

Multi-proxy evidence for the denudation of Taiwan

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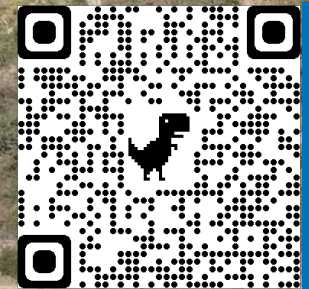
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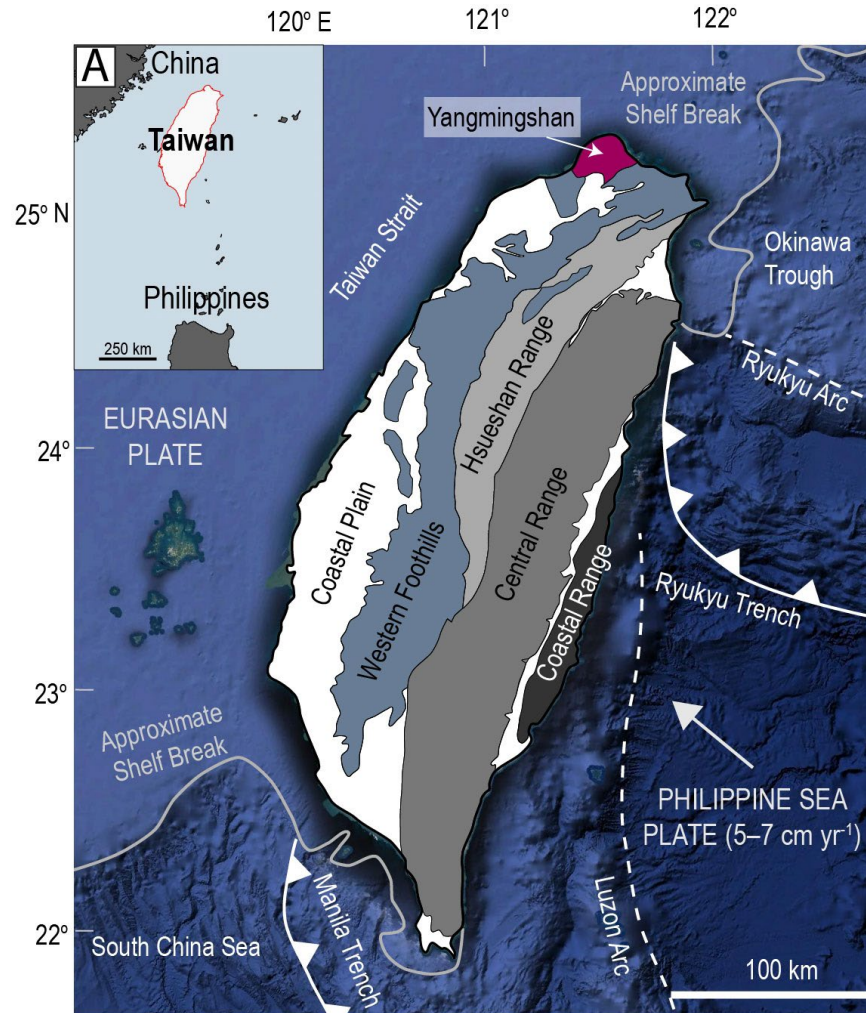
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Outstanding Student & PhD
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Taiwan Geology

Located at boundary between Philippine Sea Plate and Eurasian Plate



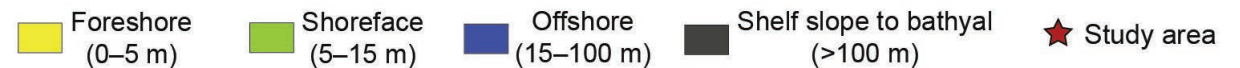
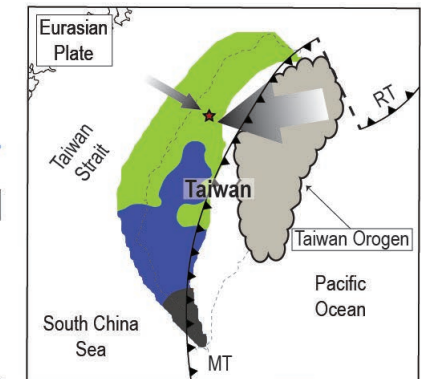
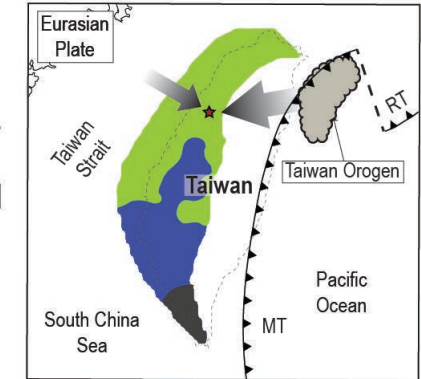
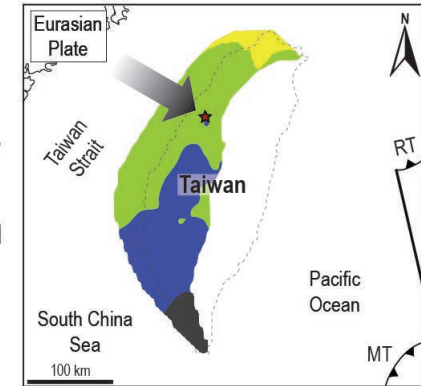
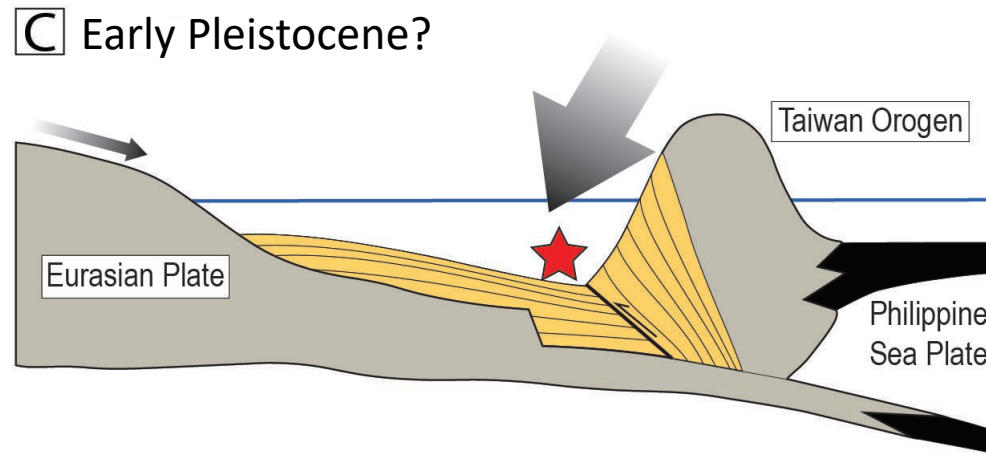
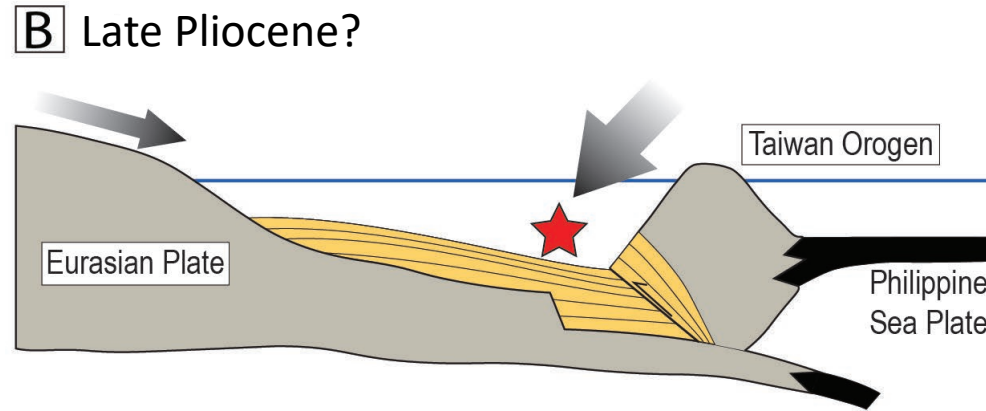
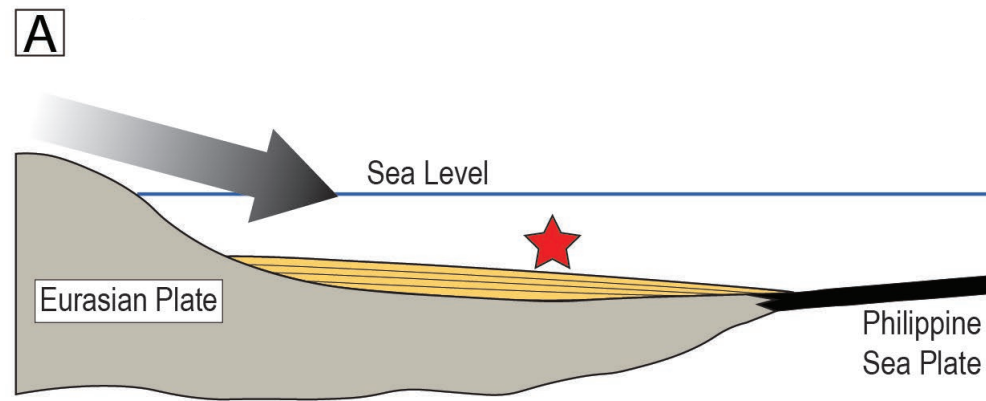
(Hsieh et al., in prep, after Dashtgard et al., 2020)

Age (Ma)	Period	Epoch	Age	Nanofossil Zone	Western Foothills - North		
0.78	QUATERNARY	PLEISTOCENE	Iona	NN19	Toukoshan Fm		
			Calabrian				
1.80			Gela		NN18	Cholan Fm	
2.58		NN17					
	NEOGENE	PLIOCENE	Piac	NN16	Chinshui Shale		
3.60			Zanclean	NN15 } NN13	Kueichulin Fm	Yutengping Sandstone	
						Shihliufen Shale	
5.33		MIOCENE	Tortonian / Messinian	NN12		Kuantaoshan Sandstone	
				NN11			
11.63			Tortonian / Messinian	NN10 NN9 NN8 NN7 NN6	Nanchuang Fm	Shangfuchi Sst	
						Tungkang Fm	
				Lang / Serr	NN5	Nankang Fm	Kuanyinshan Sandstone
							Talu Shale
NN4			Peiliao Sandstone				
15.97			Aquitanian / Burdigalian	NN3			
				NN2	Shiti Fm		
					Taliao Fm		
					Mushan Fm		
23.03	PALEOGENE	OLIGOCENE	Chattian	NN1			
				NN25	Paleng Fm		
				NN24	Wuchishan Fm		

