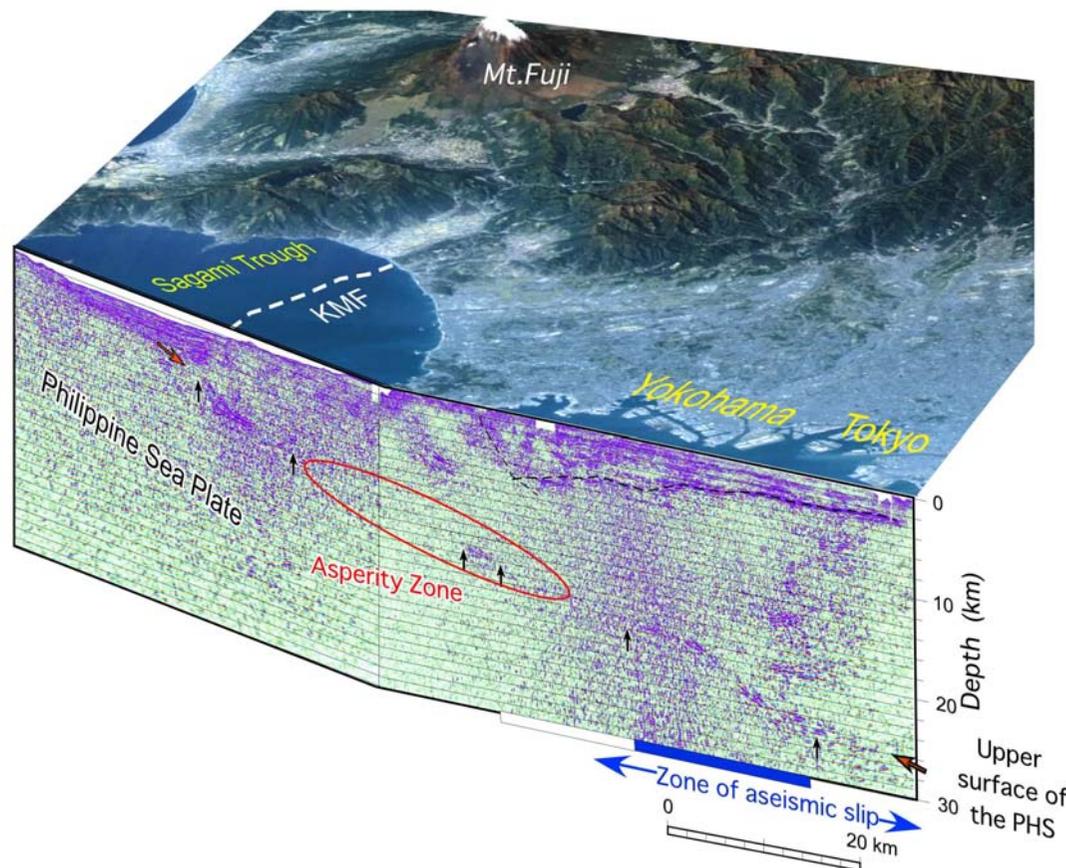


(2012年11月27日首都直下地震モデル検討会(第10回))

東京大学地震研究所
佐藤教授 提供資料

相模トラフ・伊豆衝突帯の プレート境界断層



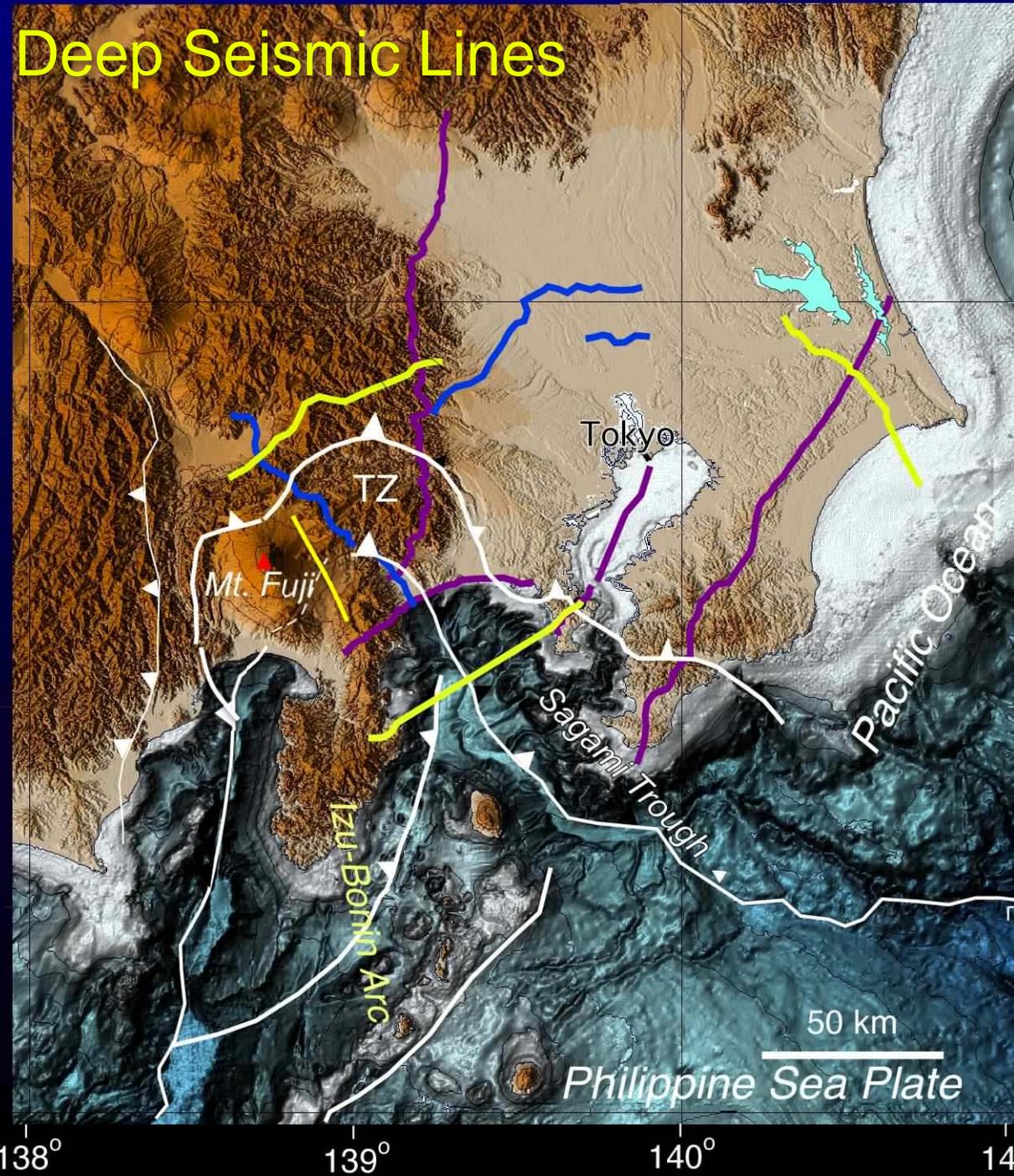
東京大学地震研究所

佐藤比呂志

内容

- 相模トラフ横断+東京湾縦断地殻構造
- 房総半島縦断地殻構造断面
- 国府津-松田断層帯の構造
- 伊豆-衝突帯の地殻構造
- 富士山下の活断層

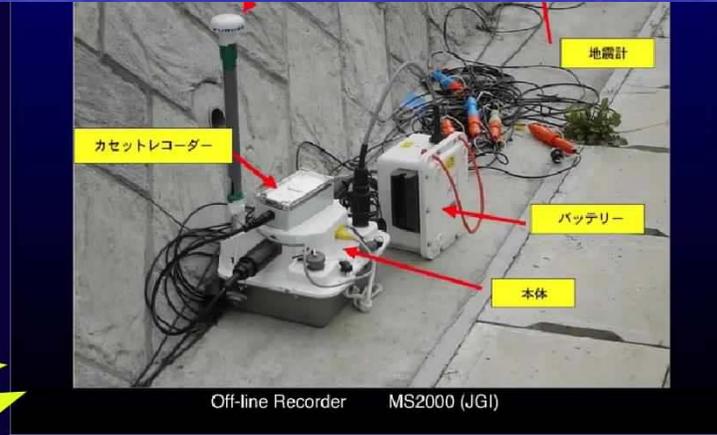
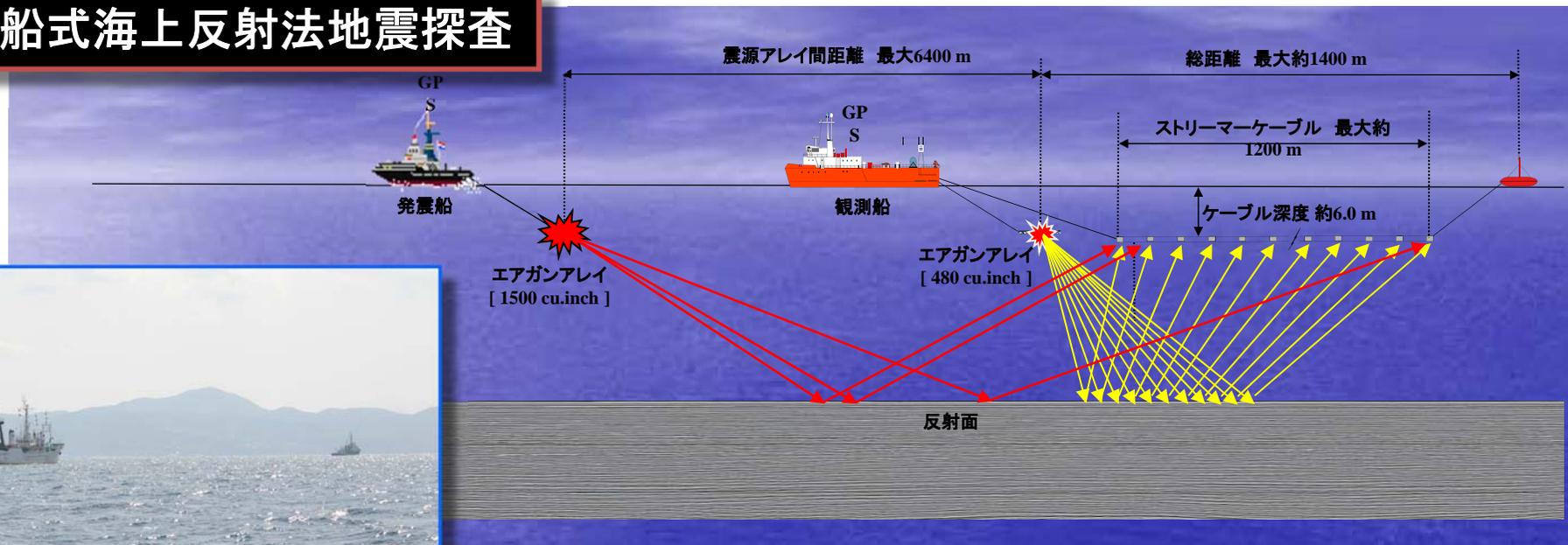
Deep Seismic Lines



- Seismic lines acquired in 2009 - 2010
- Seismic lines acquired in 2006
- Seismic lines acquired in 2002-2003 (Sato et al., 2005; Science)

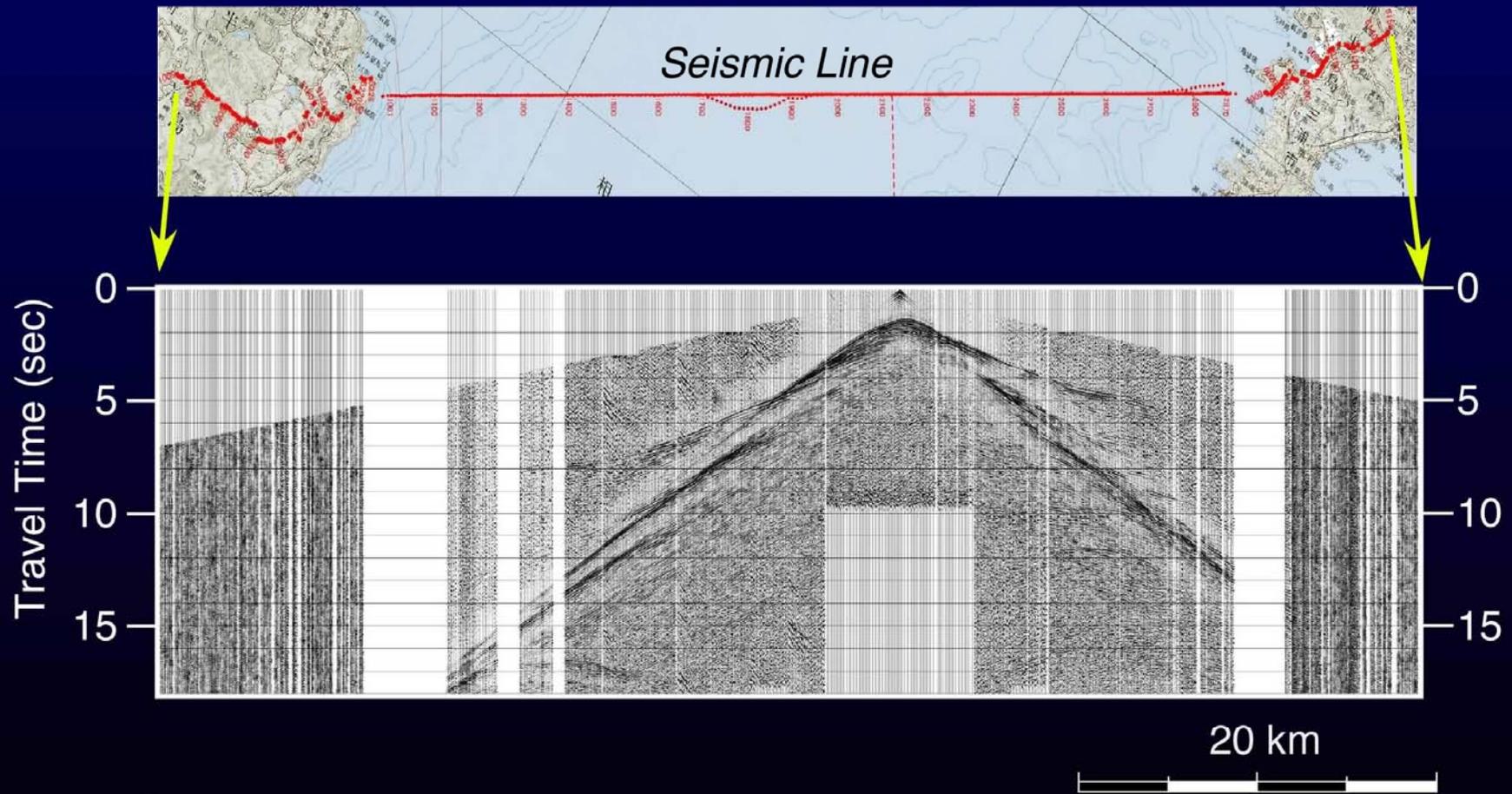
Topographic map is after Kimoto (2000)

