Metasomatism between serpentinite and pelitic schist in the Yuli belt, eastern Taiwan: fluid-rock interactions during subduction metamorphism

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Abstract

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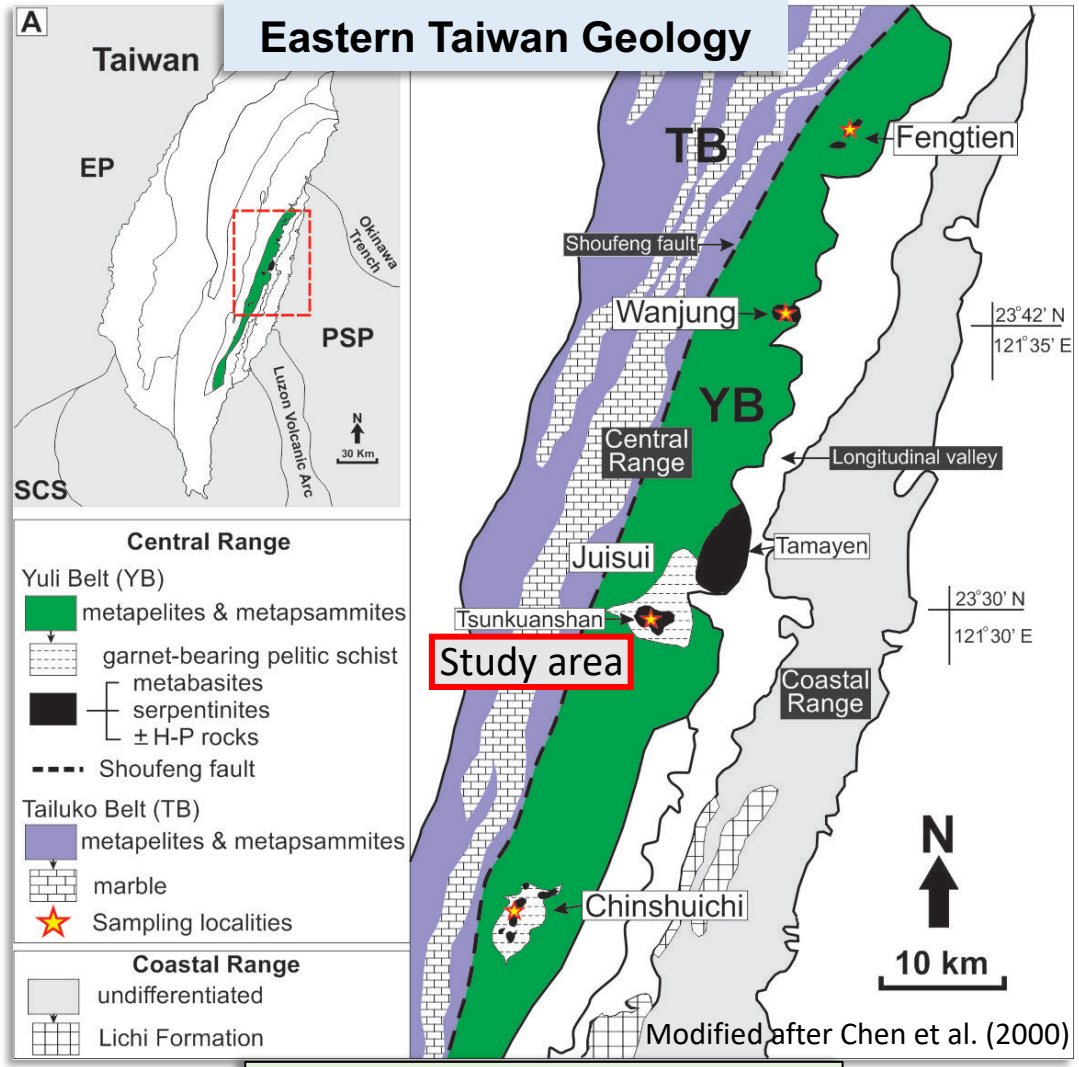
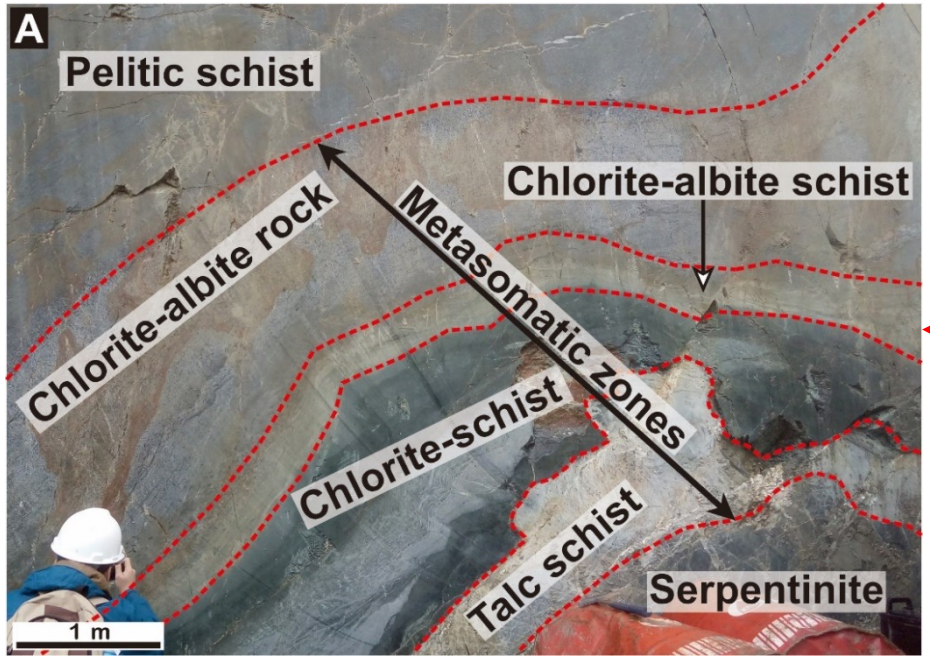