Objective

To determine the denudation of Taiwan using the sedimentary record

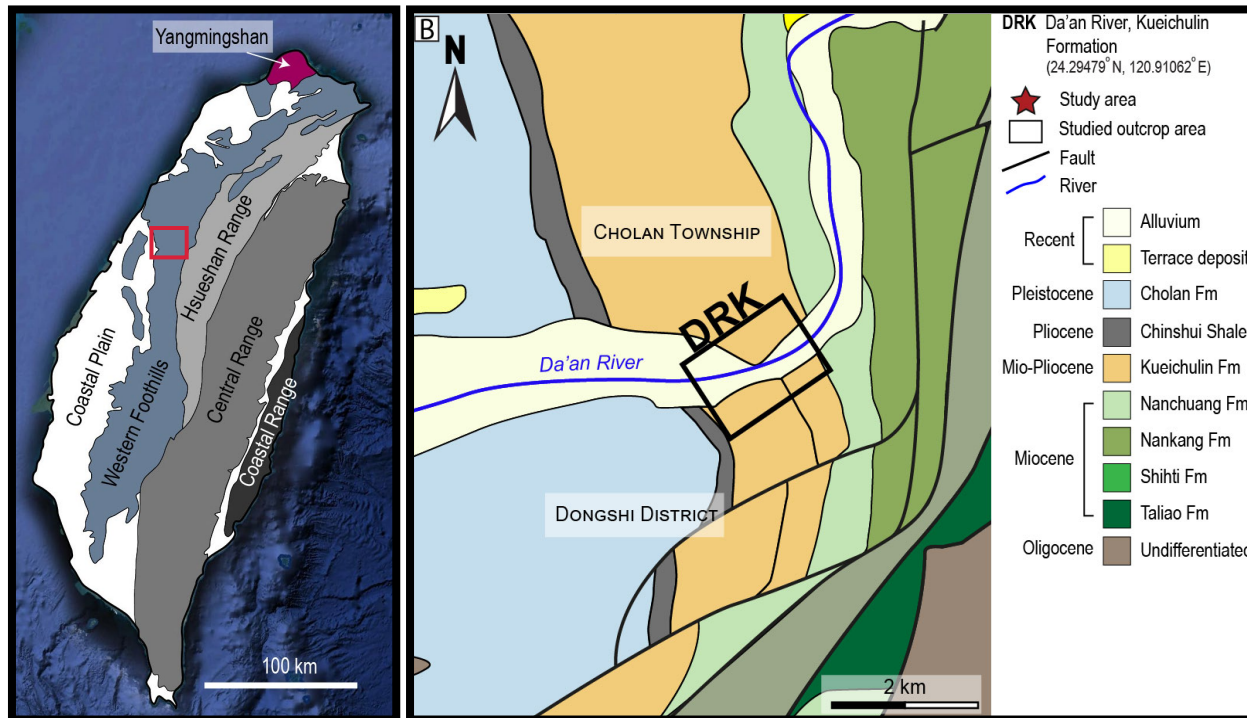
- Clay mineralogy
- C & N geochemistry
- Rock magnetic susceptibility



Sediment Sources

Log outcrops of the Kueichulin Formation at Da'an River

- 430-m section
- Clay mineralogy: 52 samples
- $\delta^{13}\text{C}_{\text{org}}$ and C/N: 272 samples
- Rock magnetic susceptibility: 66 samples

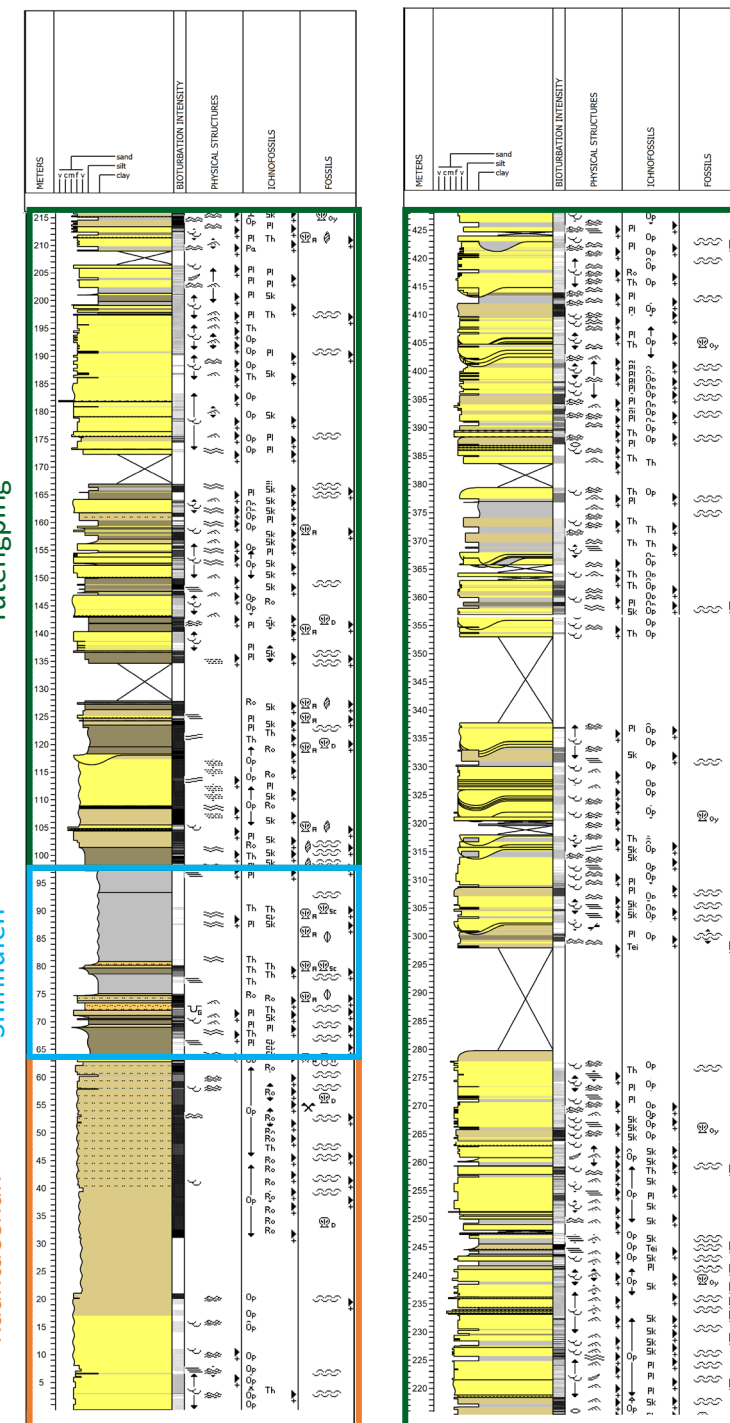


(Hsieh et al., in prep, after Dashtgard et al., 2020, 2021)

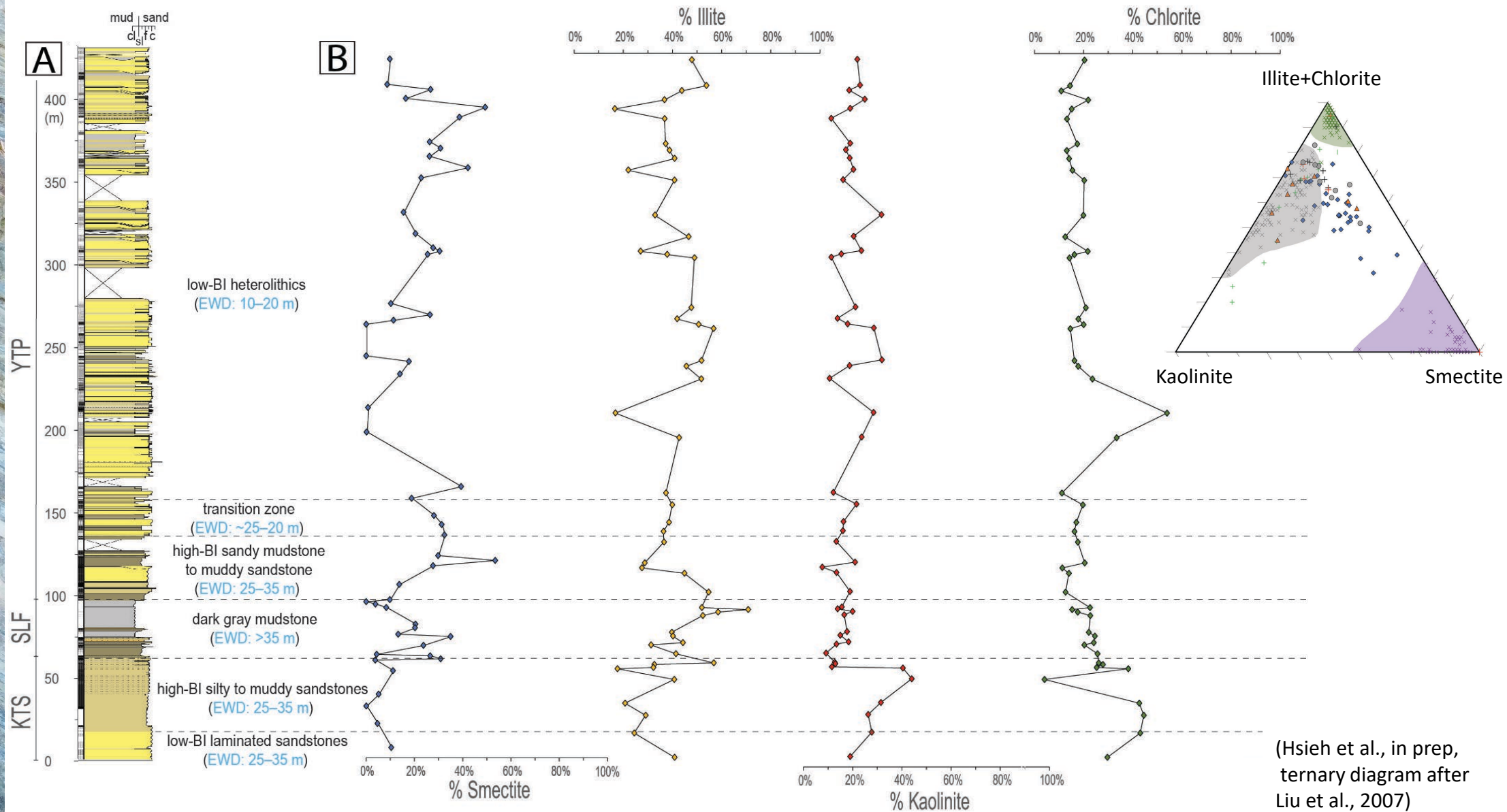
Yutengping

Shihliufen

Kuantaoshan



Results



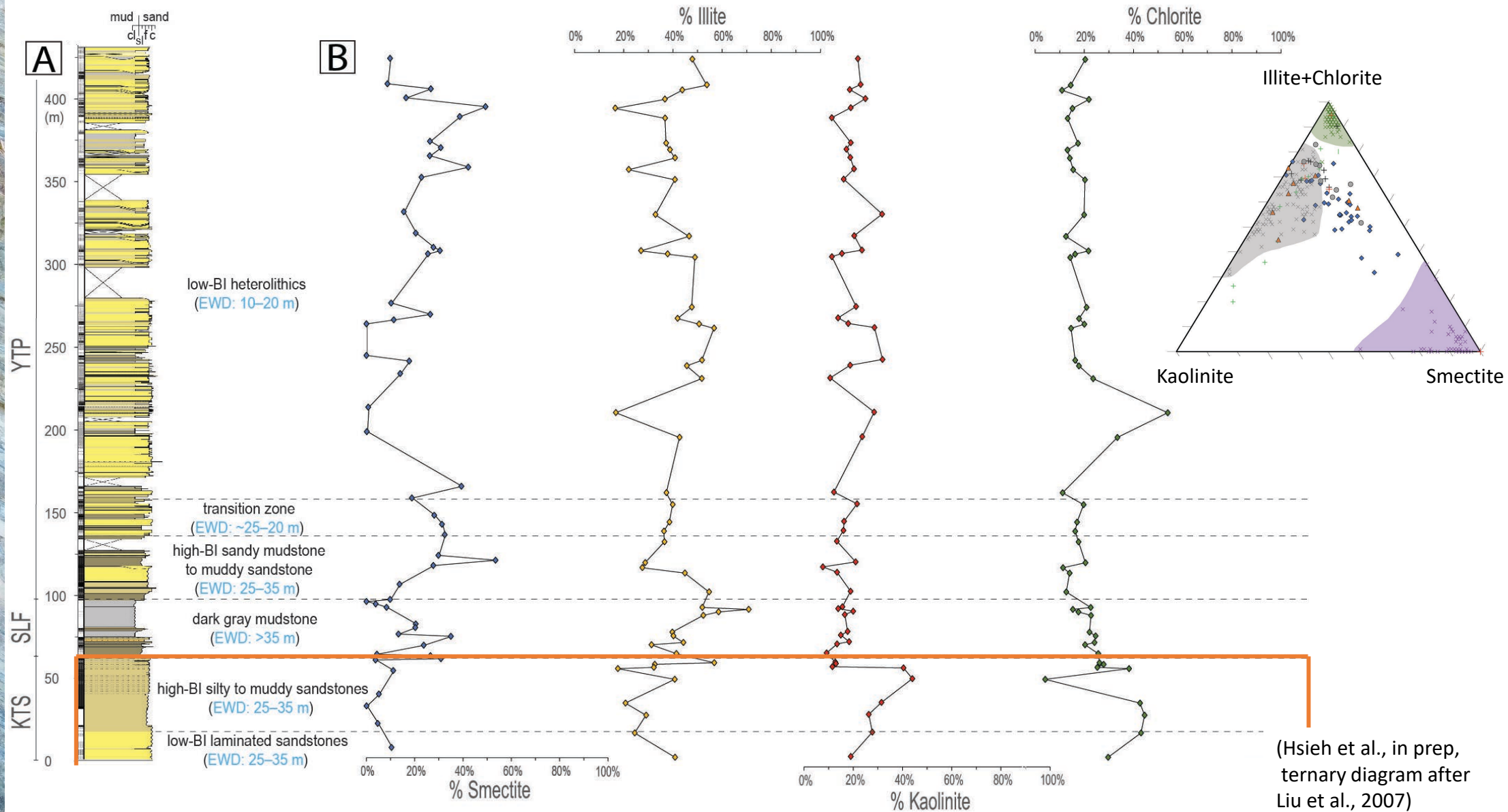
Results

Smectite (%)
11.6 ± 11.2 (8)

