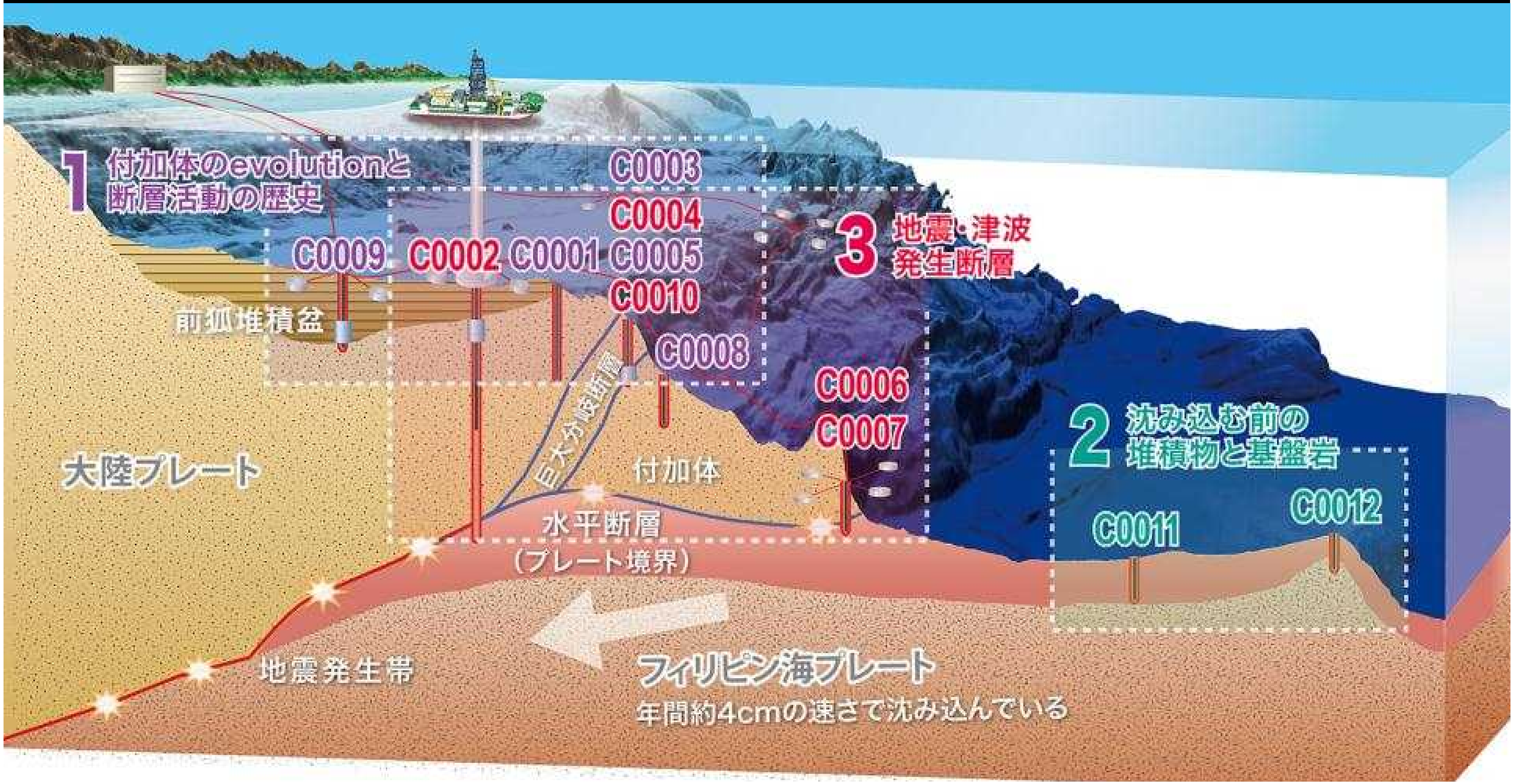
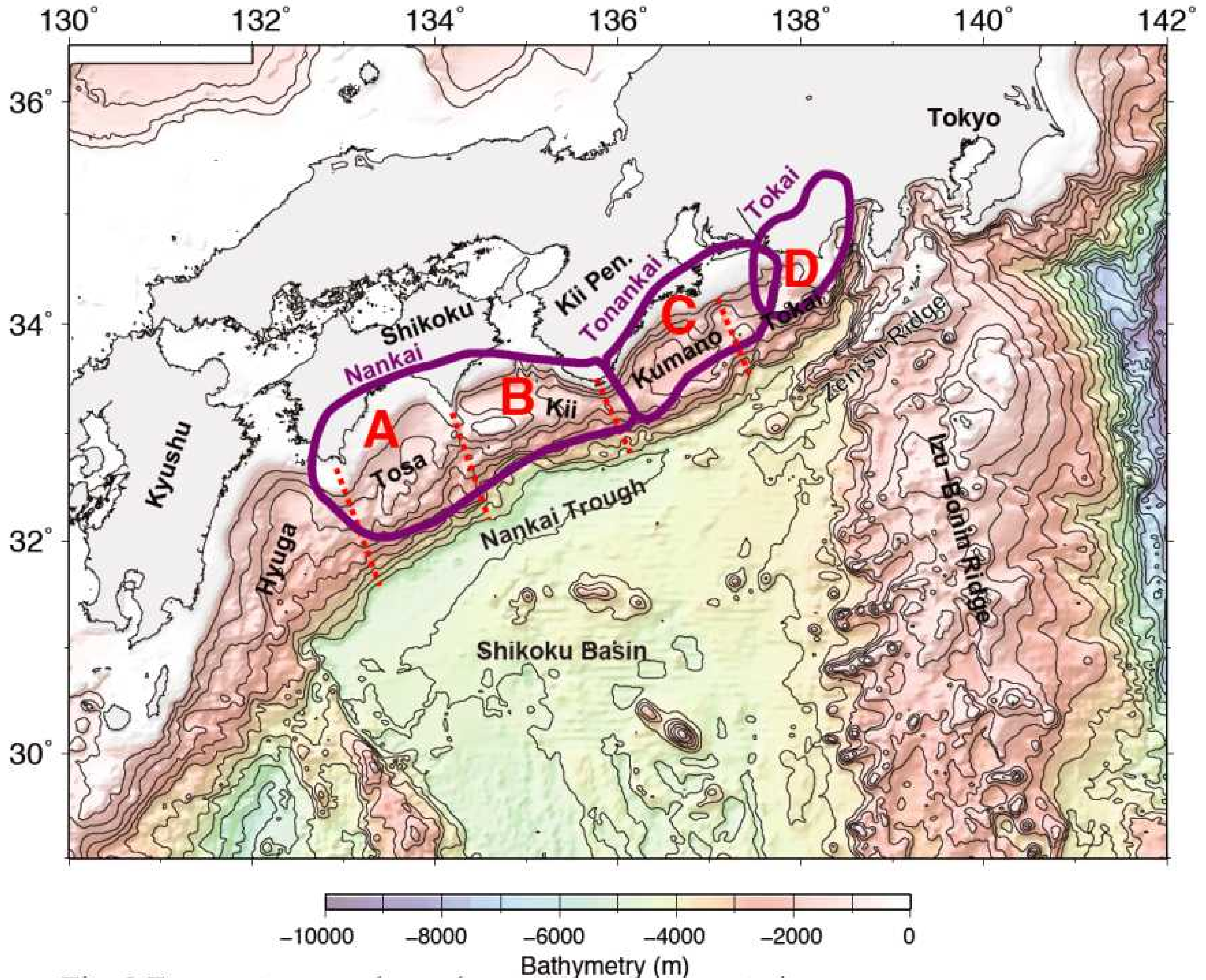
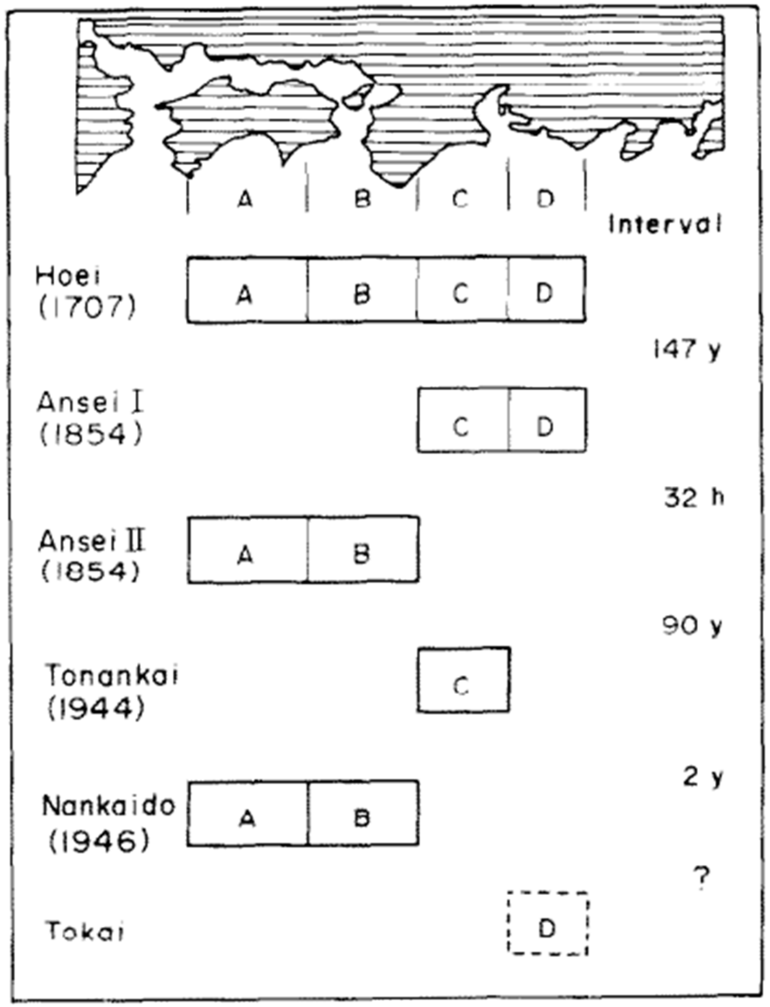
1. 付加体の進化と断層活動の歴史
2. 沈み込む堆積物と基盤岩
3. 地震・津波発生断層
4. 地震観測の現状と展望

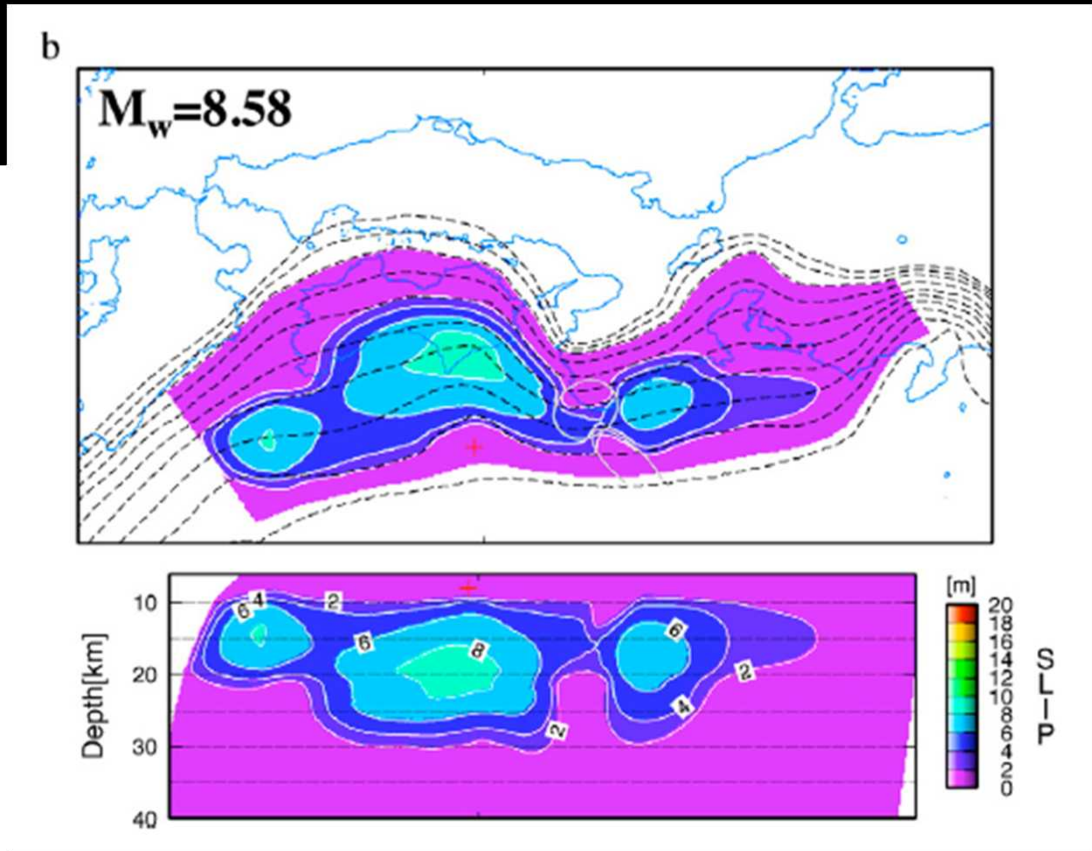



130°
132°
134°
136°
138°
140°
142°
36°
34°
32°
30°
Tokyo
Tokai
D
Kii Pen.
Tonankai
C
Tokai
Shikoku
Nankai
Kumano
B
Kii
A
Tosa
Kyushu
Nankai Trough
Zenisu Ridge
Izu-Bonin Ridge
Hyuga
Shikoku Basin
−10000
−8000
−6000
−4000
−2000
0
Bathymetry (m)