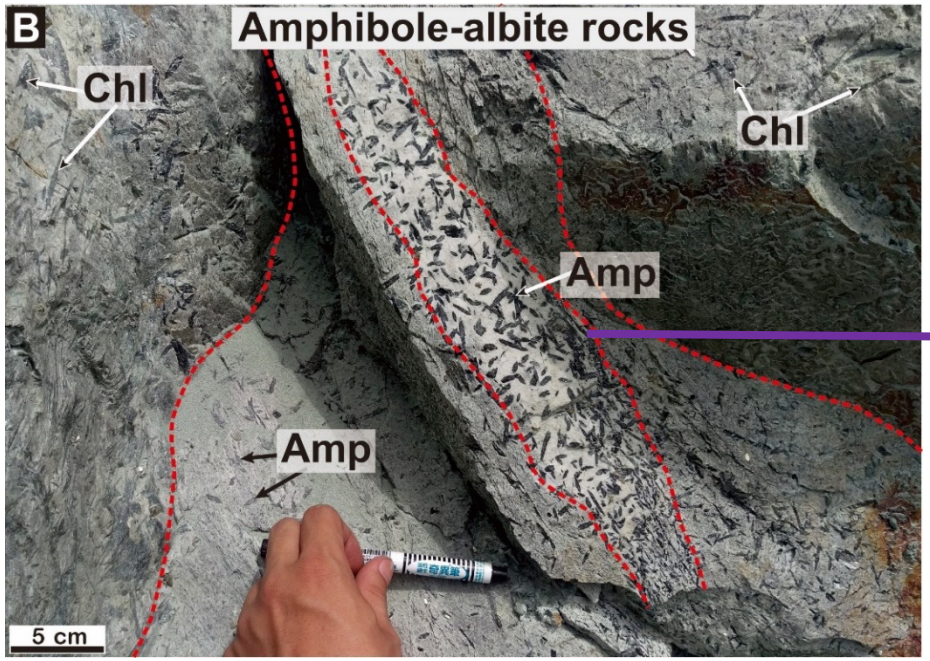
The Yuli metamorphic belt

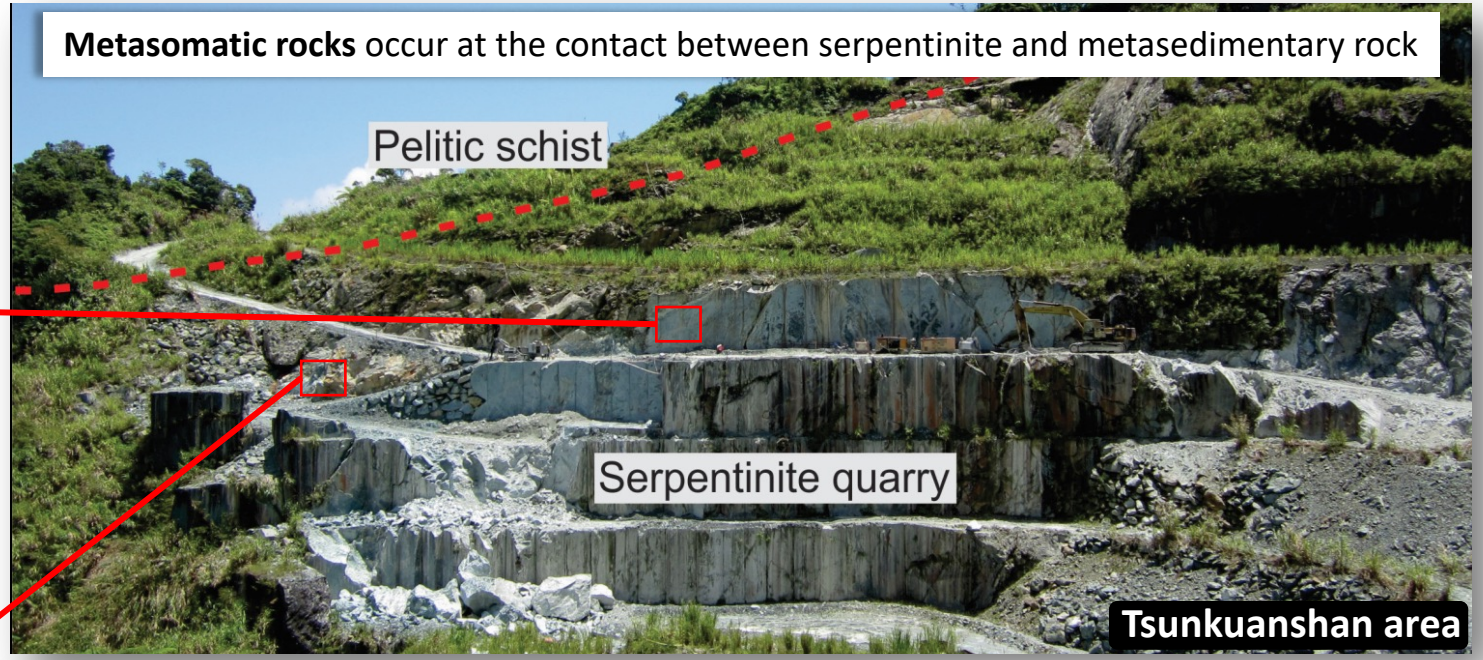
Subduction-related metamorphism
(Keyser et al., 2016; Huang et al., 2020)

