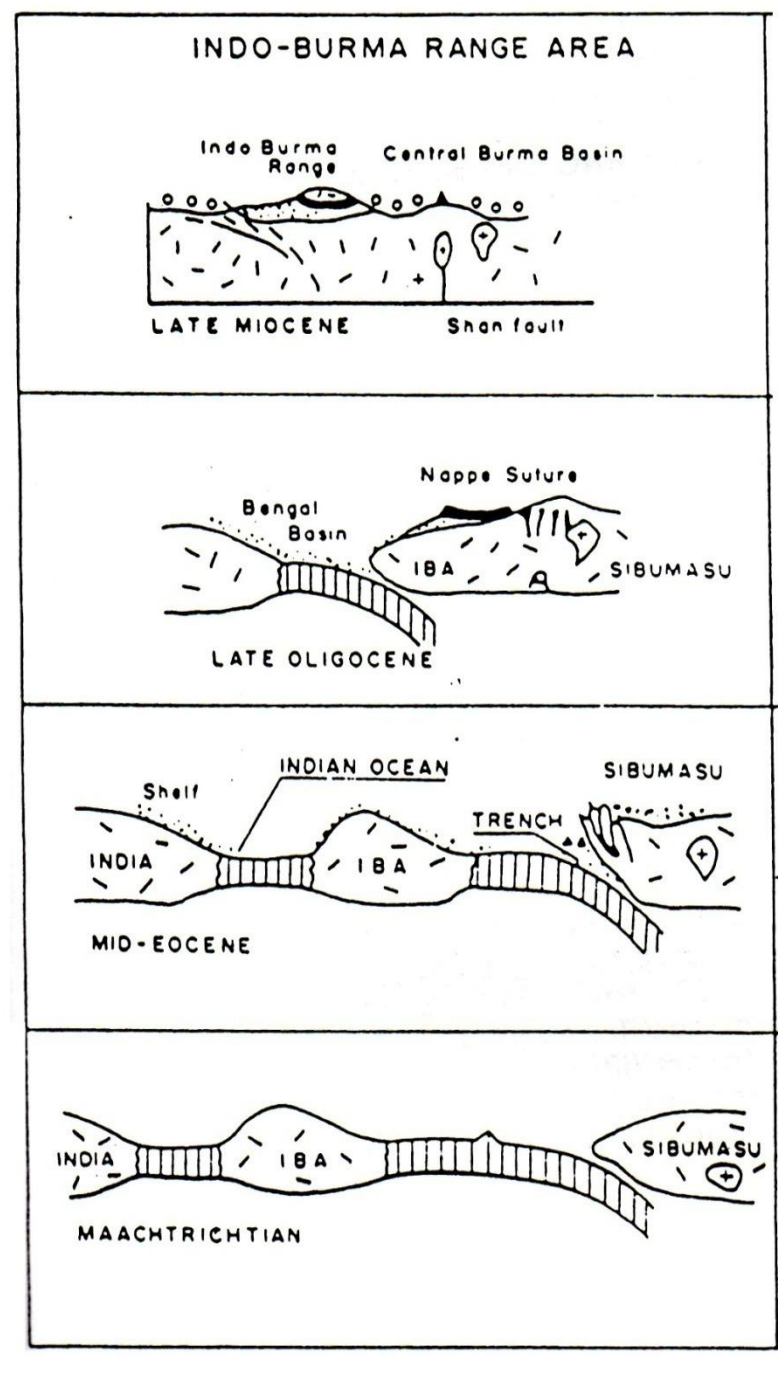


Fig - Accretion and emplacement of Naga Hills Ophiolites:  
Tectonic model (Archaryya, Ray and Sengupta, 1990.)