何が破壊領域を決めているか？



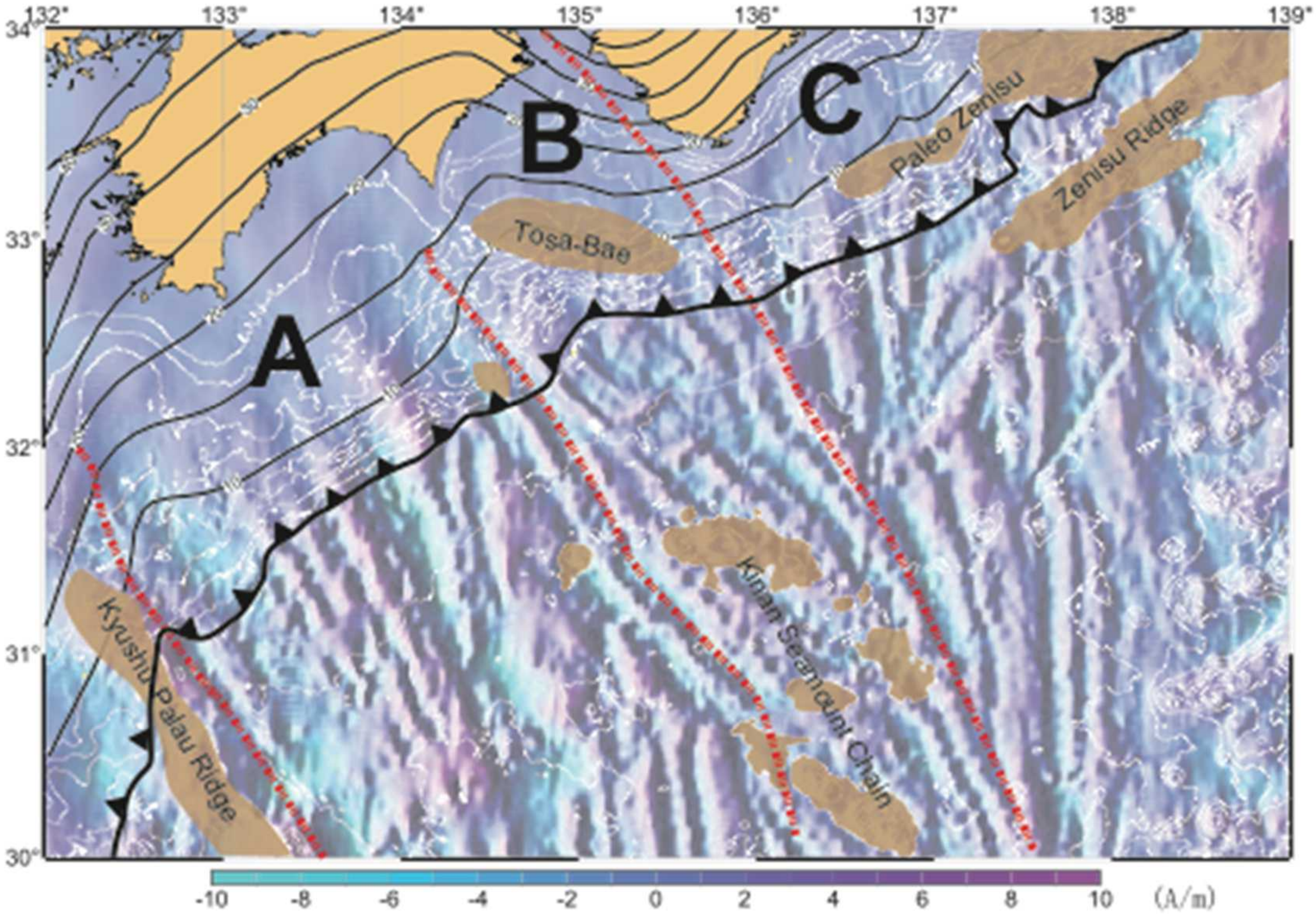
Ando, 1975



Hyodo & Hori, 2013

沈み込む（下盤）プレート?
沈み込まれる（上盤）プレート?
プレート境界断層の地域変化?

Topographic high and slab segmentation



Ando, 1975, Kido et al., 2004, Kodaira et al.,2002, 2004, Park et al., 1999; Ide et al., 2010

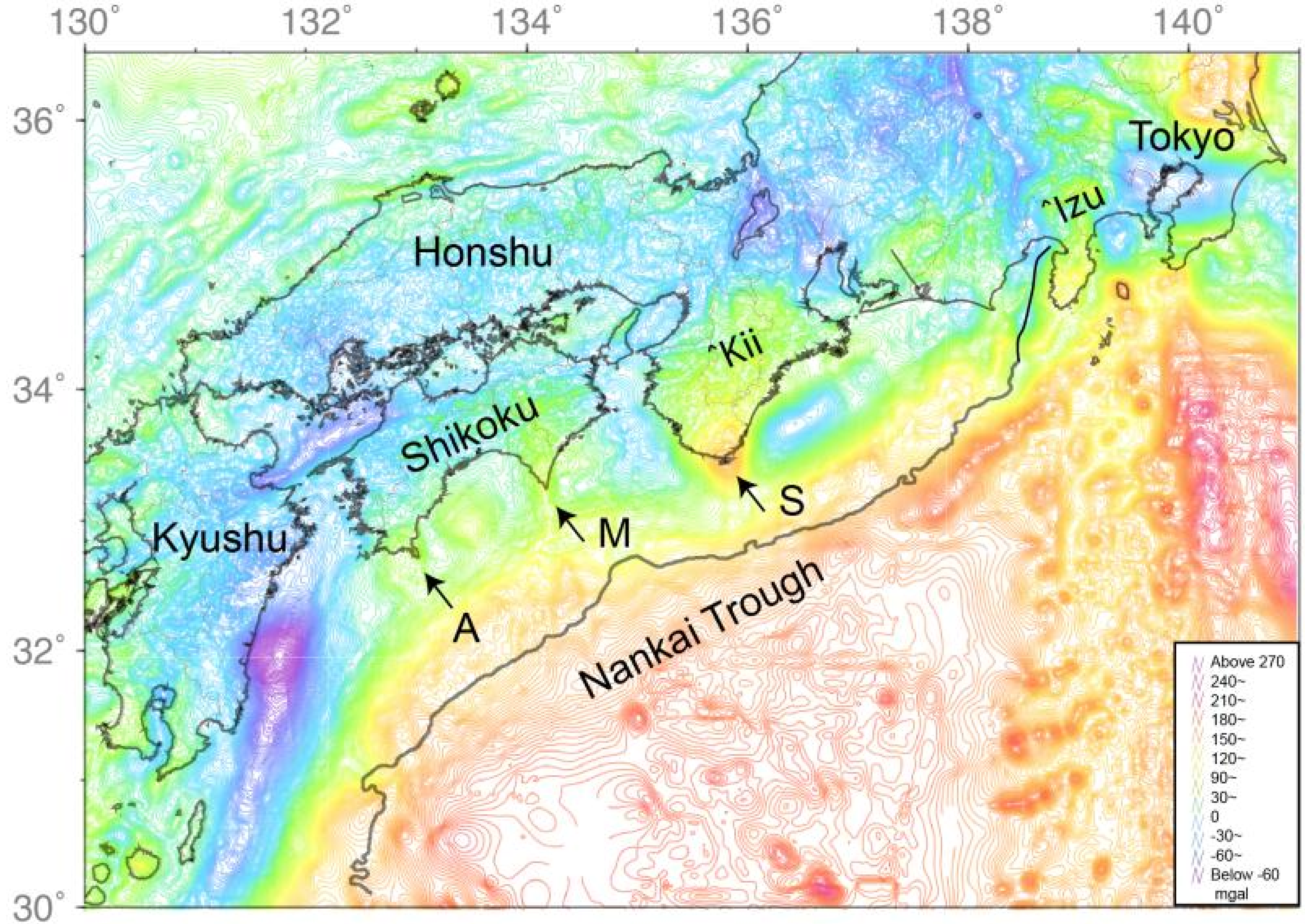


Fig. 4 Bouger gravity anomay for the assumed density of 2.0 g/cm^3. Note that the Capes Ashizuri (A), Muroto (M) in Shikoku, and Cape Shiono (S) in the Kii Peninsula and their northern extensions represent positive anomaly in the forearc region. The anomaly might be caused by the existence of dense pultonic rocks beneath there. Gravity contours are from Geological Survey of Jaspan (https://gbank.gsj.jp/geonavi/geonavi.php)

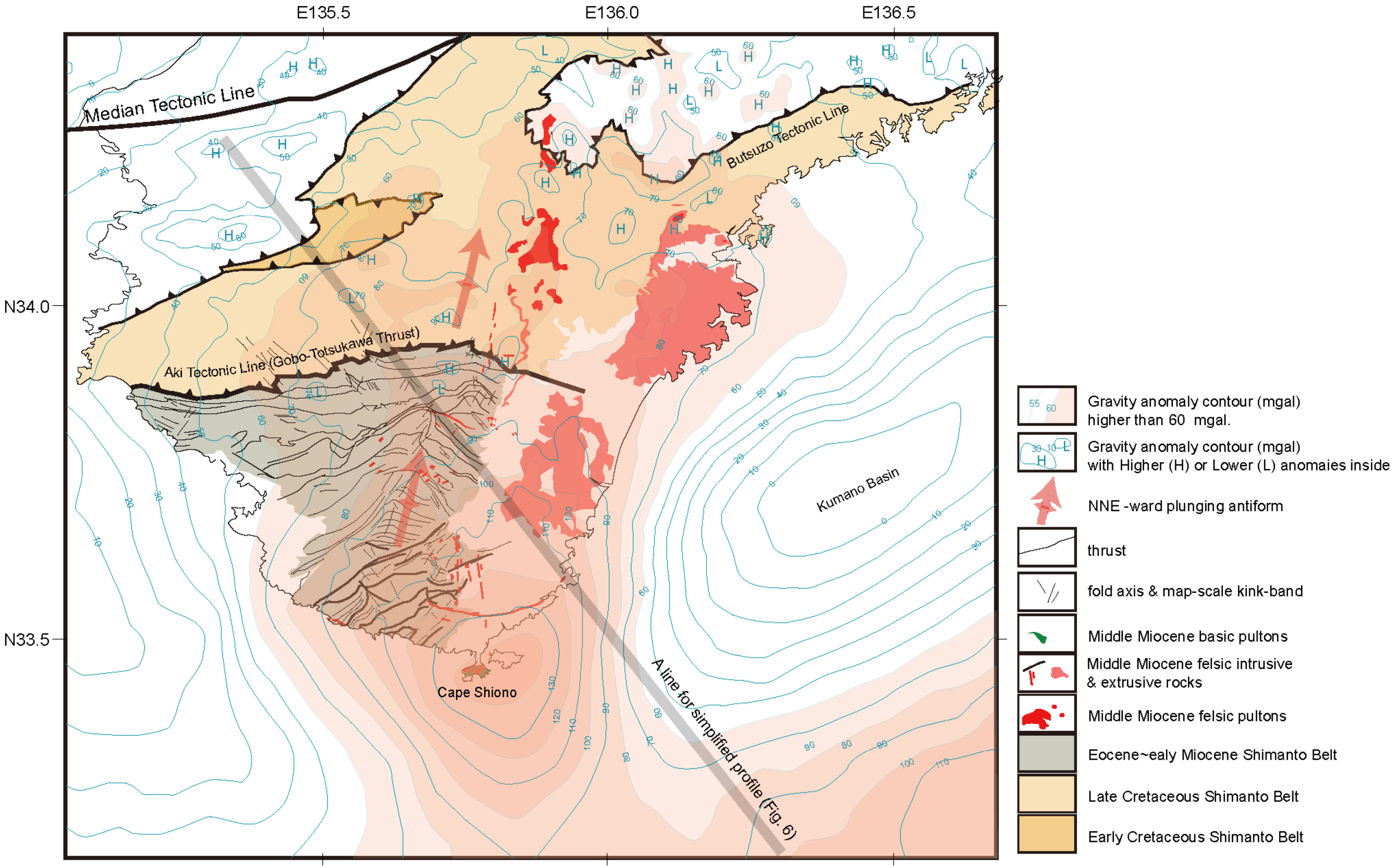
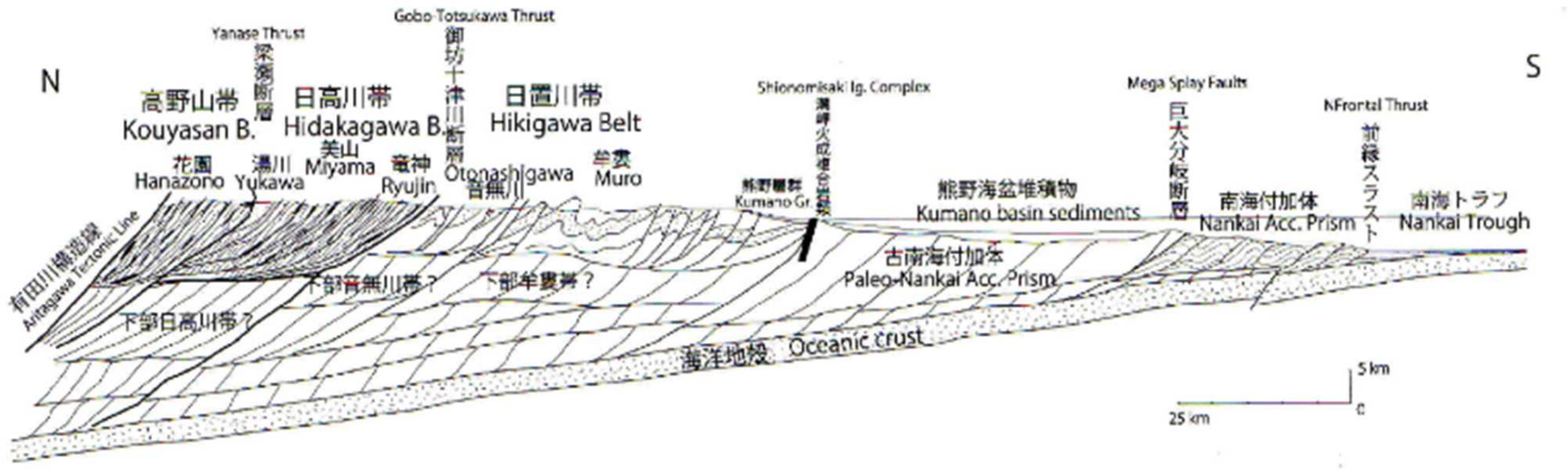


Fig. 5 Simplified geologic structure of the Shimanto Belt in the Kii Peninsula north to the Cape Shiono with Bouger gravity anomaly with assumed density of 2.0 g/cm^3 (compiled from Nakaya, 2012; Seamless Geological map series by Geological Survey of Japan, 2013). Note that NNE-ward plunging antiform and felsic pultons is clearly recognized. The antiform and igenous rock distribution is associated with positive gravity anomaly and is continued to the off-shore continental shelf. The gravity anomaly around the Cape Shiono suggests a large pulton below.