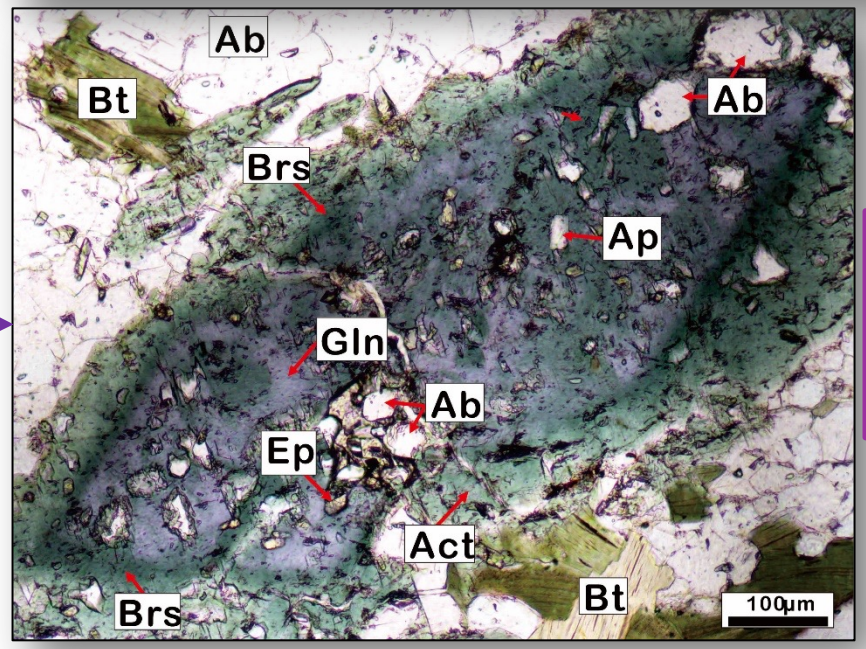
High-pressure metamorphic belt
P-T conditions 1.0-1.7 GPa and 480-560 °C
(Beyssac et al., 2008; Tsai et al., 2013; Baziotis et al., 2017)