二船式海上反射法地震探査

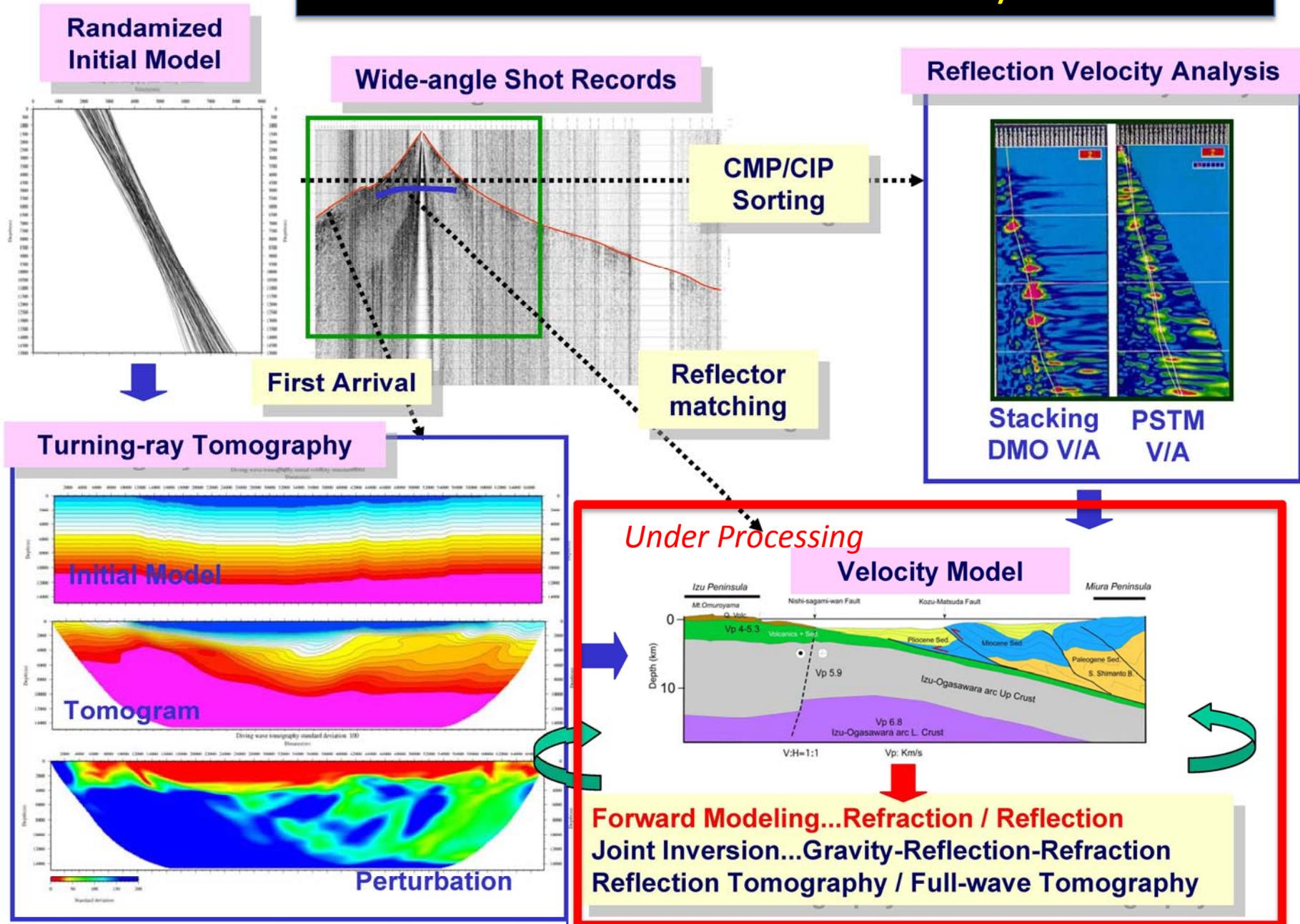


海上発震は陸上でも受振→擬似的発震点となる
 →長大展開での屈折法による速度構造解析

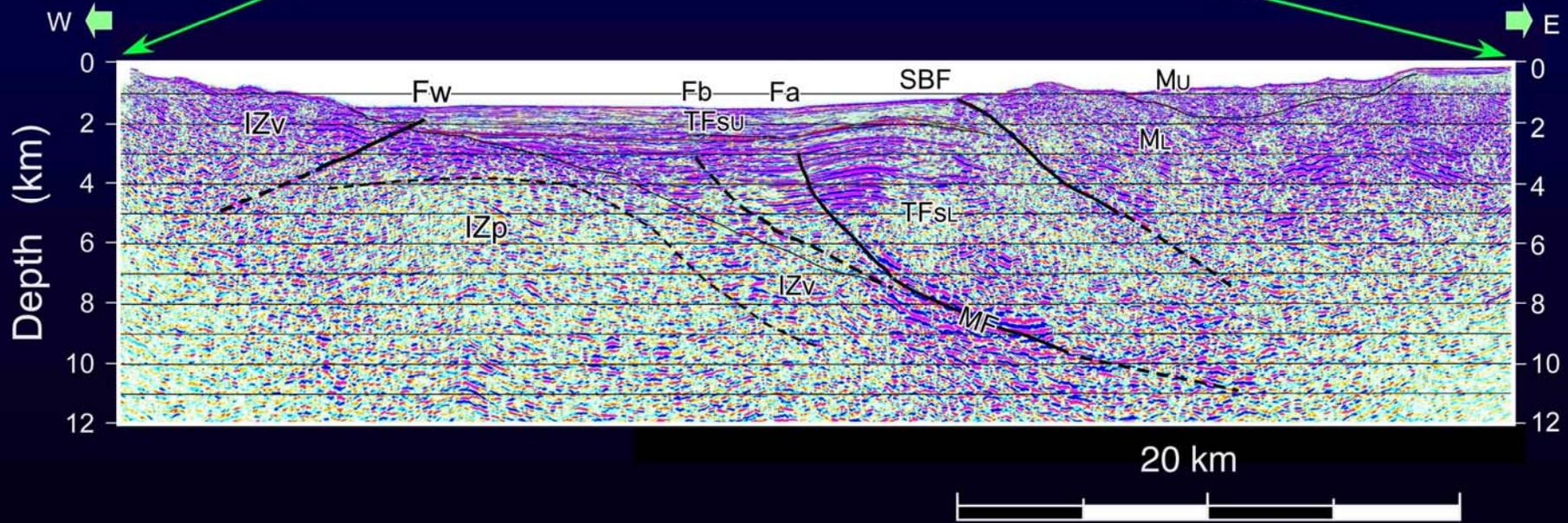
Example of Super Gather



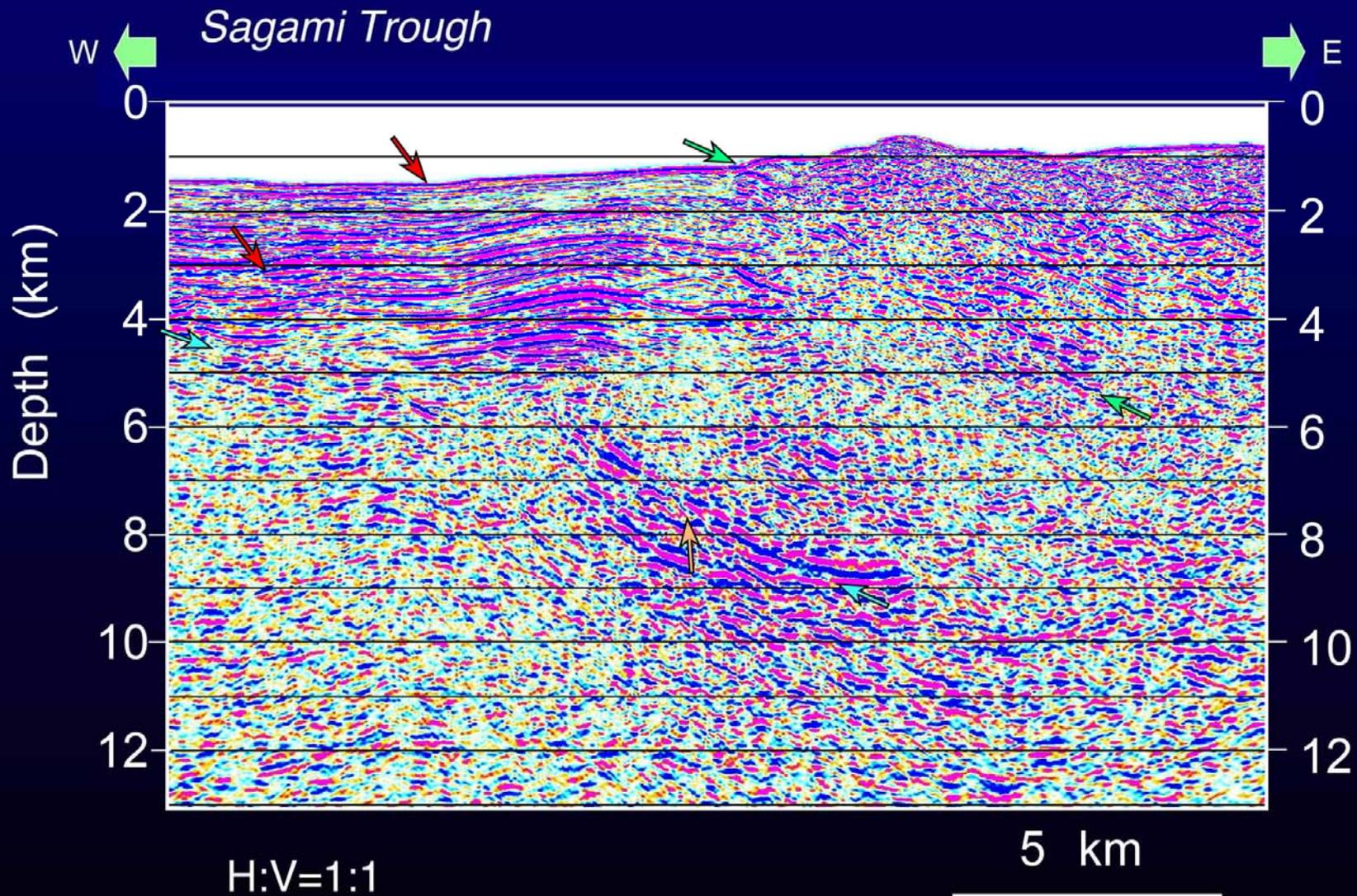
Work Flow to construct velocity model



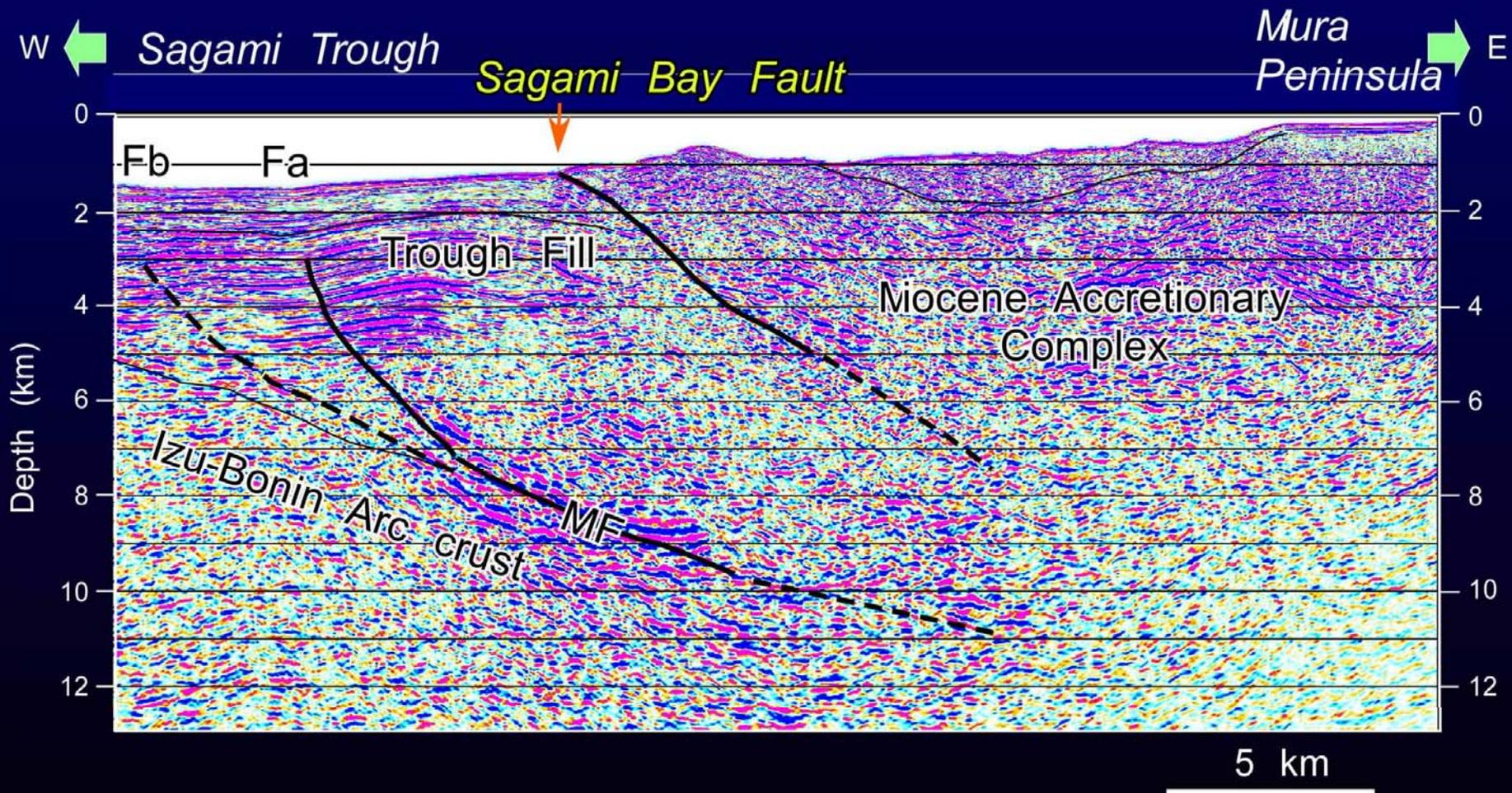
Depth converted seismic section Sagami Bay 2009



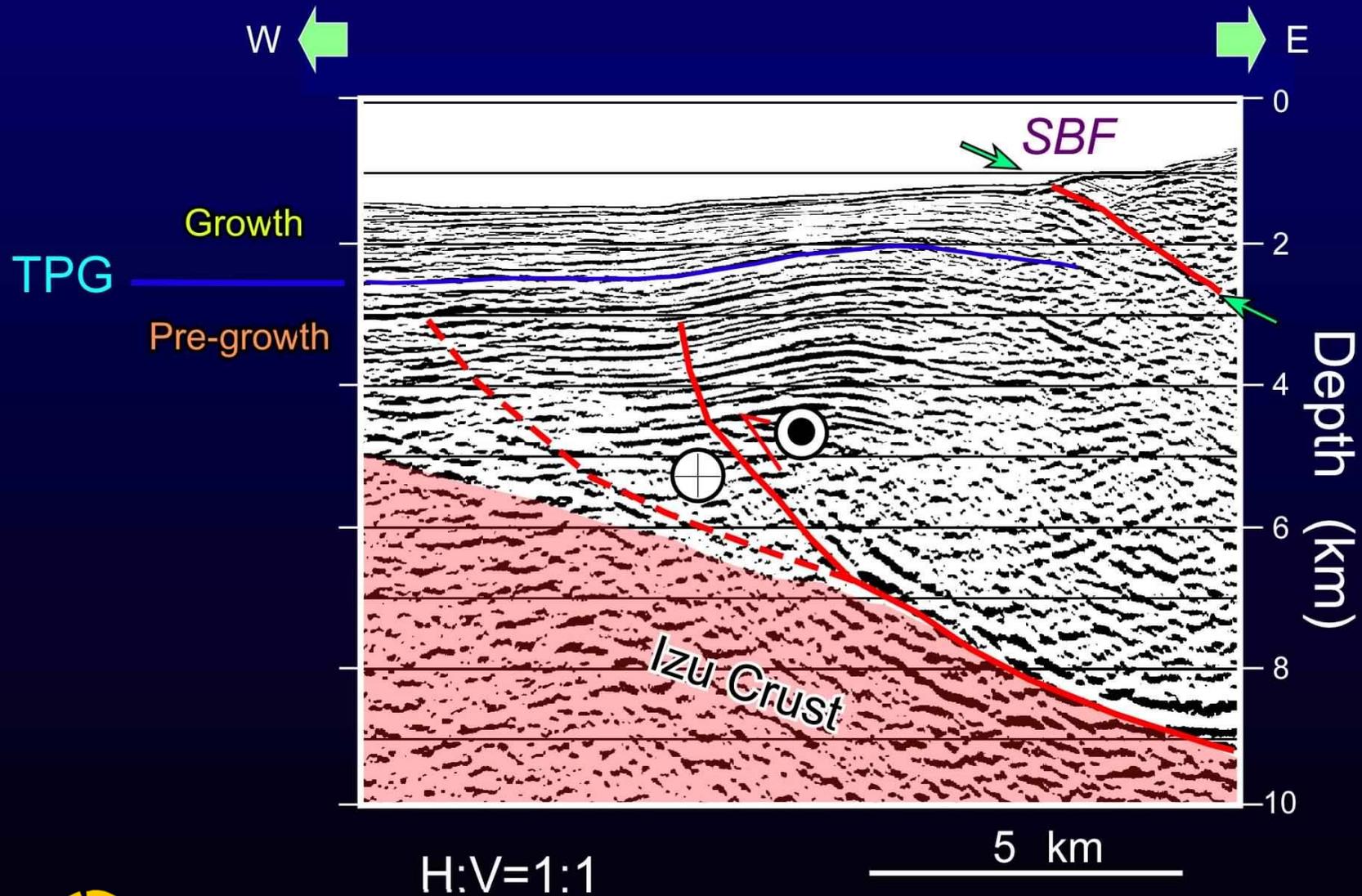
Central part of the seismic section Sagami Bay 2009

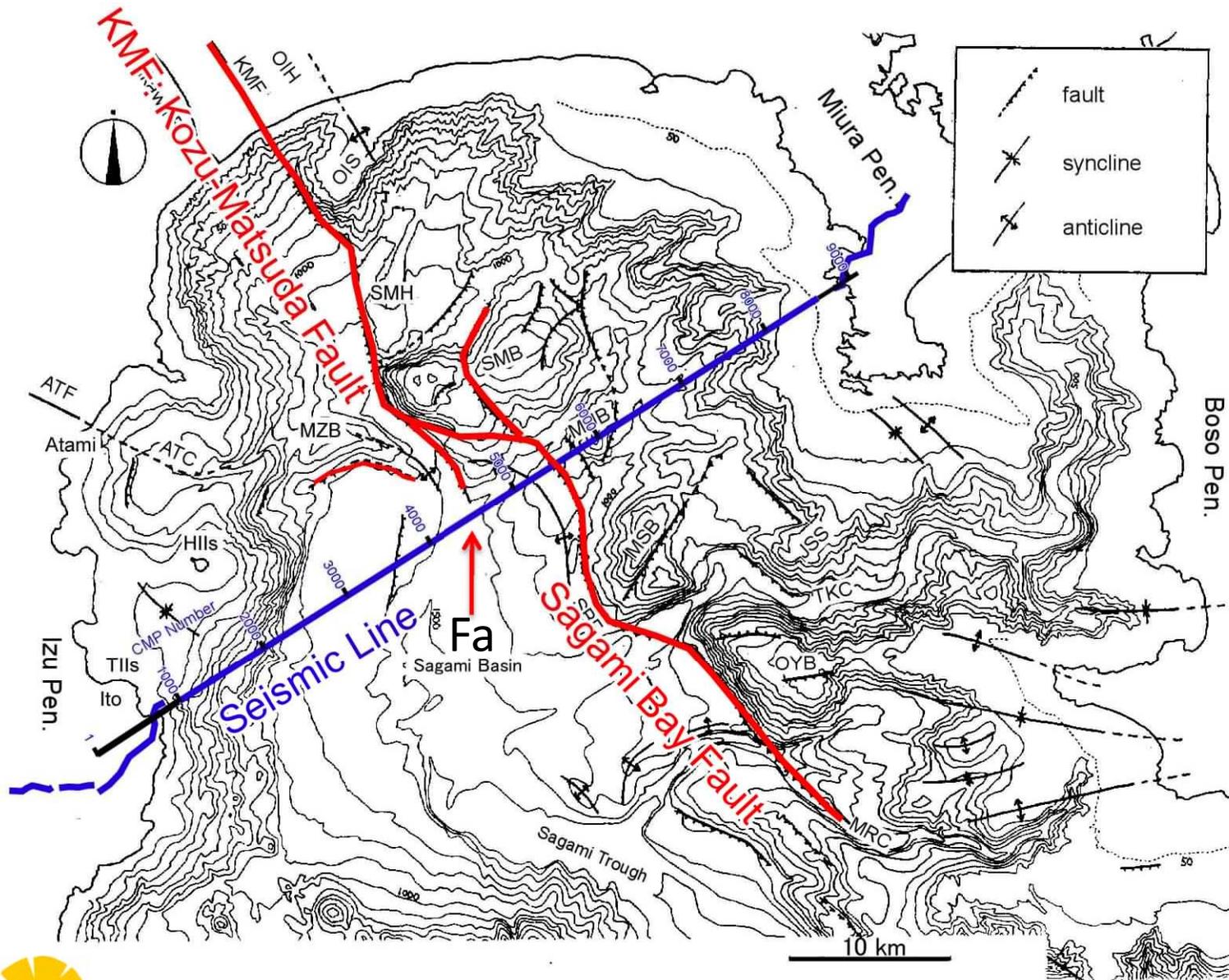


Eastern part of the seismic section Sagami Bay 2009

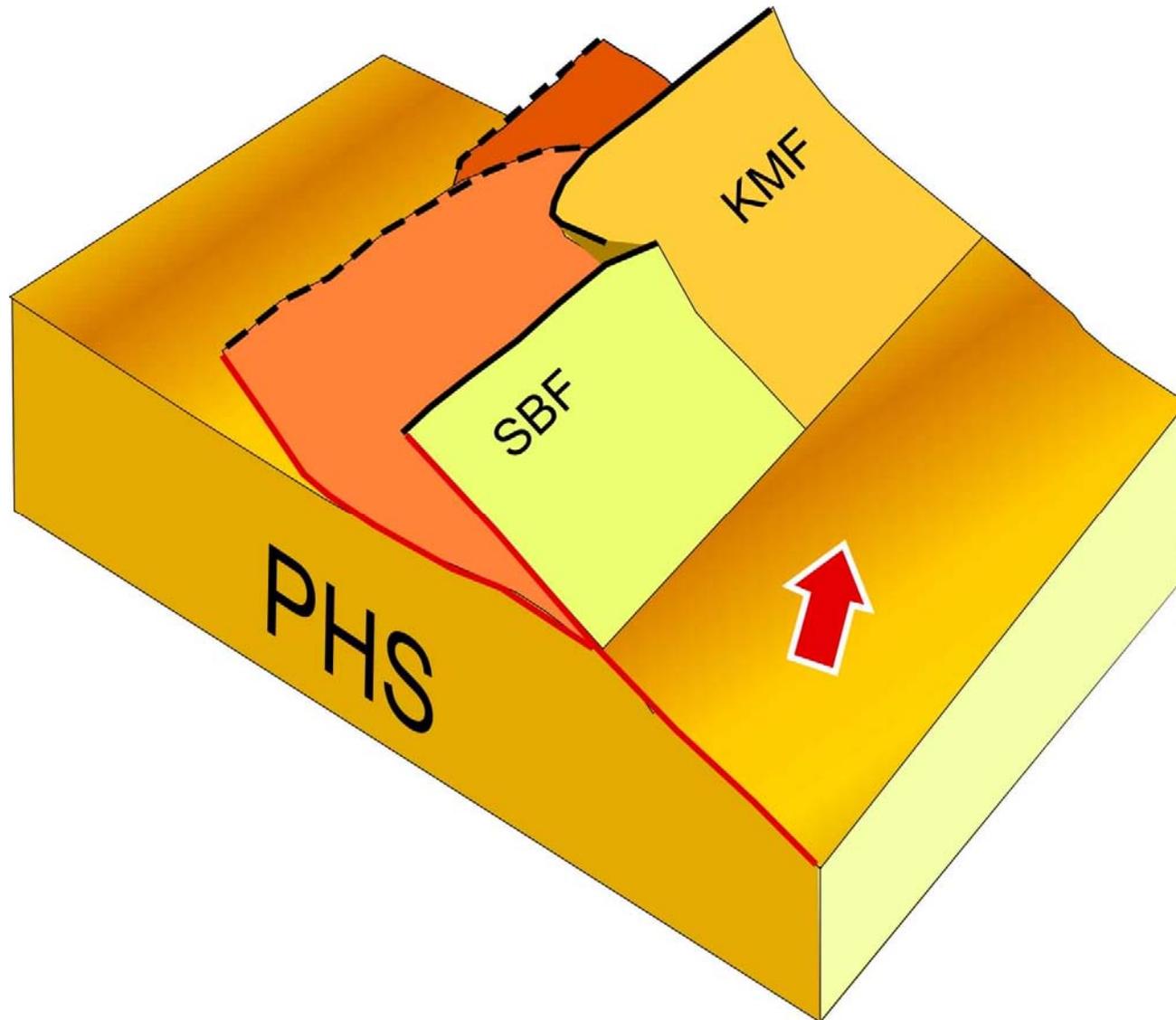


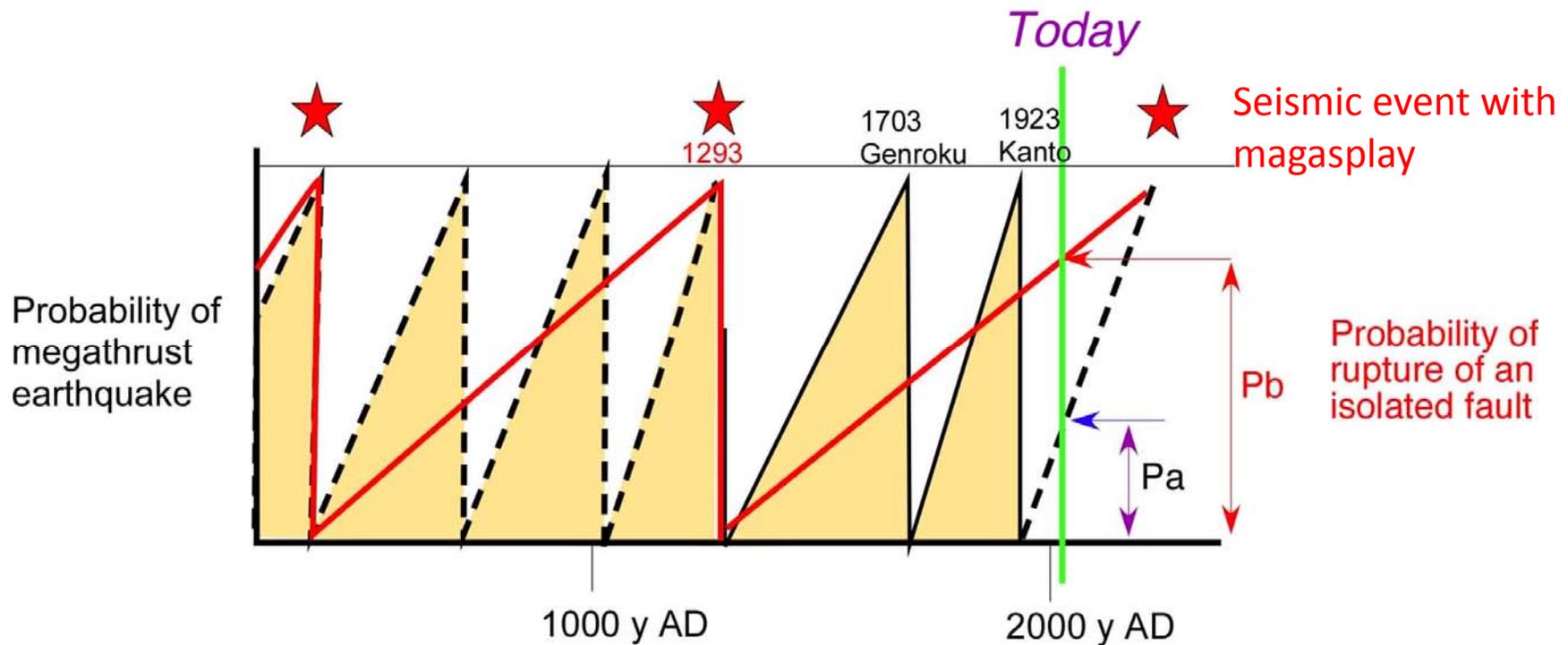
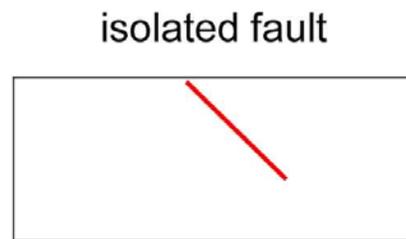
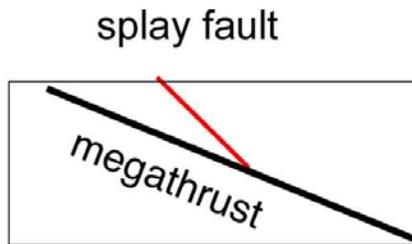
Central part of the seismic section Sagami Bay 2009



