

Spatio-temporal evolution of rift volcanism driven by progressive crustal unloading

Presented by

Gaetano Ferrante

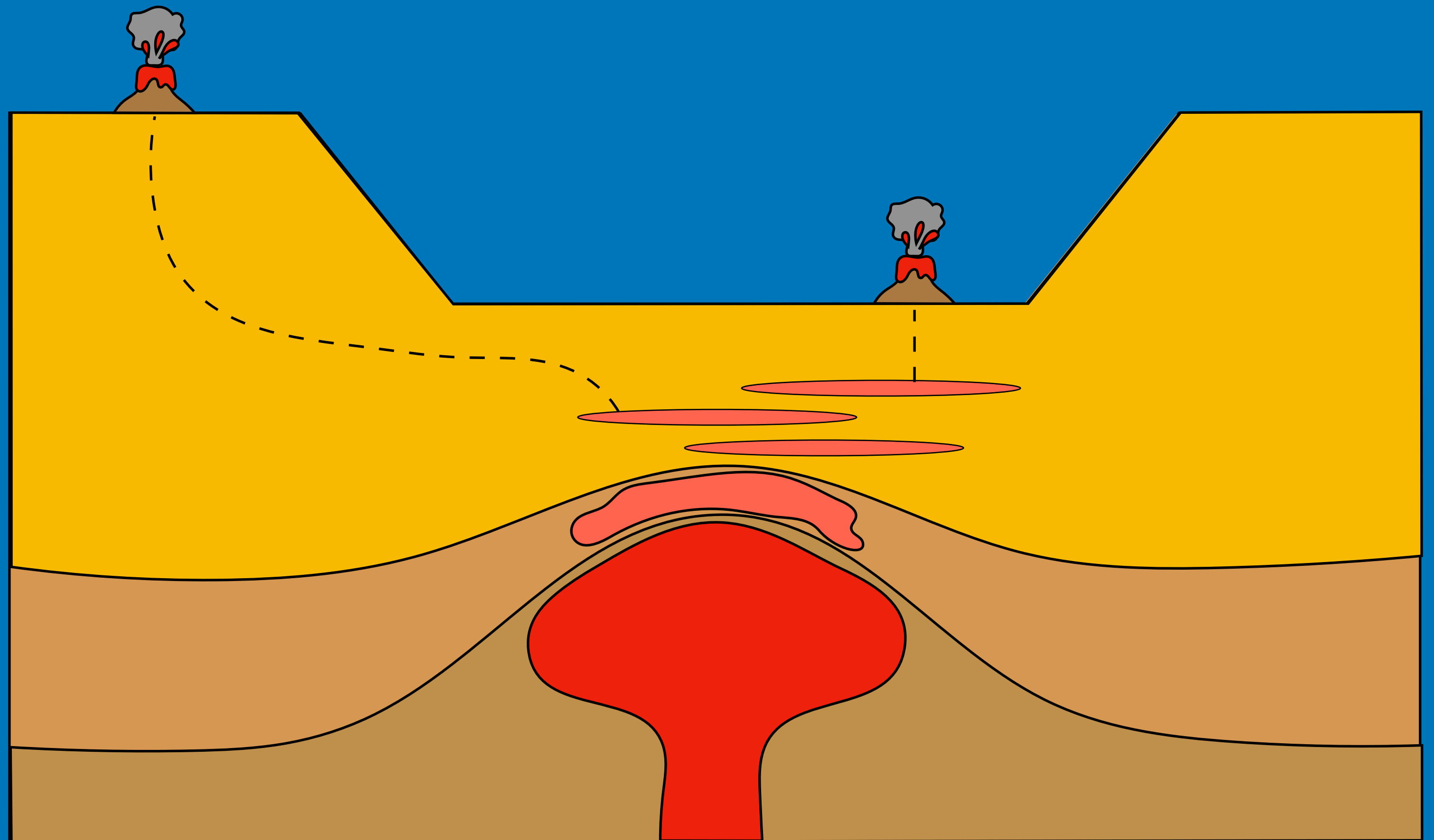