Field observations



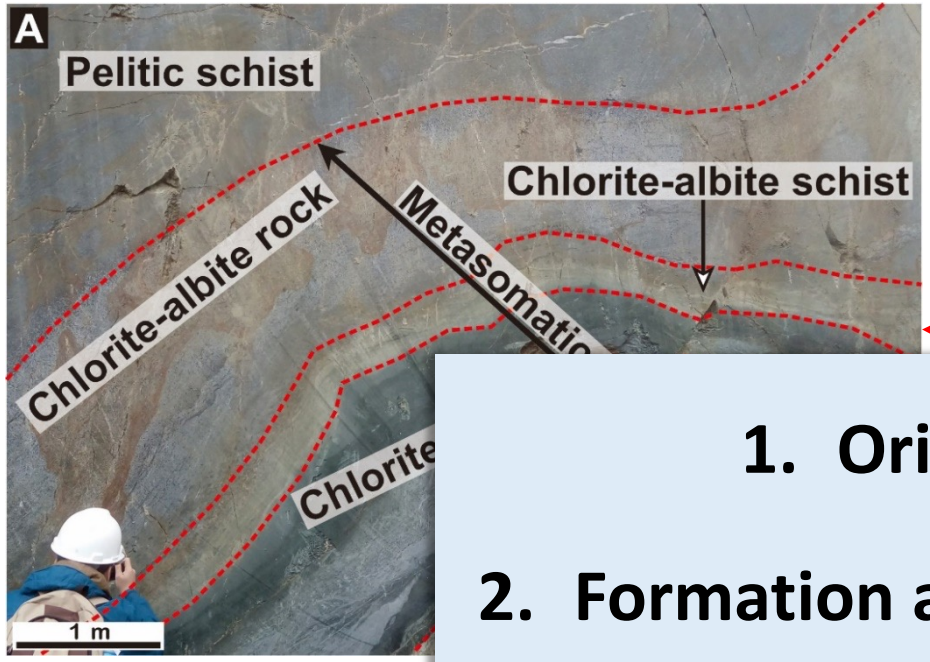




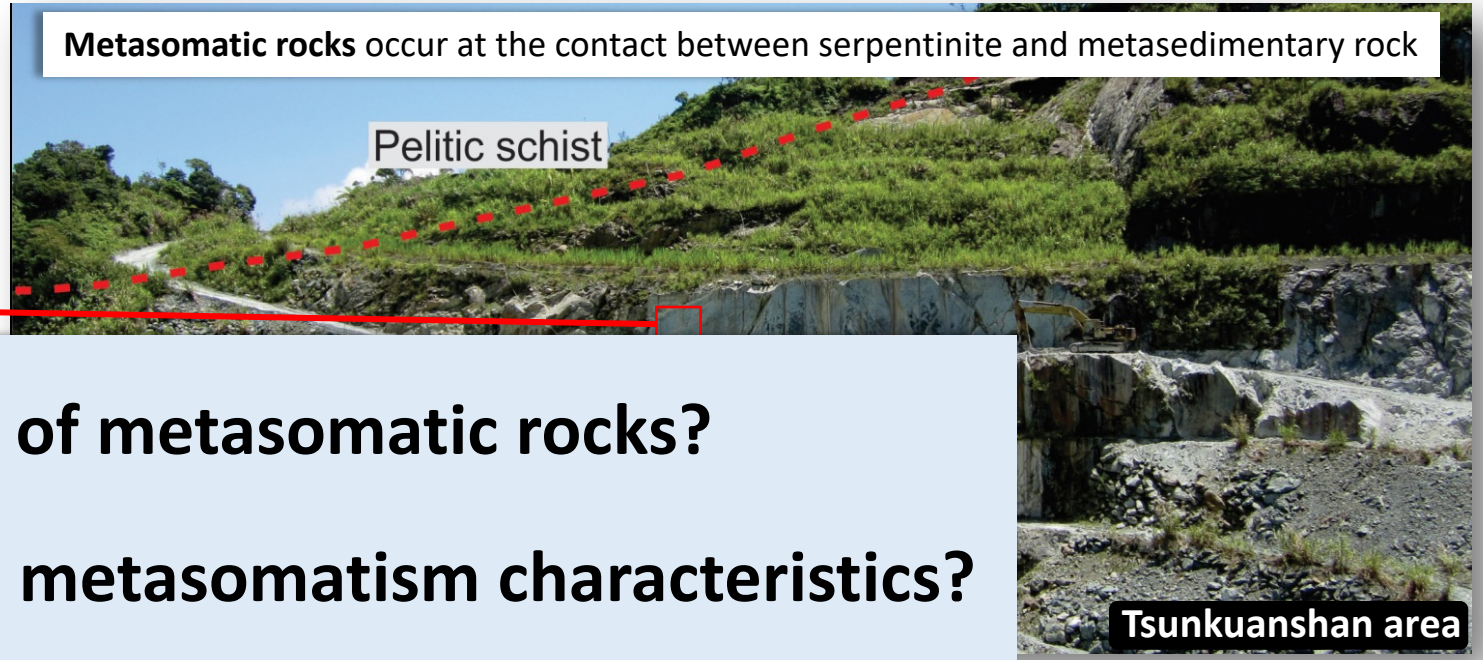


Amphibole zoned (three stages)
- Purple **glaucophane** (core)
- Dark green **barroisite** (mantle)
- Light green **actinolite** (rim)

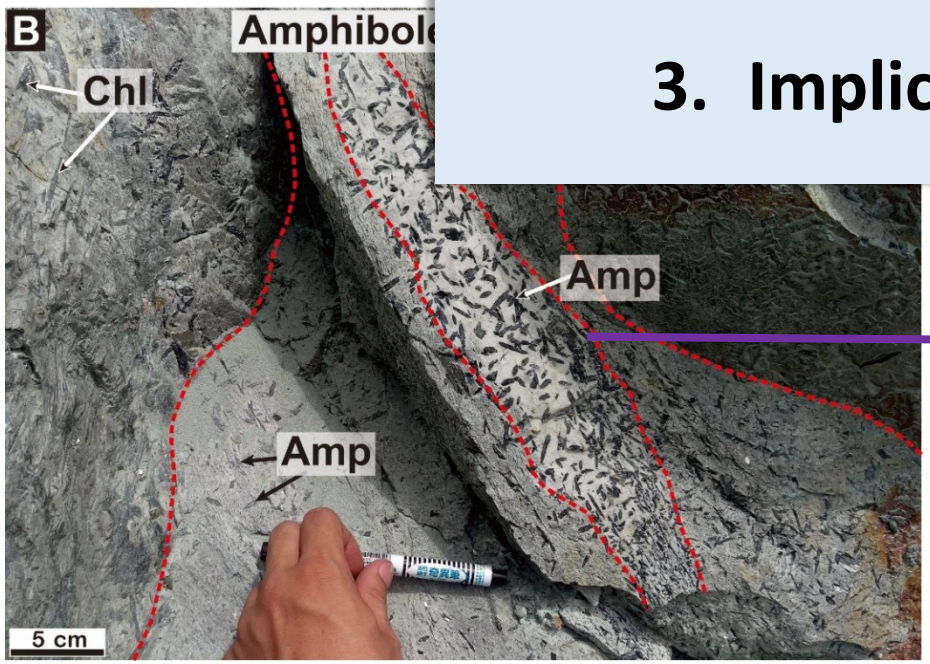
Research questions

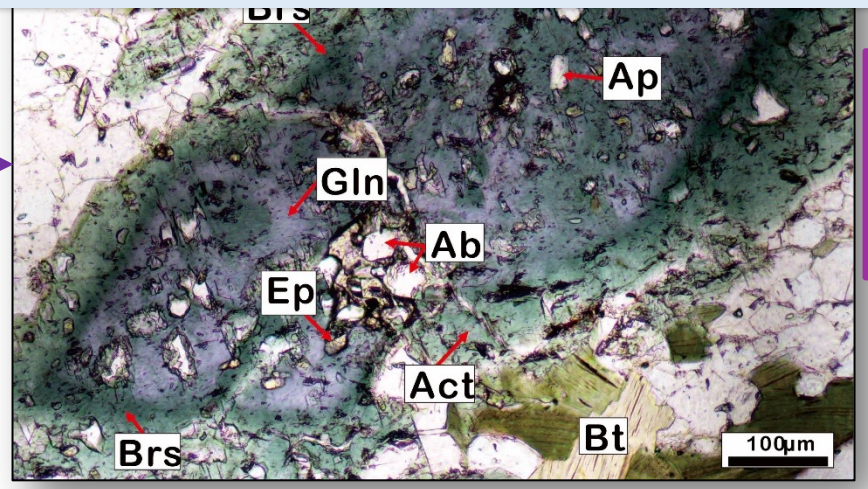


Metasomatic rocks occur at the contact between serpentinite and metasedimentary rock



1. Origin of metasomatic rocks?
2. Formation and metasomatism characteristics?
3. Implication to the tectonic setting?





Amphibole zoned (three stages)
- Purple **glaucophane** (core)
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Modal proportions