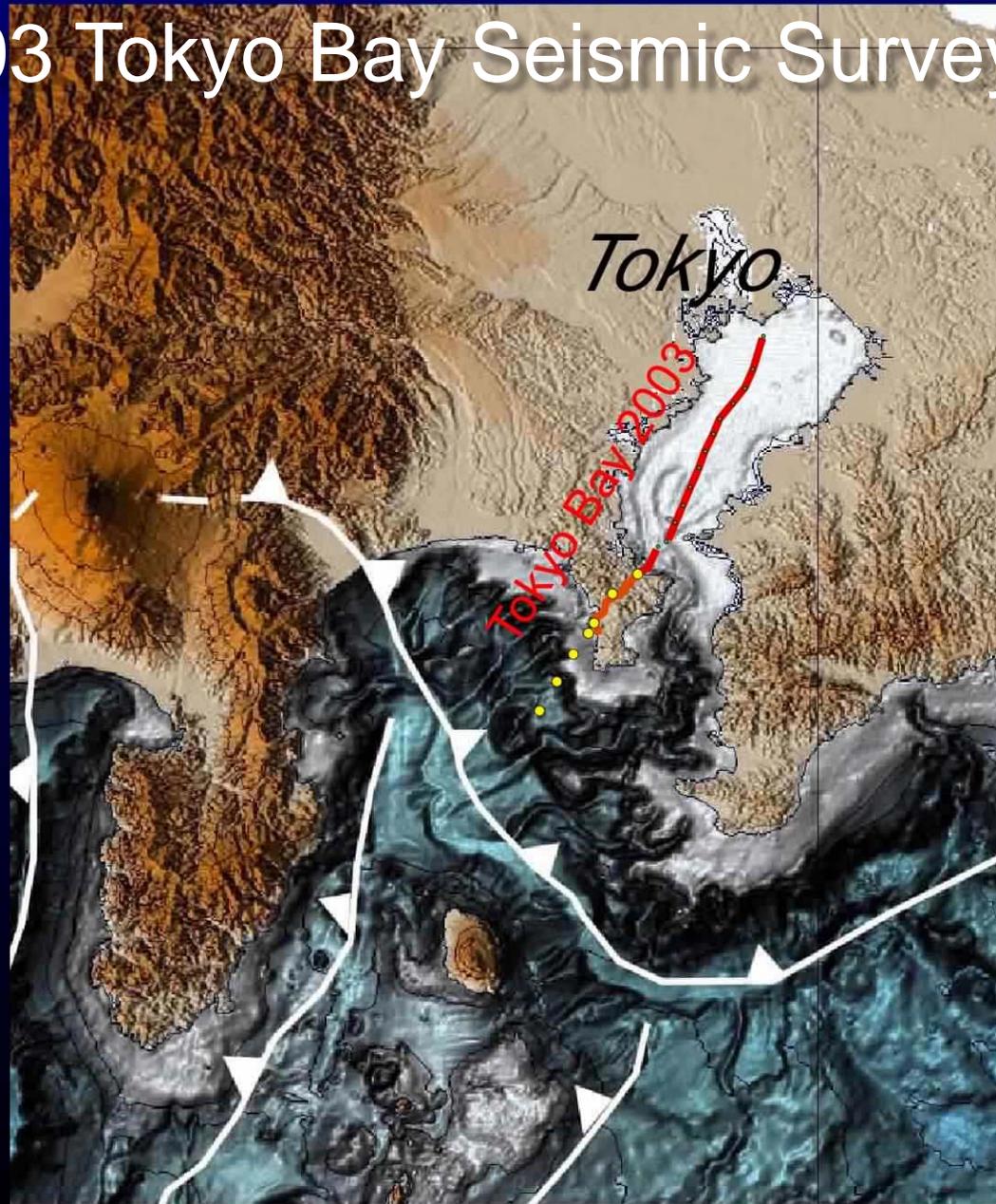


Geometry of fault system

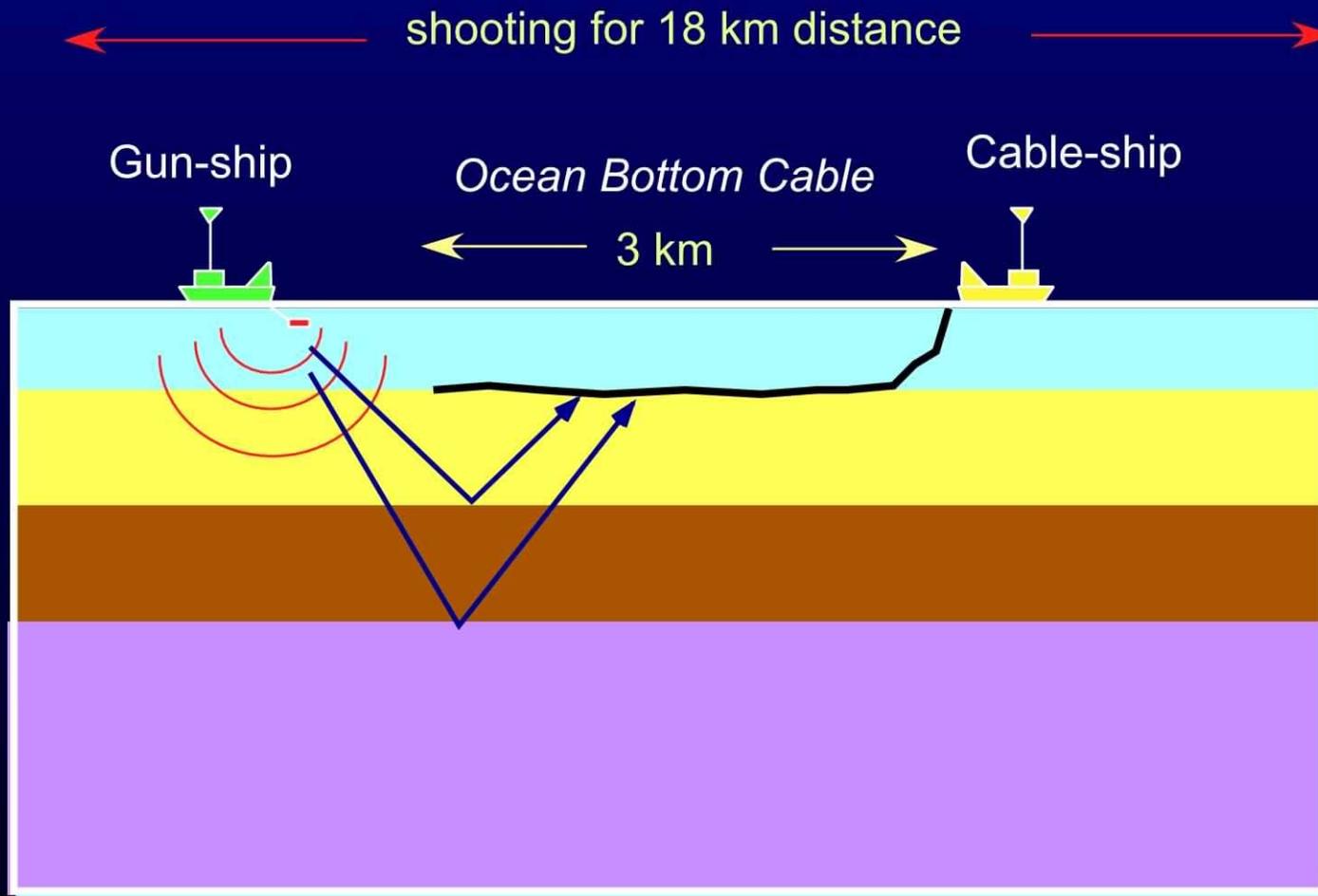


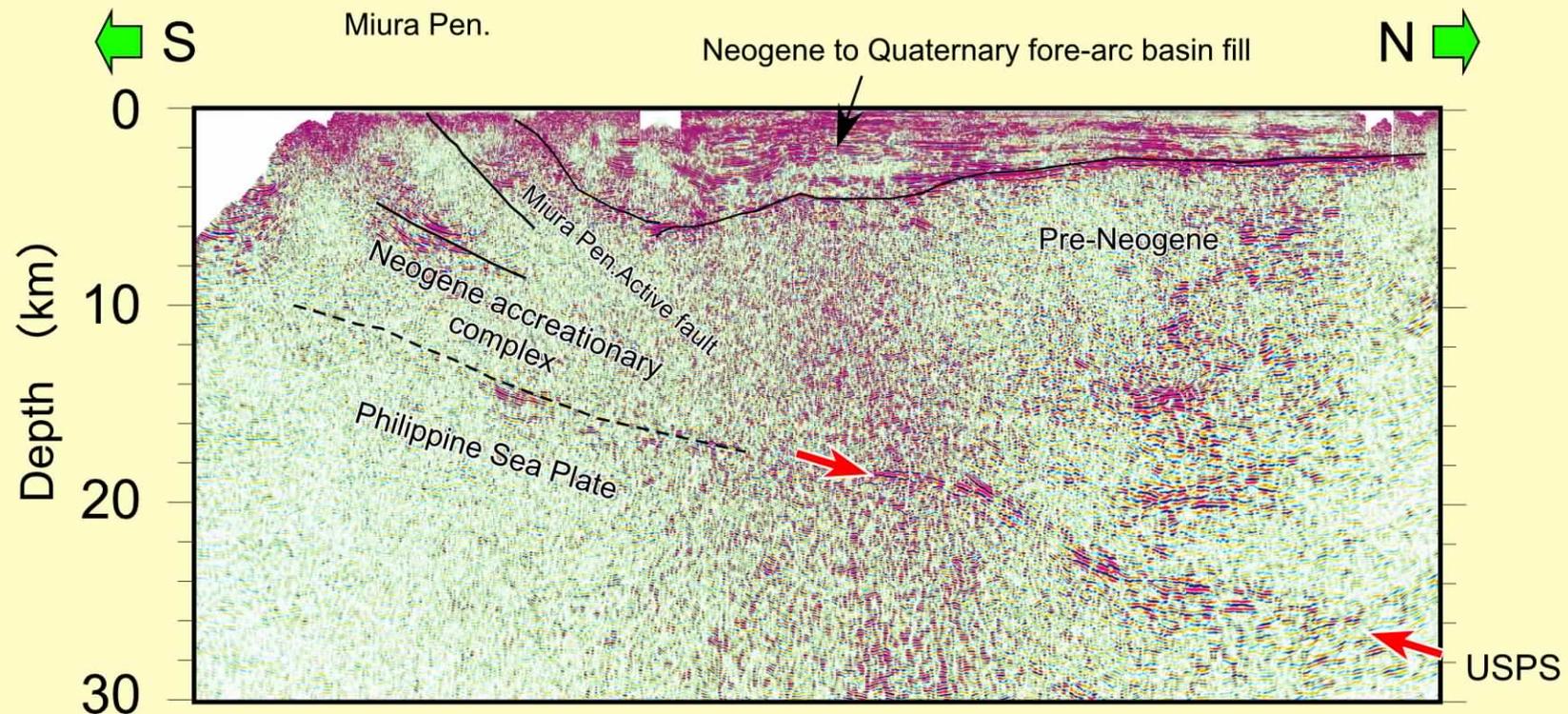


2003 Tokyo Bay Seismic Survey



Data acquisition in the 2003 Tokyo Bay Seismic Survey





V:H=1:1

0 30 km

Zone of Poor Reflection

Zone of Strong Reflection



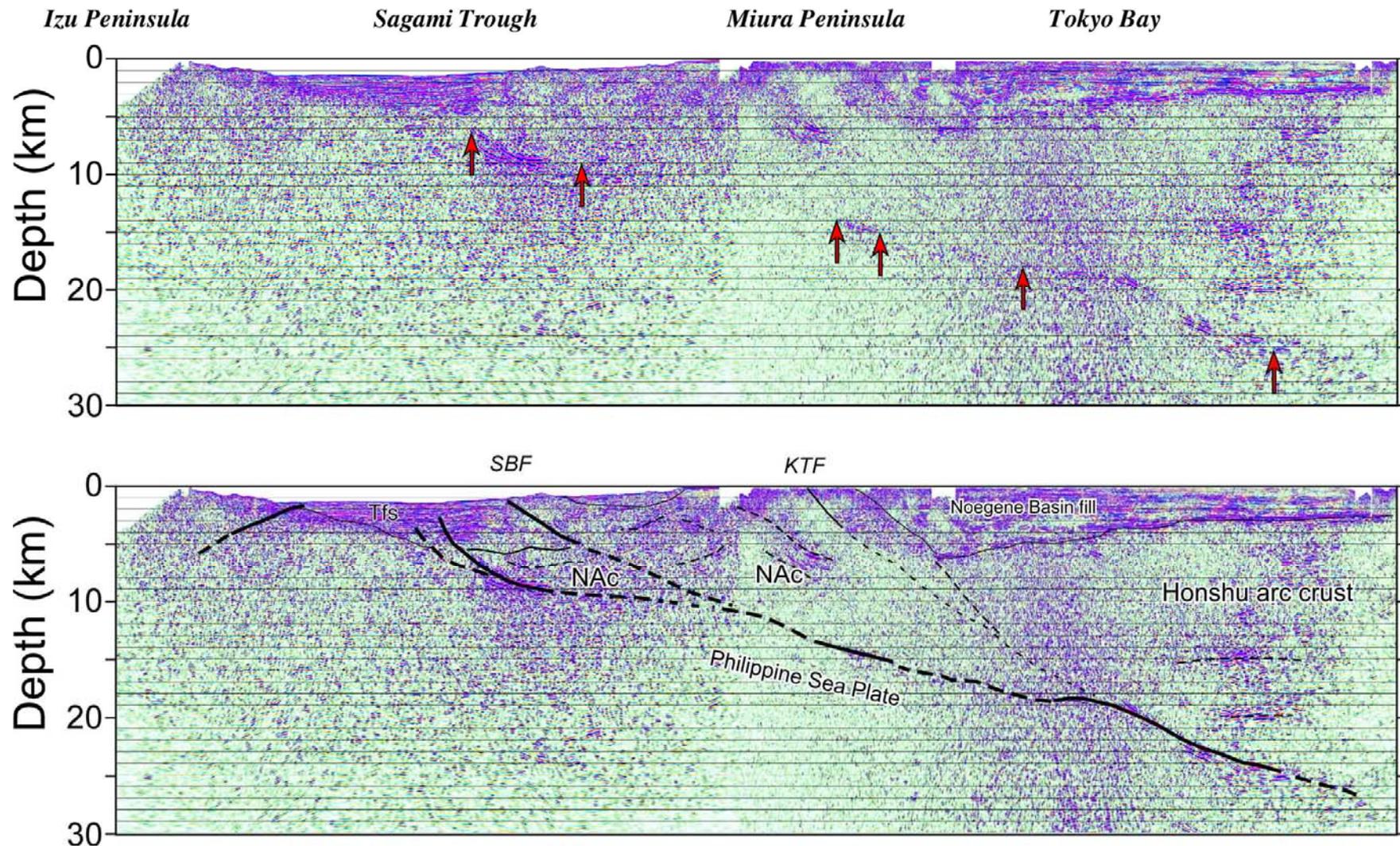
Locked Zone

Aseismic slip zone

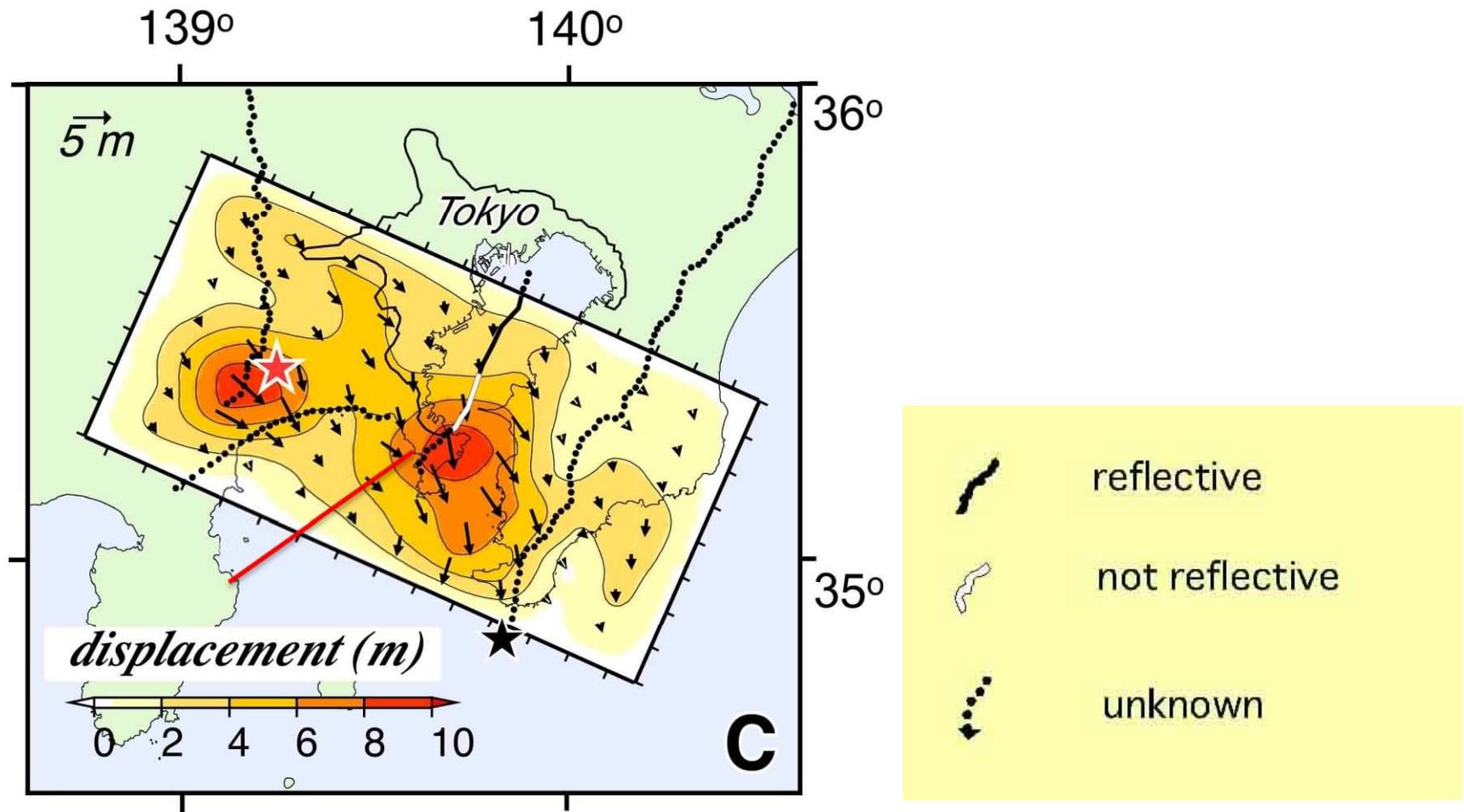


ERI, Univ. Tokyo

Izu – Tokyo Seismic Section



Coseismic slip of the 1923 Kanto Earthquake



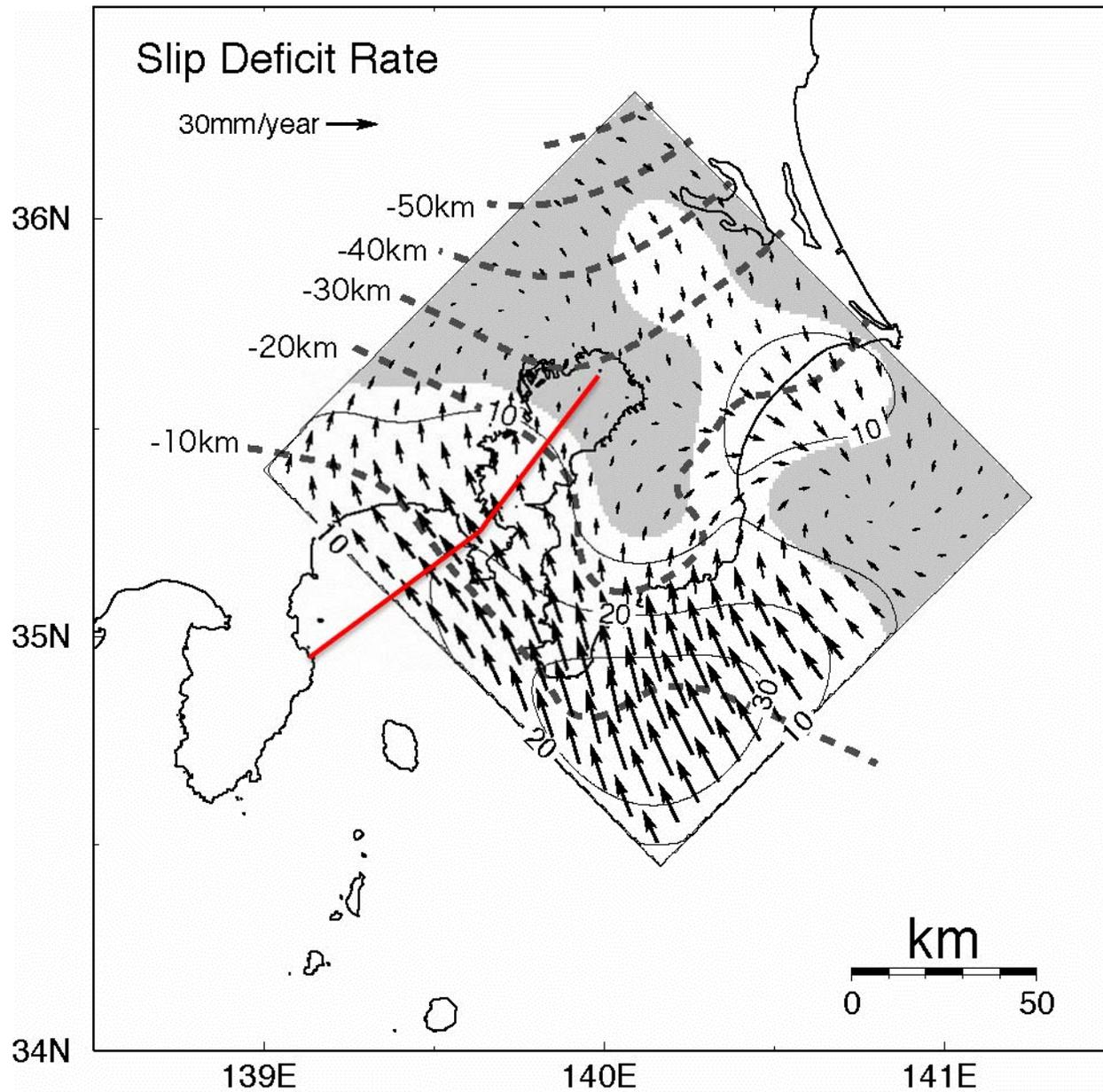
Sato et al. (2005, Science)



ERI, Univ. Tokyo