Illite (%)
29.8 ± 8.6 (8)

Kaolinite (%)
26.7 ± 11.9 (8)

Chlorite (%)
31.9 ± 13.5 (8)



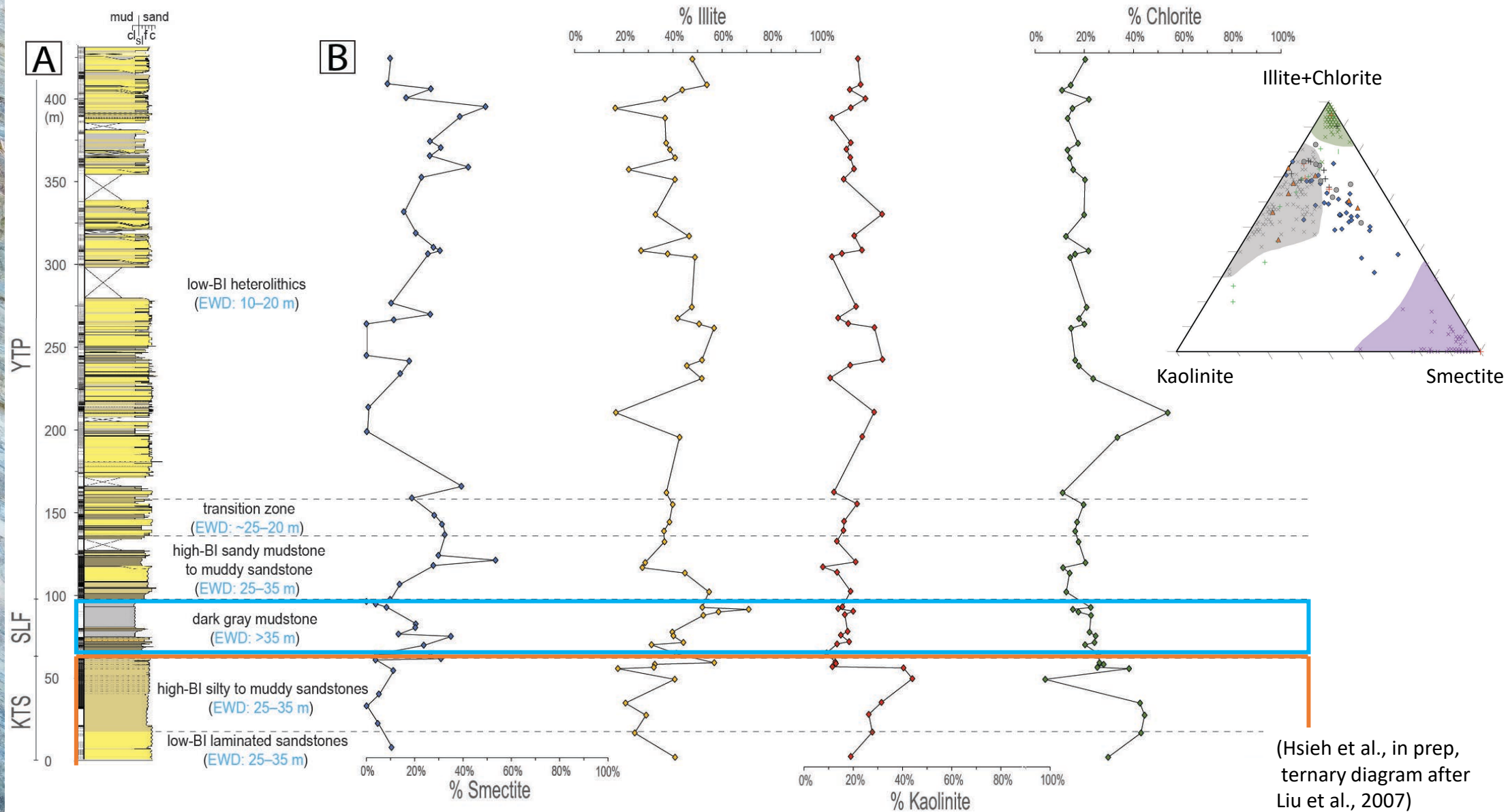
Results

Smectite (%)
13.9 ± 10.8 (10)
11.6 ± 11.2 (8)

Illite (%)
48.7 ± 11.6 (10)
29.8 ± 8.6 (8)

Kaolinite (%)
15.2 ± 3.1 (10)
26.7 ± 11.9 (8)

Chlorite (%)
22.1 ± 3.5 (10)
31.9 ± 13.5 (8)



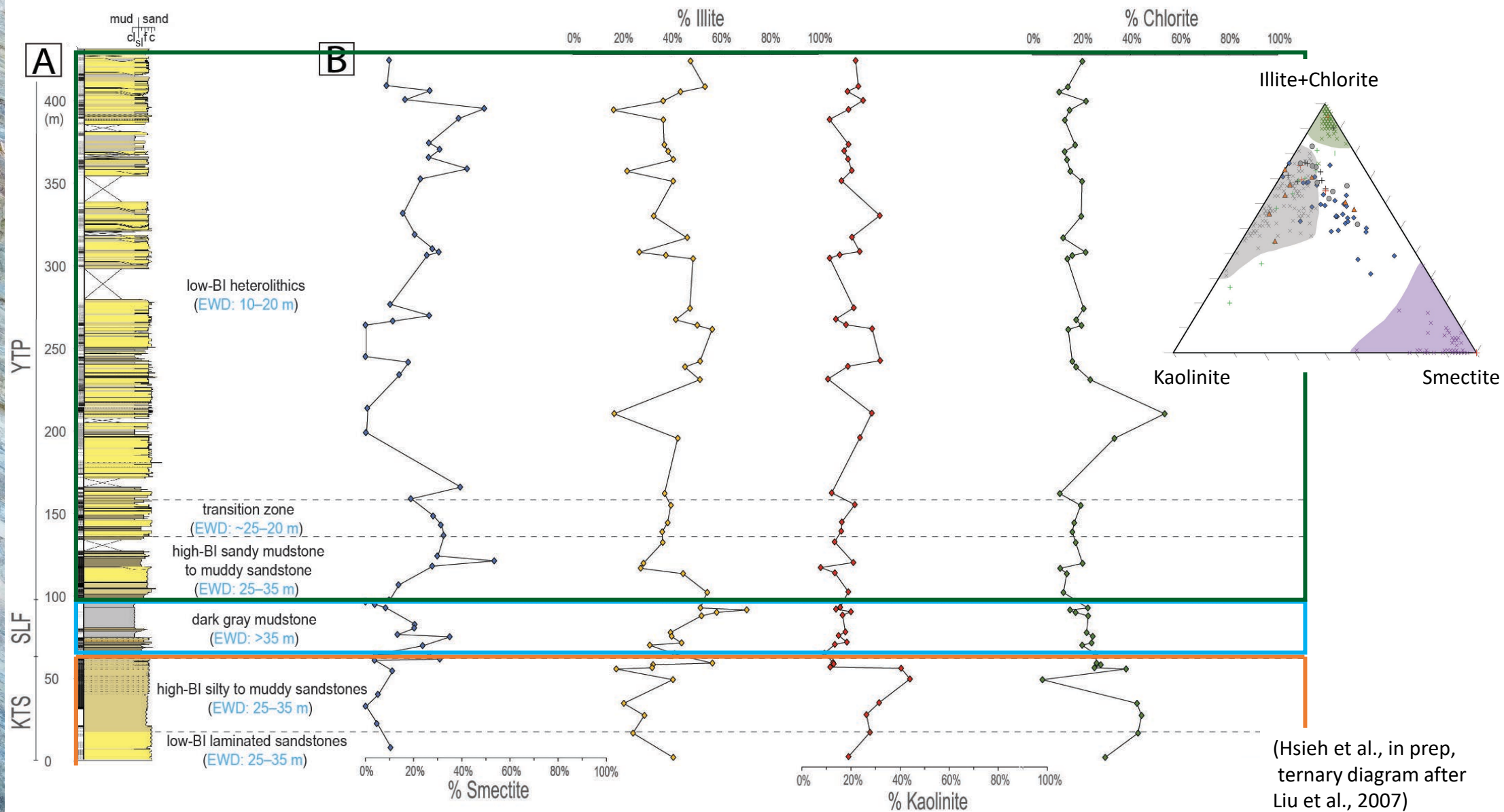
Results

Smectite (%)
22.7 ± 13.5 (34)
13.9 ± 10.8 (10)
11.6 ± 11.2 (8)

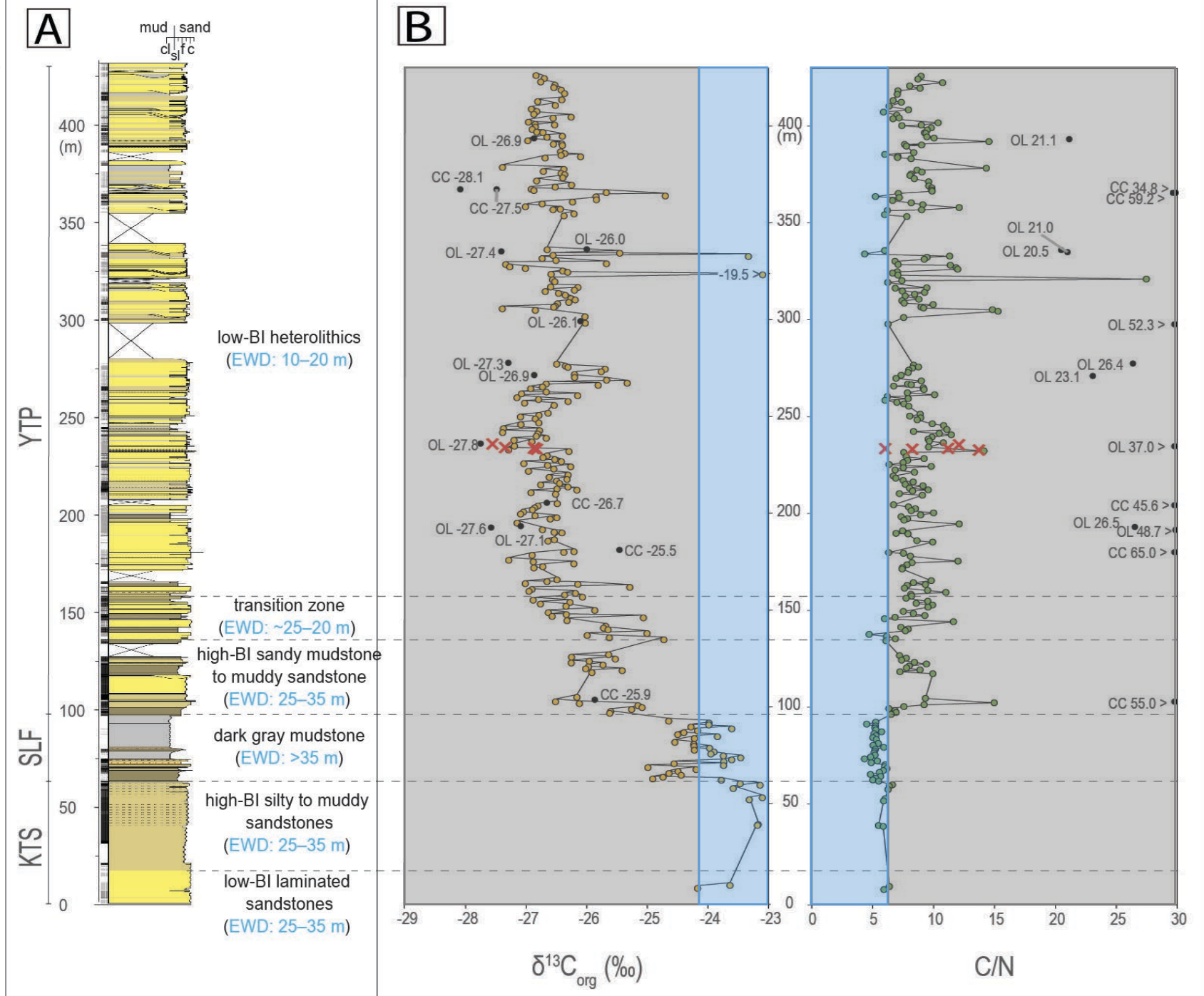
Illite (%)
40 ± 10.1 (34)
48.7 ± 11.6 (10)
29.8 ± 8.6 (8)