Eleonora Rivalta

Francesco Maccaferri

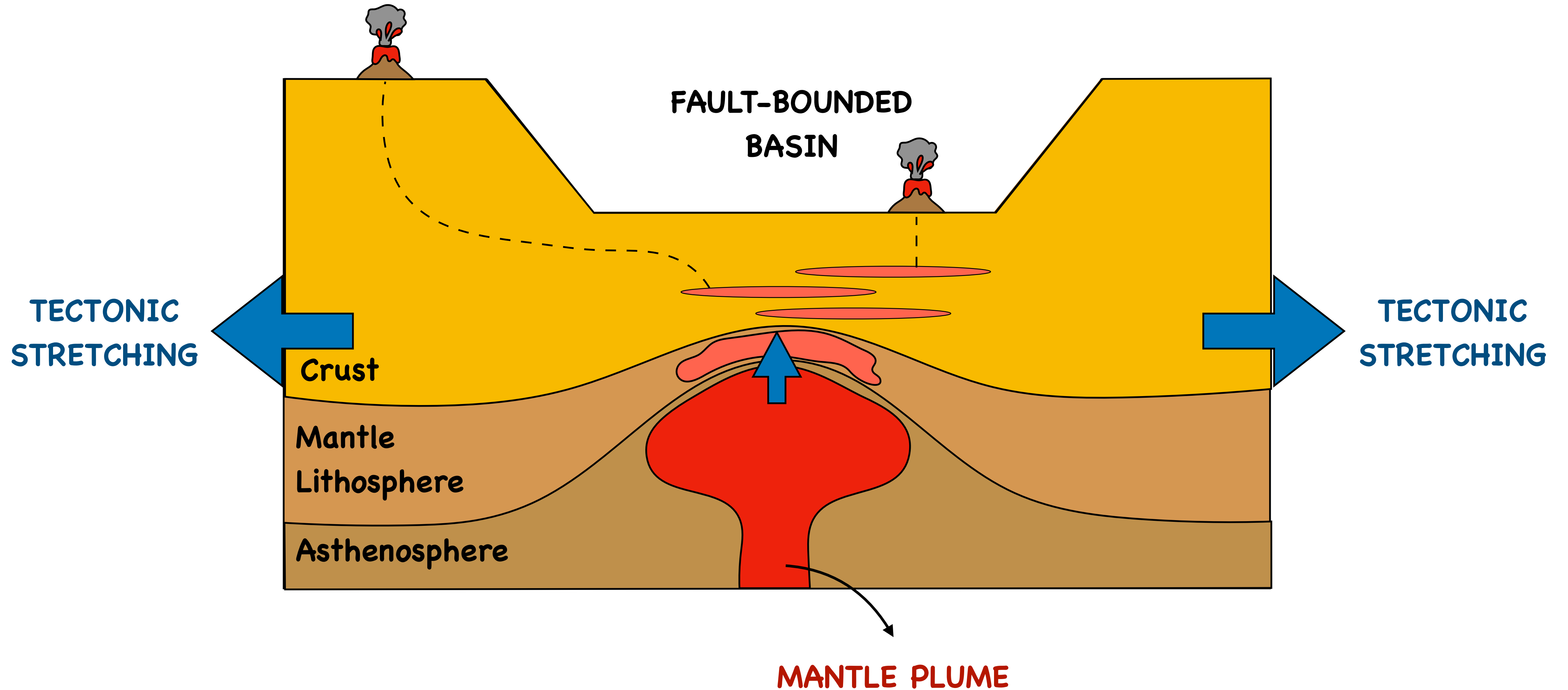
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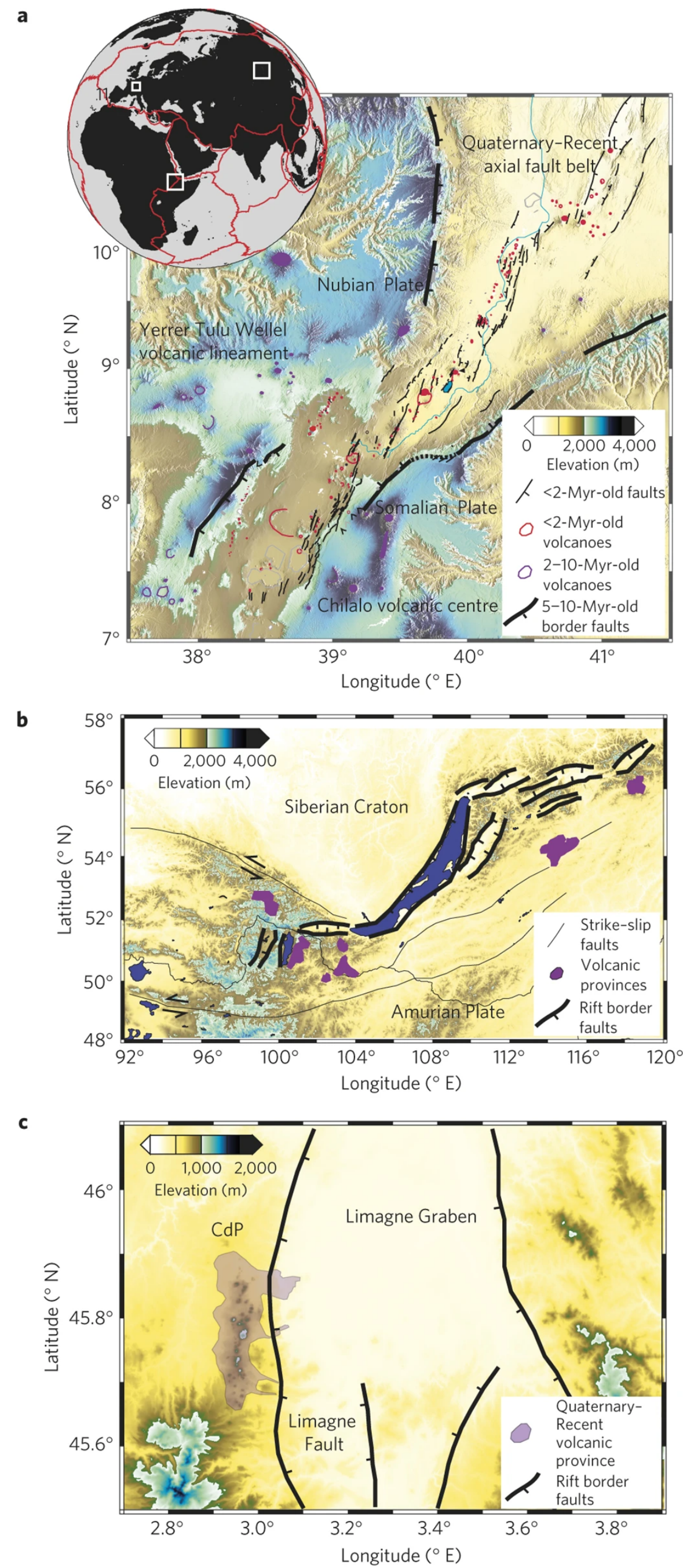