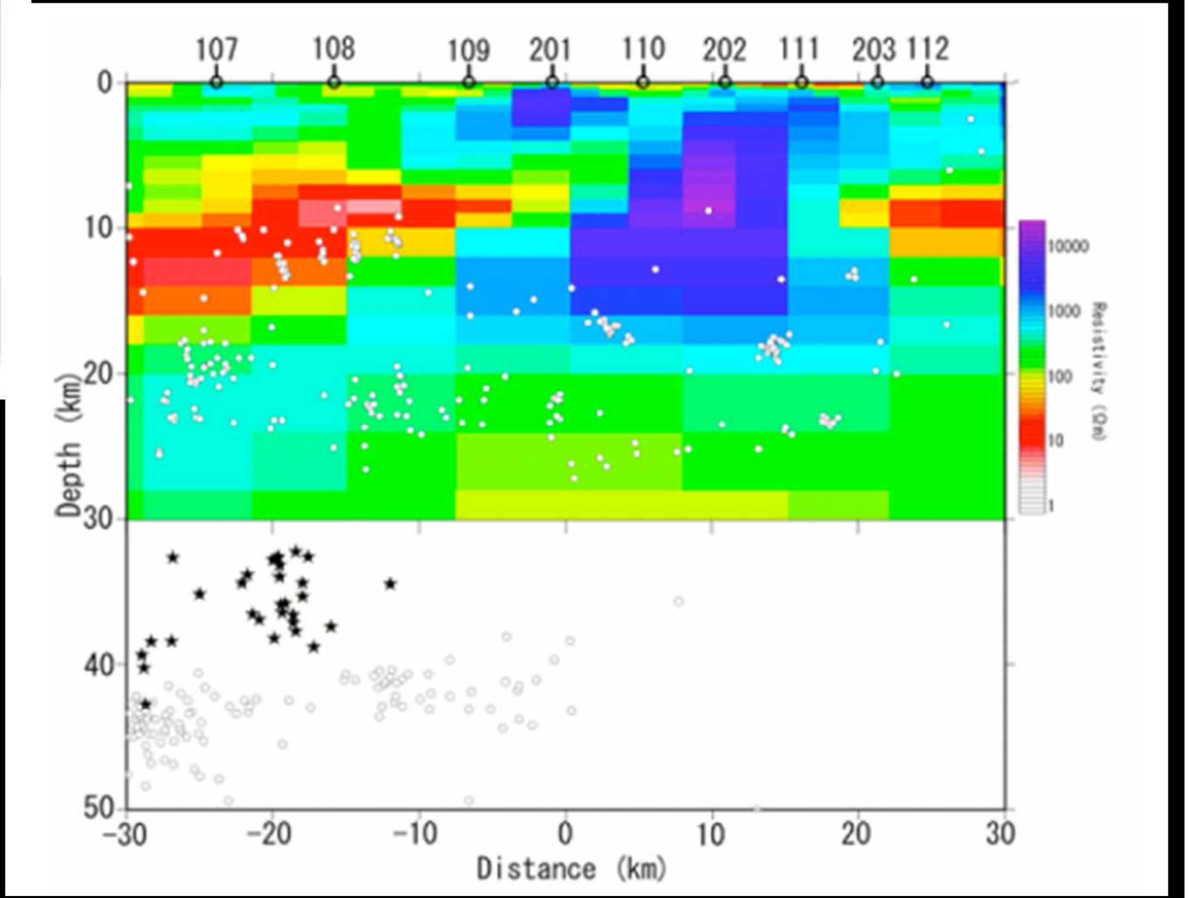
これまでの常識＝西南日本上盤プレートの地殻は付加体からなる



第９図　有田川構造線から南海トラフに至る地域の地下深部断面模式図

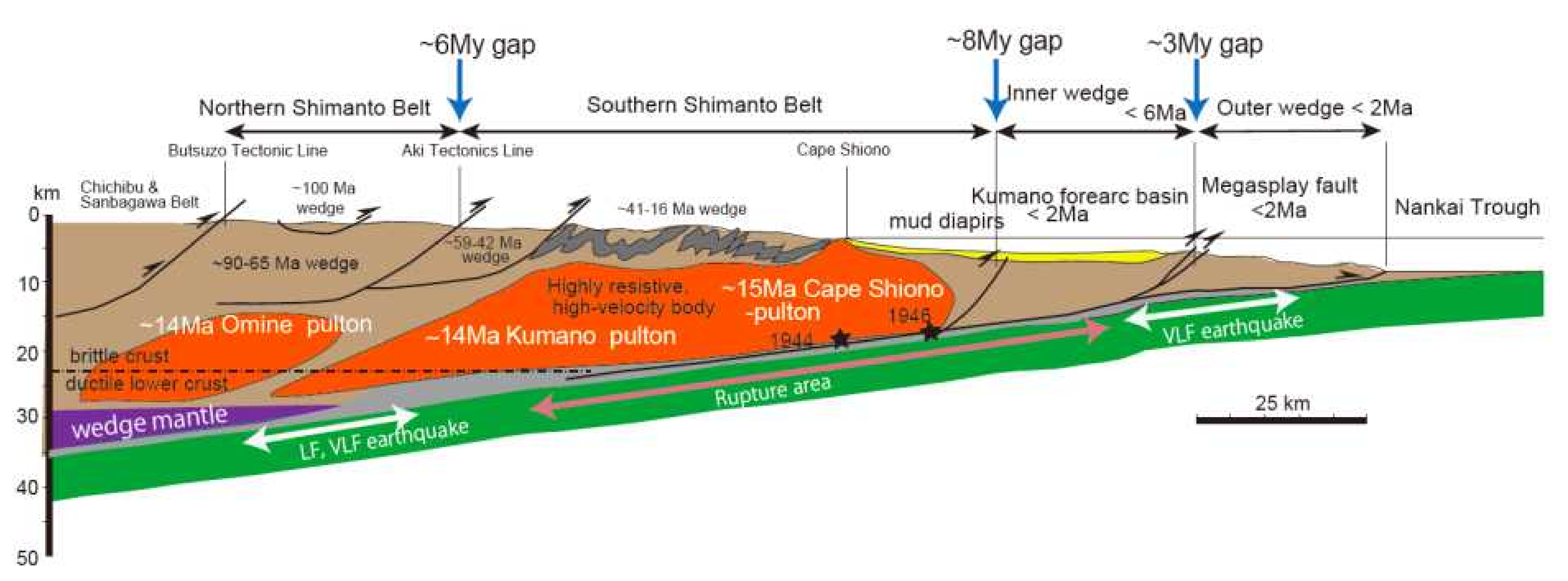
Fig. 9 Subsurface geologic profile of the Shimanto and the Nankai Accretionary Prisms.

Suzuki (2012)
common idea
Accretionary prism growth and the splay fault as an out-of-sequence thrust



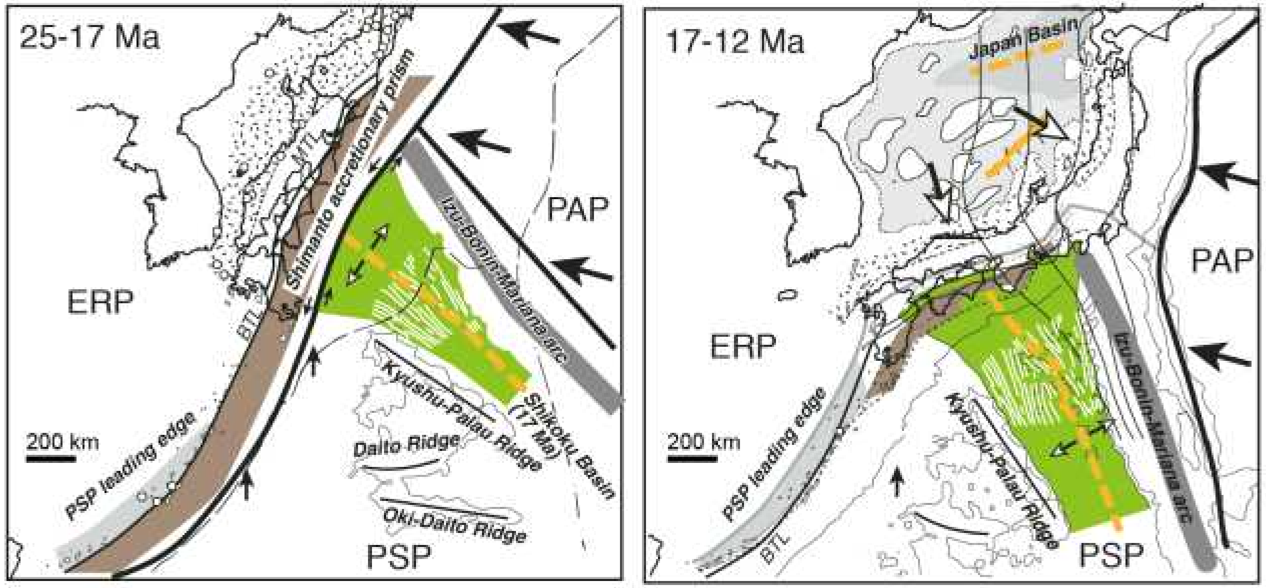
Fuji-ta, et al., 1997,
Tohnoh Institute

Resistive body is situated within the entire crust.

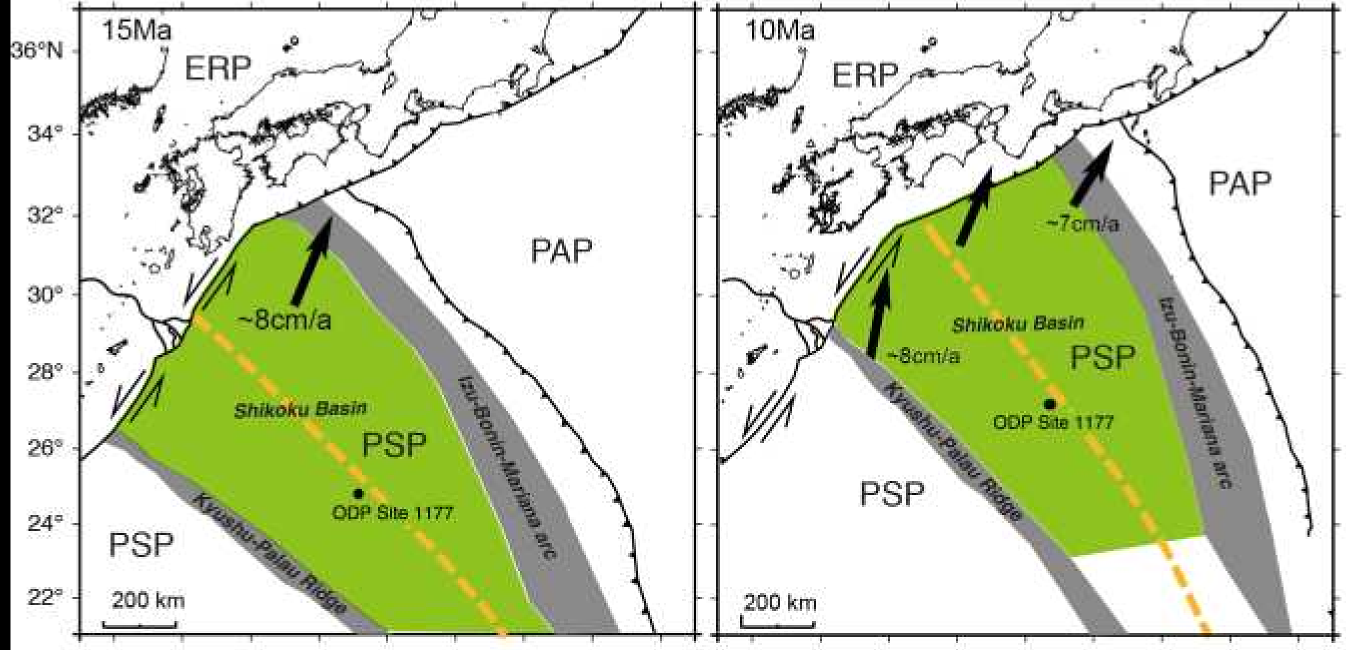


Gravity, magetotelluric, velocity and volcanological (caldera) investigations suggest a large pultonic body in the depth from ~5km to ~20km in the Kii Peninsula