Kaolinite (%)
19.4 ± 5.8 (34)
15.2 ± 3.1 (10)
26.7 ± 11.9 (8)

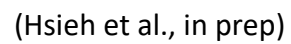
Chlorite (%)
18.2 ± 7.7 (34)
22.1 ± 3.5 (10)
31.9 ± 13.5 (8)



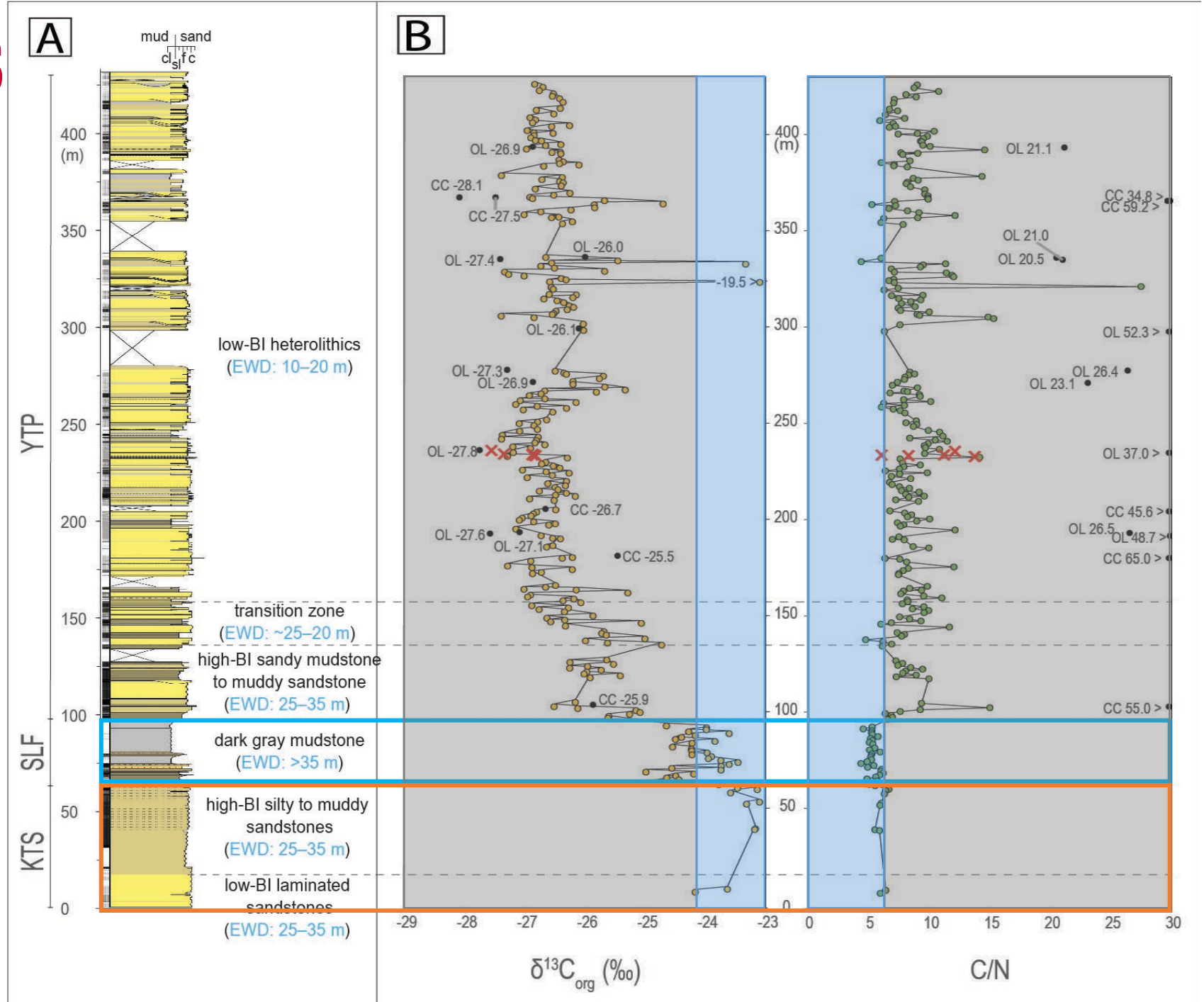
Results



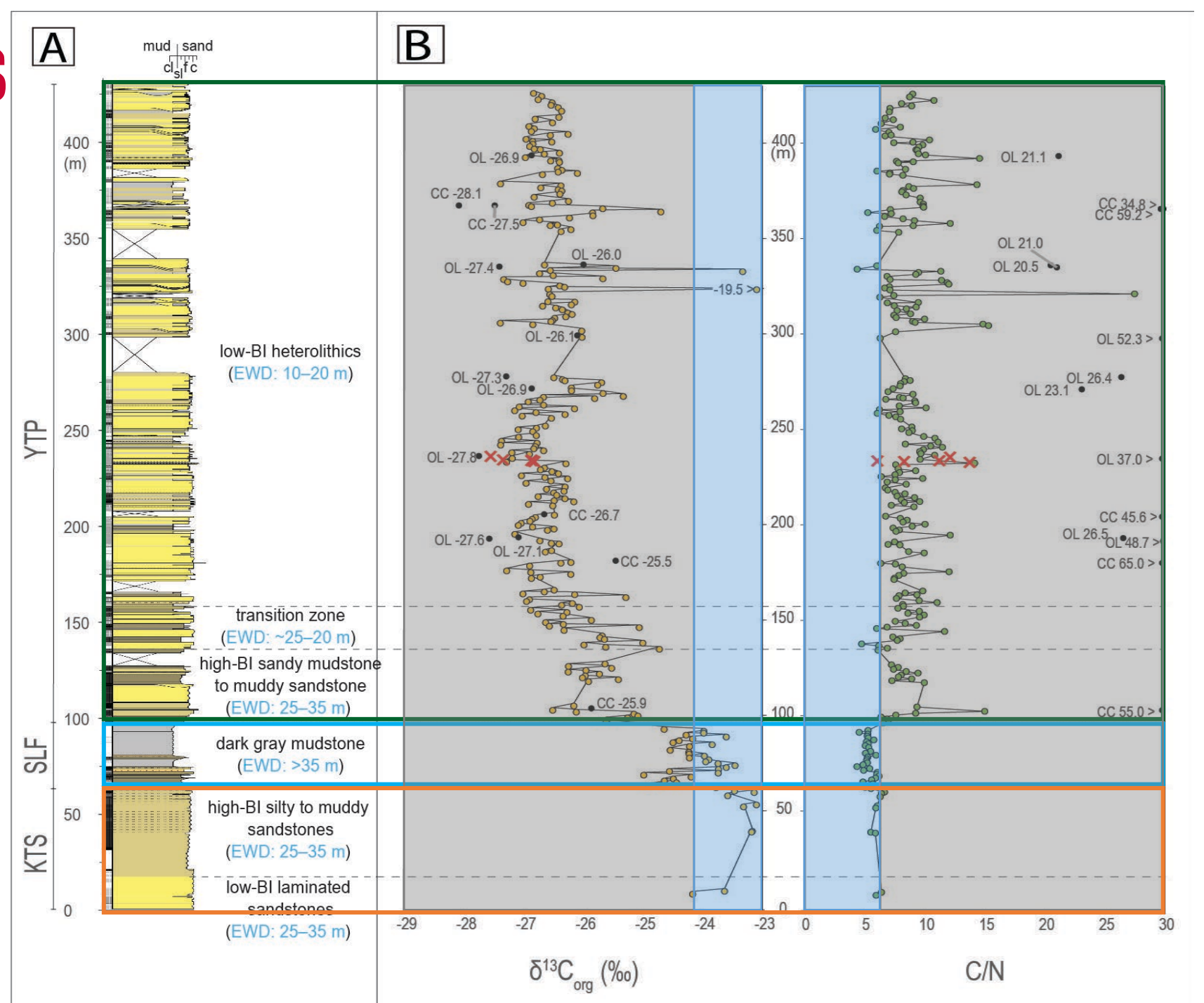
A detailed photograph of a geological rock face showing distinct, wavy, and layered sedimentary structures. The layers are primarily light-colored (tan, yellow, and grey) with some darker, bluish-grey bands. The rock surface is rough and textured, with some small green plants growing in the crevices.