Analysis by Kobayshi and Koketsu

Slip Deficit Rate on the upper surface of the PHS.



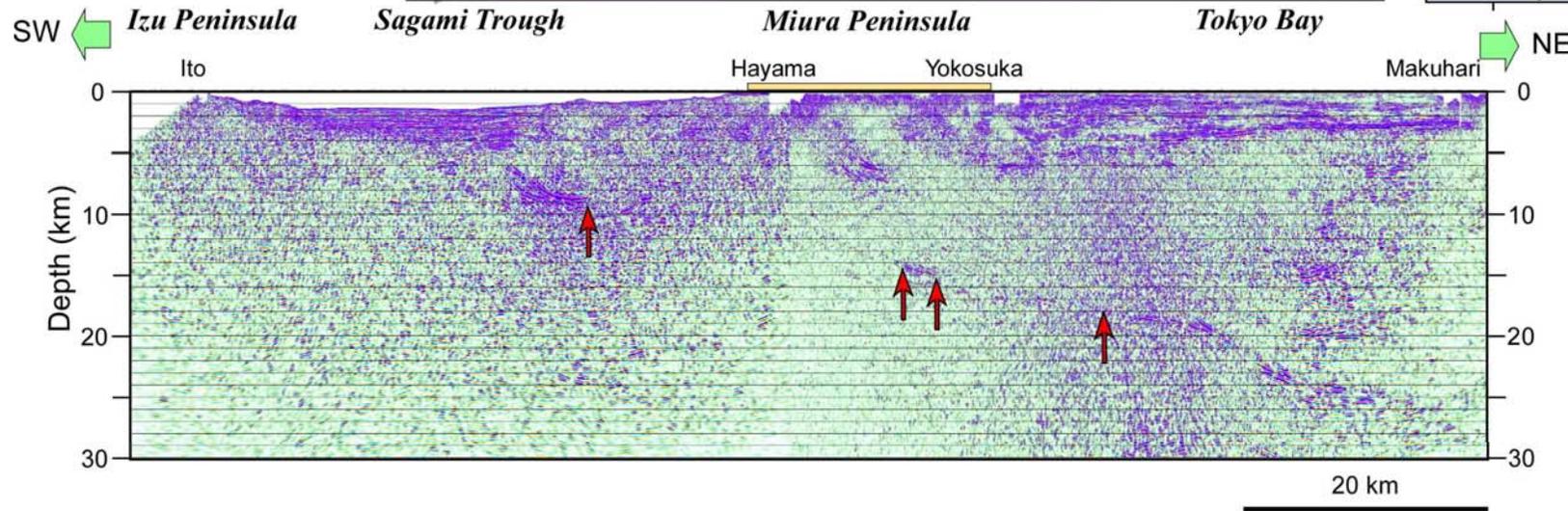
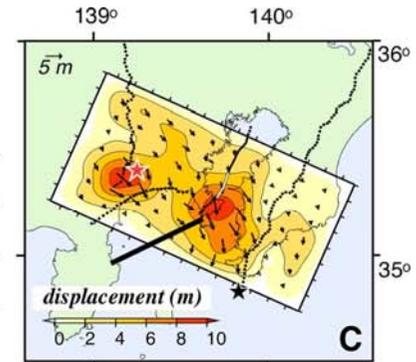
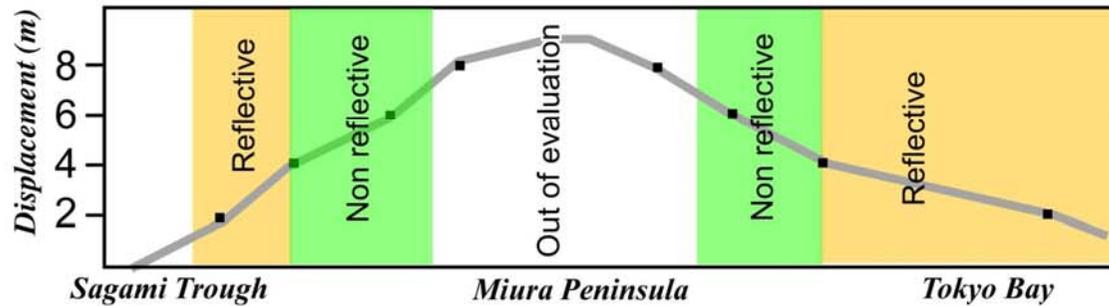
Metro 2005 geometry

1996–2000 GPS
crustal deformation
data

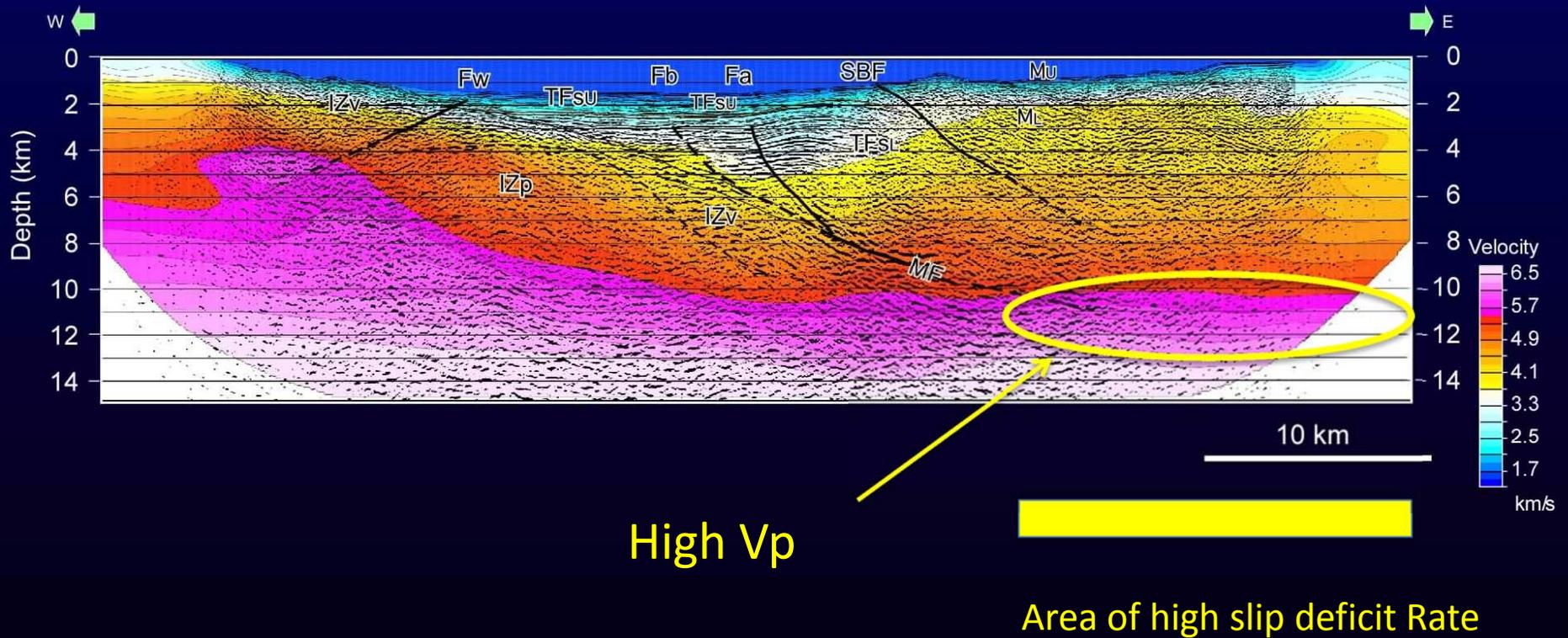
Sagiya and Sato (2005)

Relationship between amount of displacement during the Kanto earthquake and reflectivity of fault surface

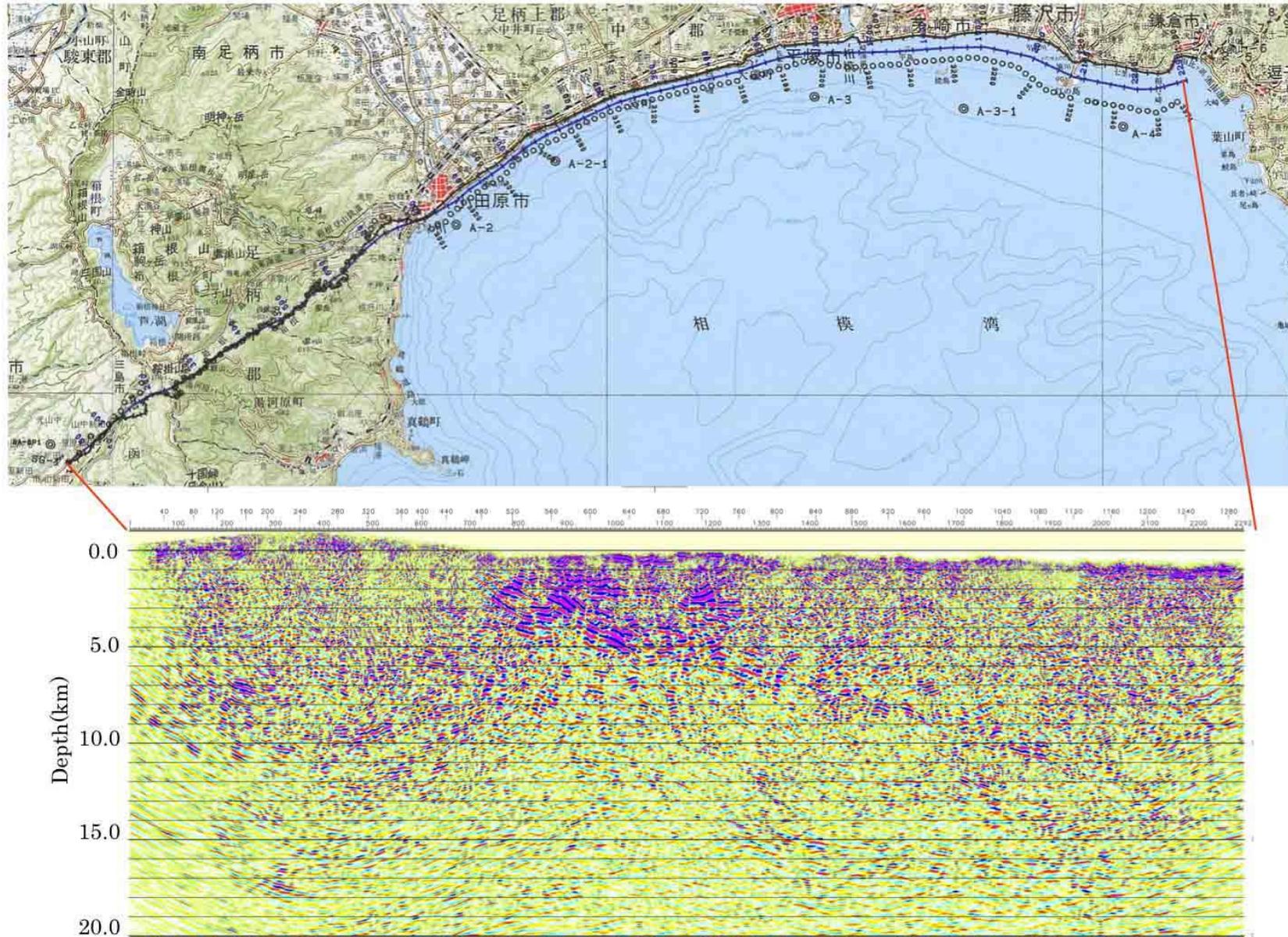
Area of high slip-deficit rate



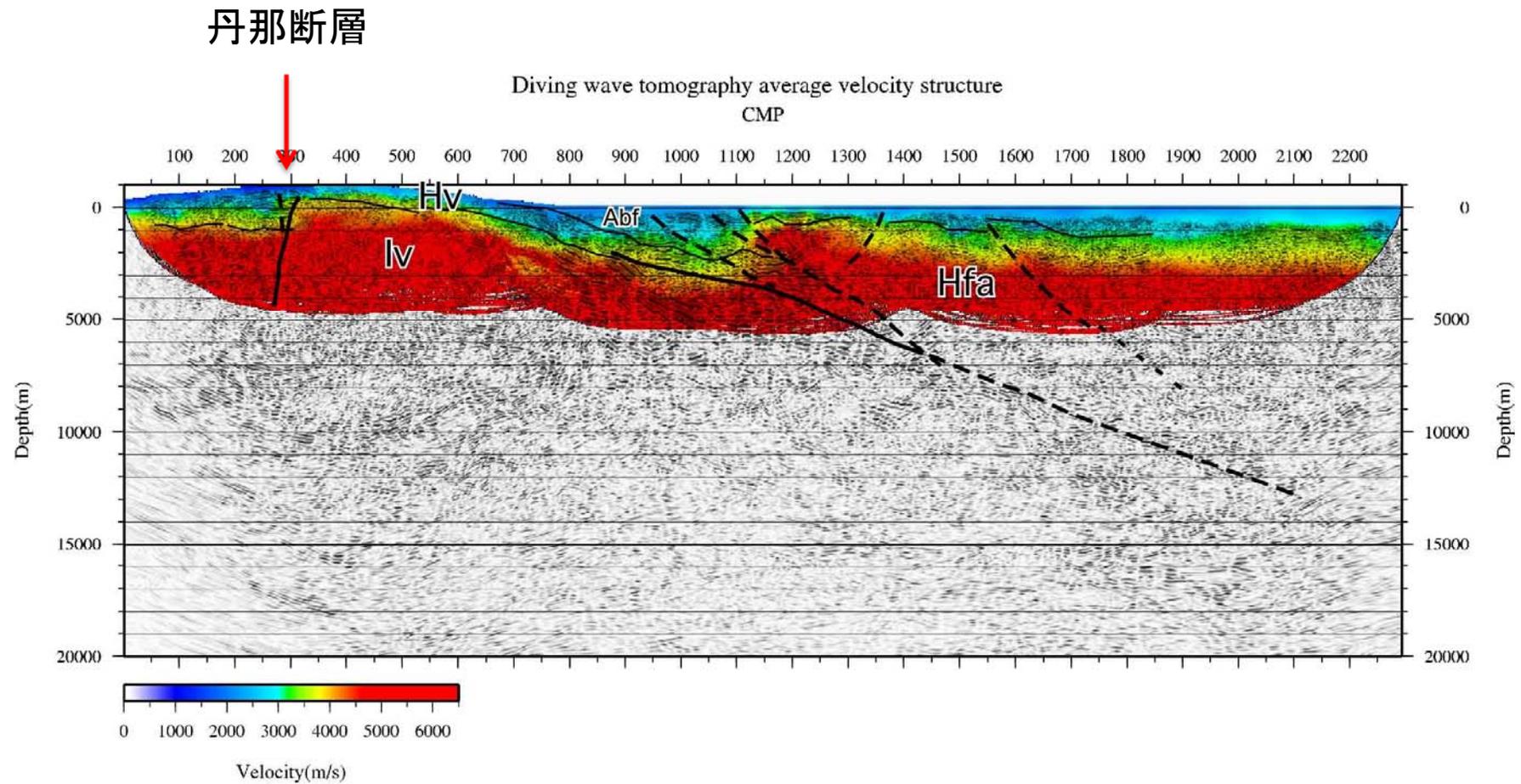
Depth converted section with velocity profile of the Sagami Bay 2009