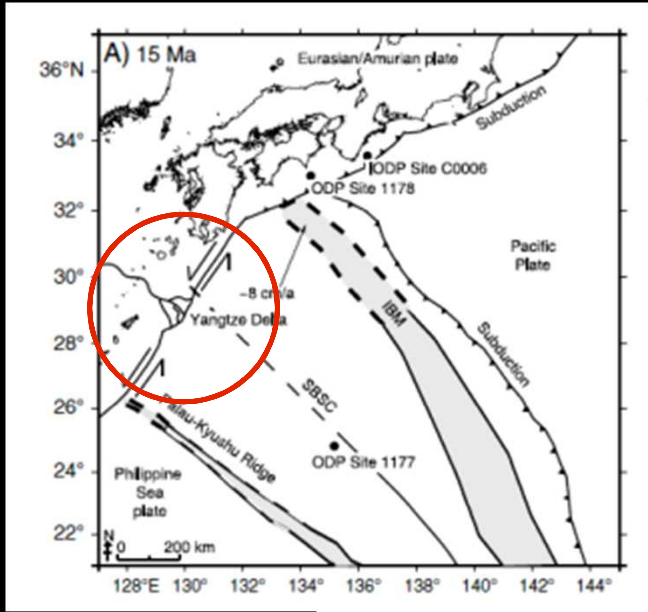
a) TTT junction fixing hypothesis (Kimura et al., 2002; Yanai et al., 2010 etc)



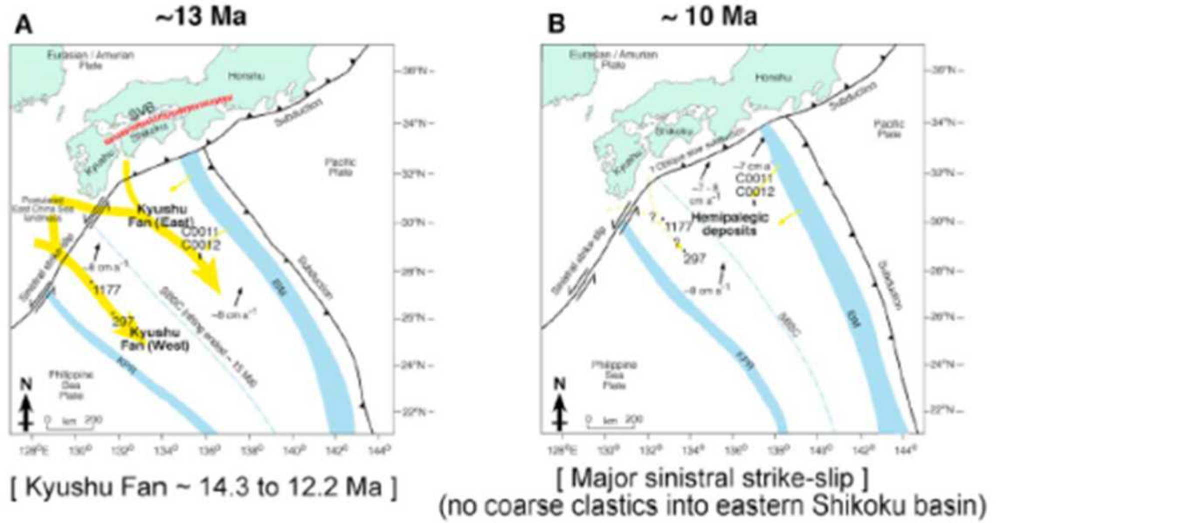
b) TTT junction migration hypothesis (Hall., 2002; Clift et al., 2013 etc)

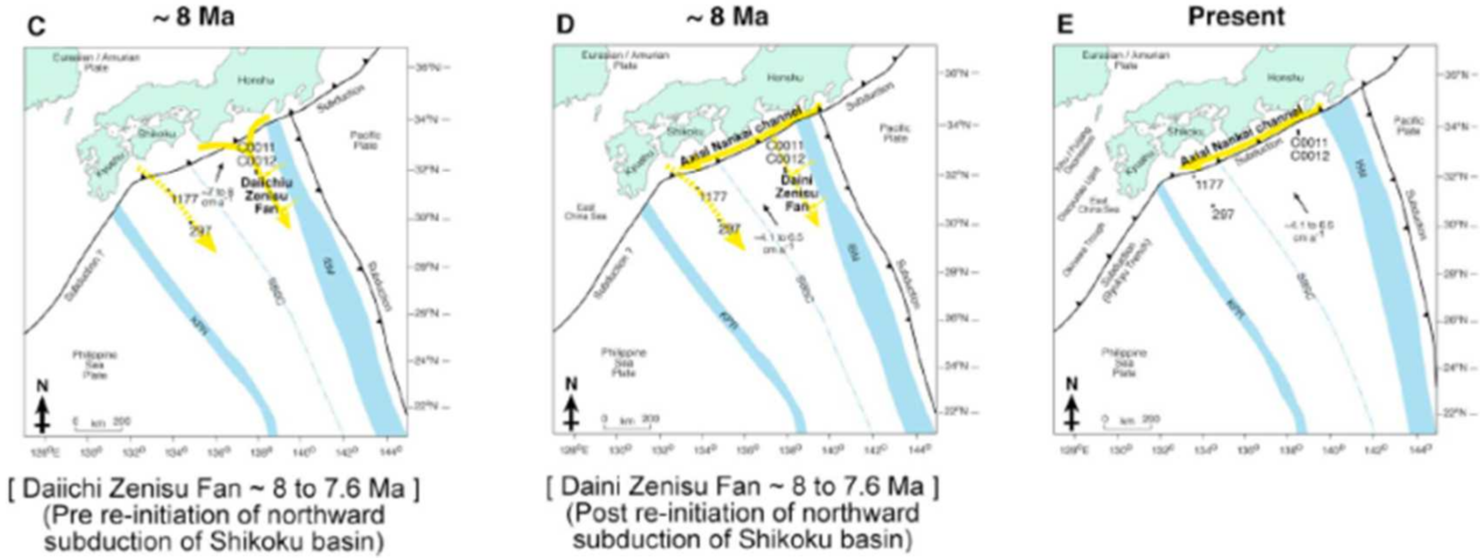


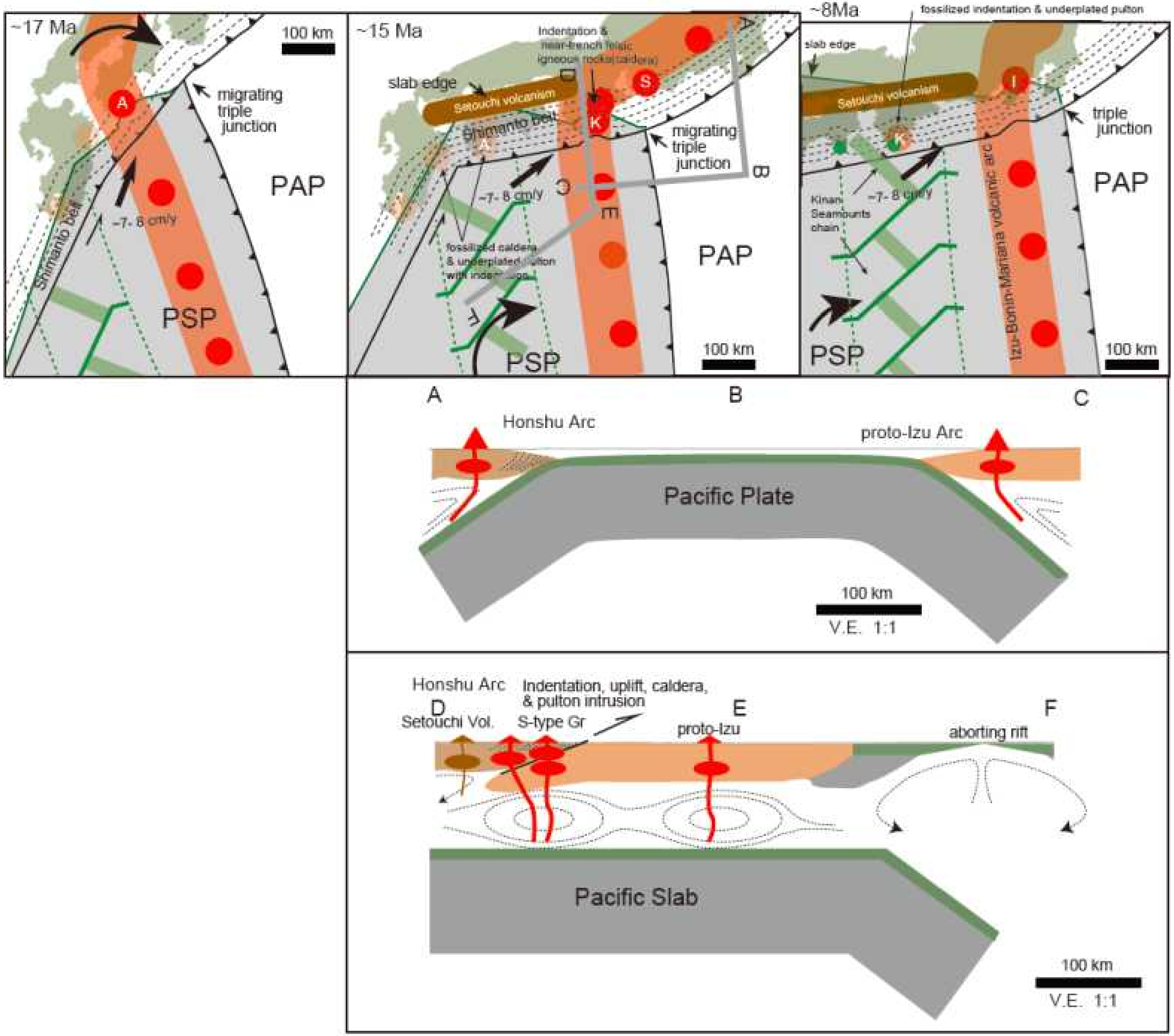
Pickering et al., 2013
on Sdrolias et al. (2004) and Hall et al. (2002)