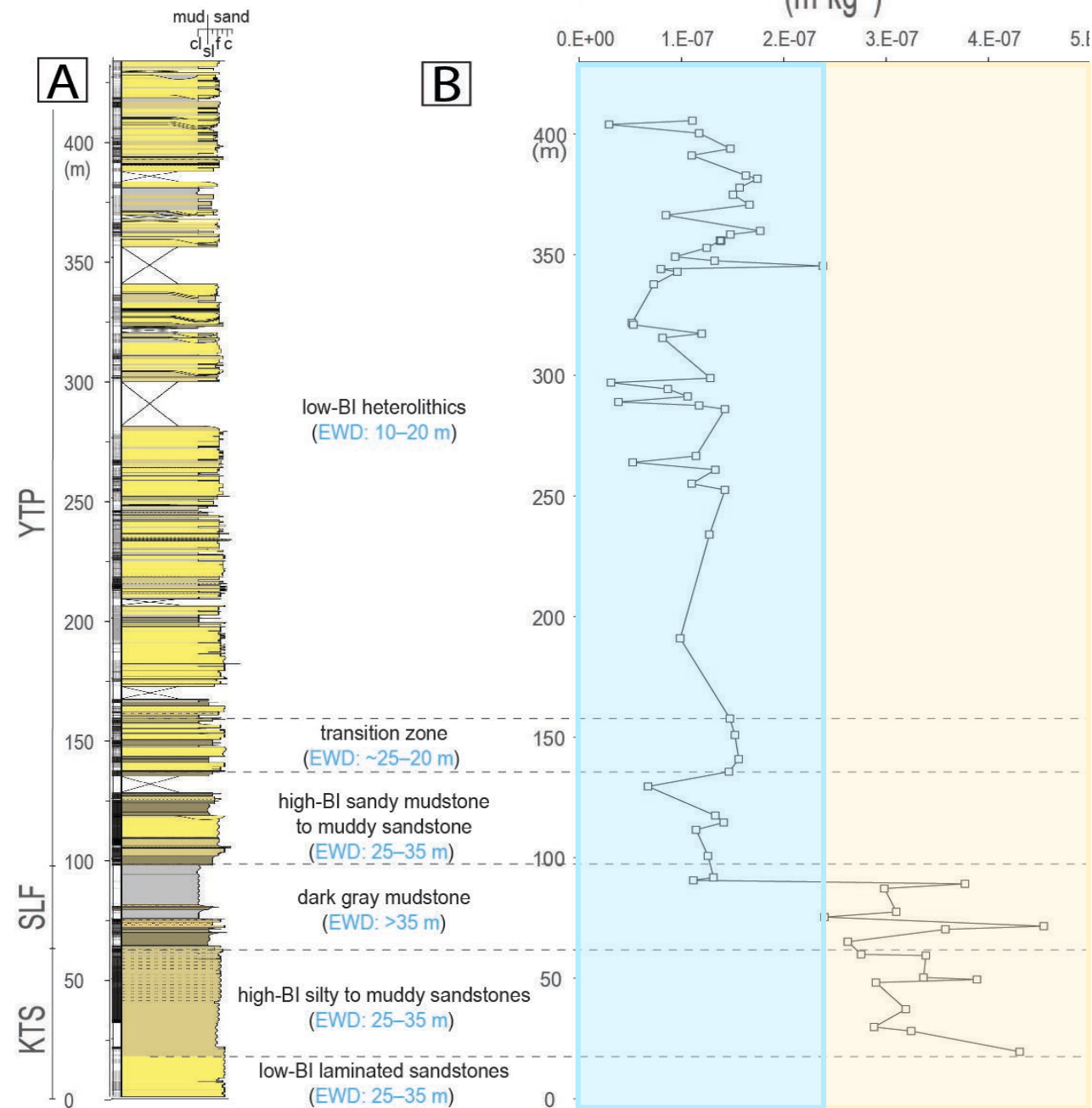
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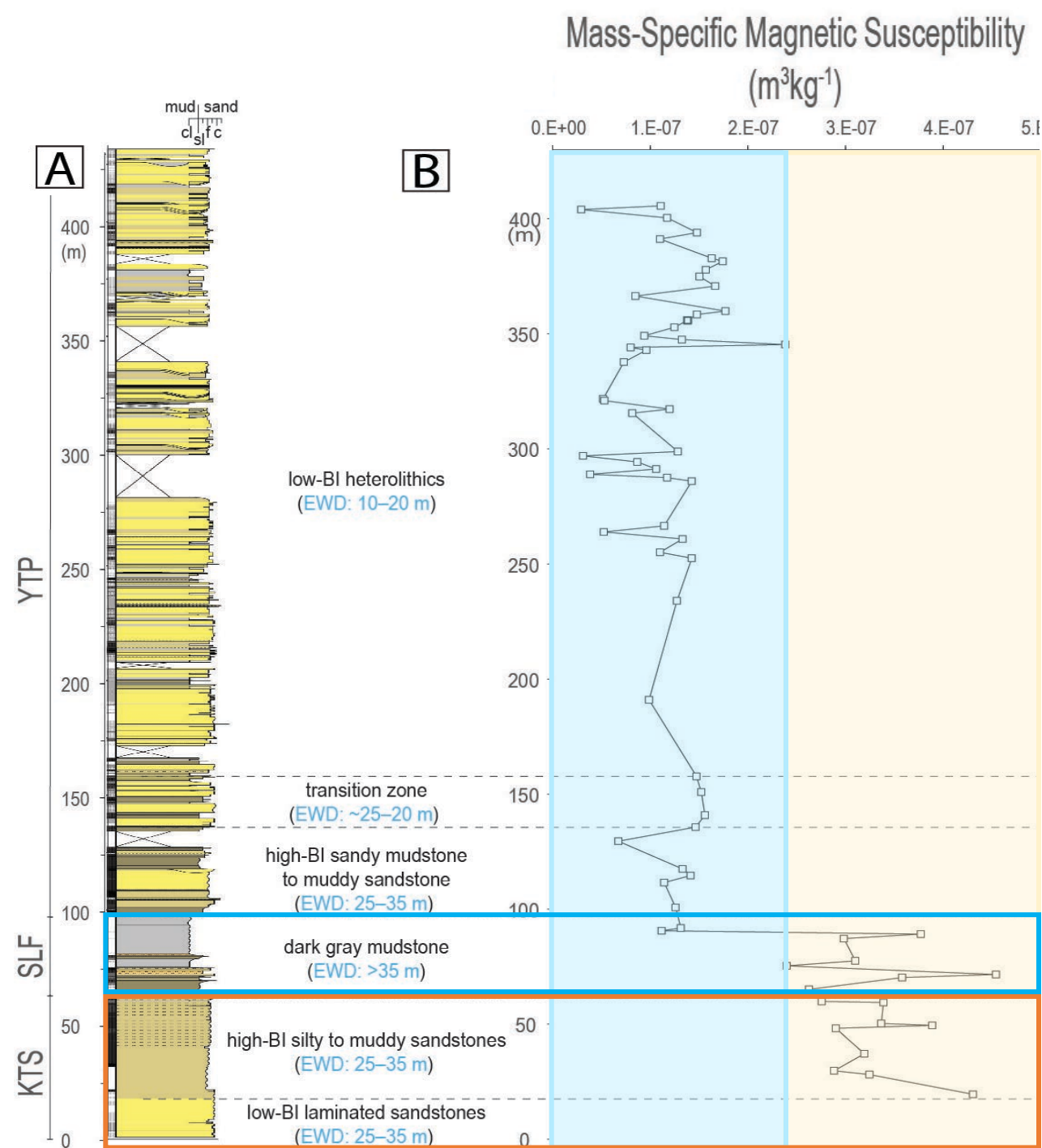
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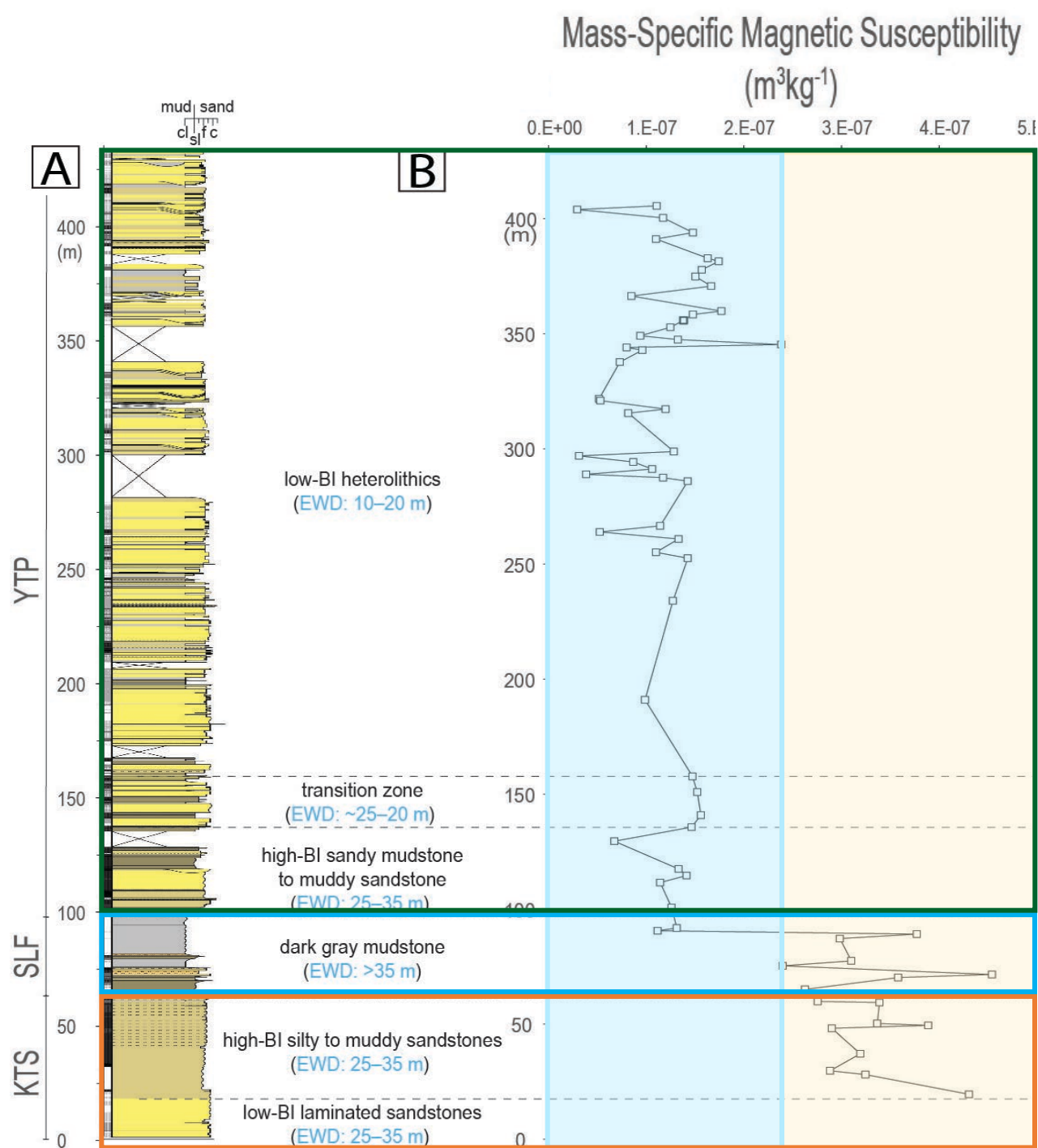
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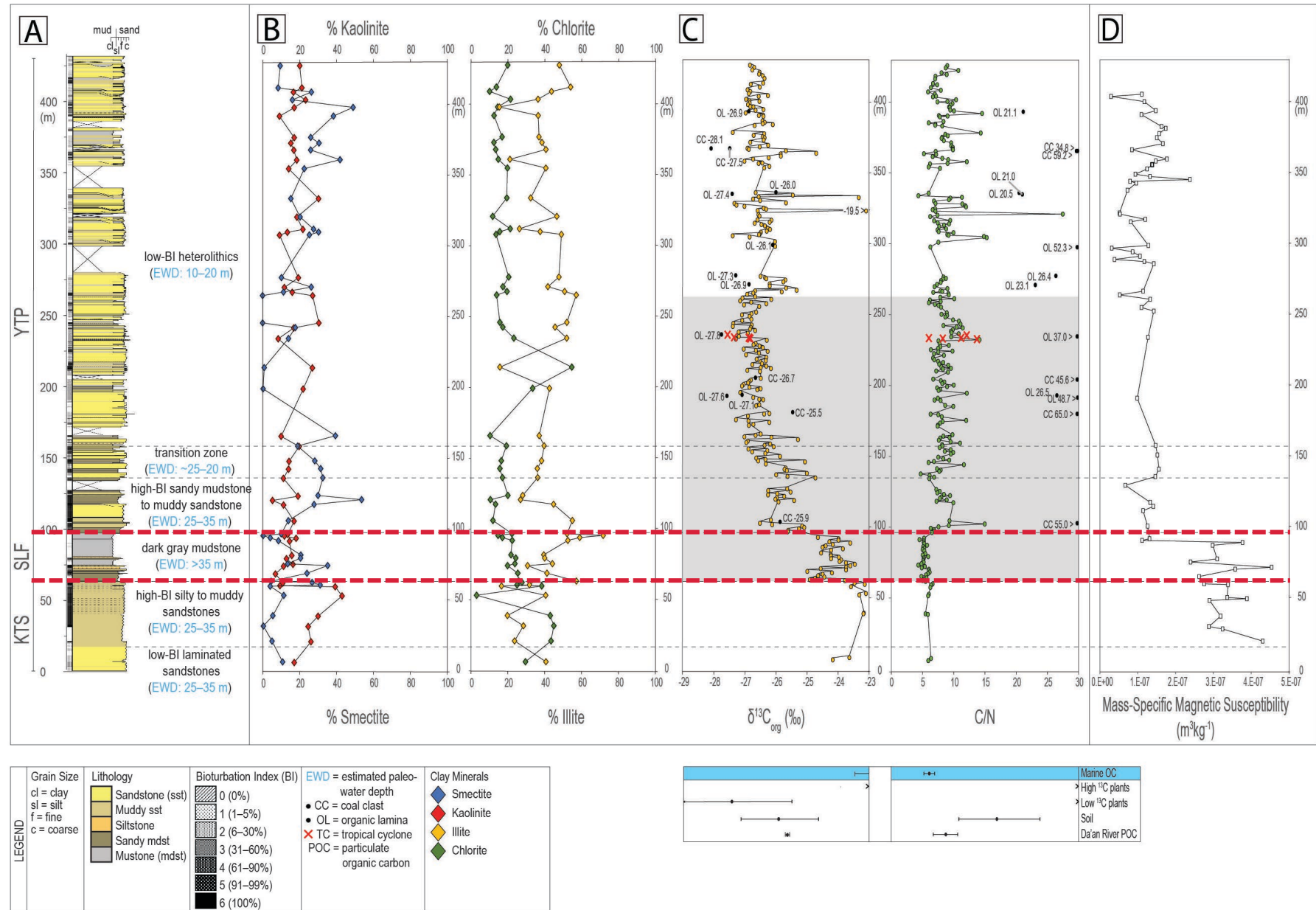
Results