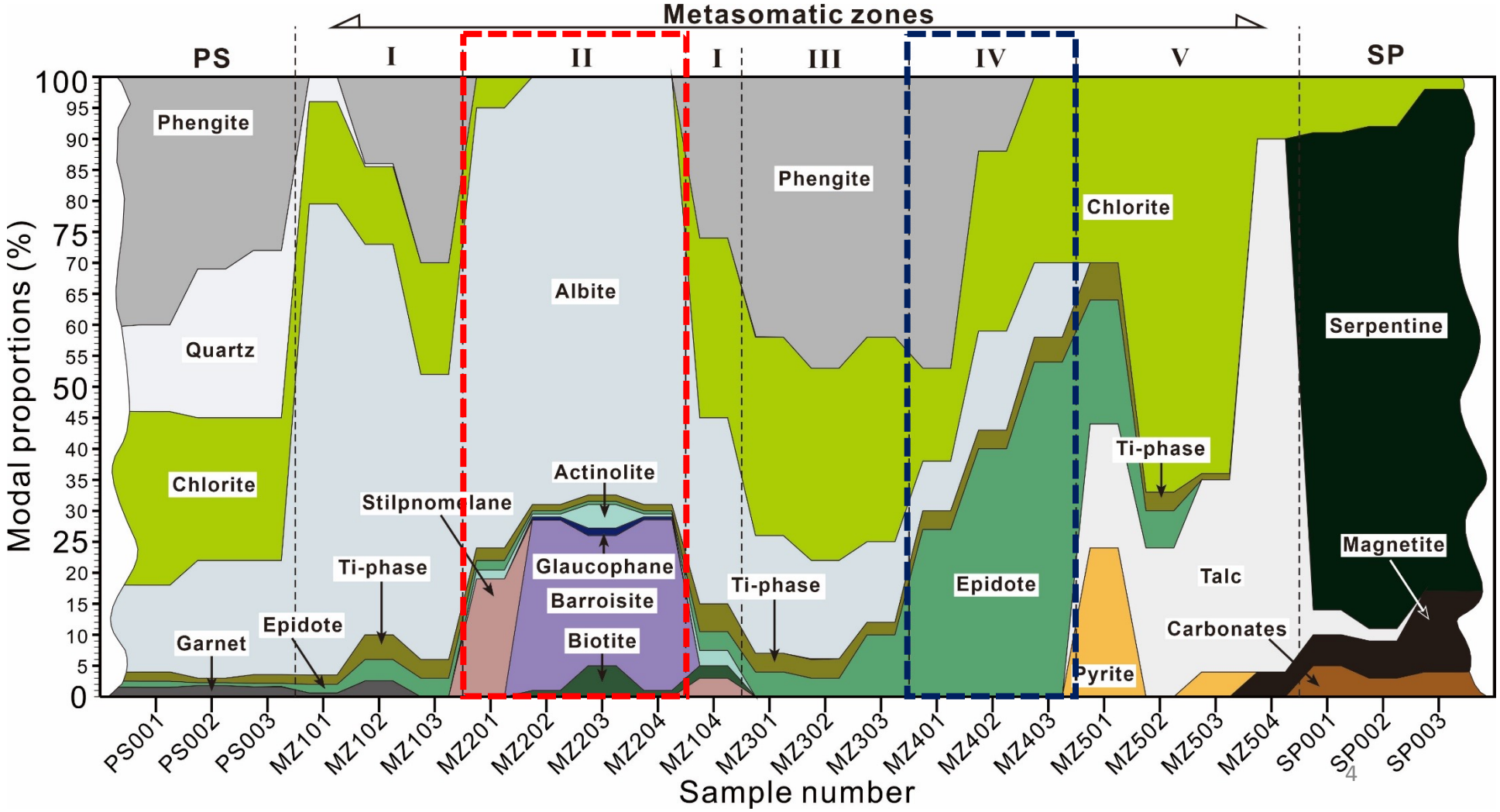
Pelitic schist	Metasomatic zones						Serpentinite
	Chorite-albite rock/schist	Amphibole-albite rock	Chorite-albite rock	Albite-chlorite schist	Epidote-chlorite schist	Chlorite-talc schist	
PS	Zone I	Zone II	Zone I	Zone III	Zone IV	Zone V	SP

Anomaly in zone II:

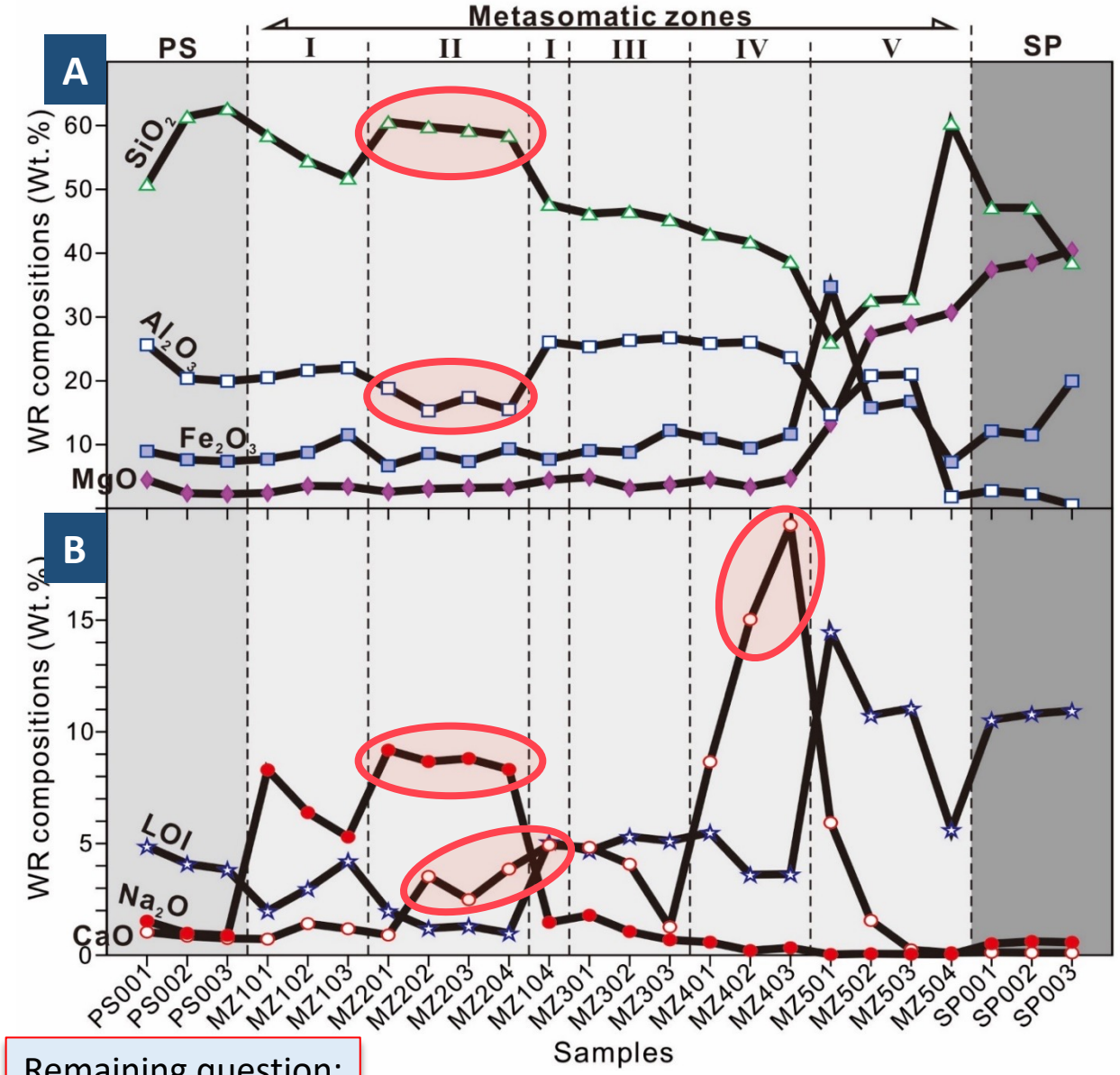
1. Increase of **albite**.
2. Decrease of **chlorite** and **phengite**.
3. The only occurrence of **amphibole** (glaucophane-barroisite-actinolite zoning).

Anomaly in zone IV:

1. Increase of **epidote**.
2. Decrease of **chlorite** and **phengite**.



Whole-rock geochemical compositions



Remaining question:

Why zone **II** and **IV** show **unusual chemical compositions**?

Key points:

A

1. **SiO_2 increased** (zone II)
2. **Al_2O_3 decreased** (zone II)

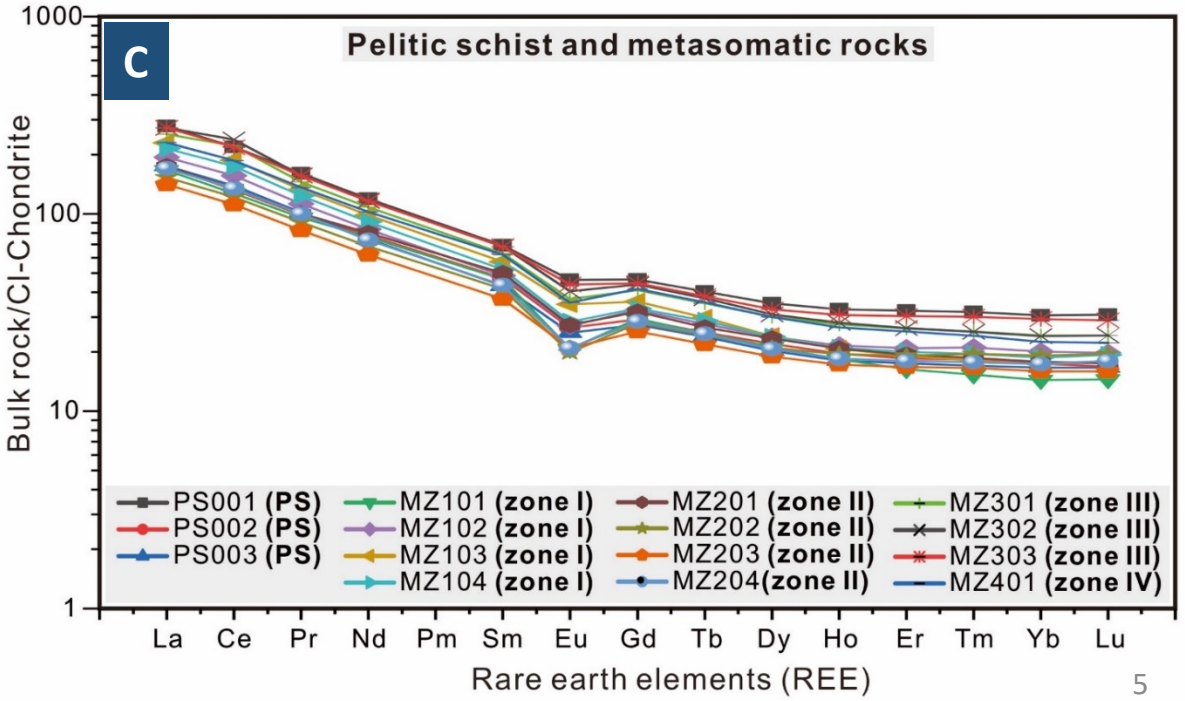
B

1. **Na_2O increased** (zone II)
2. **CaO increased** (zone II - IV)