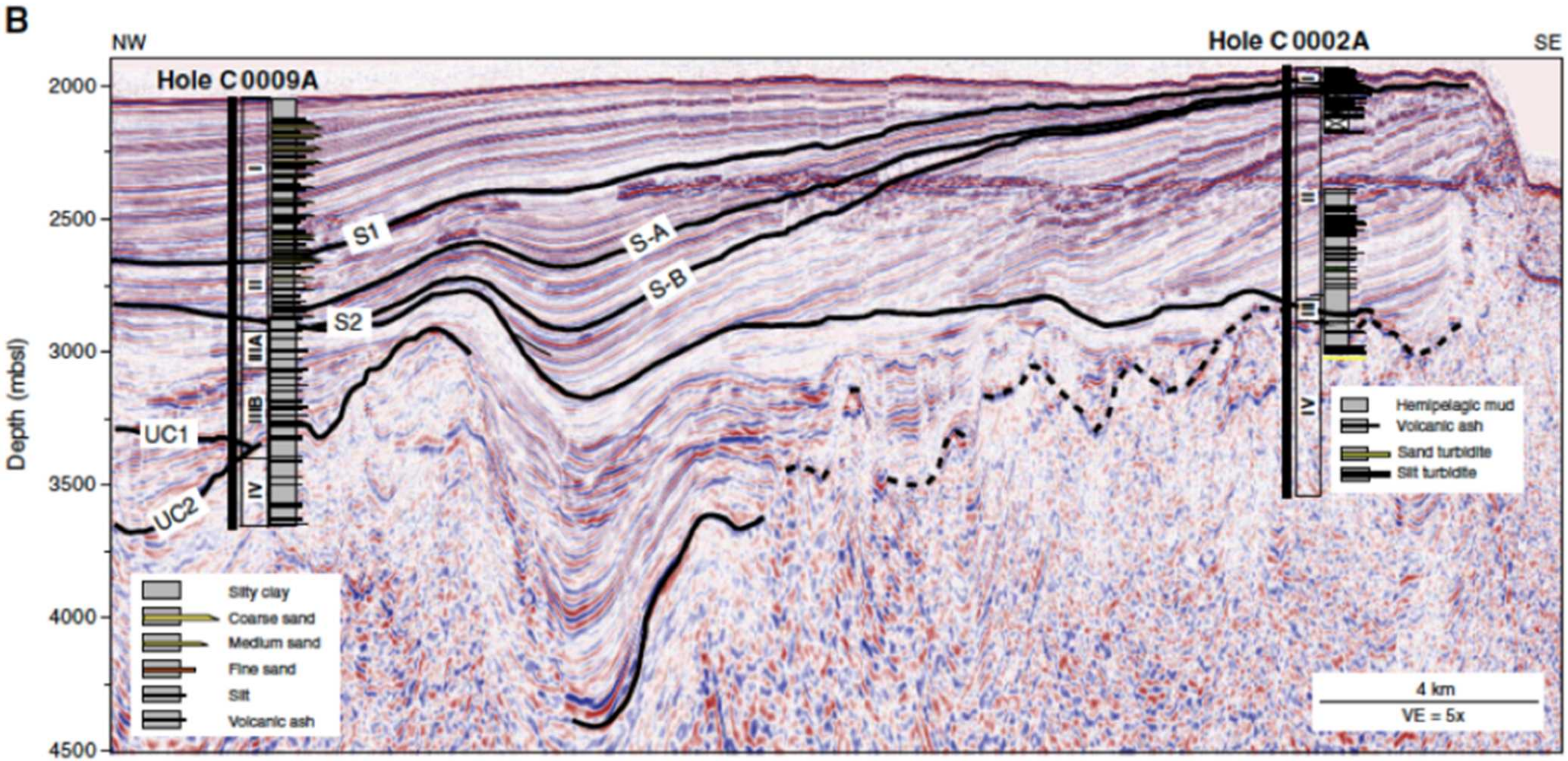
Clift et al., 2013



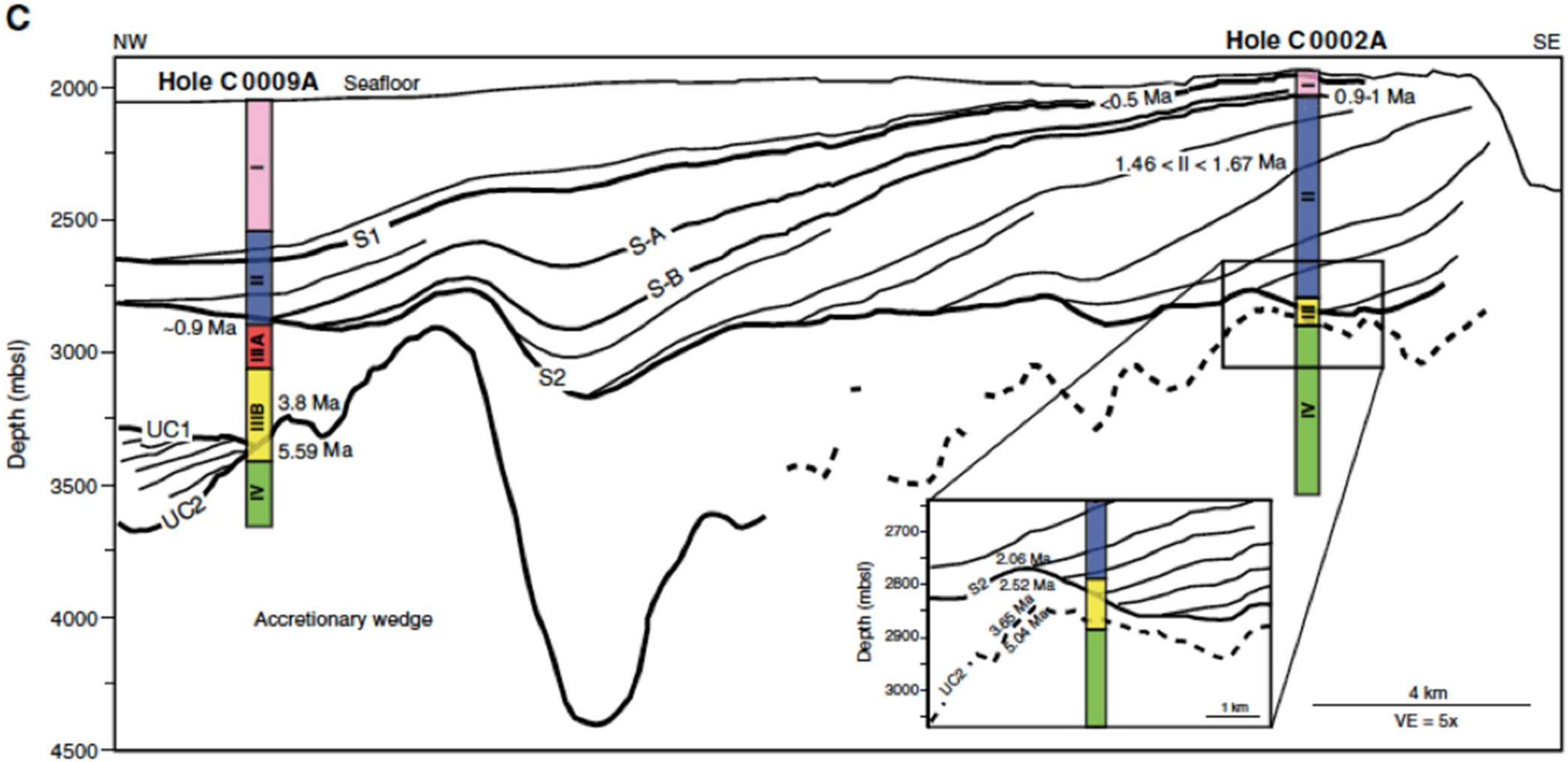




~17 Ma
100 km
A
migrating triple junction
PAP
~7- 8 cm/y
Shimanto belt
PSP
~15 Ma
Indentation & near-trench felsic igneous rocks (caldera)
slab edge
Setouchi volcanism
Shimanto belt
S
K
migrating triple junction
~7- 8 cm/y
fossilized caldera & underplated pulton with indentation
PAP
PSP
100 km
A
B
C
D
E
F
~8Ma
fossilized indentation & underplated pulton
slab edge
Setouchi volcanism
I
K
triple junction
Kinan Seamounts chain
~7- 8 cm/y
Izu-Bonin-Mariana volcanic arc
PAP
PSP
100 km
A
B
C
Honshu Arc
proto-Izu Arc
Pacific Plate
100 km
V.E. 1:1
Honshu Arc
Indentation, uplift, caldera, & pulton intrusion
D
E
F
Setouchi Vol.
S-type Gr
proto-Izu
aborting rift
Pacific Slab
100 km
V.E. 1:1


B
NW
SE
Hole C0009A
Hole C0002A
Depth (mbsl)
2000
2500
3000
3500
4000
4500
S1
S-A
S-B
S2
UC1
UC2
I
II
IIIA
IIIB
IV
III
Hemipelagic mud
Volcanic ash
Sand turbidite
Silt turbidite
Silty clay
Coarse sand
Medium sand
Fine sand
Silt
Volcanic ash
4 km
VE = 5x

[redacted]



C
NW
Hole C0002A
SE
Hole C0009A
Seafloor
<0.5 Ma
0.9-1 Ma
1.46 < II < 1.67 Ma
I
II
IIIA
IIIB
IV
S1
S-A
S-B
S2
~0.9 Ma
3.8 Ma
5.59 Ma
UC1
UC2
Depth (mbsl)
2000
2500
3000
3500
4000
4500
Accretionary wedge
2700
2800
2900
3000
2.06 Ma
2.52 Ma
3.65 Ma
5.04 Ma
1 km
4 km
VE = 5x

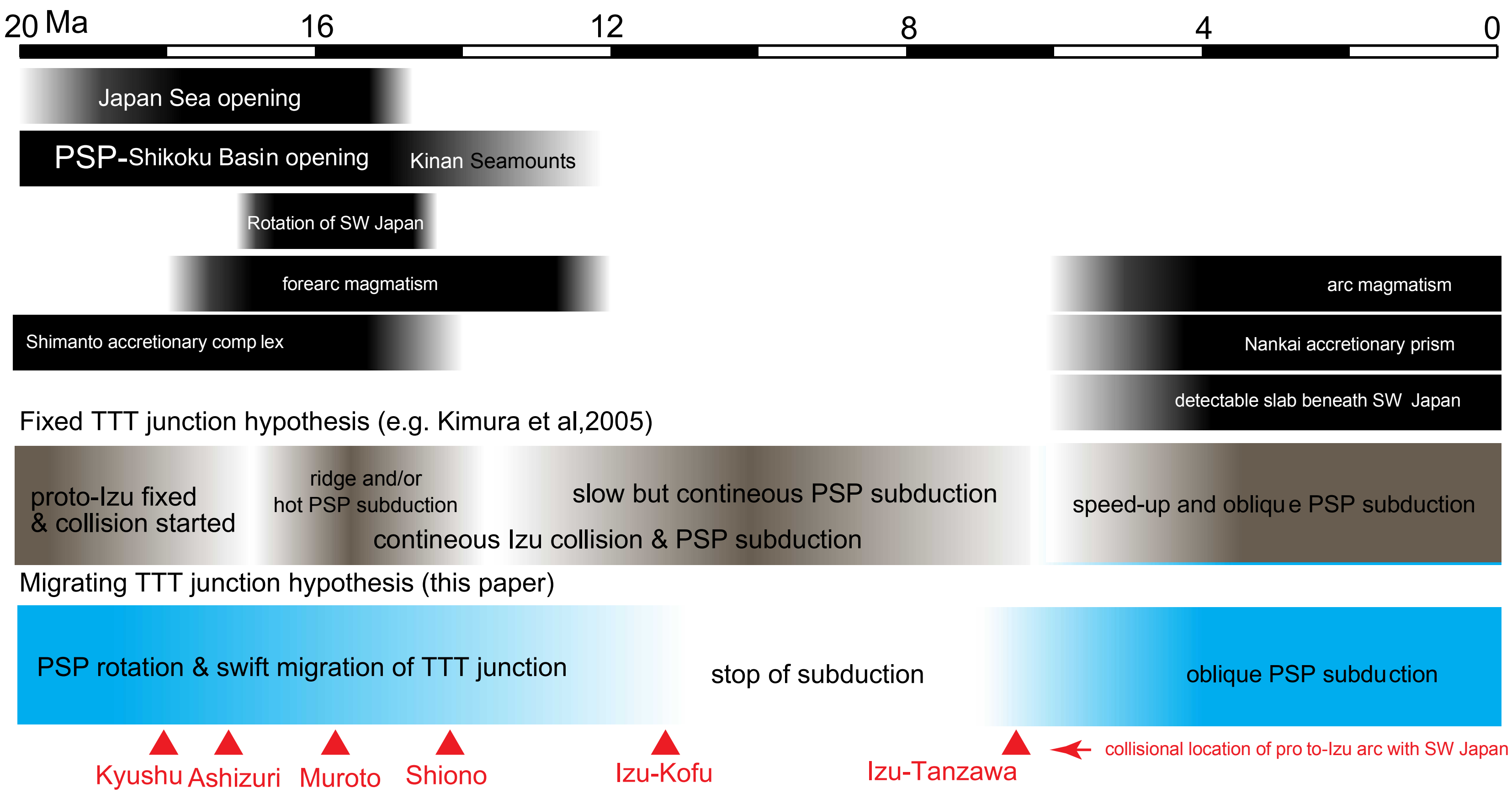
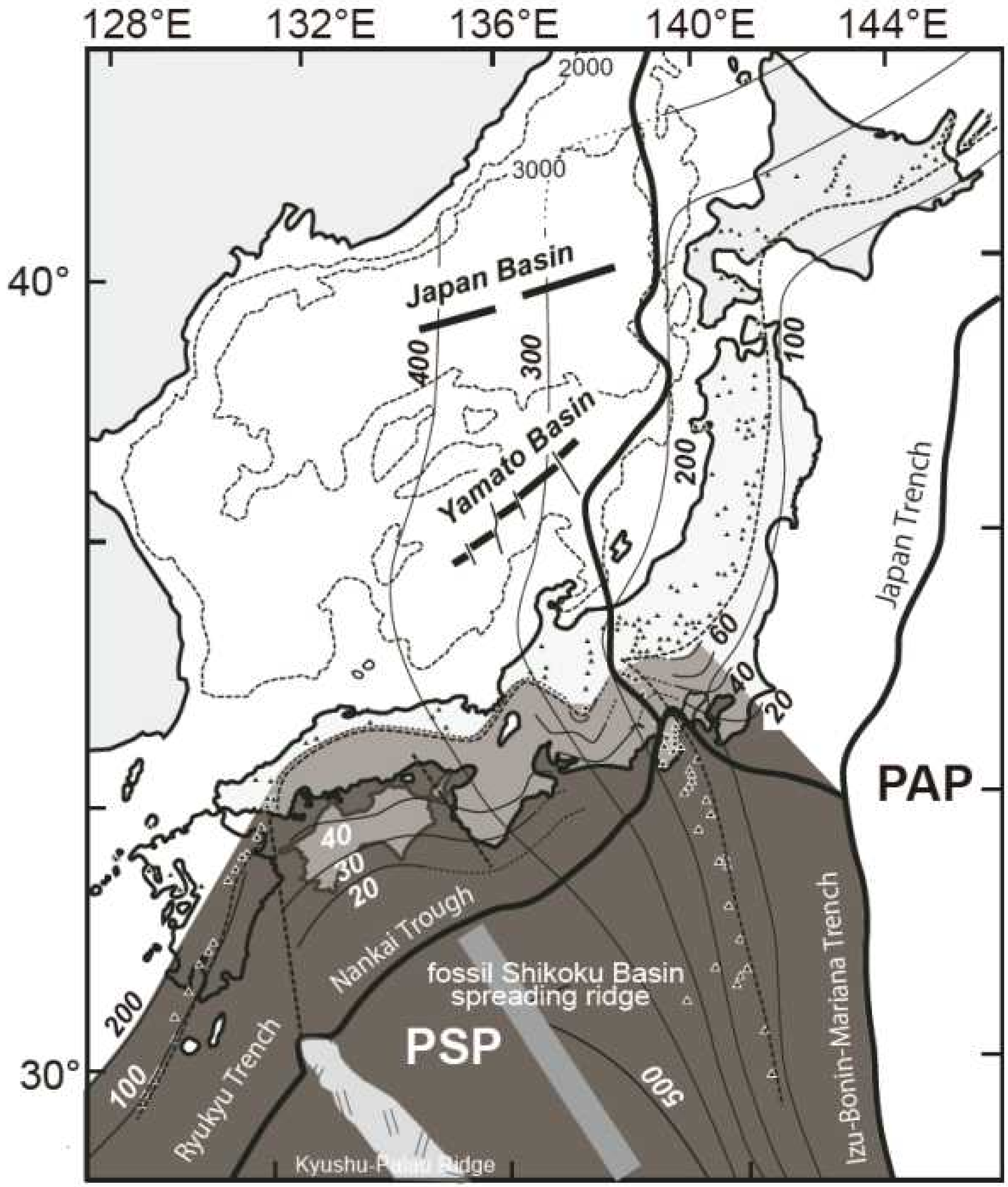
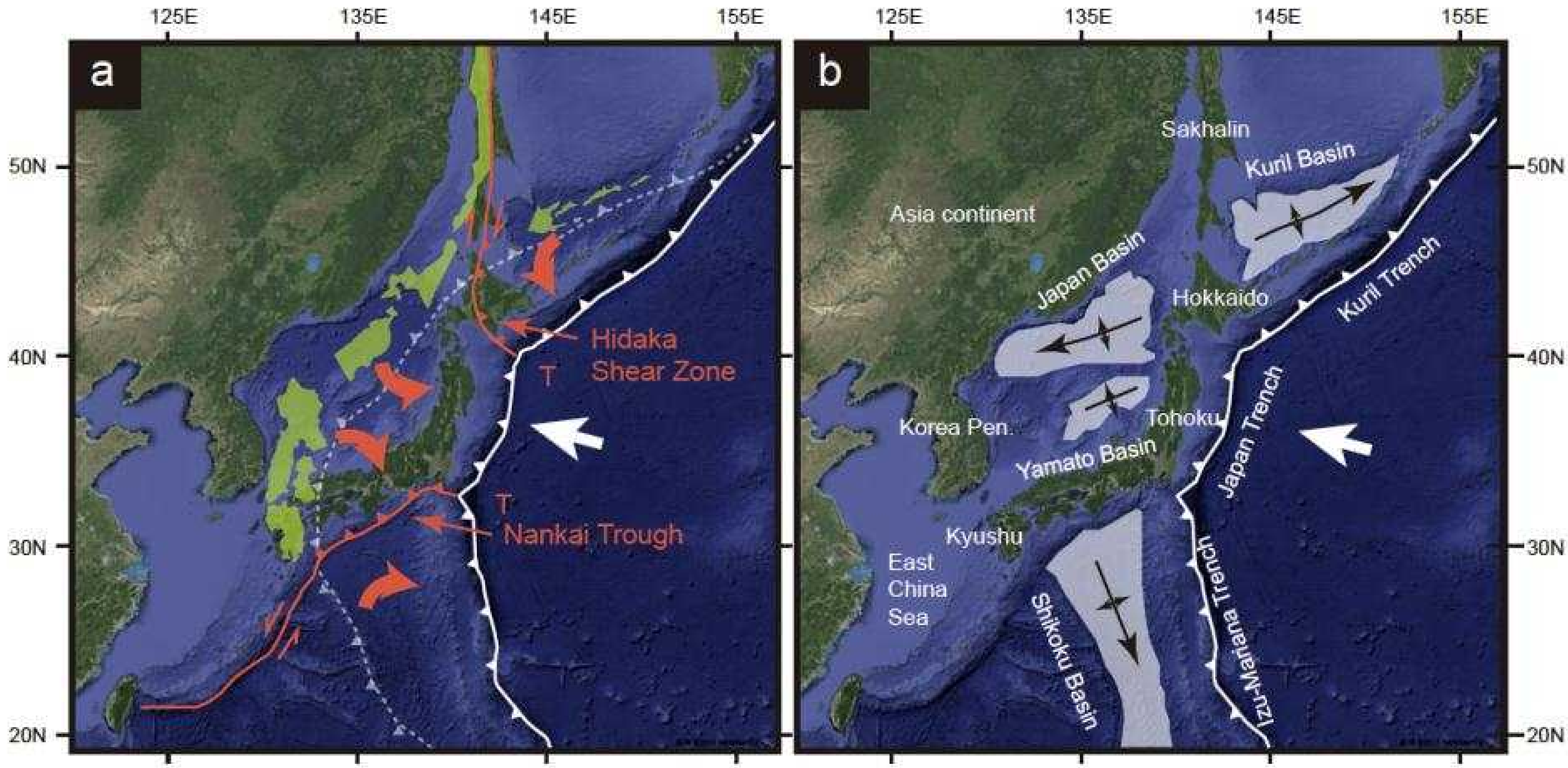