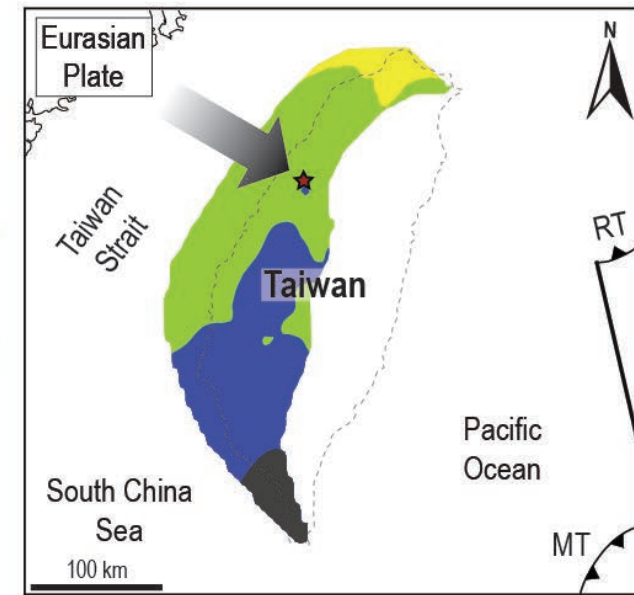
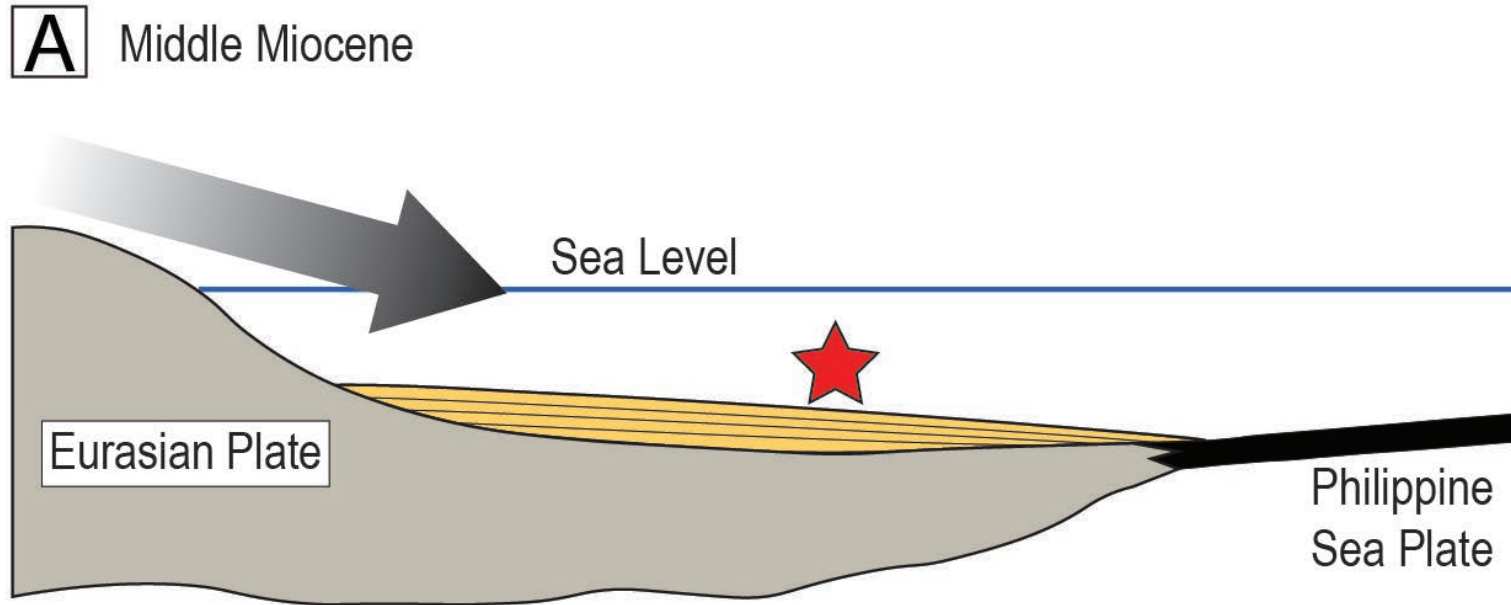
Results



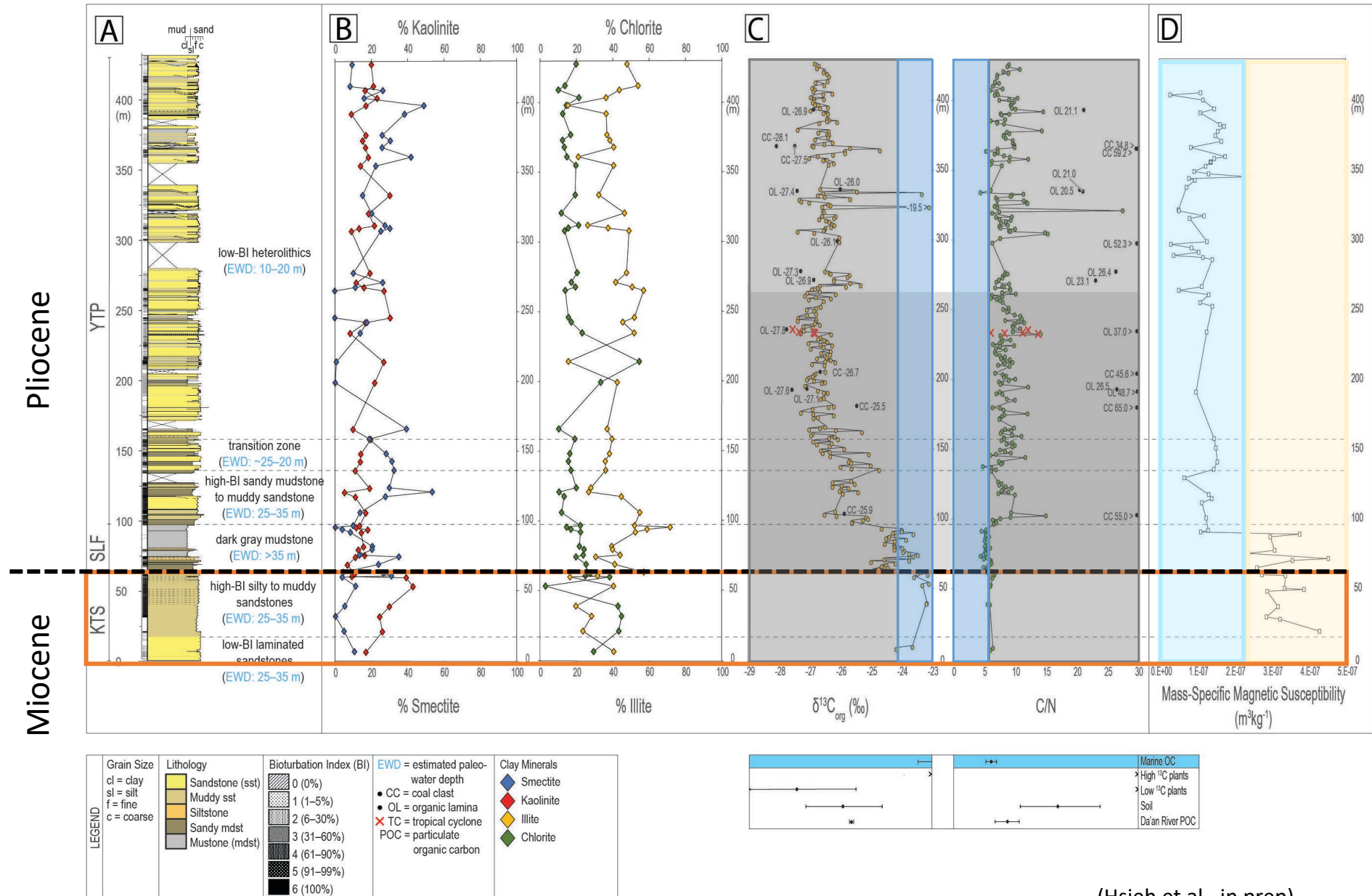
Results Summary



Discussion



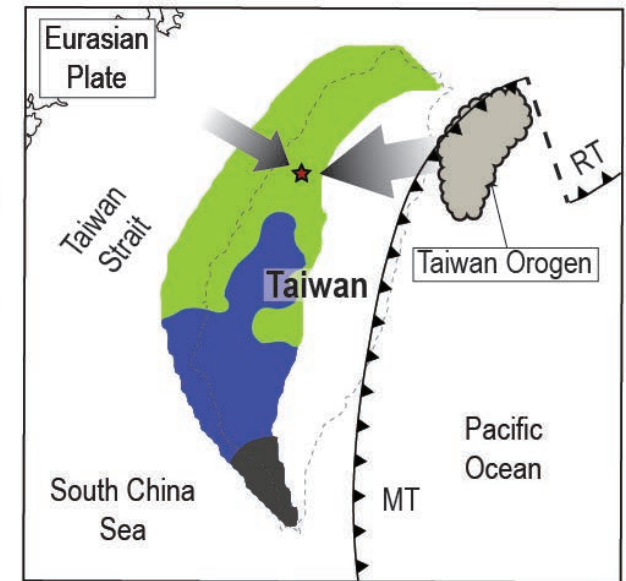
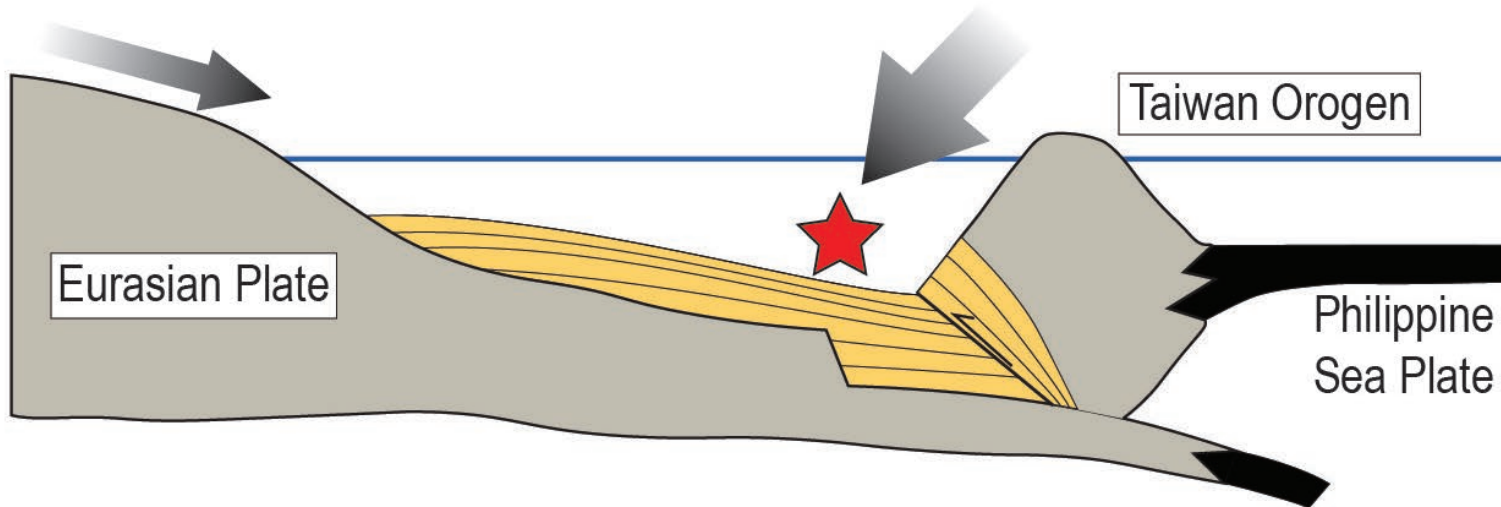
Discussion