大大特相模測線の深度断面

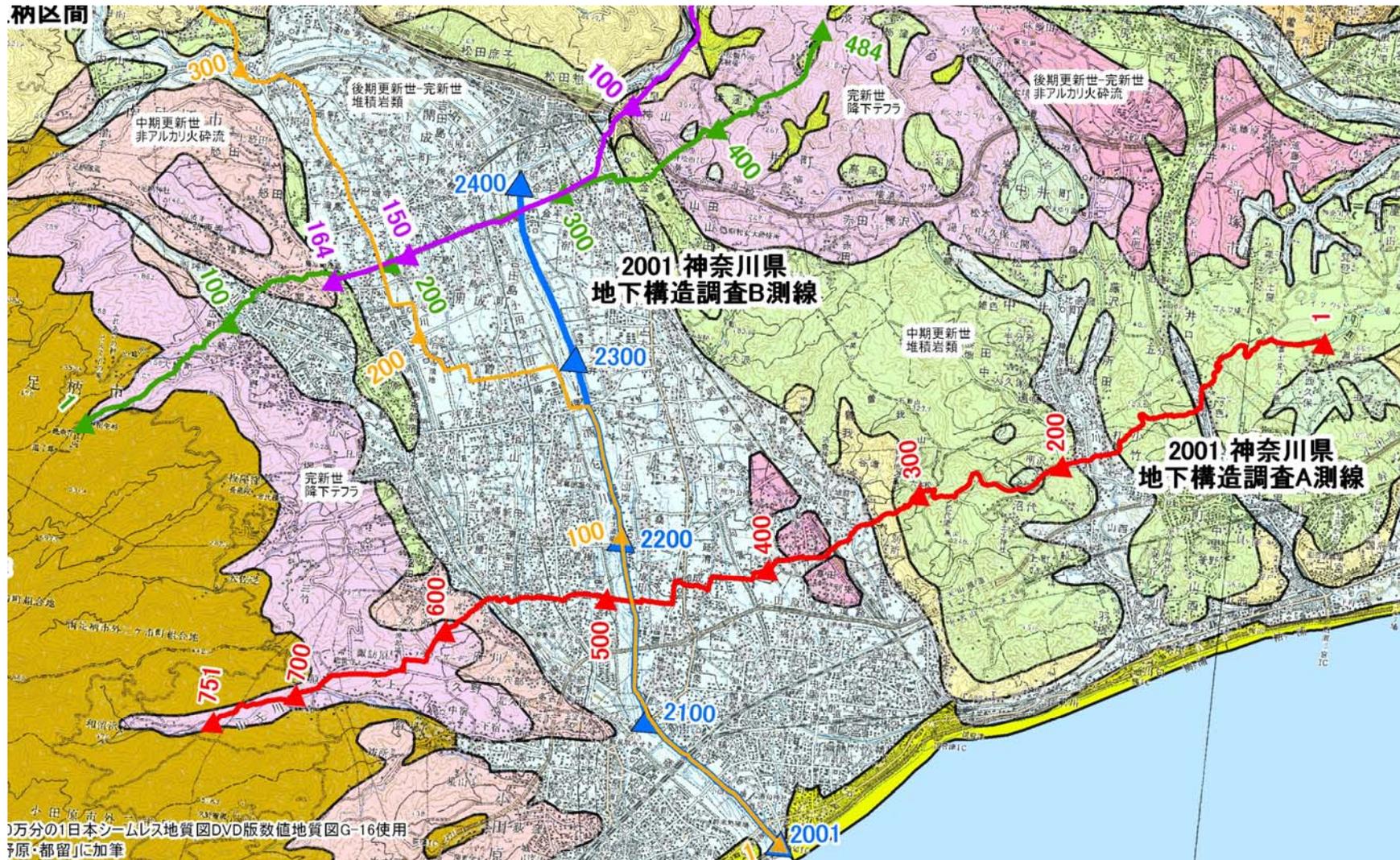


大大特相模測線の速度構造と地質学的解釈

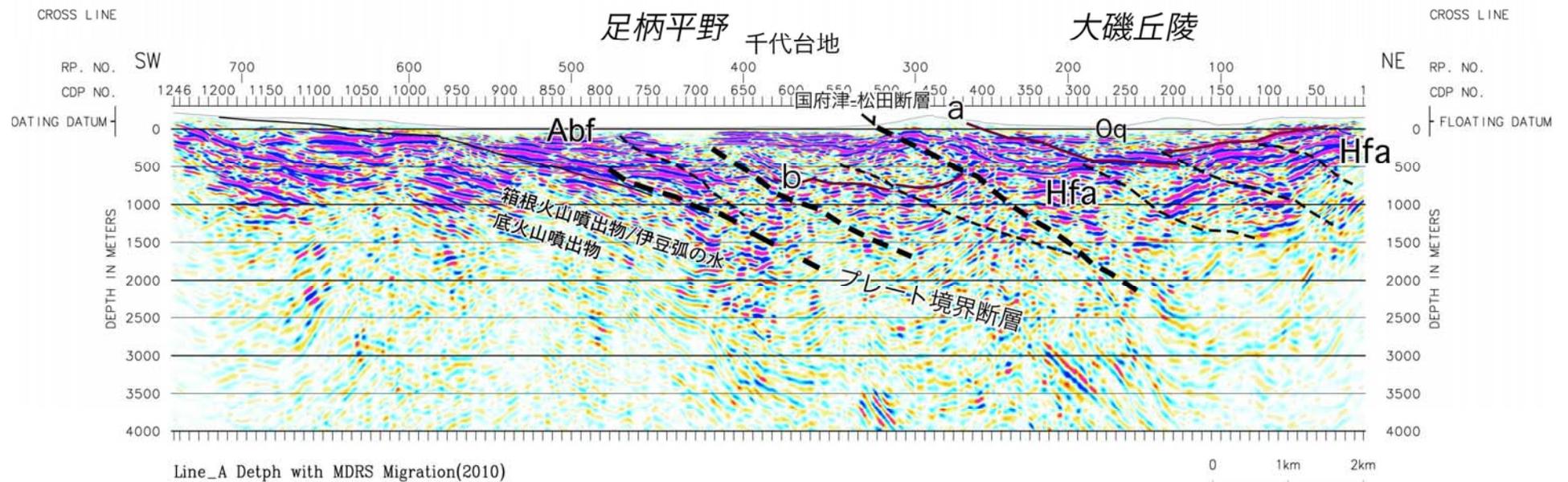


佐藤ほか(2010)神縄・国府津-松田断層帯重点報告書

足柄平野における過去の反射法地震探査測線



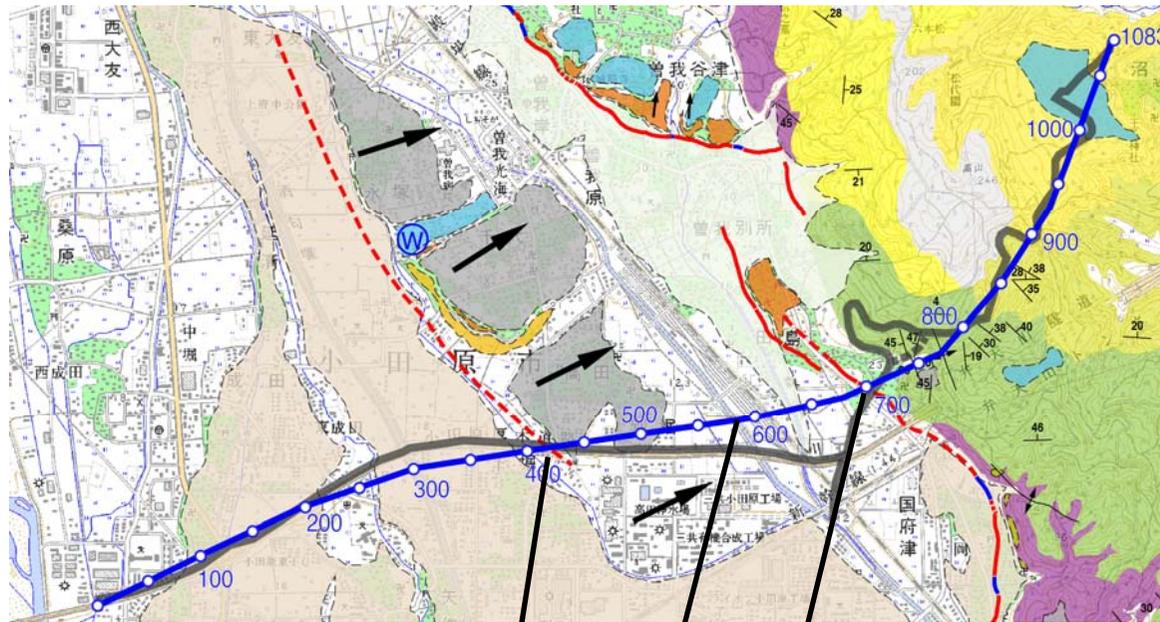
深度変換断面(MRDS解析)の地質学的解釈



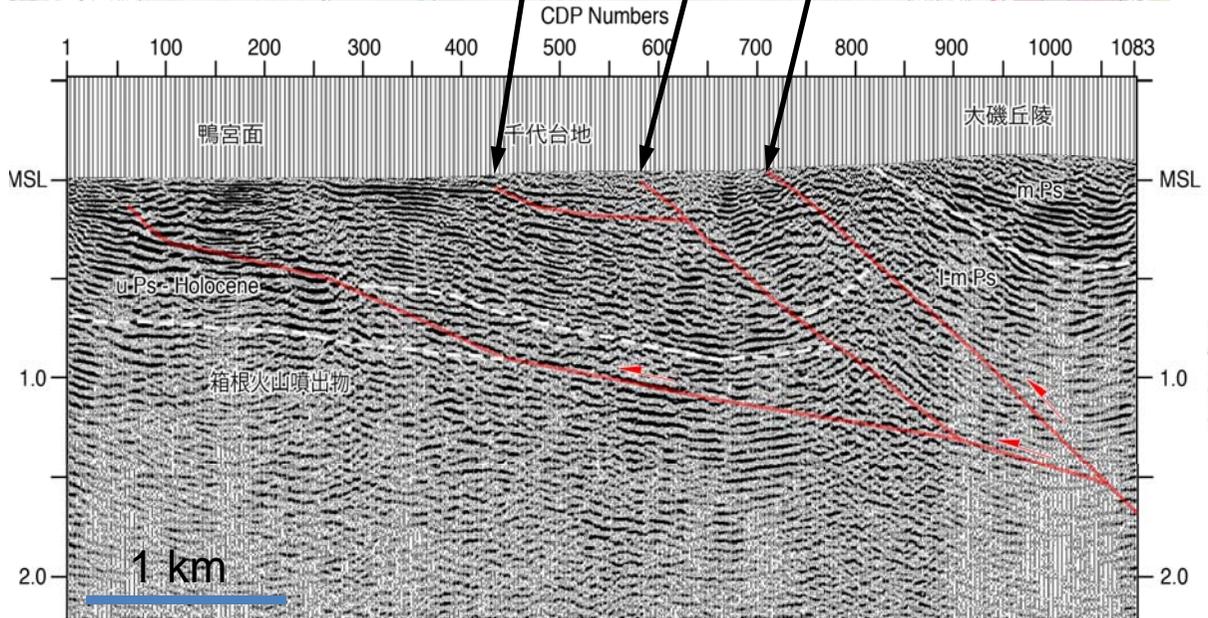
2001神奈川県地下構造調査A測線の深度変換断面

太破線: 累積変位量の大きな断層、破線:断層、Hfa:大磯丘陵下の中新統、Abf: 足柄平野を充填する第四系堆積物、Oq: 大磯丘陵の第四系

国府津一松田断層帯の高精度浅層反射法地震探査：解釈

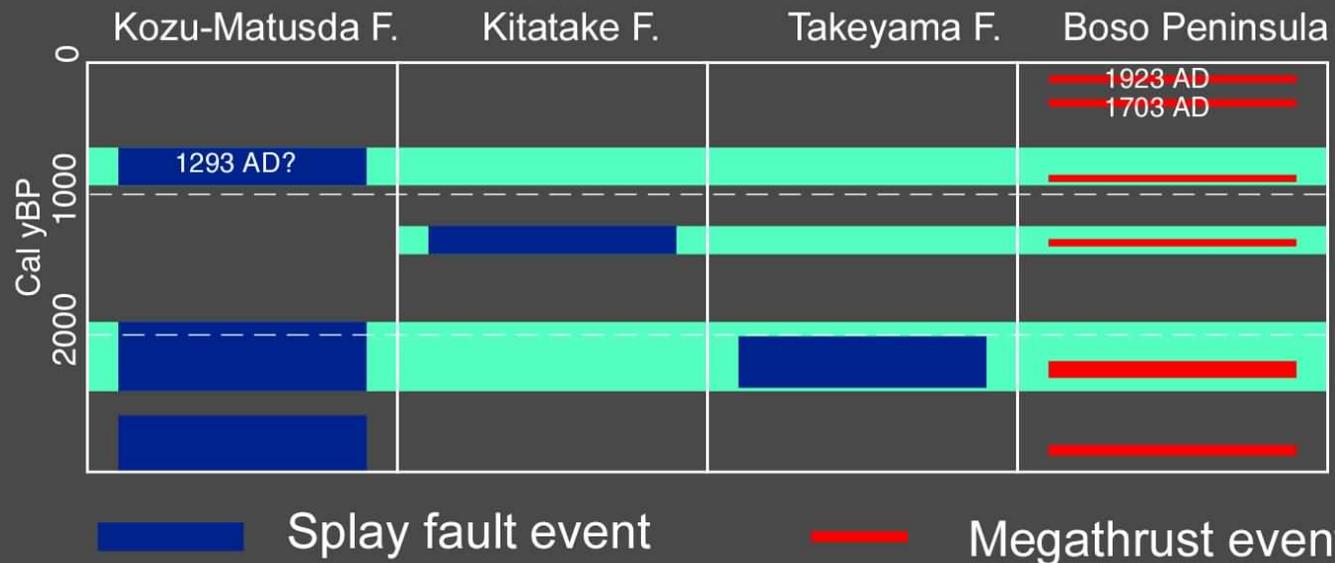
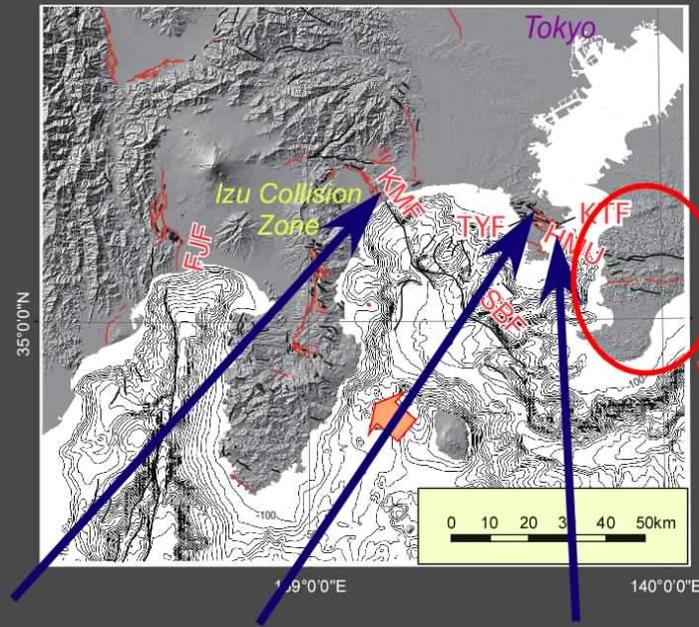


- ・国府津-松田断層の分岐スラスト構造
- ・鴨宮台地地下の伏在スラスト
- ・プレート境界先端部の覆瓦スラスト構造が足柄平野下にも伏在することが明らかになった

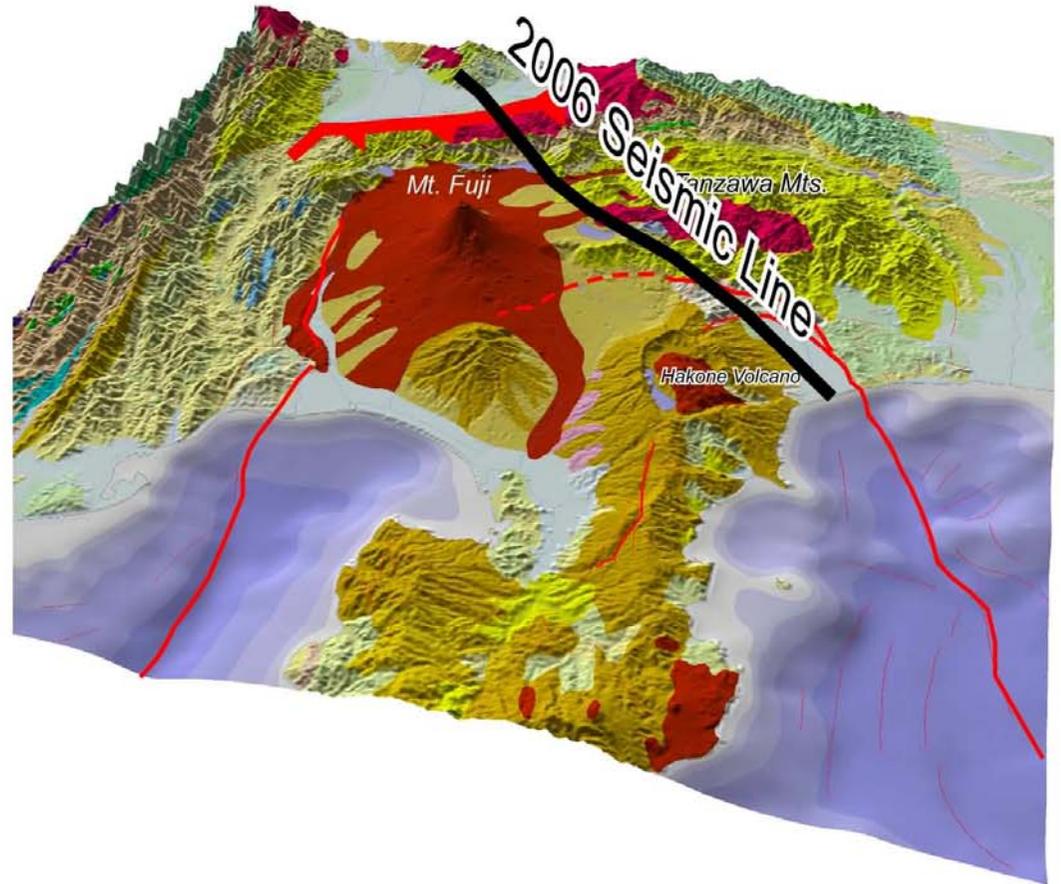
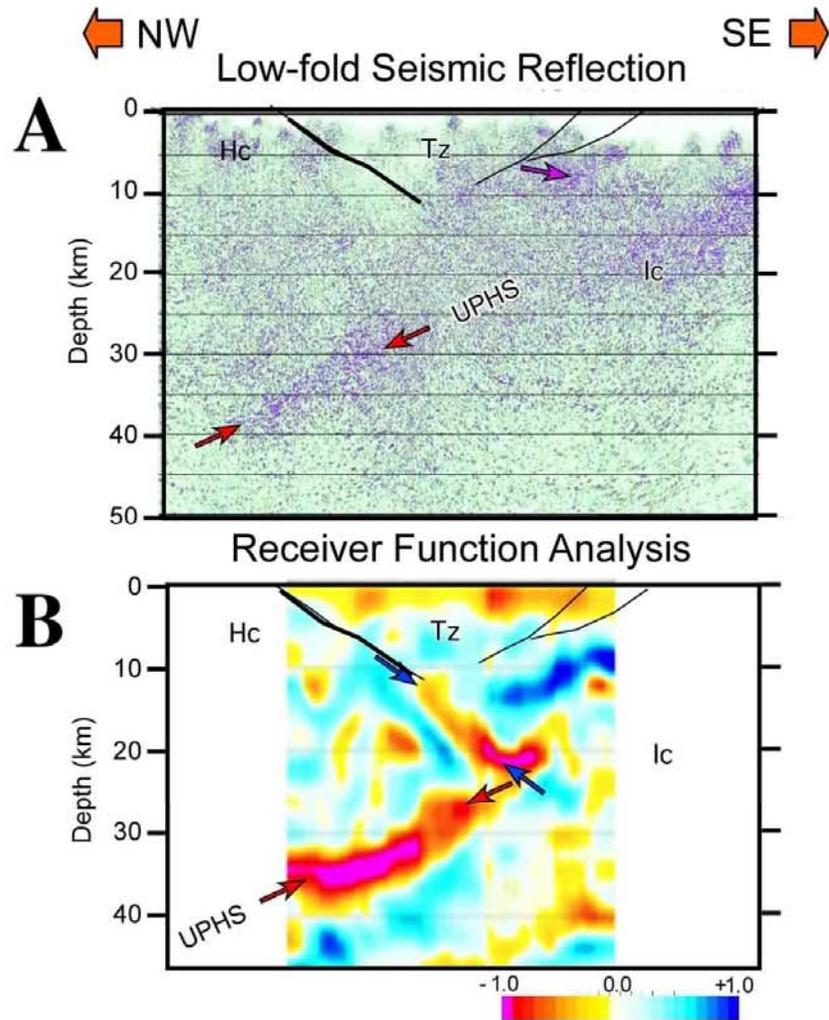


石山ほか(2012)
H23神縄・国府津-松田断層重点報告書+
連合学会

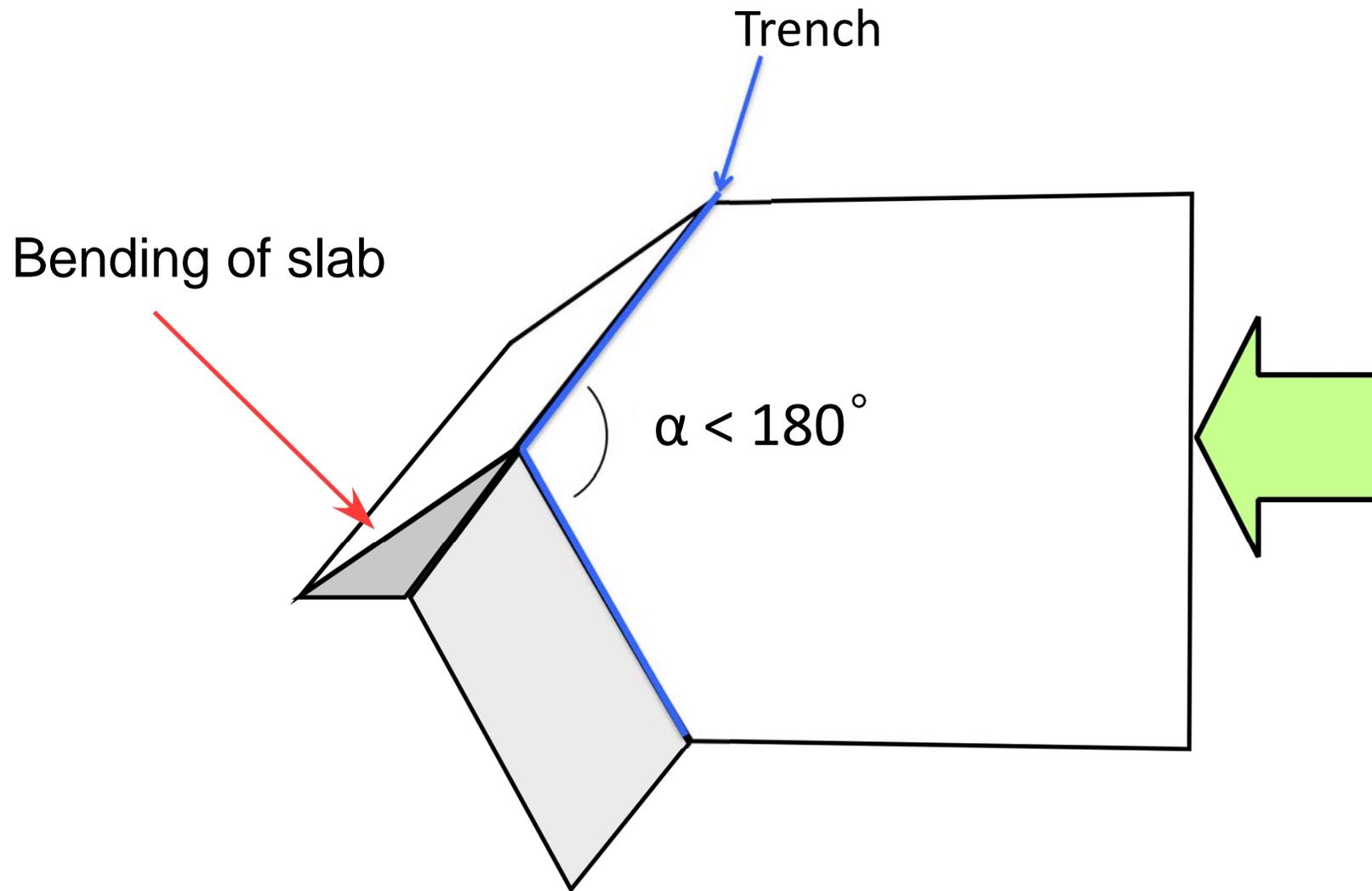
Paleoseismic events of the megathrust and its splay faults