C

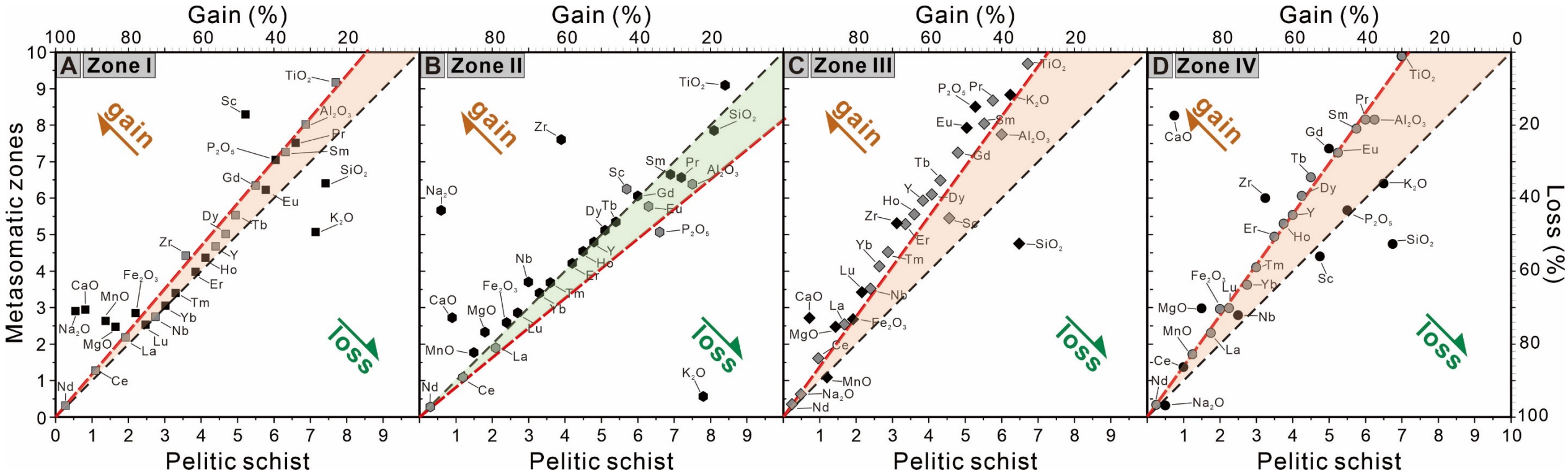
REE compositions in **pelitic schist** and **metasomatic rocks** (zone I, II, III, and IV) show **similar patterns.**

Metasomatic rocks (zone I, II, III, and IV) and **pelitic schist** were likely from the **same origin**



Isocon method

Isocon analysis is a simple and effective means of quantitatively estimating changes in mass or volume or **concentration** in mass transfer (Grant, 1986; 2005)



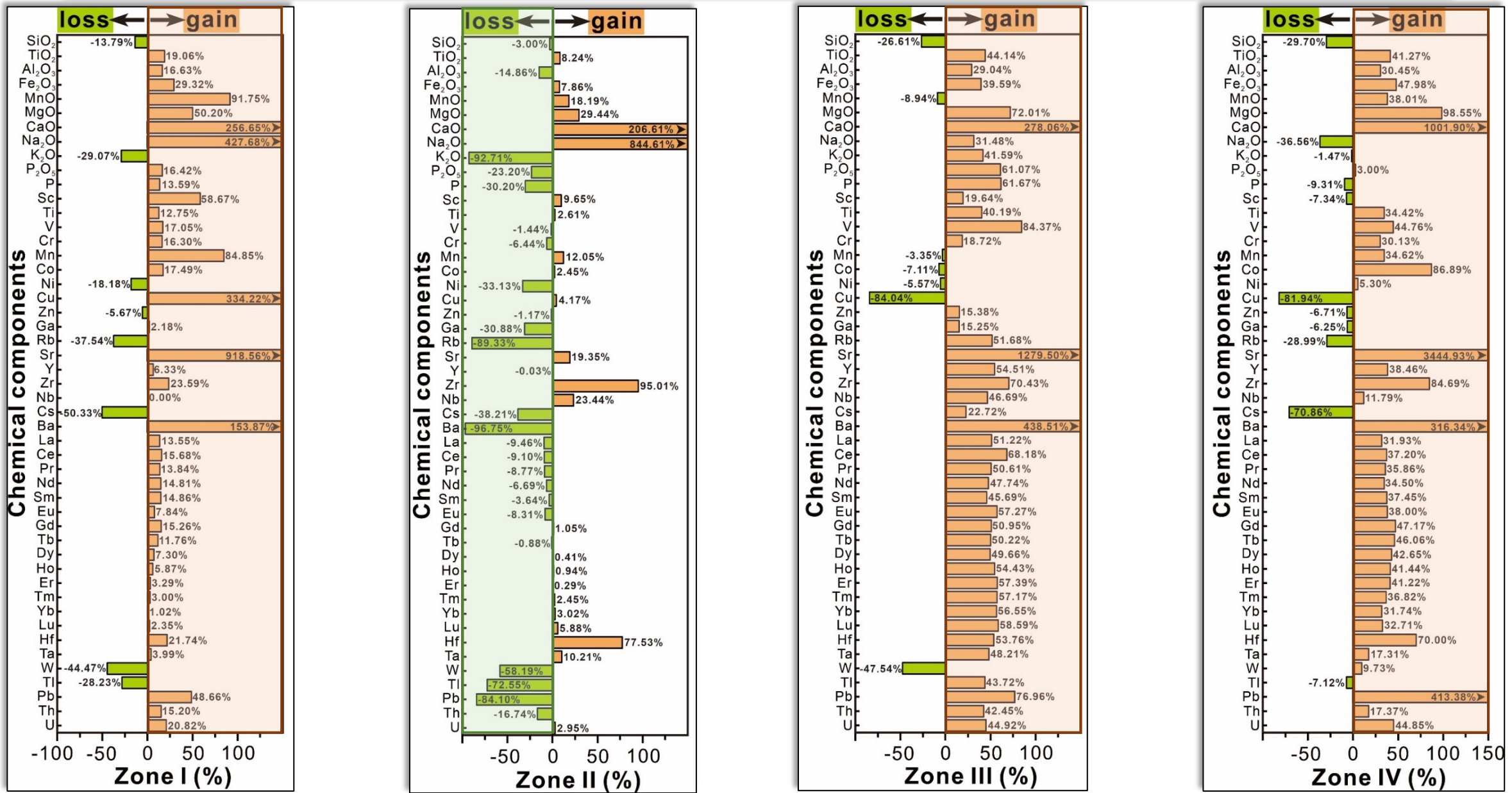
Concentrations of chemical component in **zone I, III, and IV** were **gains** relative to the pelitic schist