Fig. 16 Kimura et al.



128°E
132°E
136°E
140°E
144°E
40°
30°
2000
3000
Japan Basin
Yamato Basin
400
300
200
100
60
40
20
Japan Trench
PAP
40
30
20
Nankai Trough
fossil Shikoku Basin
spreading ridge
PSP
200
100
Ryukyu Trench
500
Izu-Bonin-Mariana Trench



掘削は、南海破壊領域の進化的要因を示唆。
掘削は、日本列島形成史の大幅変更を示唆。
（Kimura et al., TECTONICS in press）

1. 付加体の進化と断層活動の歴史
2. 沈み込む堆積物と基盤岩
3. 地震・津波発生断層
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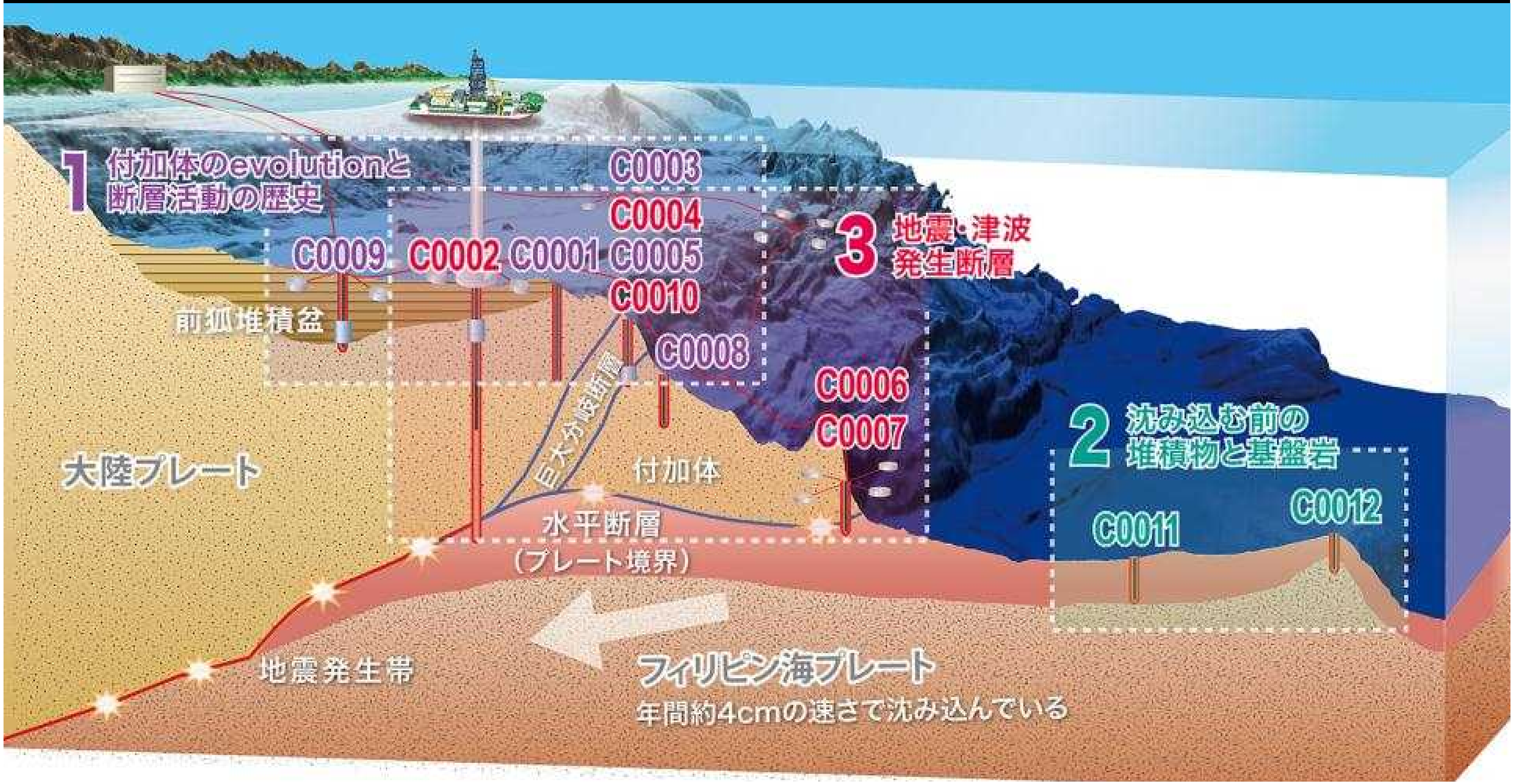
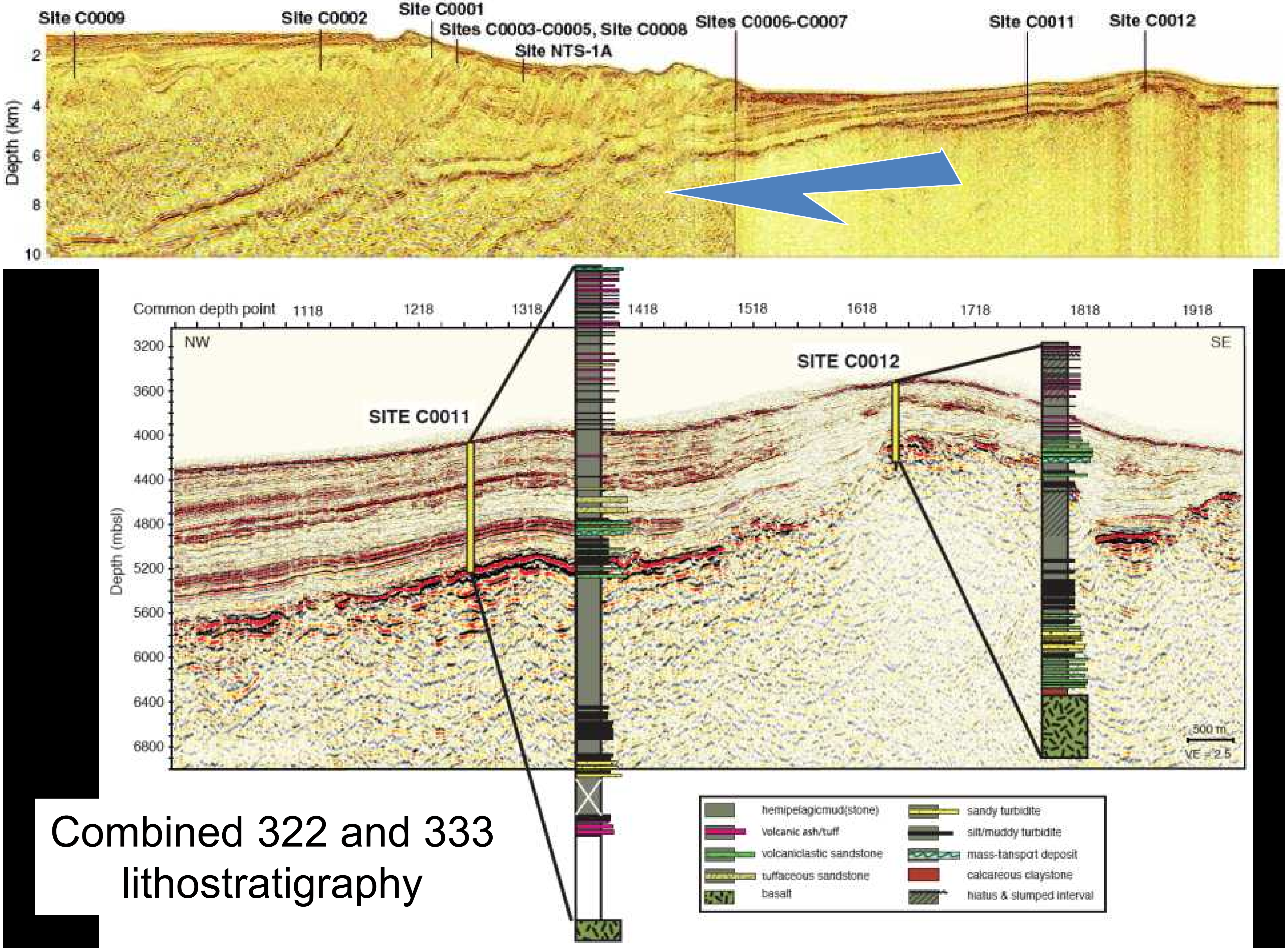