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Volcanism in Continental Rifts





Maccaferri et al., 2014

Motivation

RIFT VOLCANISM

↓

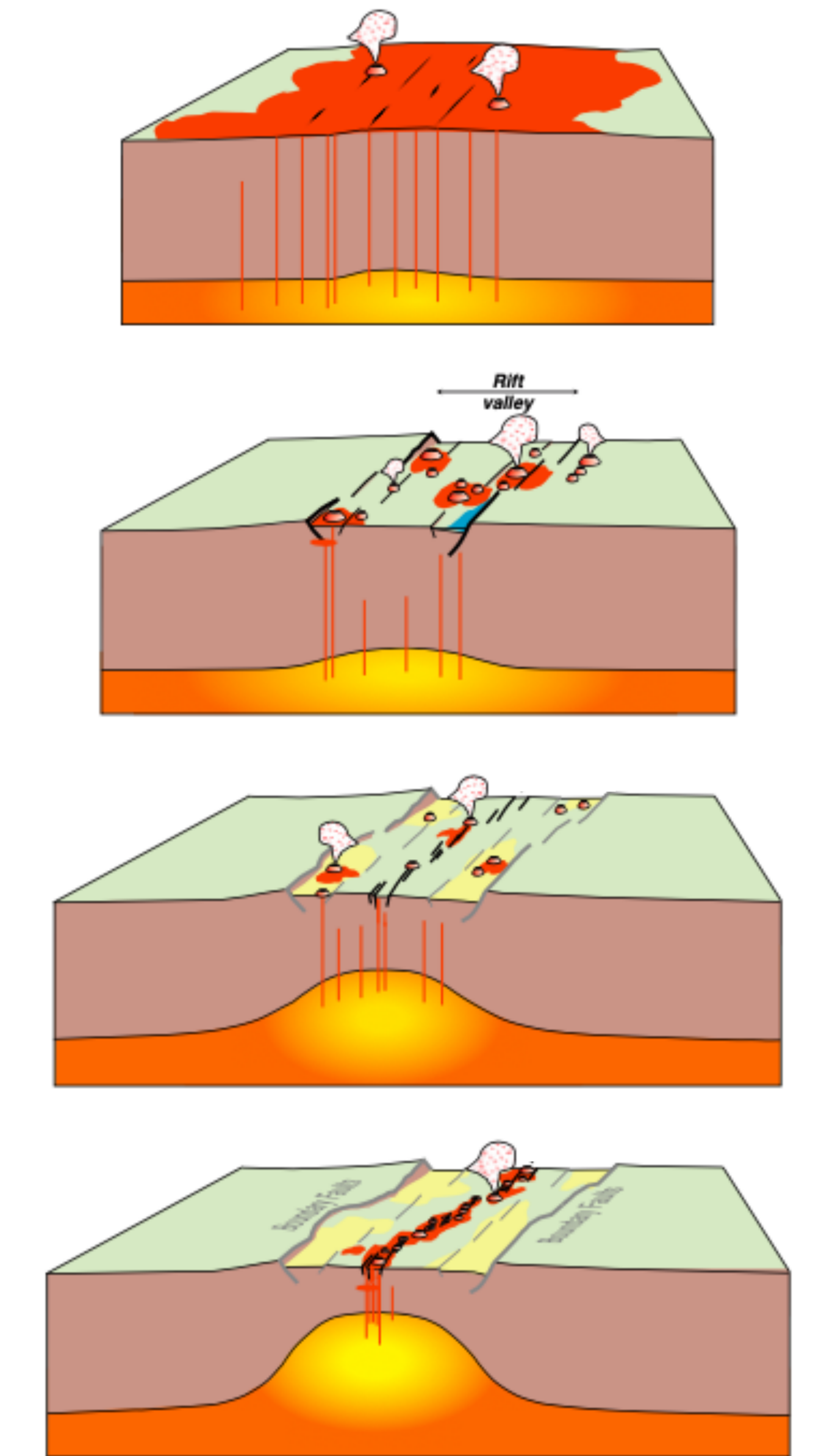