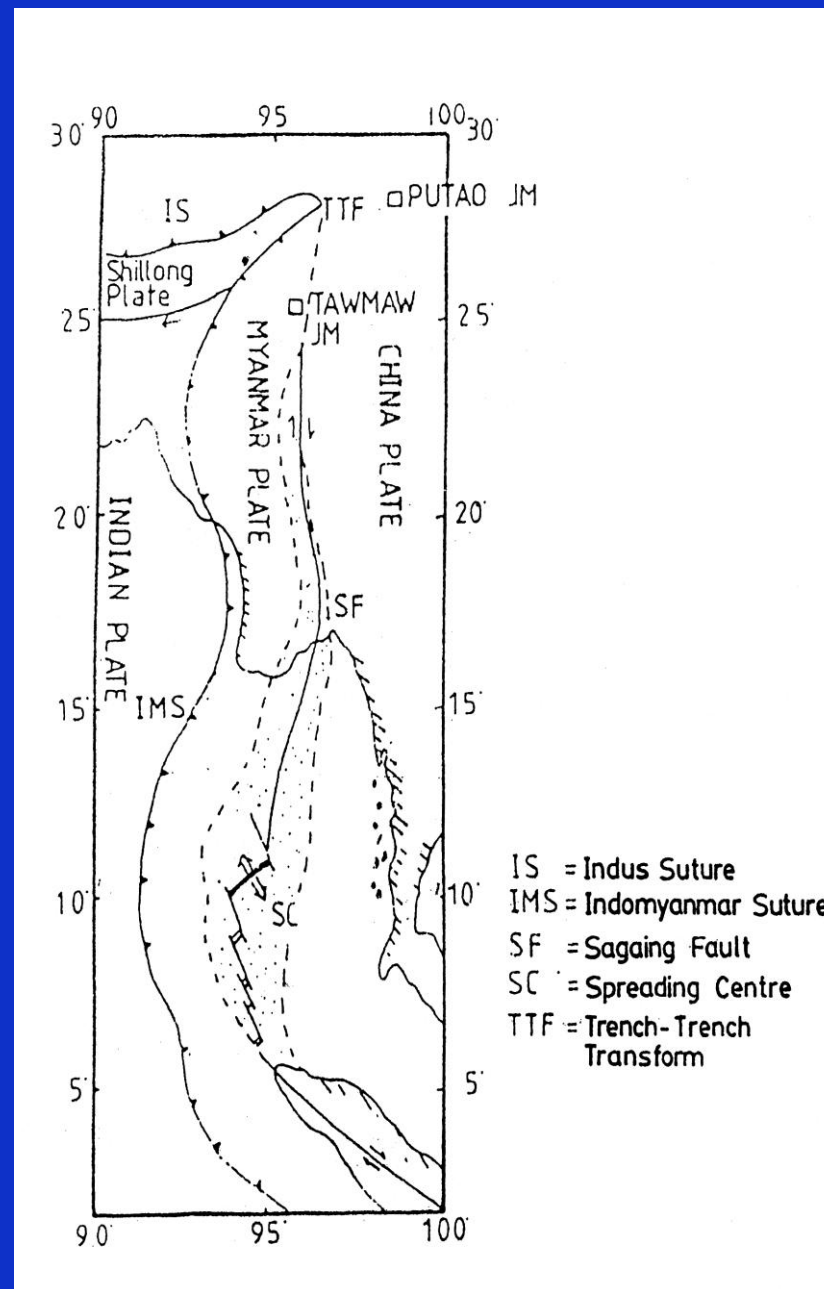


Fig - Simplified tectonic map of Myanmar (Currey *et.al.*, 1978; Maung Thein, 1983) showing the position of jadeite-serpentinites relatives to the Sagaing Fault and Indomyanmar Suture. (Nyan Thin, 1991).

# Conclusion

1. There are three Ophiolite belts in Myanmar namely WOB, COB and EOB.
2. They are paralleling each other and trending North-South.
3. They are dismembered incomplete Ophiolites.
4. Compare to these belts, they are very similar to each other and they would be combined as a single Ophiolite line as COL in Cretaceous.
5. Due to gravity data, EOB is root zone Ophiolite and COB & WOB are rootless Ophiolite forming sandwiched slices or overlies thick sedimentary sequence.
6. In Mid-Miocene, due to the dextral movement of Sagaing fault, COB moved to very near position of Triple junction point (TTF) forming as jadeite mineralization only in this belt.

Thank you