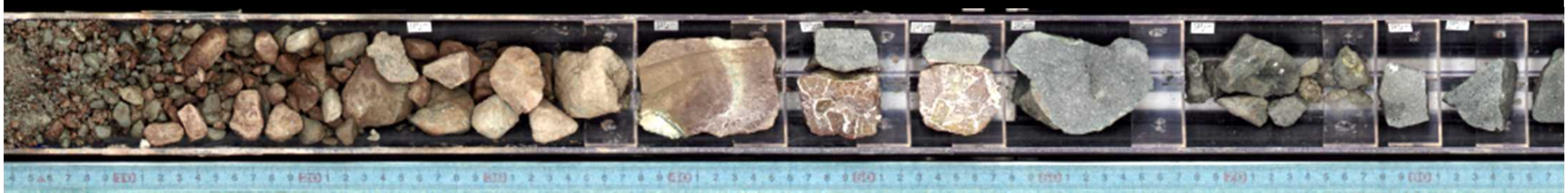


Combined 322 and 333 lithostratigraphy

Sediment - basalt interface

322 obtained just small sample of basement

333-C0012F



333-C0012G

Basalt alteration

- 100 m cored, 18 m recovered
- Phyric basalt pillows and massive flows
- Localized oxidizing alteration
  - Accumulation of iron hydroxides in veins
- **Pervasive alteration under reducing conditions**
  - **Replacement of olivines, glass and most plagioclases**
  - **Hydrous secondary phases: clay (saponite…) and zeolites (analcime…)**
  - Pyrite occurrence

8RCC-43-49

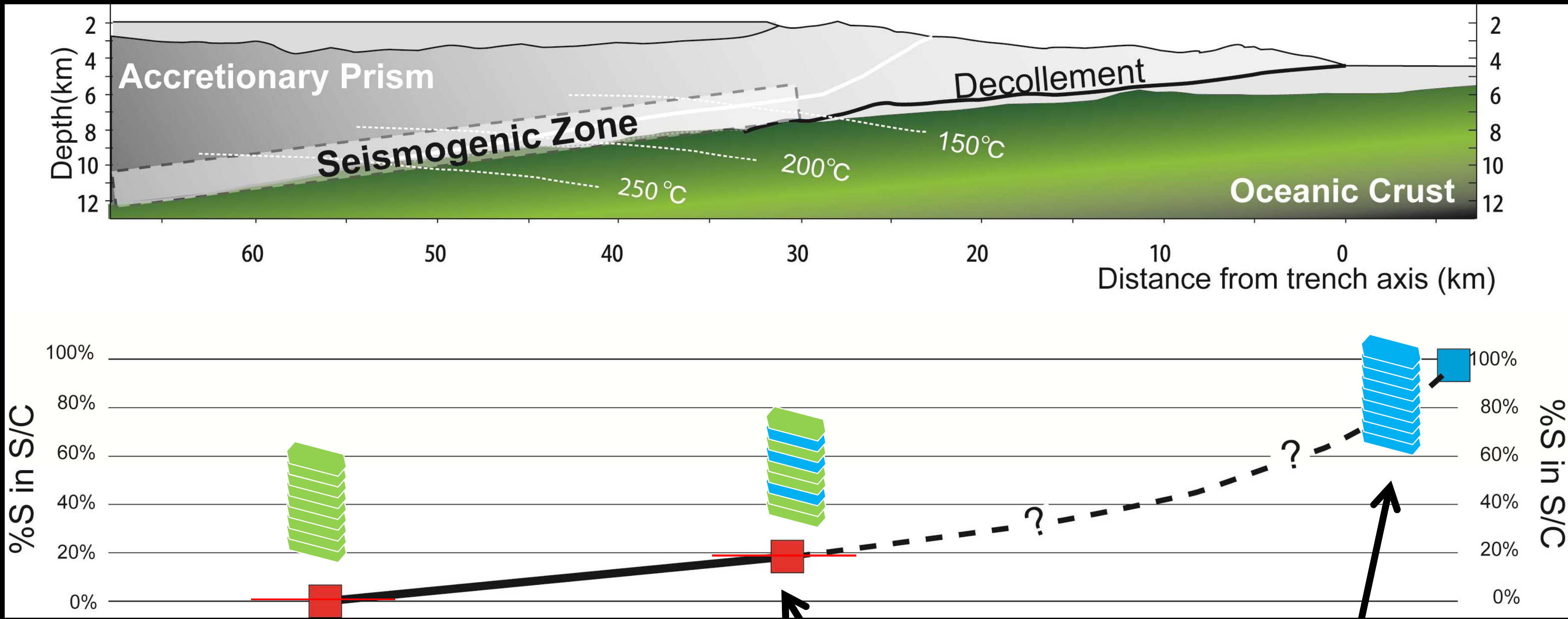
6RCC-21-23

6RCC-21-23

Kochi City?

4R1-28-29 (least altered sample)