'UNIVERSAL' PATTERNS

↓

in-rift ↔ off-rift

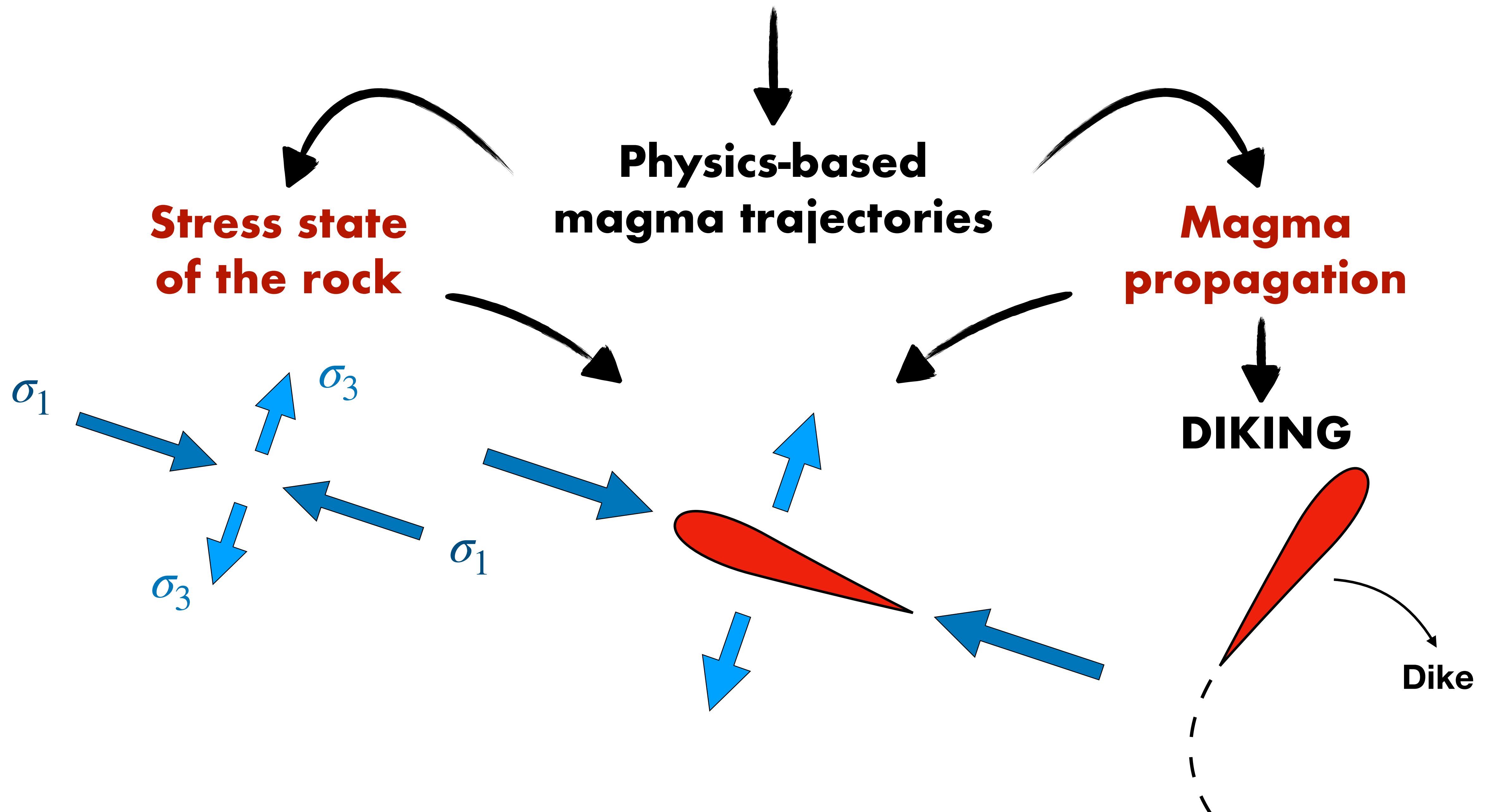
↓