Deeper images by previous research



Sato et al. (2006)



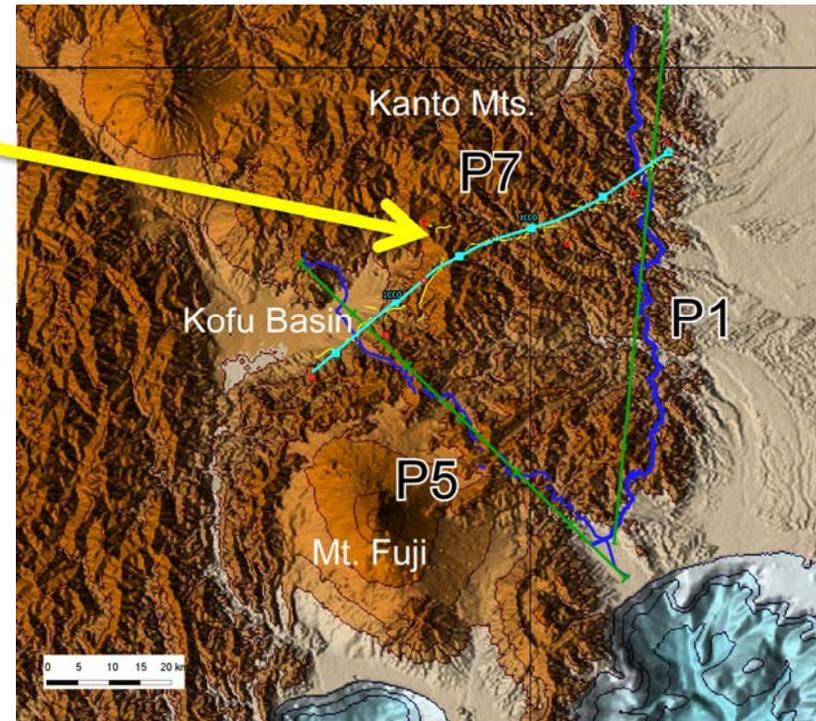
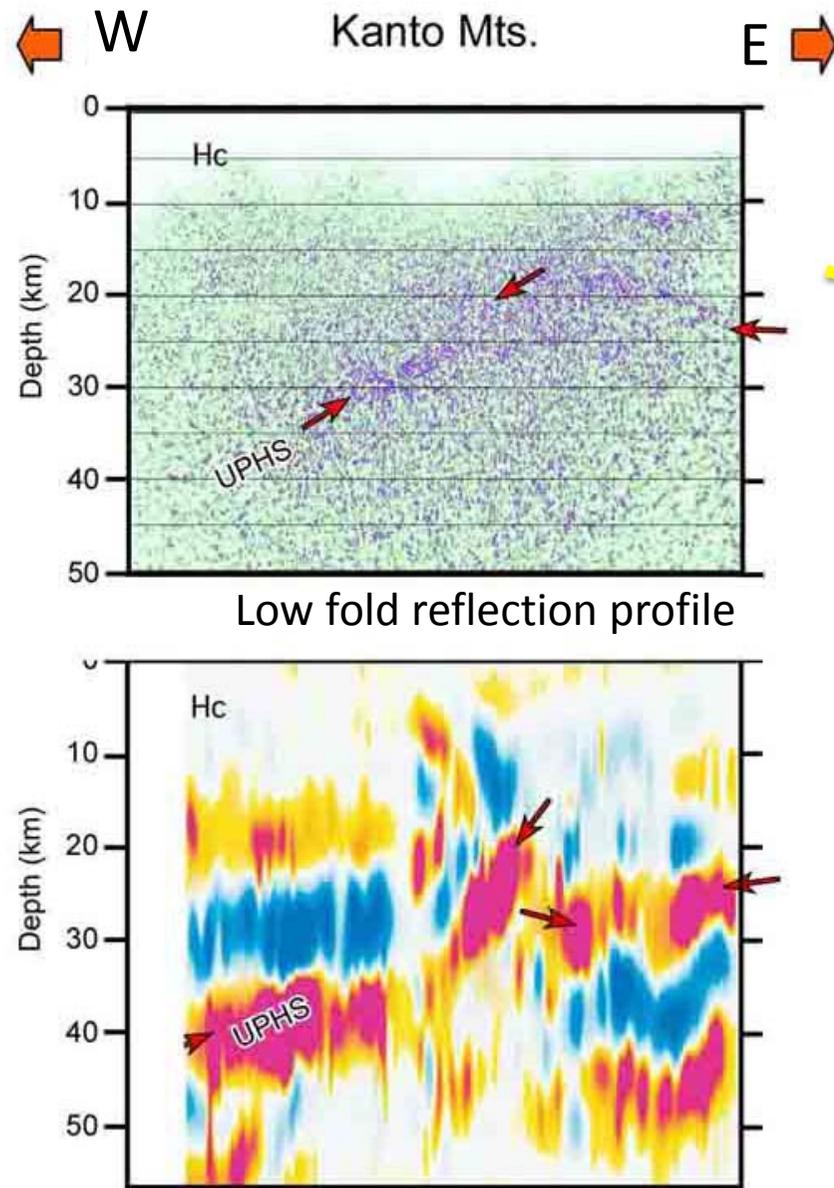


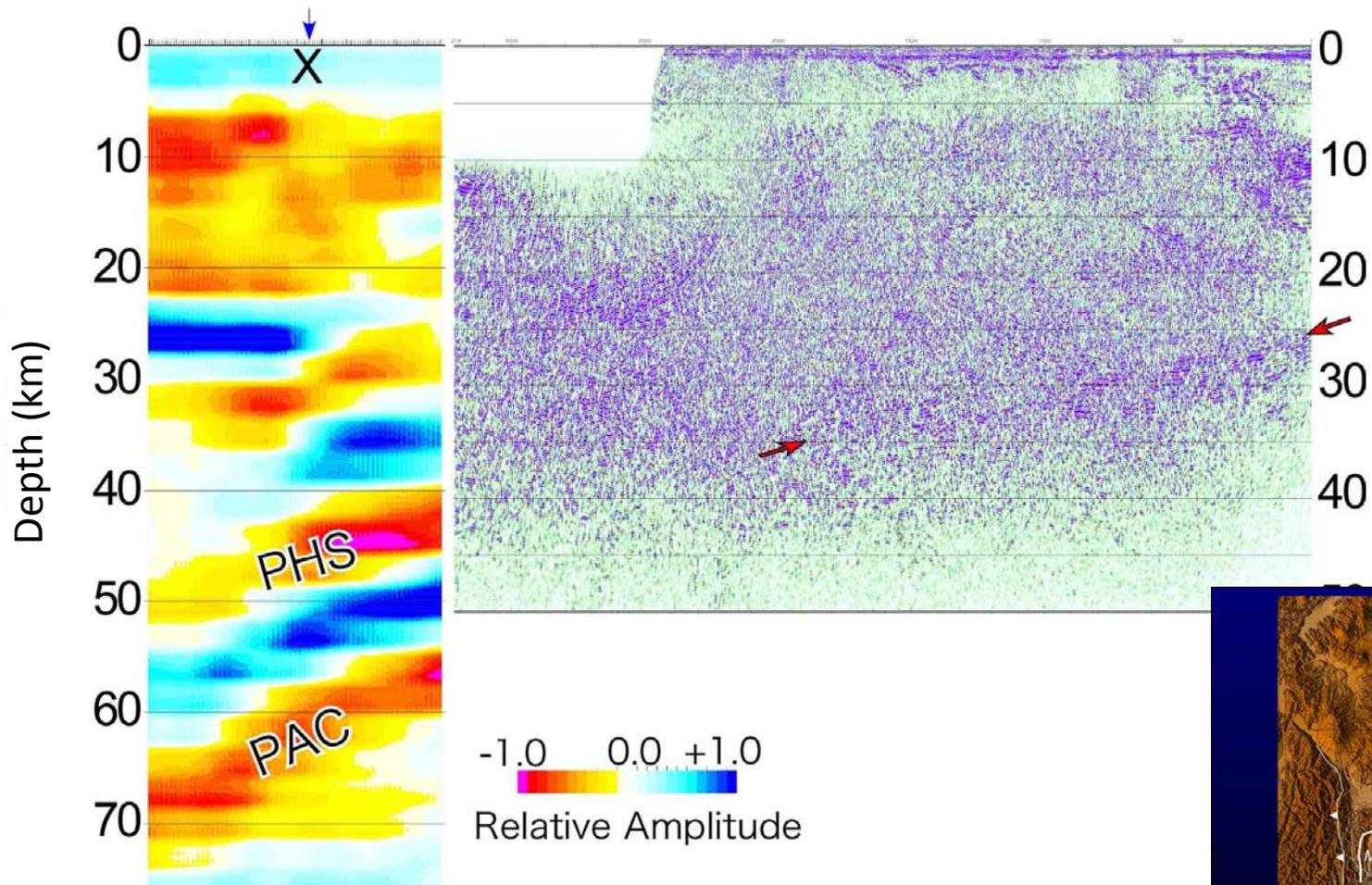
Fig. 5. Location of deep seismic lines in the Izu collision zone.

- CMP line, — Receiver line
- CMP line of P7 — Receiver points of P7
- High-energy shot point