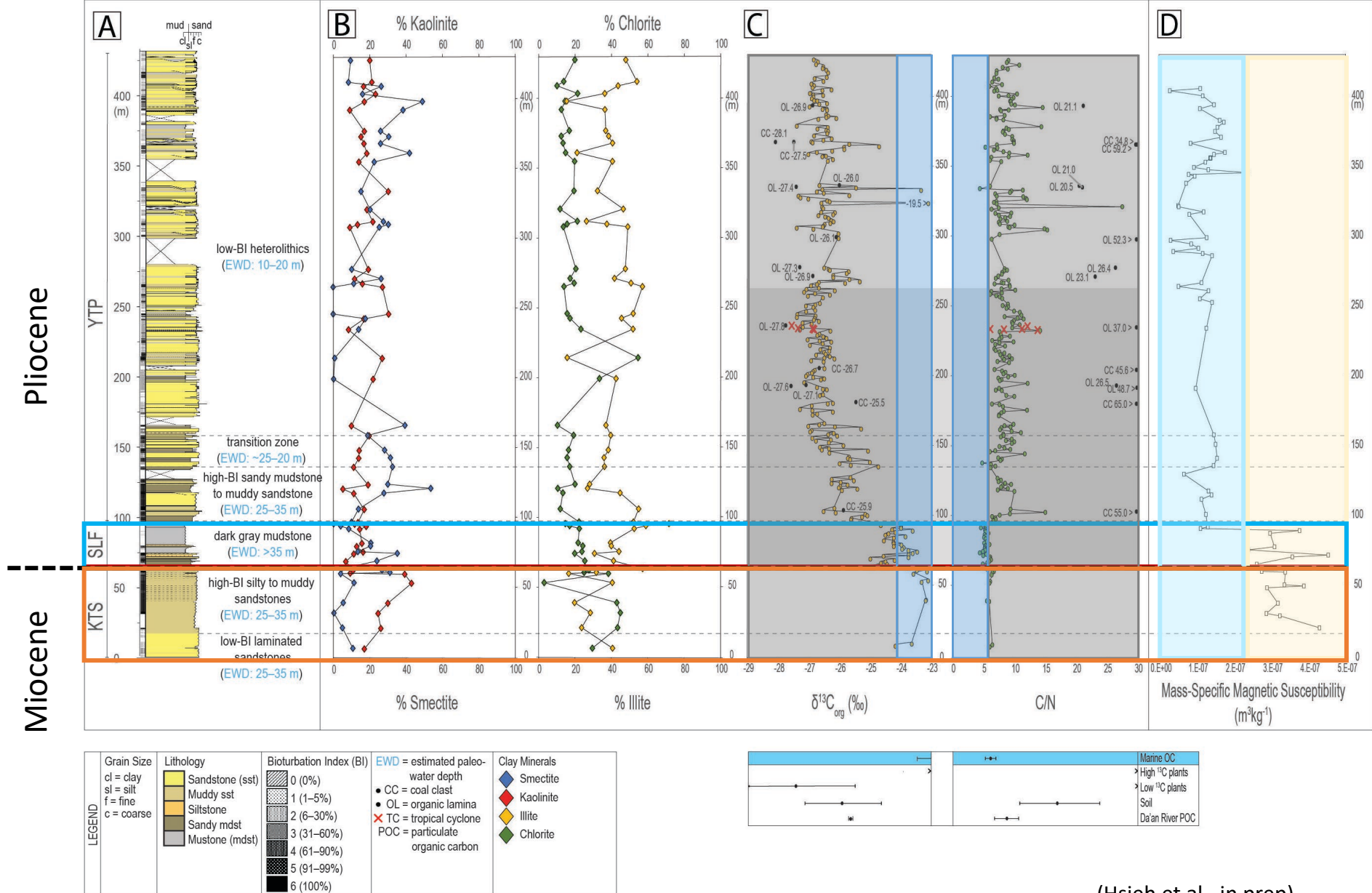
(Hsieh et al., in prep)

Discussion

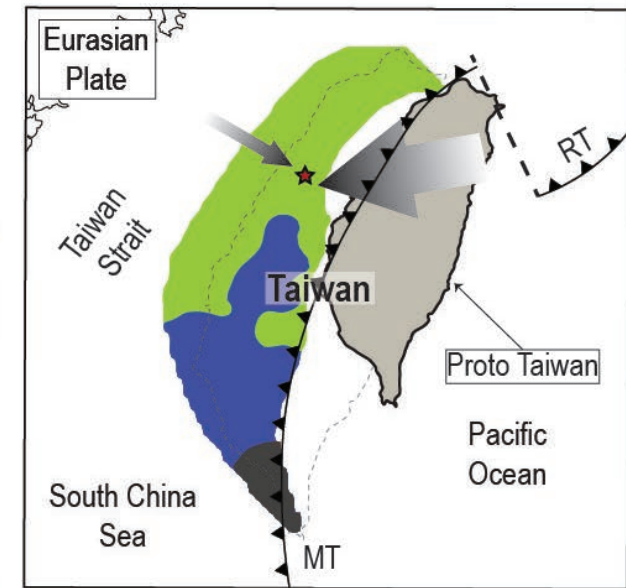
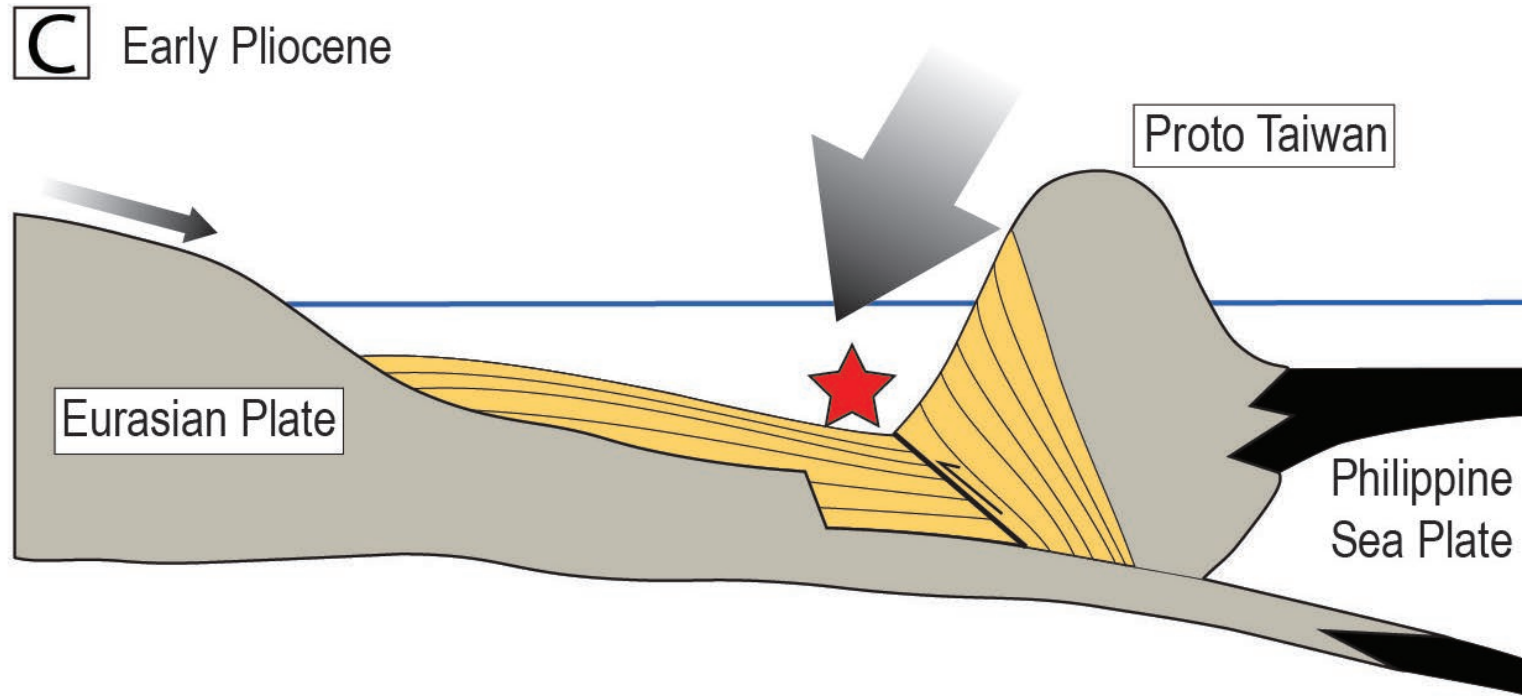
B Miocene-Pliocene Transition