UNCLEAR CAUSES

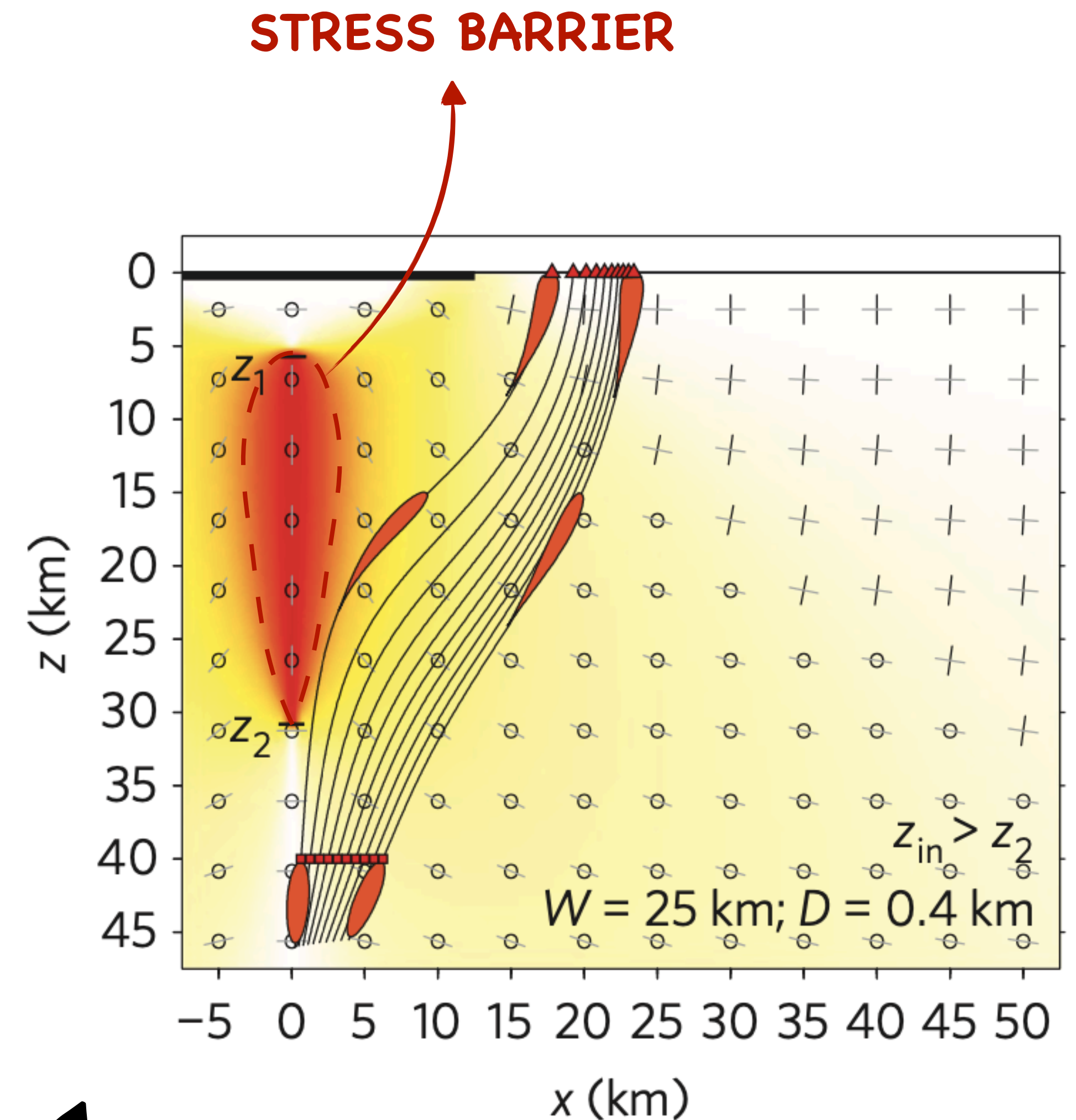
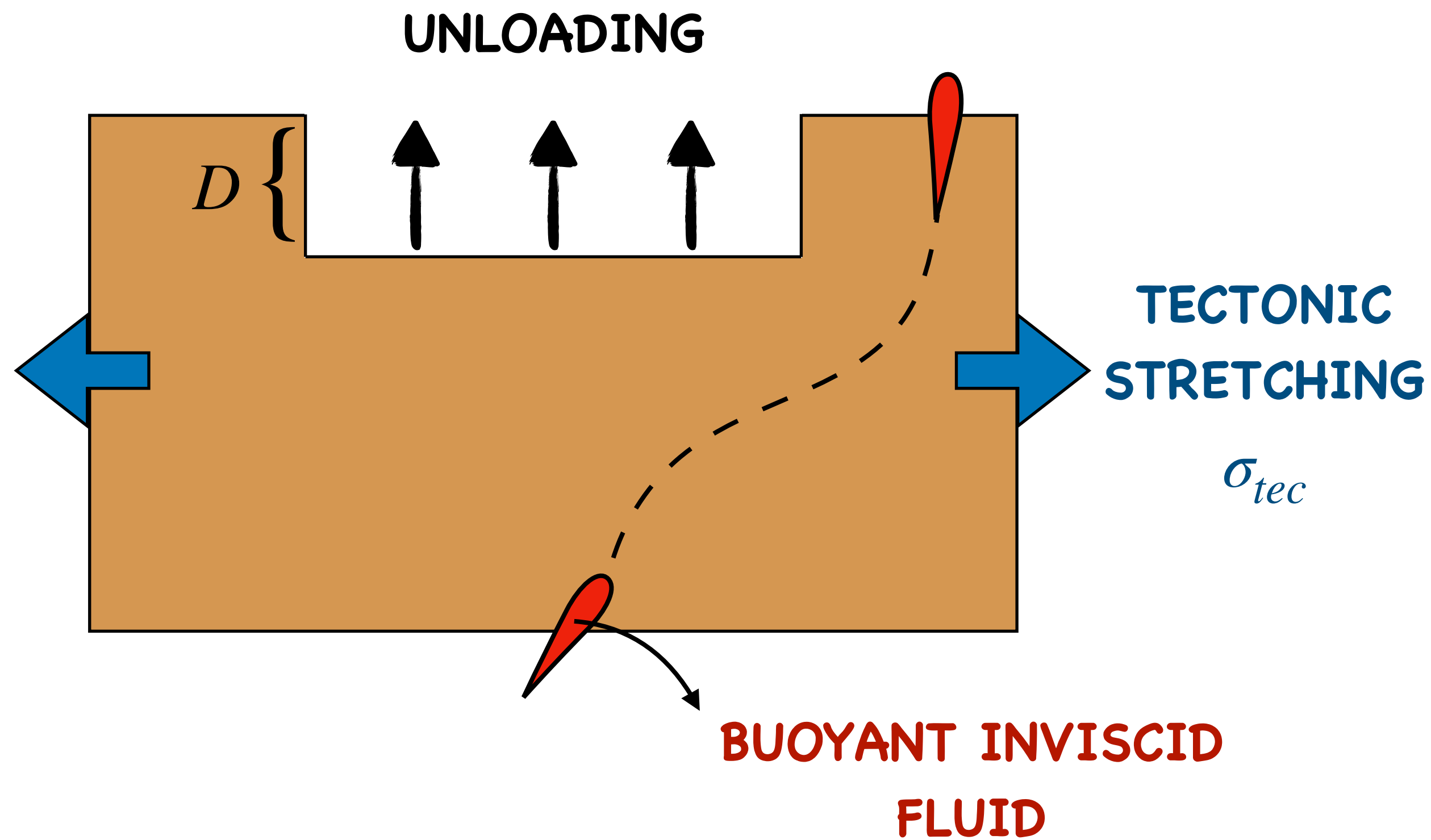