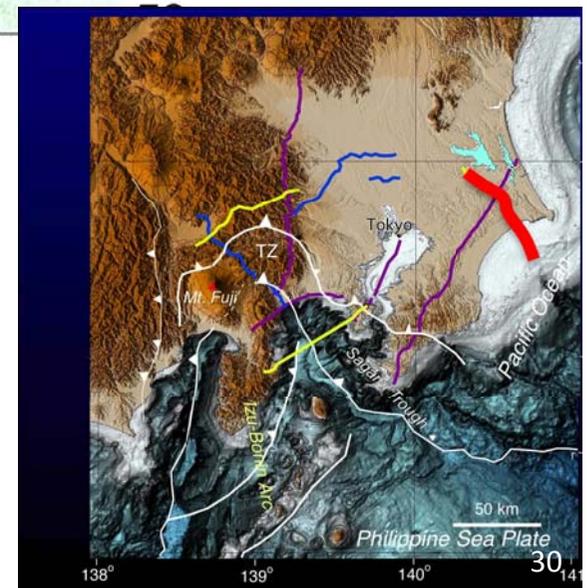
← NW RF analysis

Low fold reflection profile

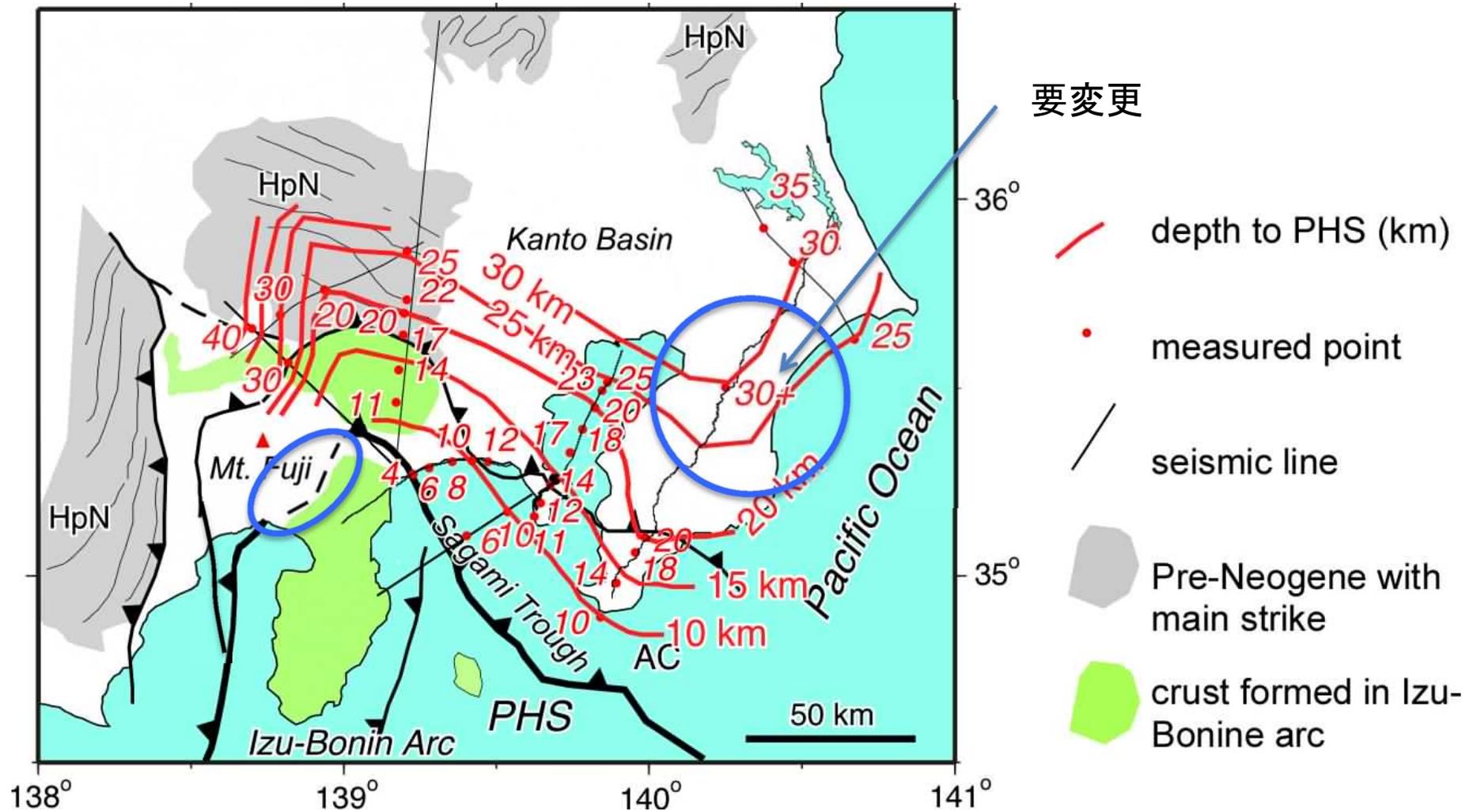
SE →



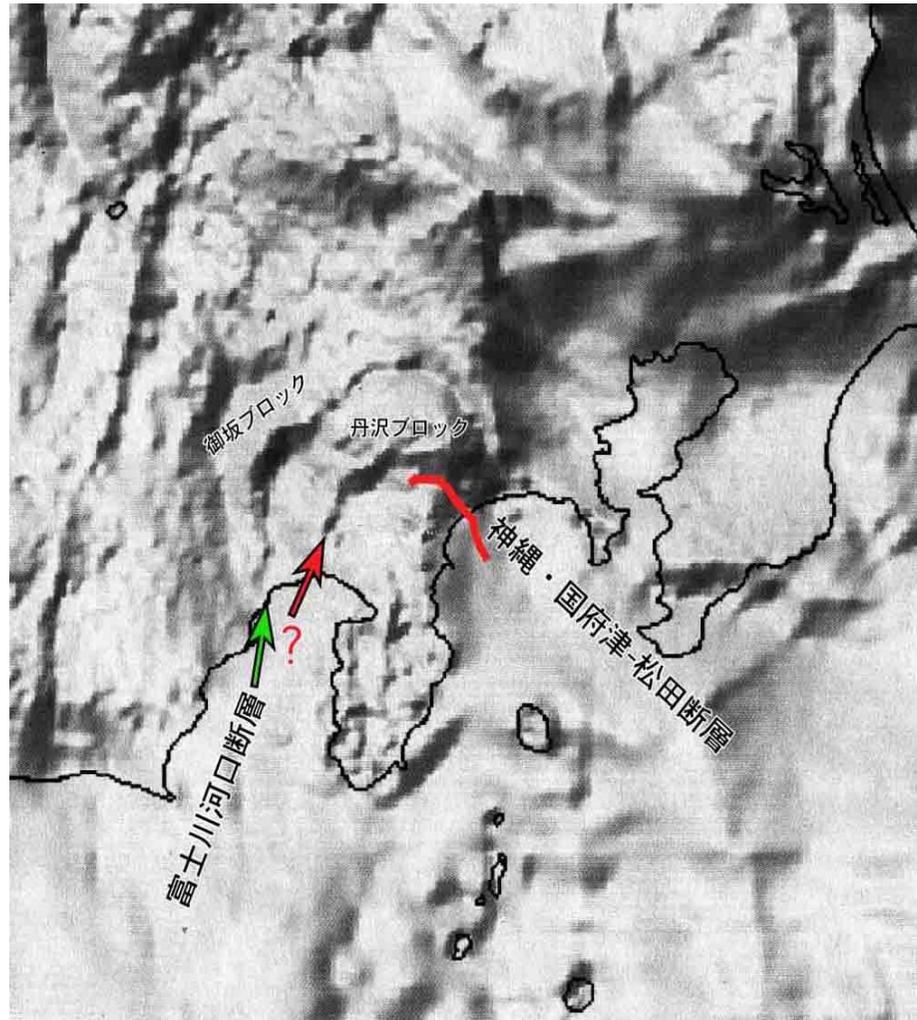
2010 Kujukuri-Tsukuba seismic line



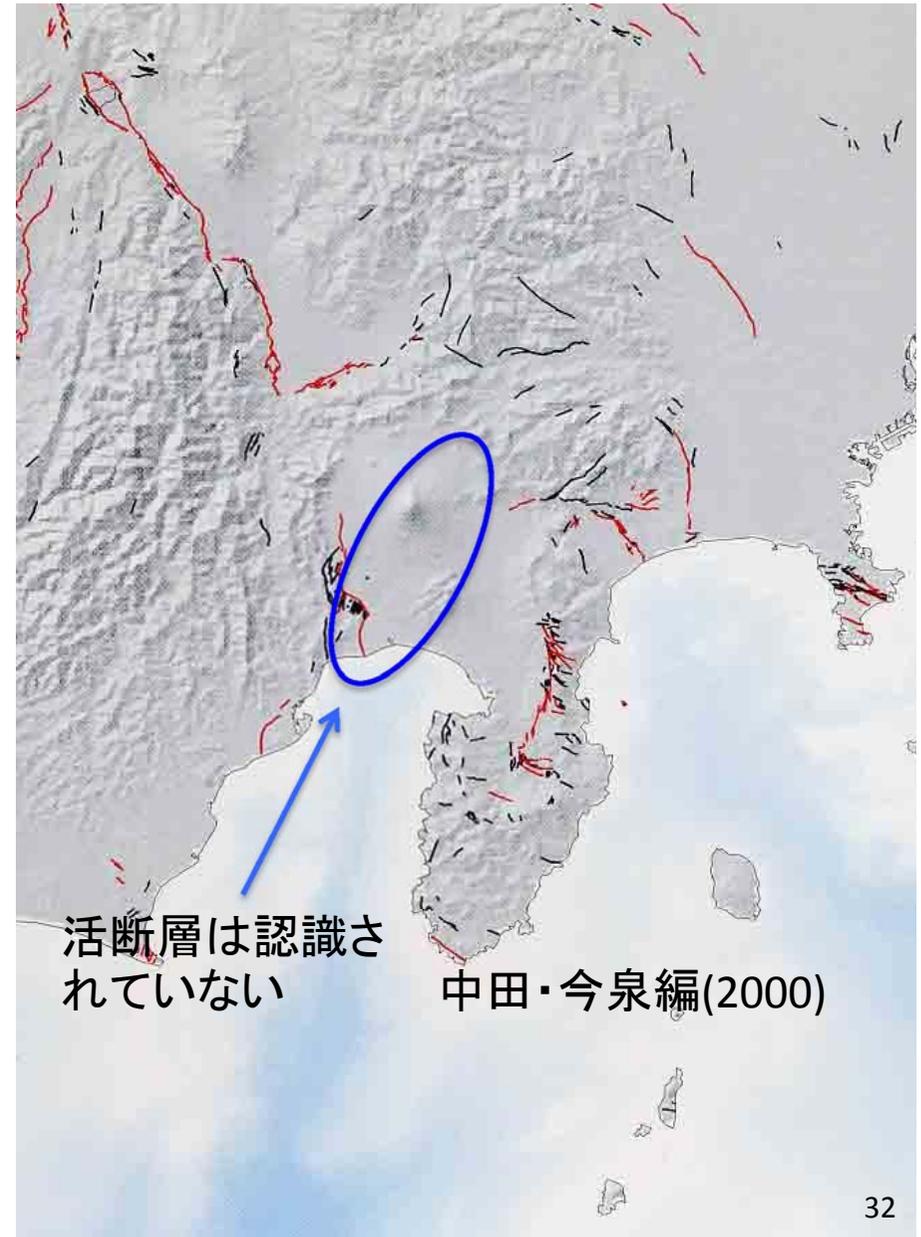
Depth to upper surface of PHS



南関東周辺の重力異常



関東地方のブーゲ異常 (仮定密度2.67)/地質調査所編(2000)「日本重力CD-ROM」のデータを使用



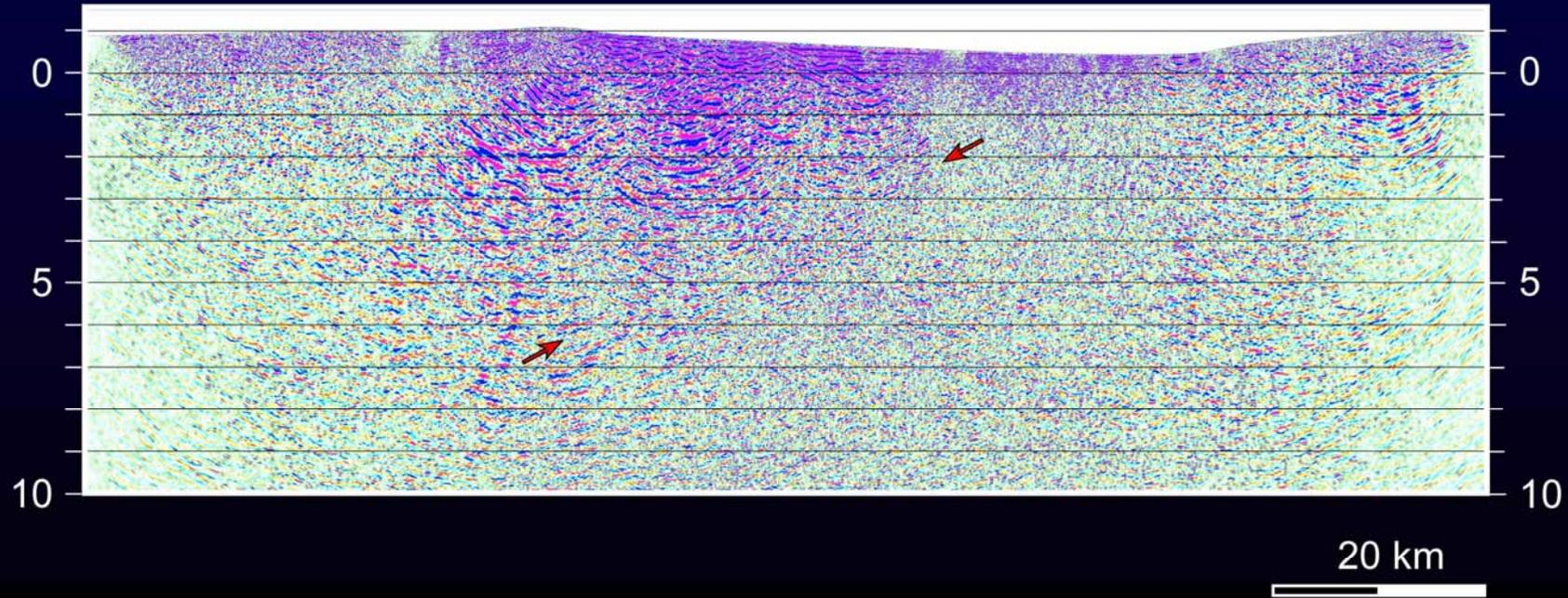
2011 箱根-富士吉田測線



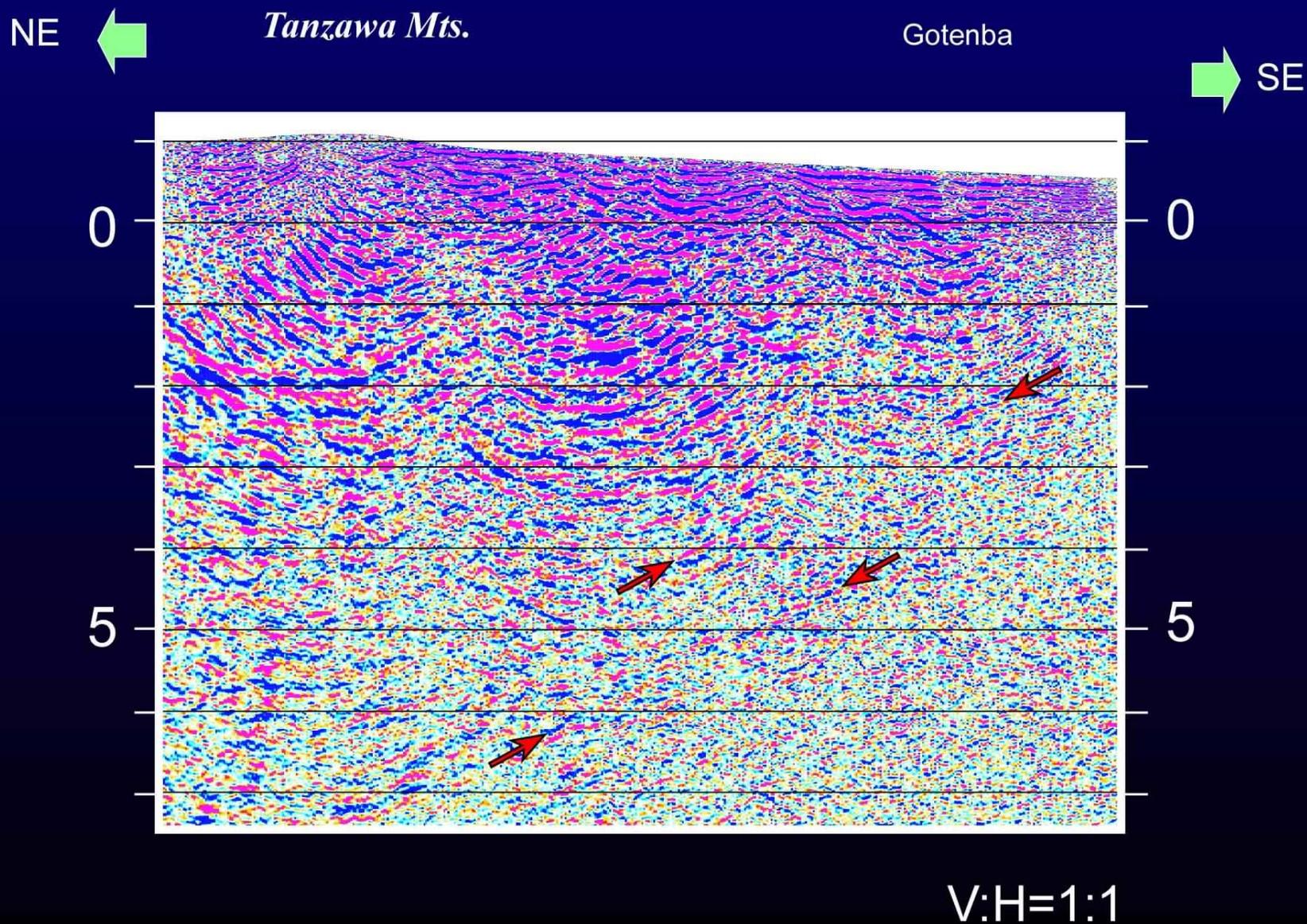
Migrated Depth-converted seismic section



NE ← *Tanzawa Mts.* Gotenba *Hakone Volcano* → SE



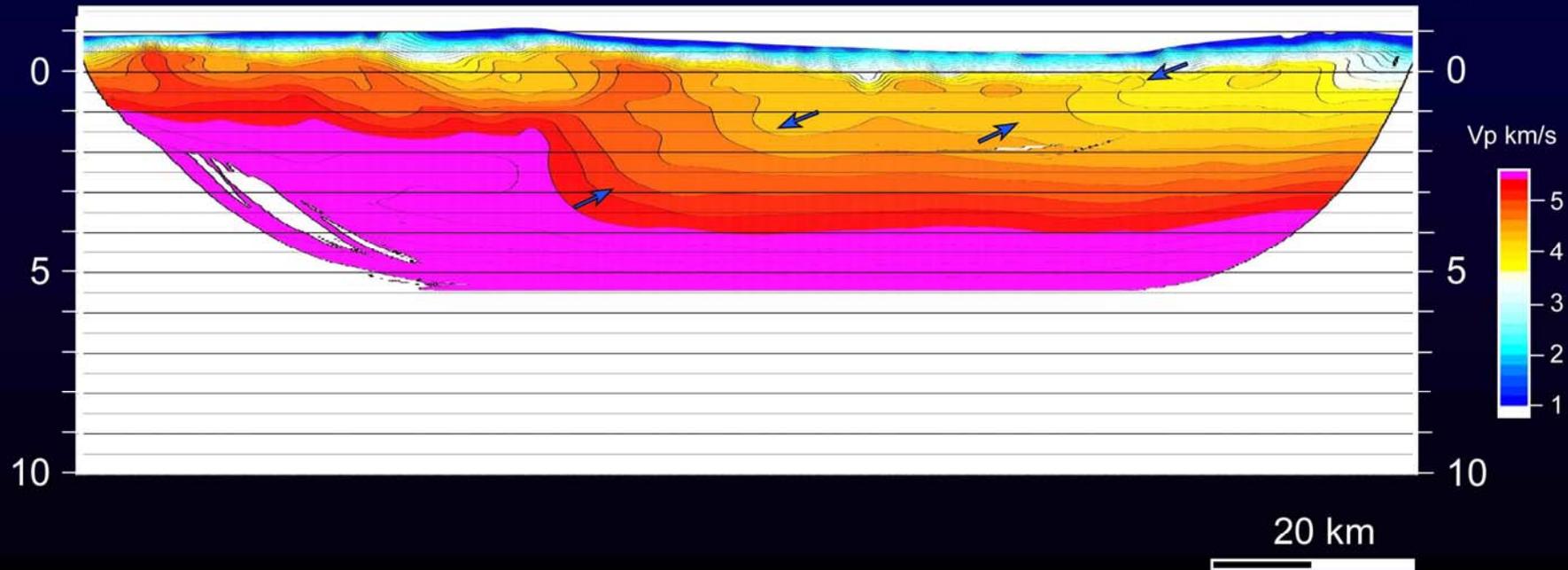
Blow up of the depth section beneath Gotemba



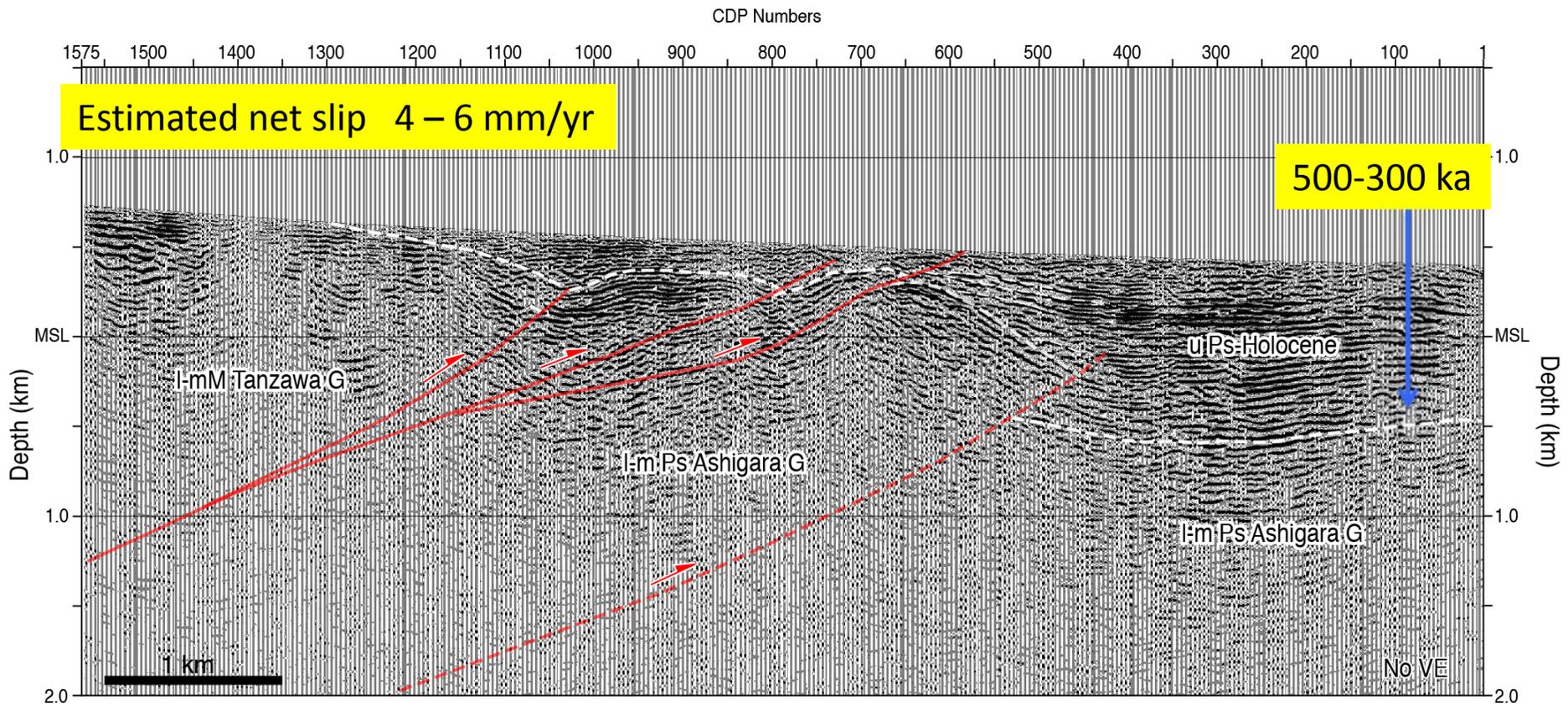
Velocity structure by Refraction Tomography



NE ← *Tanzawa Mts.* Gotemba *Hakone Volcano* → SE



Shallow high-resolution seismic survey

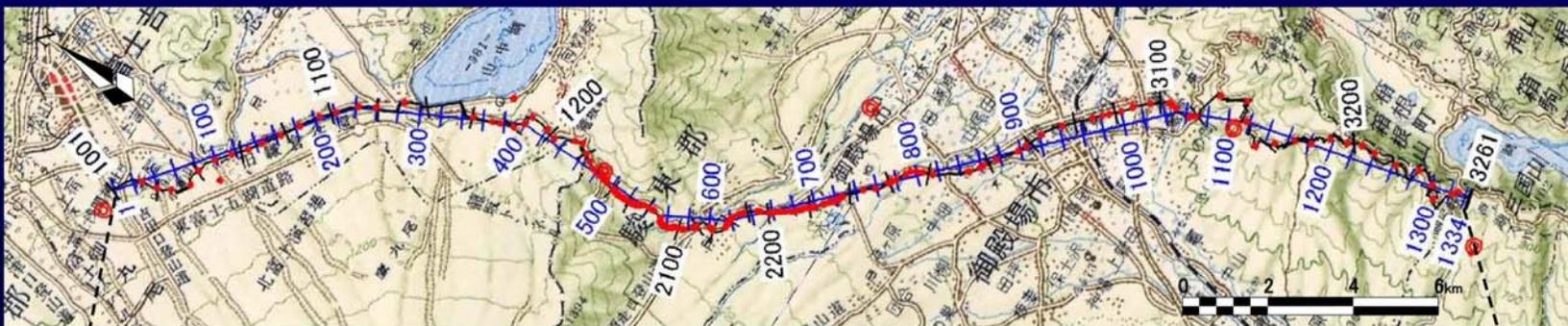


石山ほか(2012)