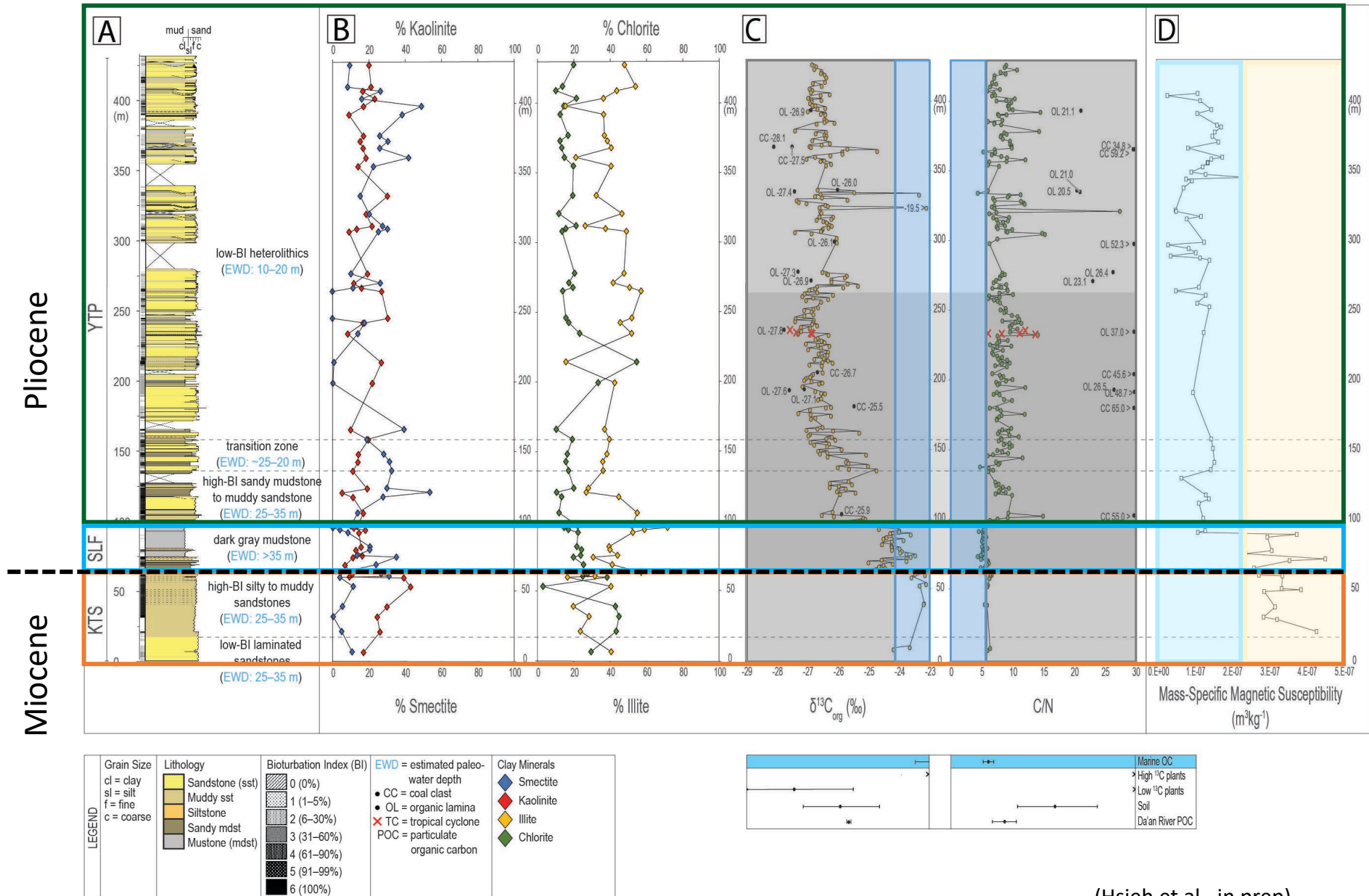
Discussion



Discussion



Discussion

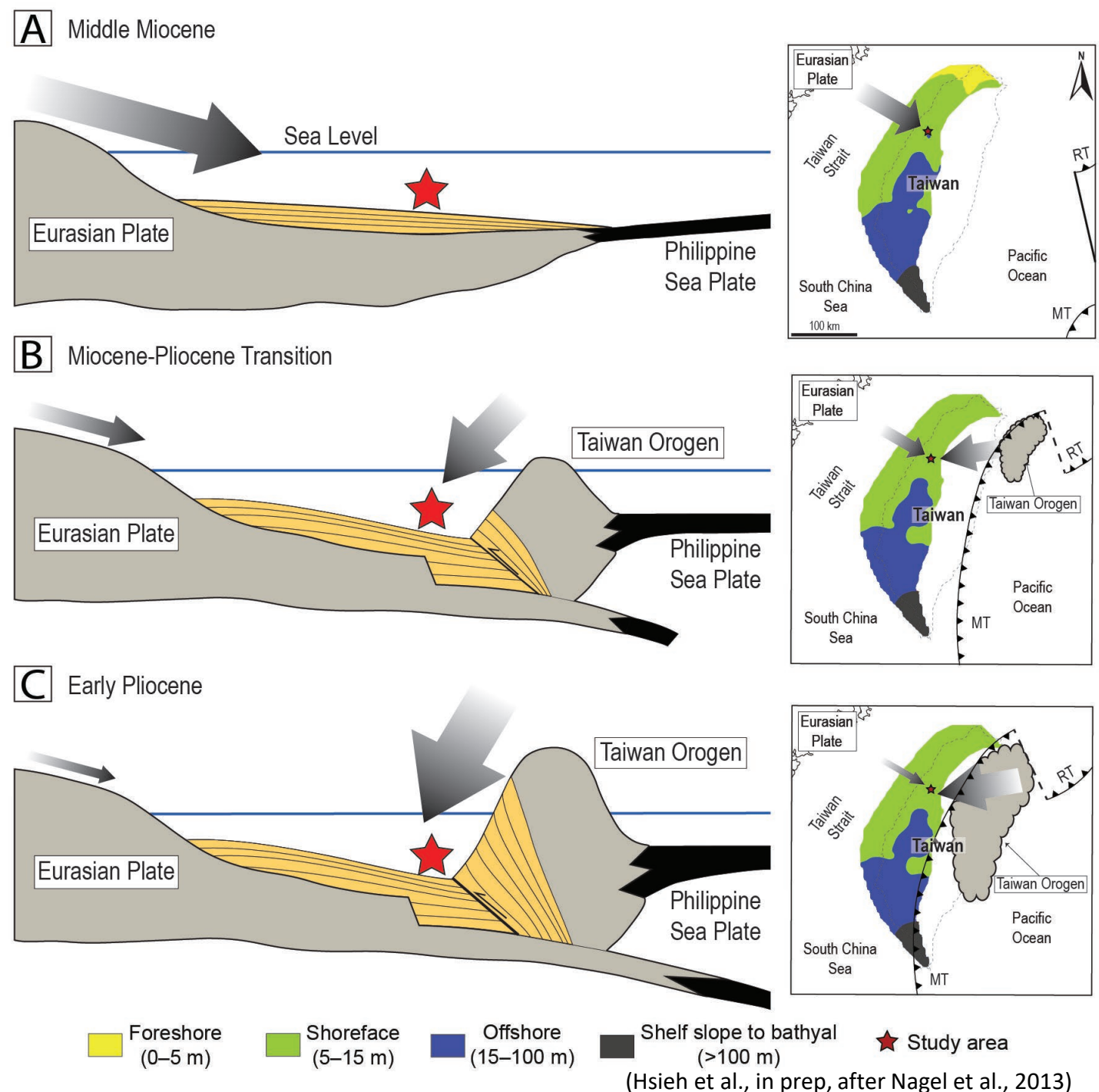


(Hsieh et al., in prep)

Conclusion

Onset of sedimentation from Taiwan in the late Miocene → ~2 Myr earlier than previously thought!

Taiwan became the dominant sediment source in the early Pliocene → Transition of sources happened in < 1 Myr!

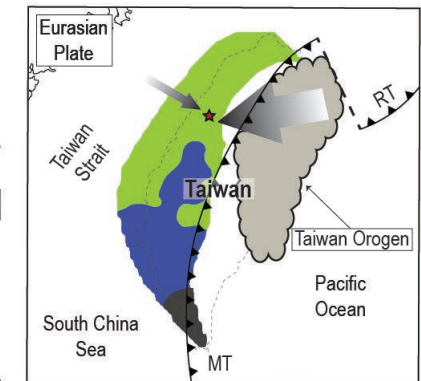
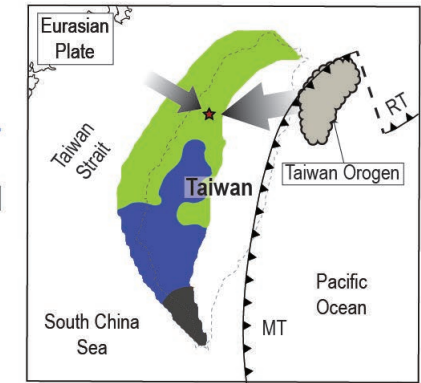
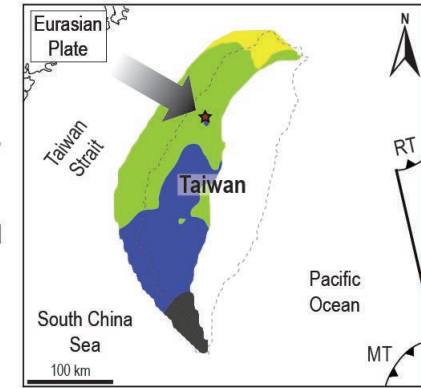
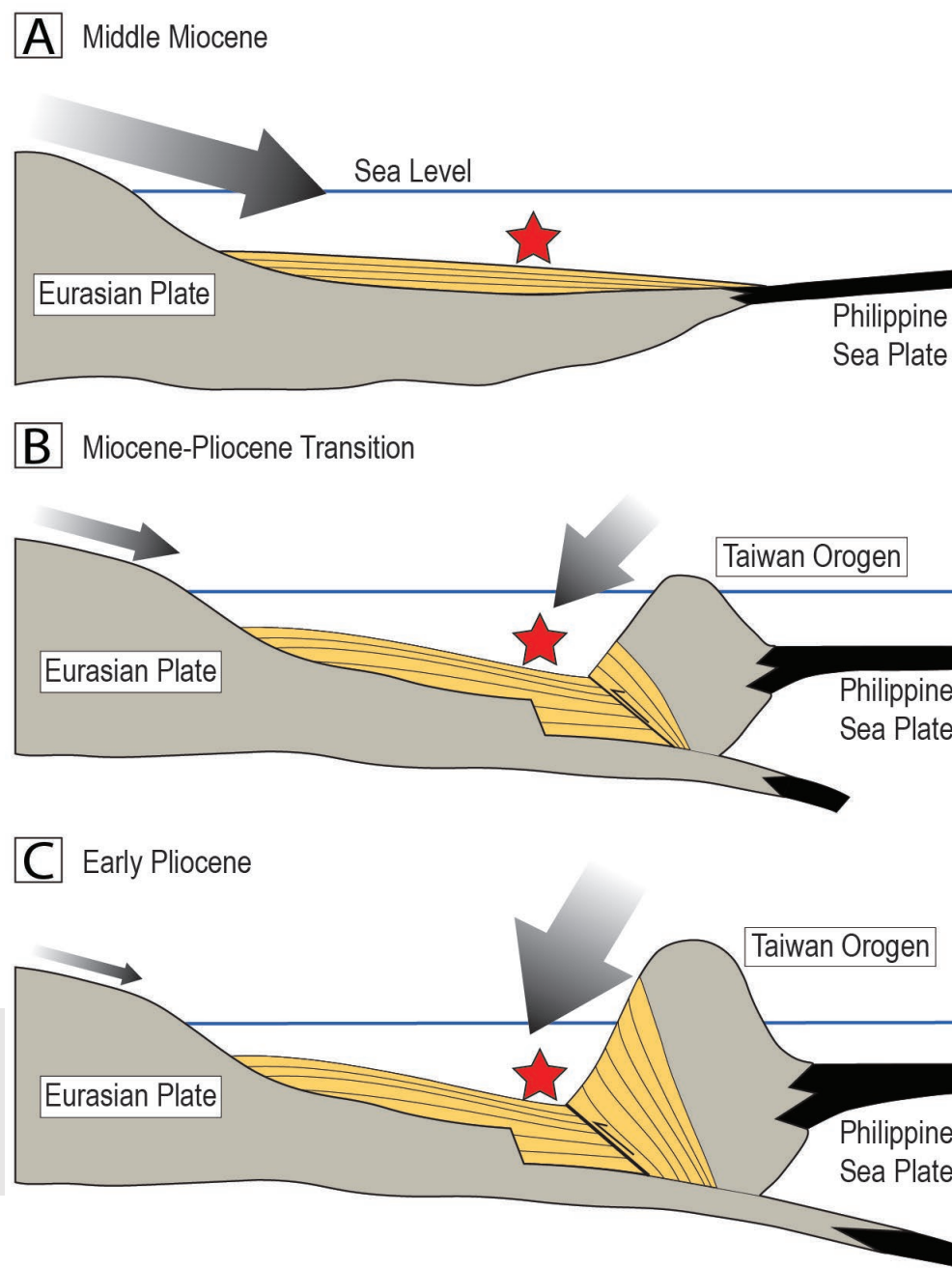


Conclusion

Onset of sedimentation from Taiwan in the late Miocene → ~2 Myr earlier than previously thought!

Taiwan became the dominant sediment source in the early Pliocene → Transition of sources happened in < 1 Myr!

Thank You!



Foreshore
(0–5 m)

Shoreface
(5–15 m)

Offshore
(15–100 m)

Shelf slope to bathyal
(>100 m)

★ Study area

(Hsieh et al., in prep, after Nagel et al., 2013)