Corti, 2009

Model of Rift Volcanism



Gravitational Unloading Model (Maccaferri et al., 2014)



Controlling parameters

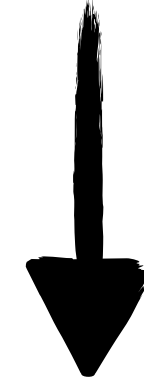
$P = \rho g D$

σ_{tec}

$P > \frac{\pi}{2} \sigma_{tec}$

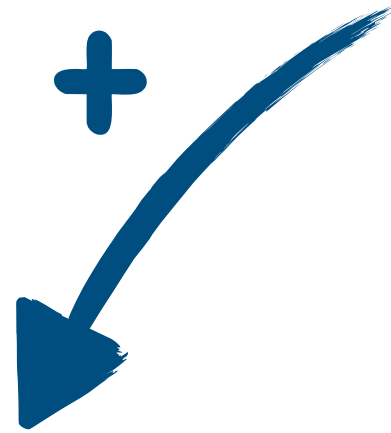
Maccaferri et al., 2014

Model Setup



Gravitational Unloading Model

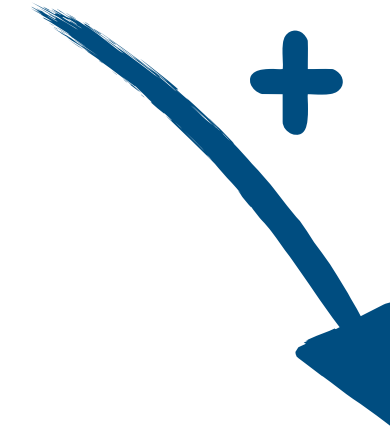
(Maccaferri et al., 2014)