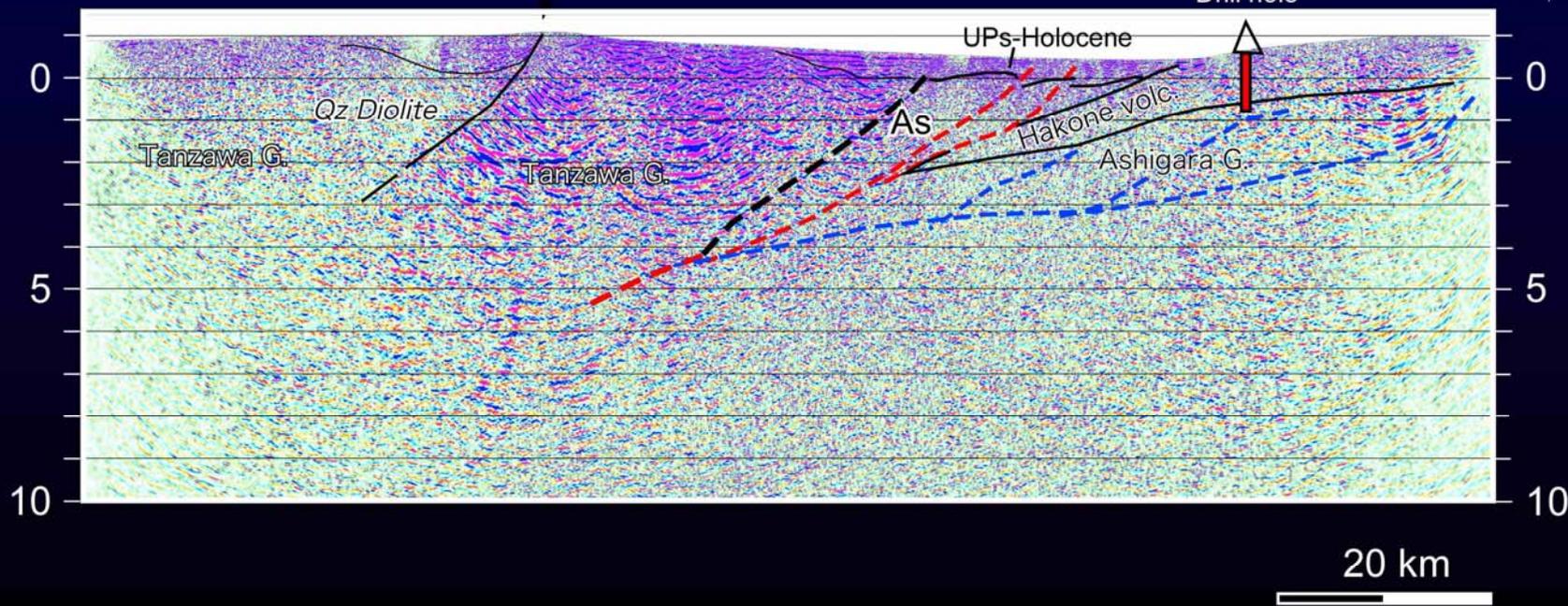
活動性

- 足柄層群の上面が、1 km程度の食い違い
→ 垂直方向に2 mm/年の可能性
- 断層面に沿った変位（断層の傾斜を30度として）
→ 4 mm/年

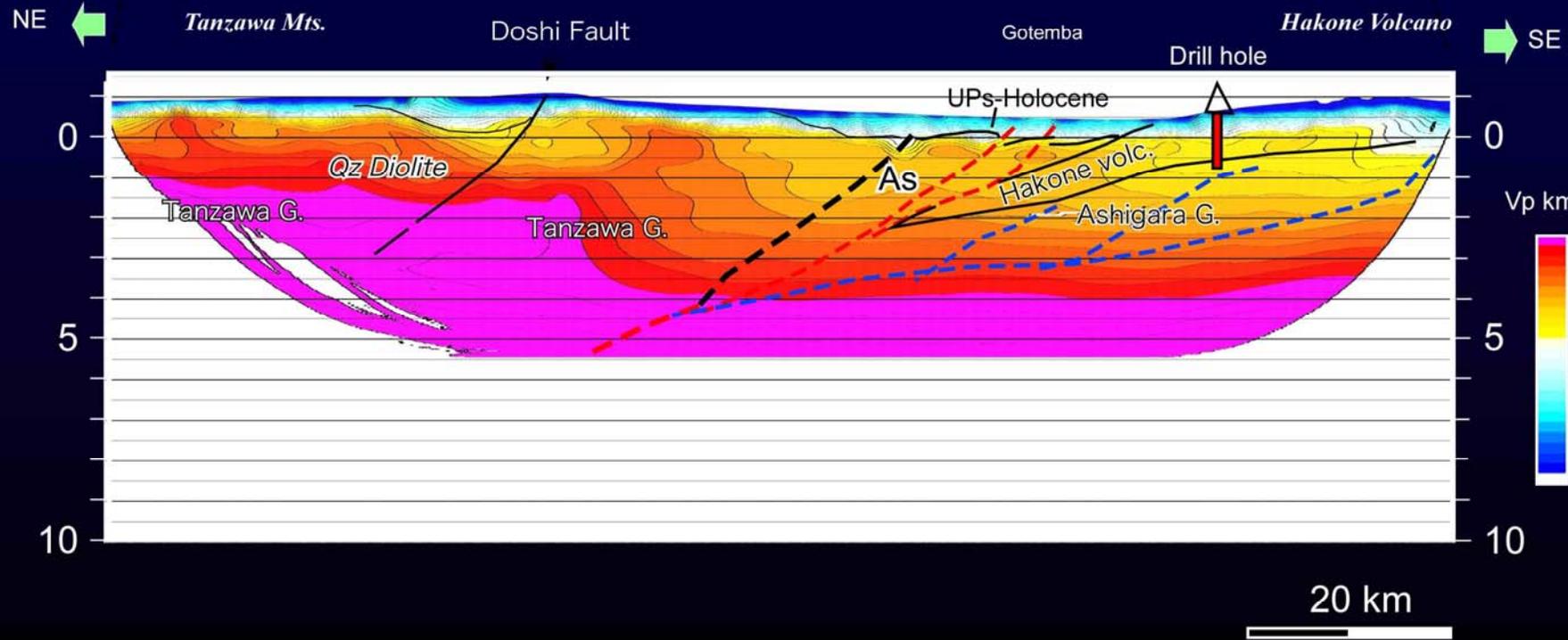
Geologic Interpretation



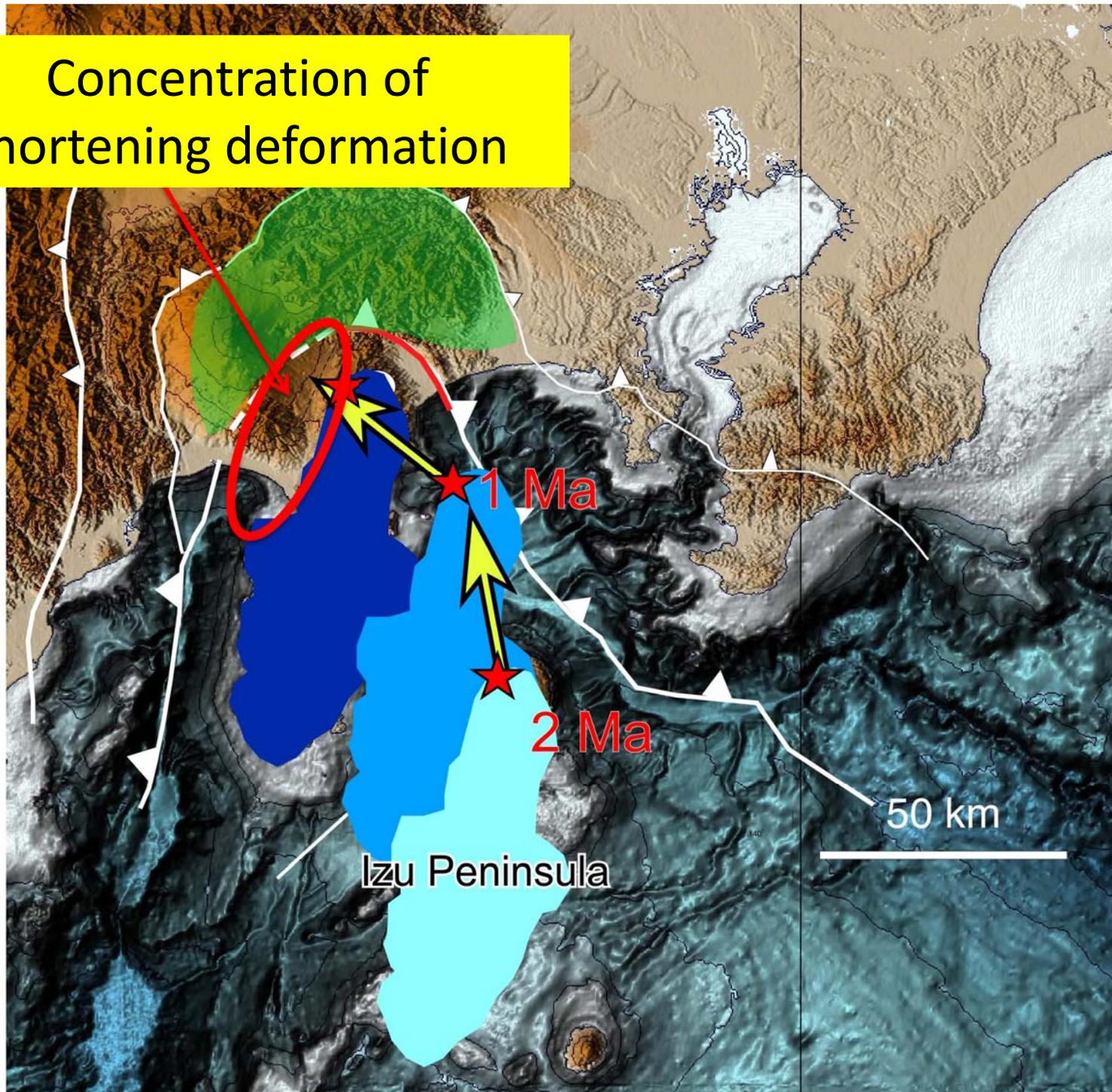
NE ← *Tanzawa Mts.* Doshi Fault Gotemba Hakone Volcano → SE



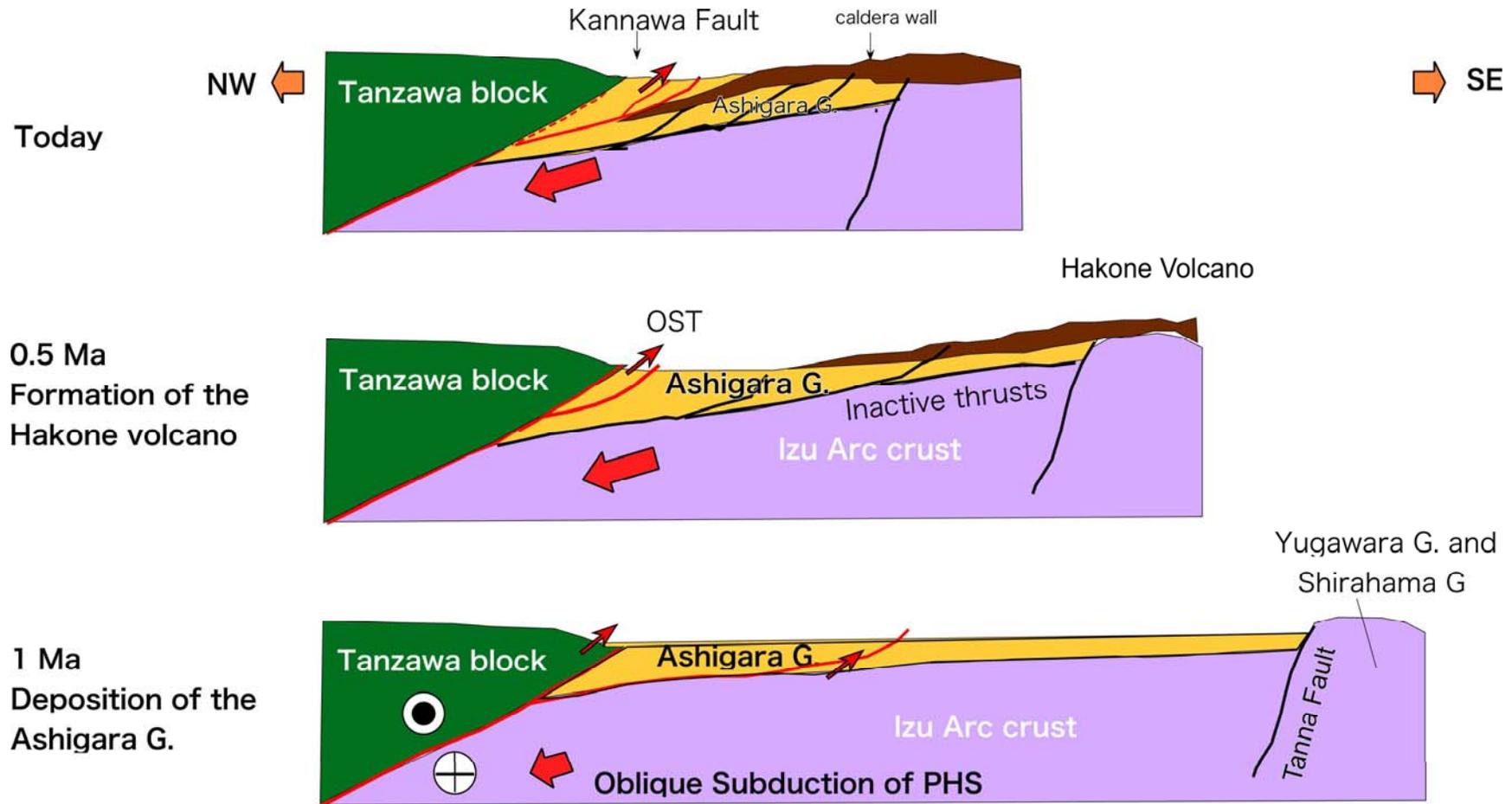
Geologic Interpretation on velocity profile



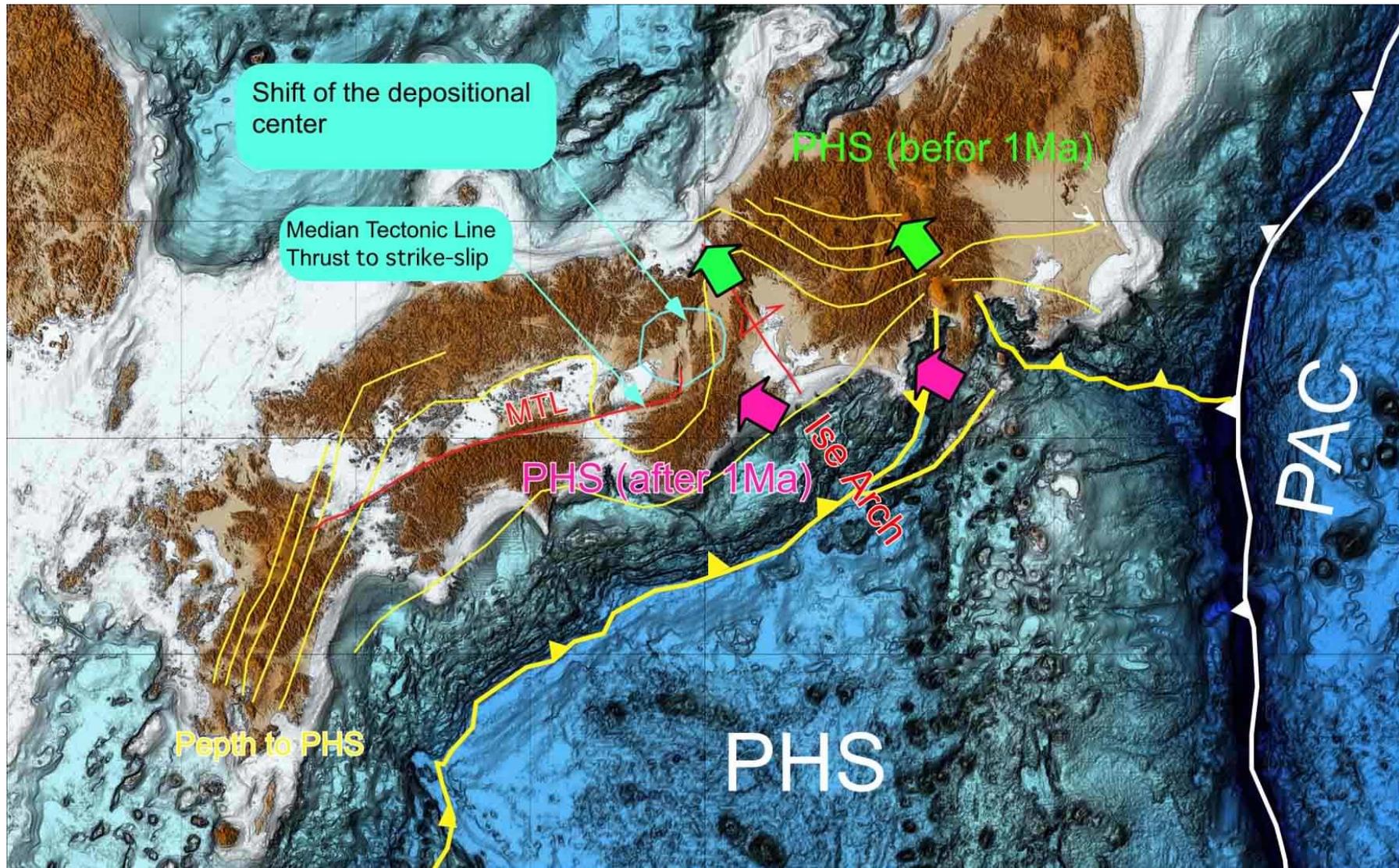
Concentration of shortening deformation



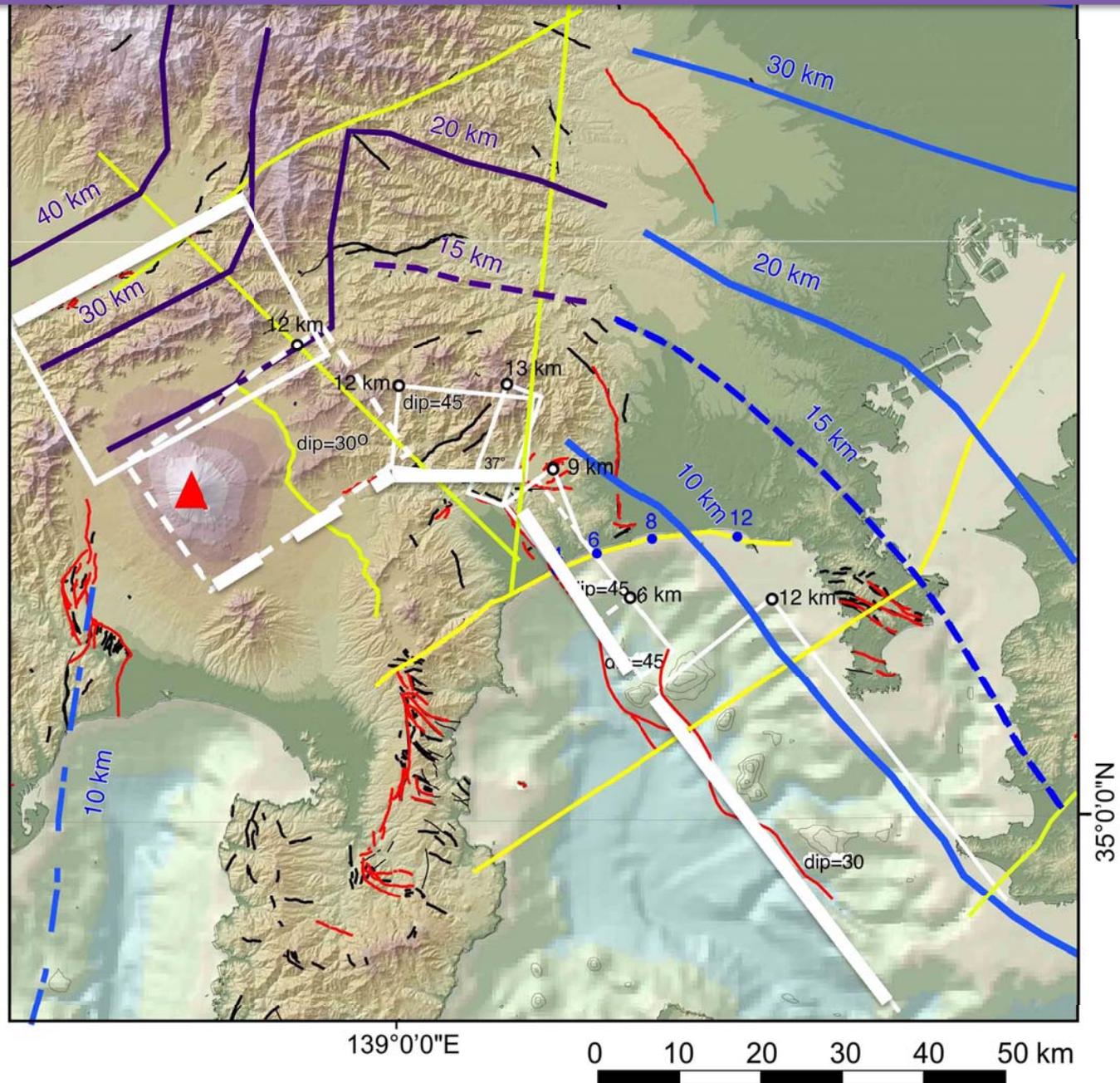
Deformation process of the Gotemba section



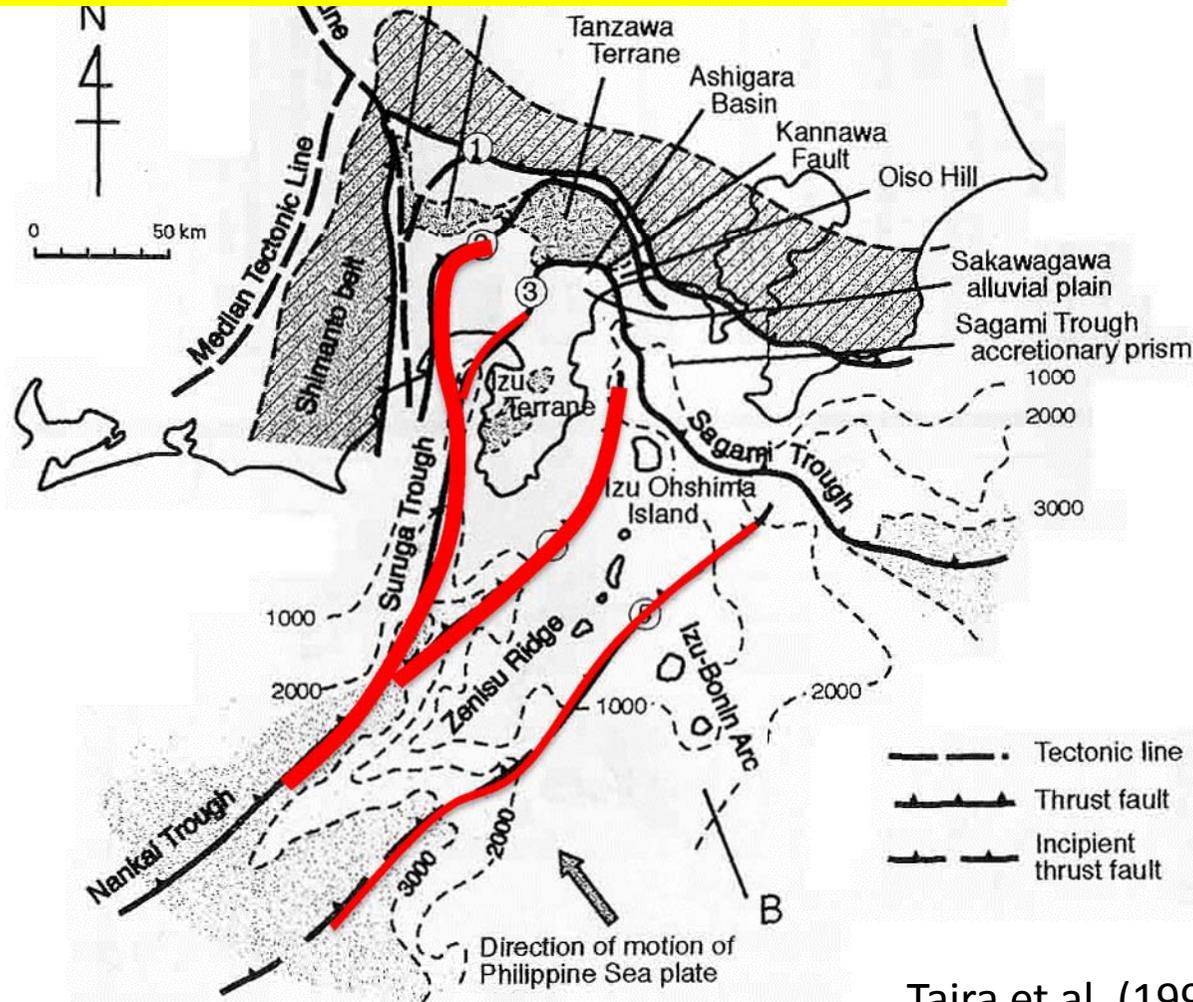
Change in motion of PHS at 1 Ma



断層の矩形モデル



フィリピン海プレートの北端はすでに破壊
 プレートの収束は複数の断層で消費
 ひずみの収支が、解けていない。
 長期評価を行うには、ひずみの収支を理解する必要がある。



Taira et al. (1998)