Concentrations of chemical component in **zone II** were **loss** compare to the pelitic schist

Isocon method follows Kuwatani et al. (2020)

Gain or loss in chemical concentrations

Metasomatism in **Zone II** might have been affected by **external fluid infiltrations (Na-Ca rich).**



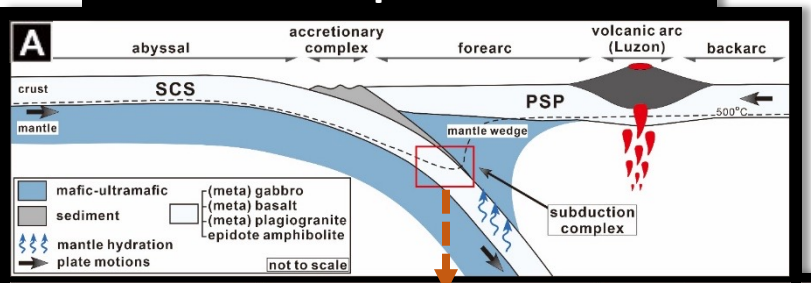
Conclusions

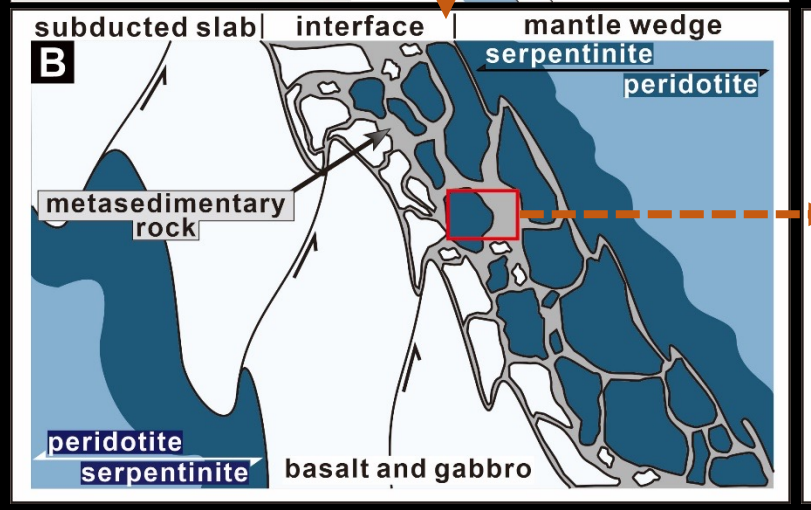
1)

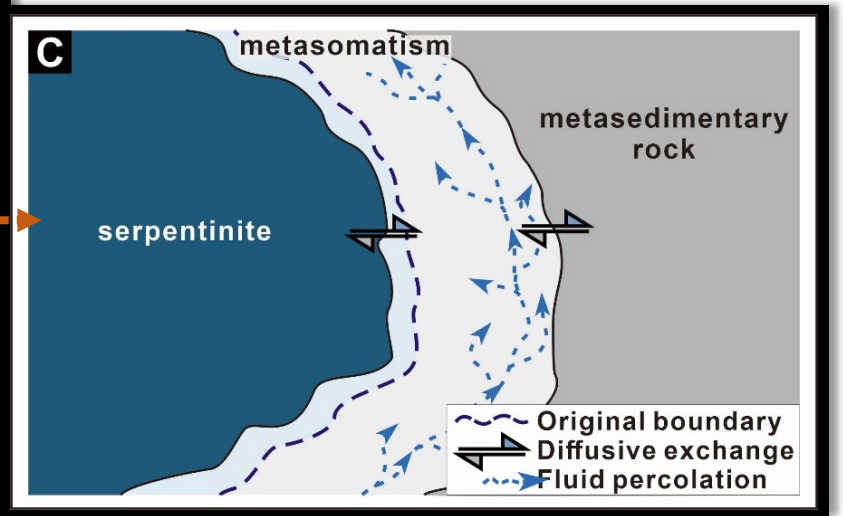
Pelitic schist	Metasomatic zones						
	Chorite-albite rock/schist	Amphibole-albite rock	Chorite-albite rock	Albite-chlorite schist	Epidote-chlorite schist	Chlorite-talc schist	Serpentinite
PS	Zone I	Zone II	Zone I	Zone III	Zone IV	Zone V	SP

Same origin — **Original contact boundary** — **Same origin**

Tectonic interpretation model







2) **Diffusive exchange** and **fluid infiltration** (Na-Ca rich) are responsible for the formation of the metasomatic zones.

3) Fluid-rock interactions during **subduction metamorphism**.

Thank you for your attention!

Abstract

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