沈み込み帯内部でのS-C 反応

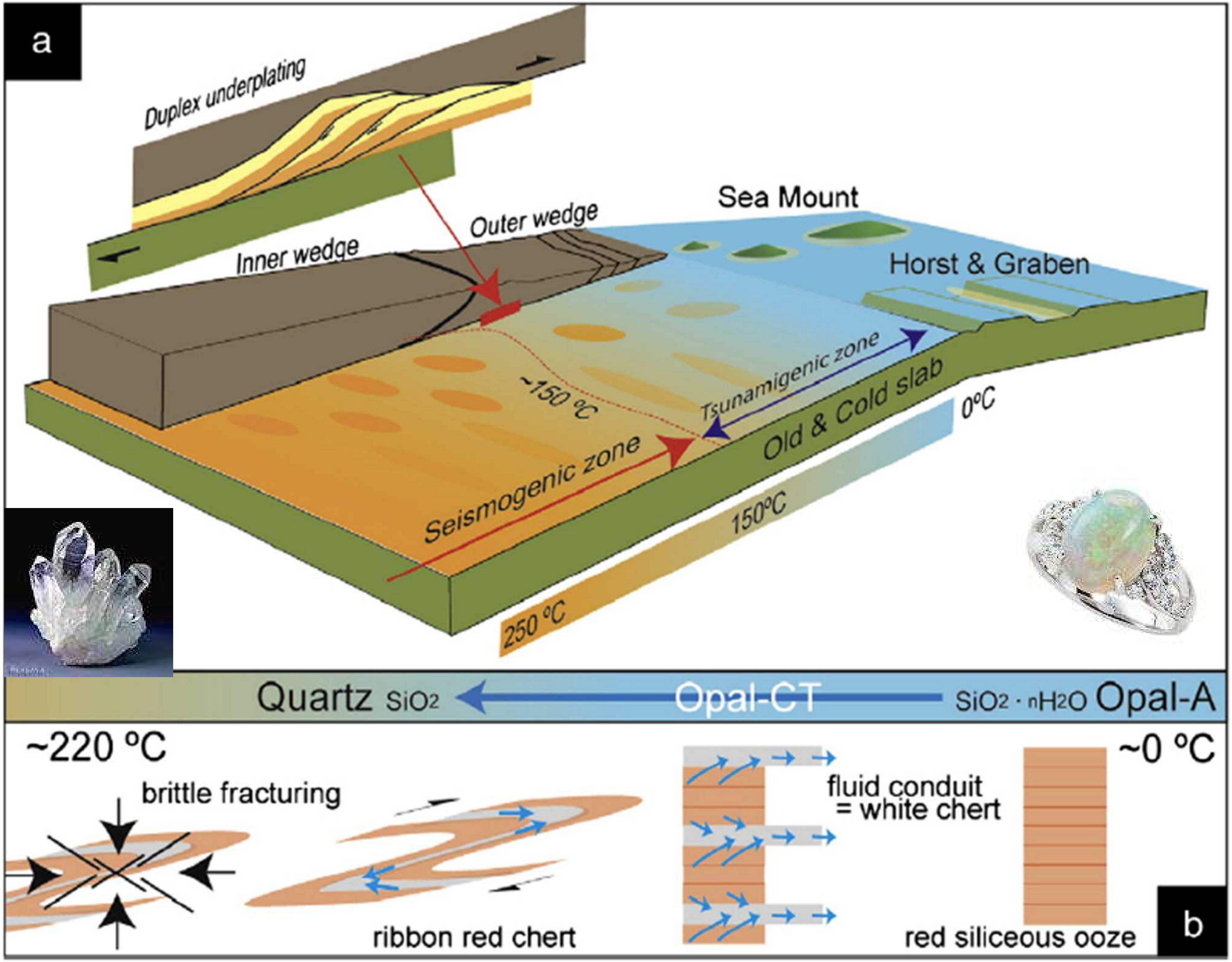


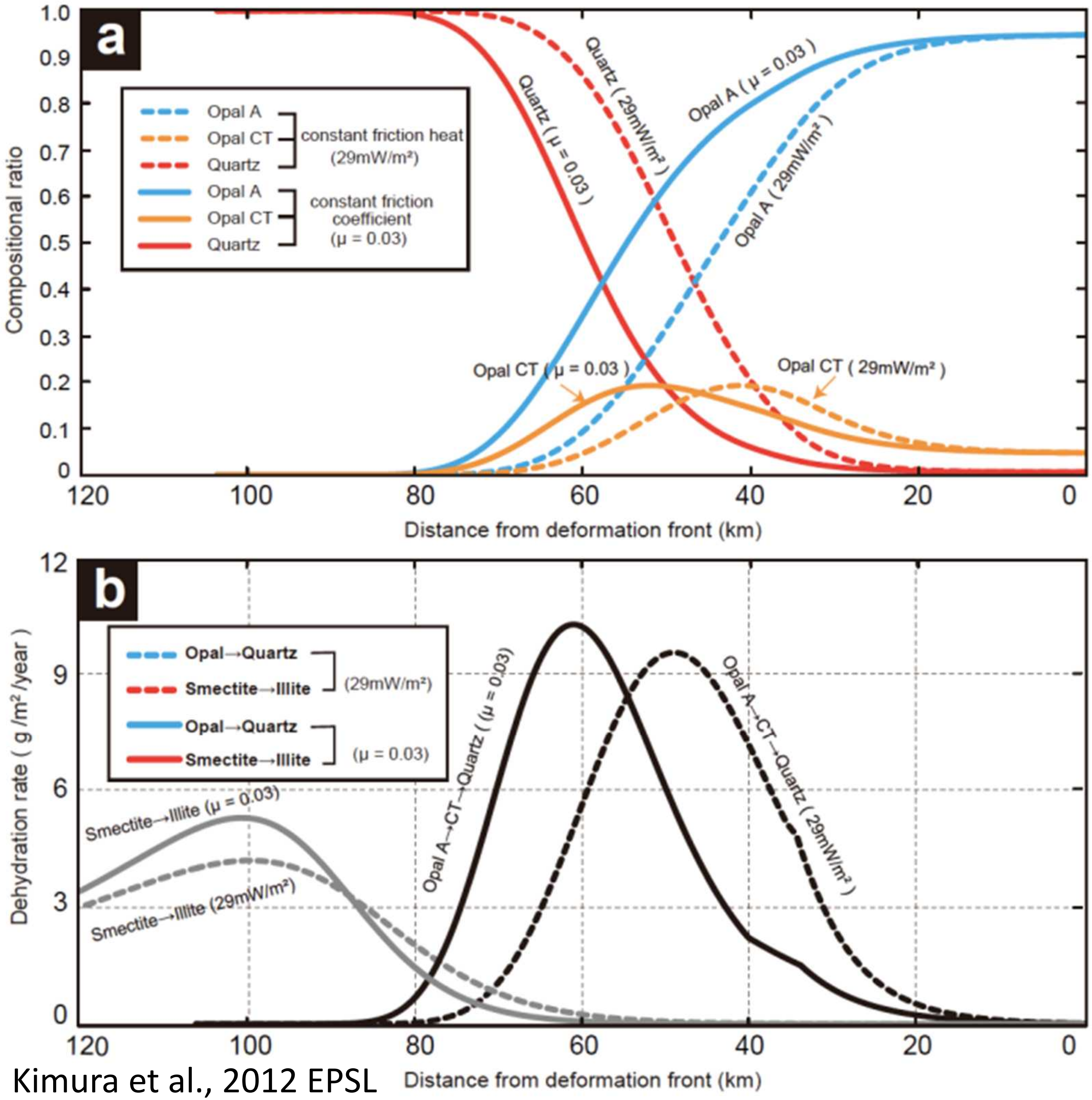
～300ºC、緑泥石化反応完了

～150ºC、地震発生帯上端
クロライト化反応進行

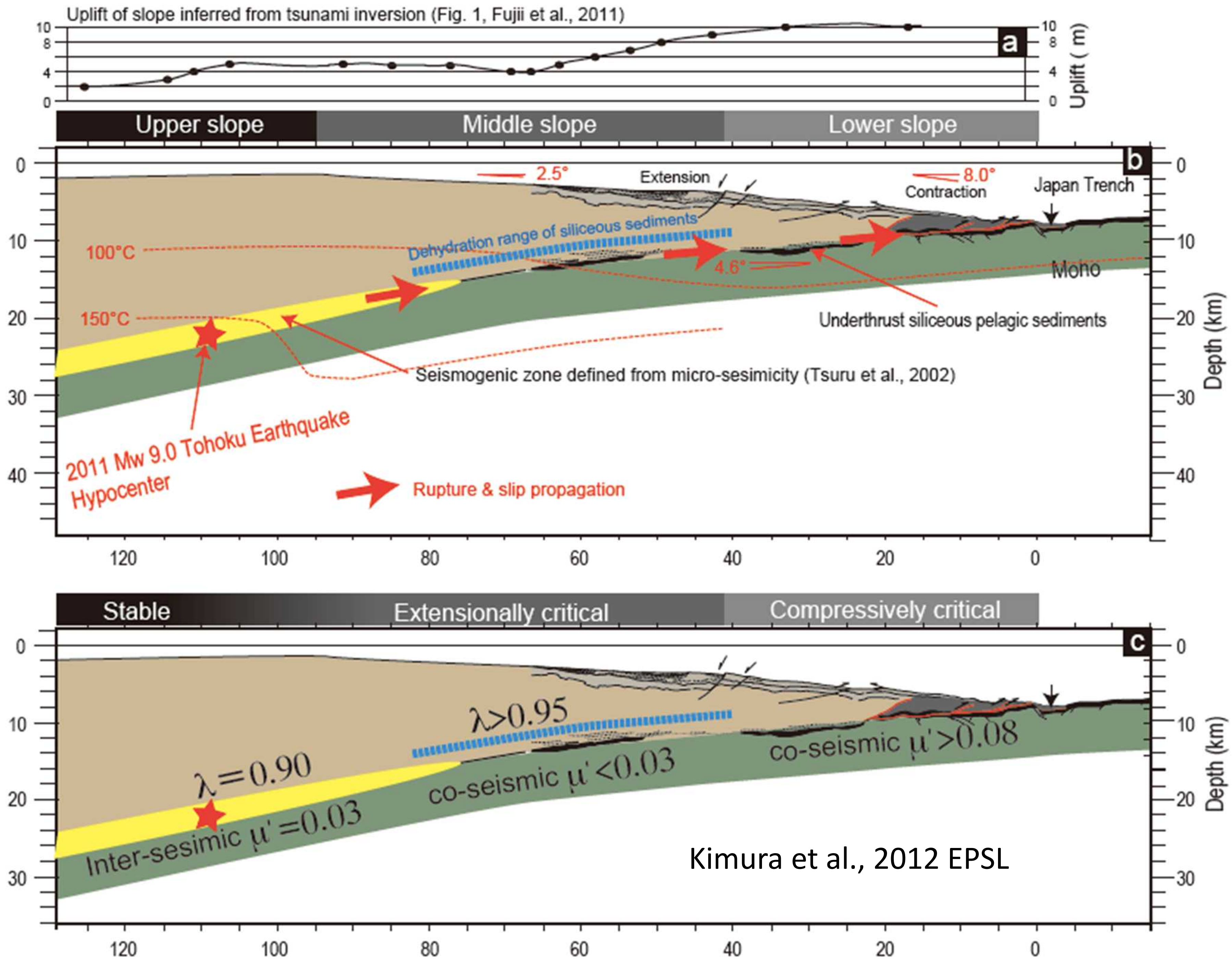
沈み込み前、
サポナイトの形成

$$(Ca_{0.24}K_{0.074}Na_{0.02})(Al_{0.18}Fe_{1.18}Mg_{1.61}Ti_{0.02})(Si_{3.22}Al_{0.78})O_{10}(OH)_2 \cdot 4.5H_2O + 1.94H^+$$
$$\rightarrow 0.9(R^{2+}, Al_{0.58})(Si_{1.51}Al_{0.49})O_5(OH)_4 + \text{dissolved cations} + 1.86SiO_2 + 4.67H_2O$$


a
Duplex underplating
Inner wedge
Outer wedge
Sea Mount
Horst & Graben
~150 ºC
Tsunamigenic zone
Old & Cold slab
0ºC
Seismogenic zone
150ºC
250 ºC
Quartz SiO2
Opal-CT
SiO2 · nH2O Opal-A
~220 ºC
~0 ºC
brittle fracturing
ribbon red chert
fluid conduit
= white chert
red siliceous ooze
b

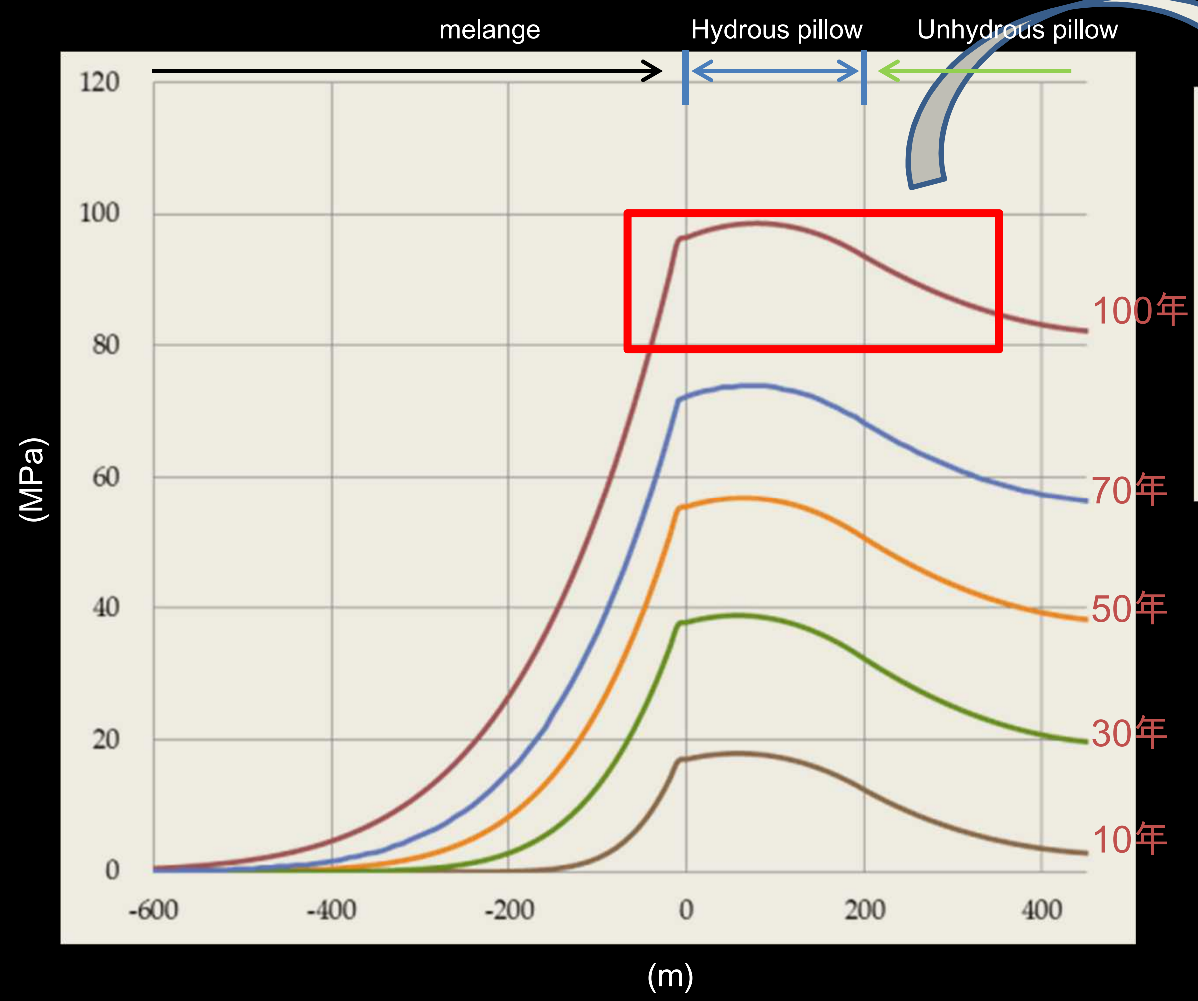


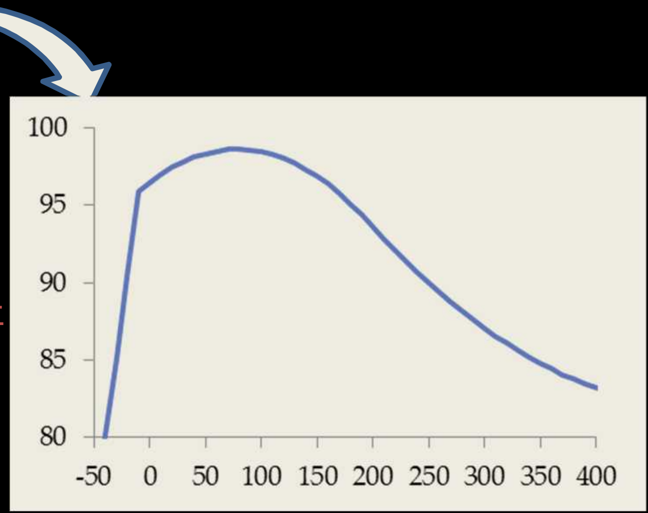
Kimura et al., 2012 EPSL

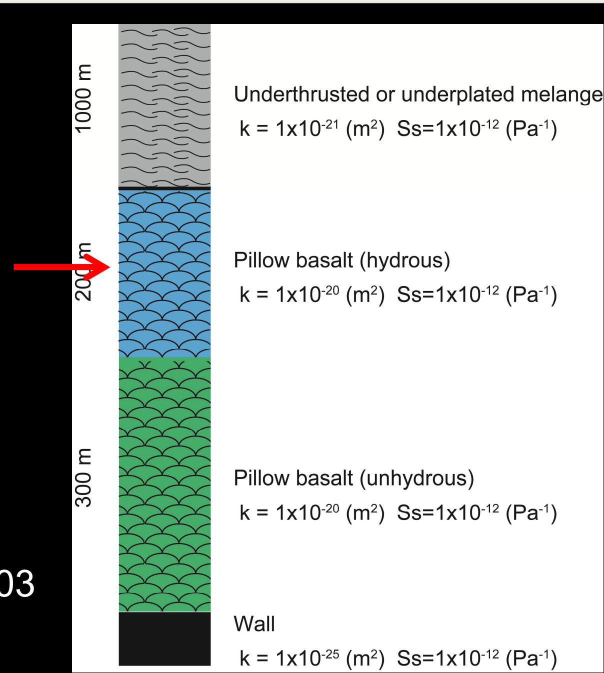


Kimura et al., 2012 EPSL

変質玄武岩の脱水による間隙水圧の時間発展

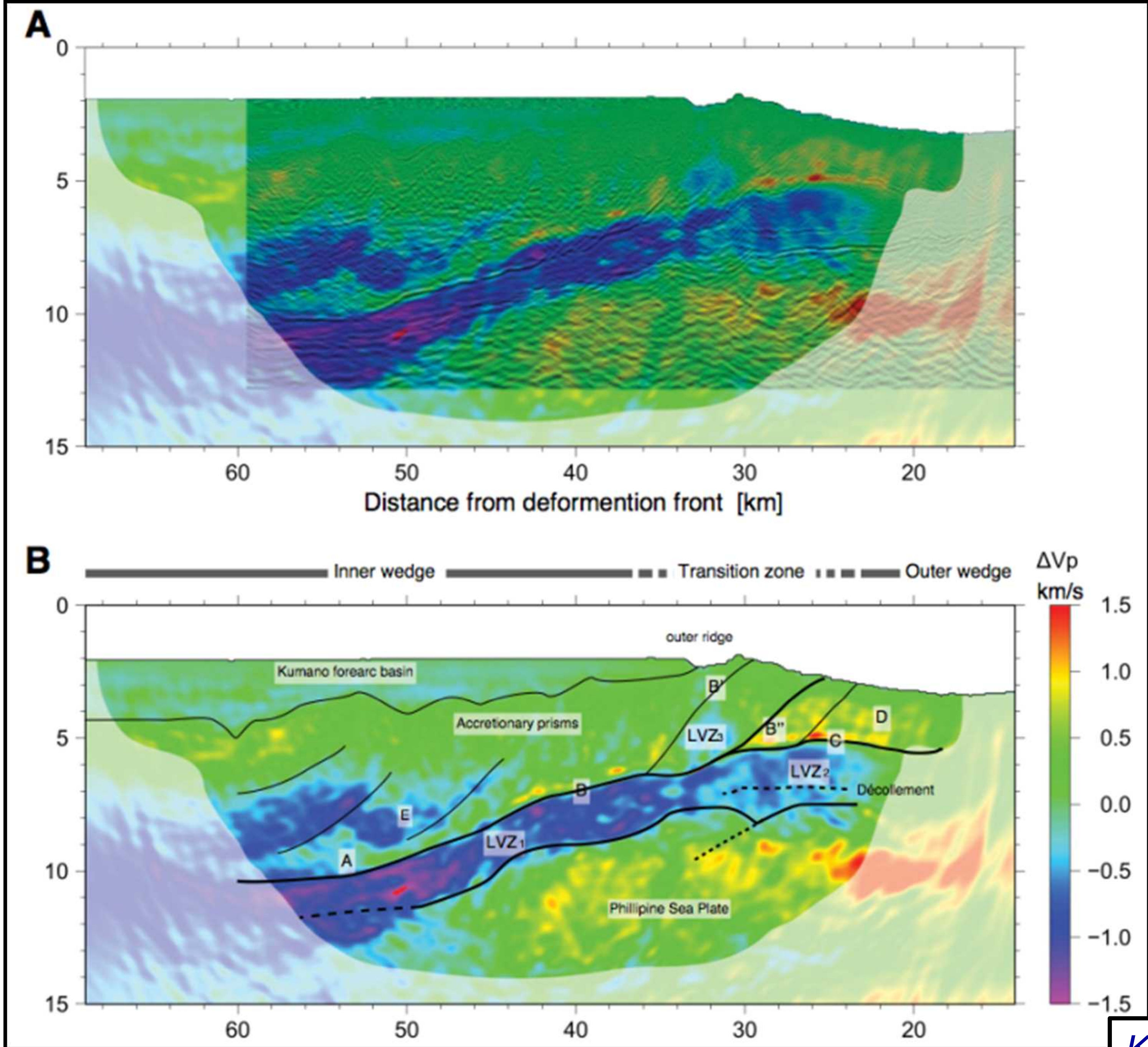






Hydrologic data fro Kato et al., 2003

Kameda et al., 2012



LVZ is laterally continuous, corresponds to thick underthrust sediments

perhaps duplexing and/or underplating?

Kamei et al, EPSL,