**DIKE
INTERACTION**



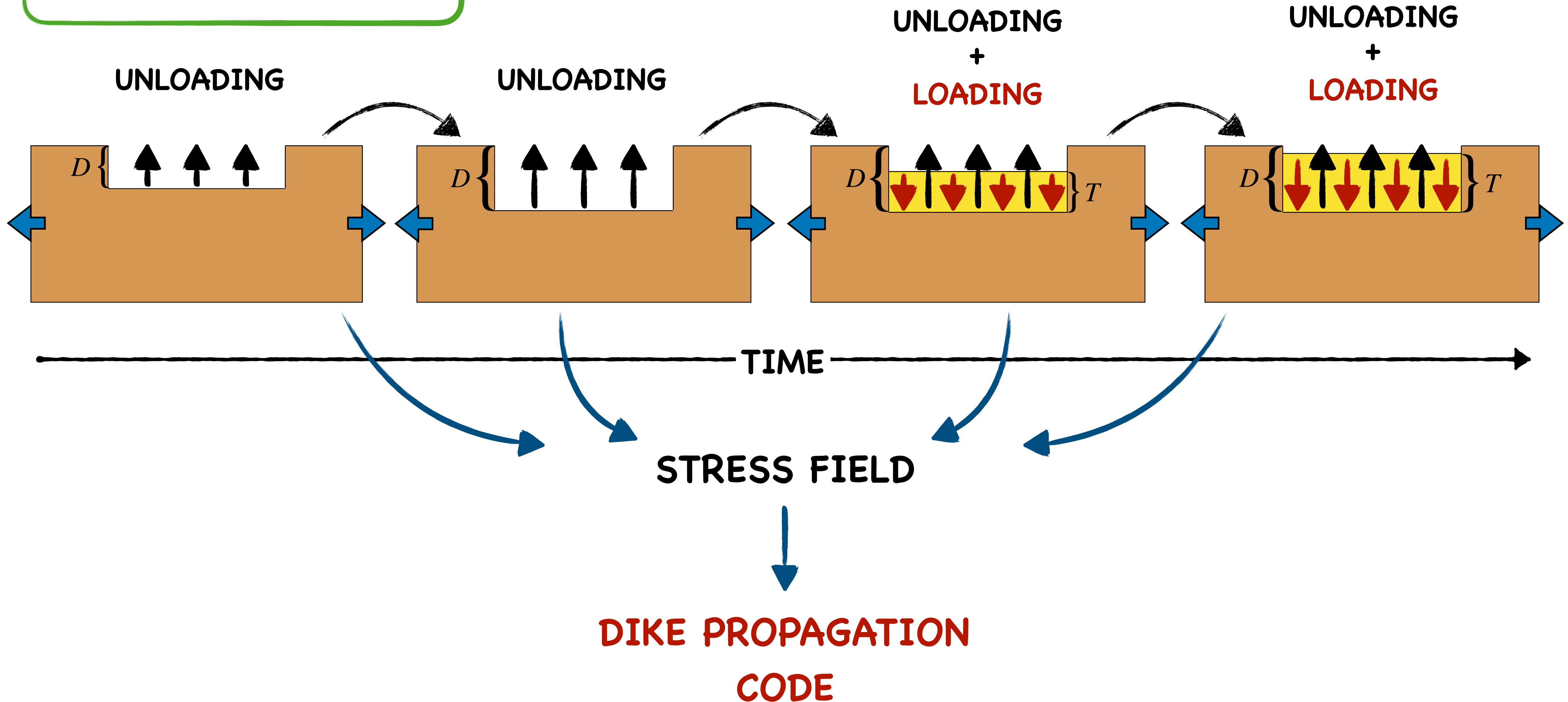
TIME DEPENDENT



**SURFACE
TOPOGRAPHY**

Model Setup

$$P = \rho g D - \rho_s g T$$



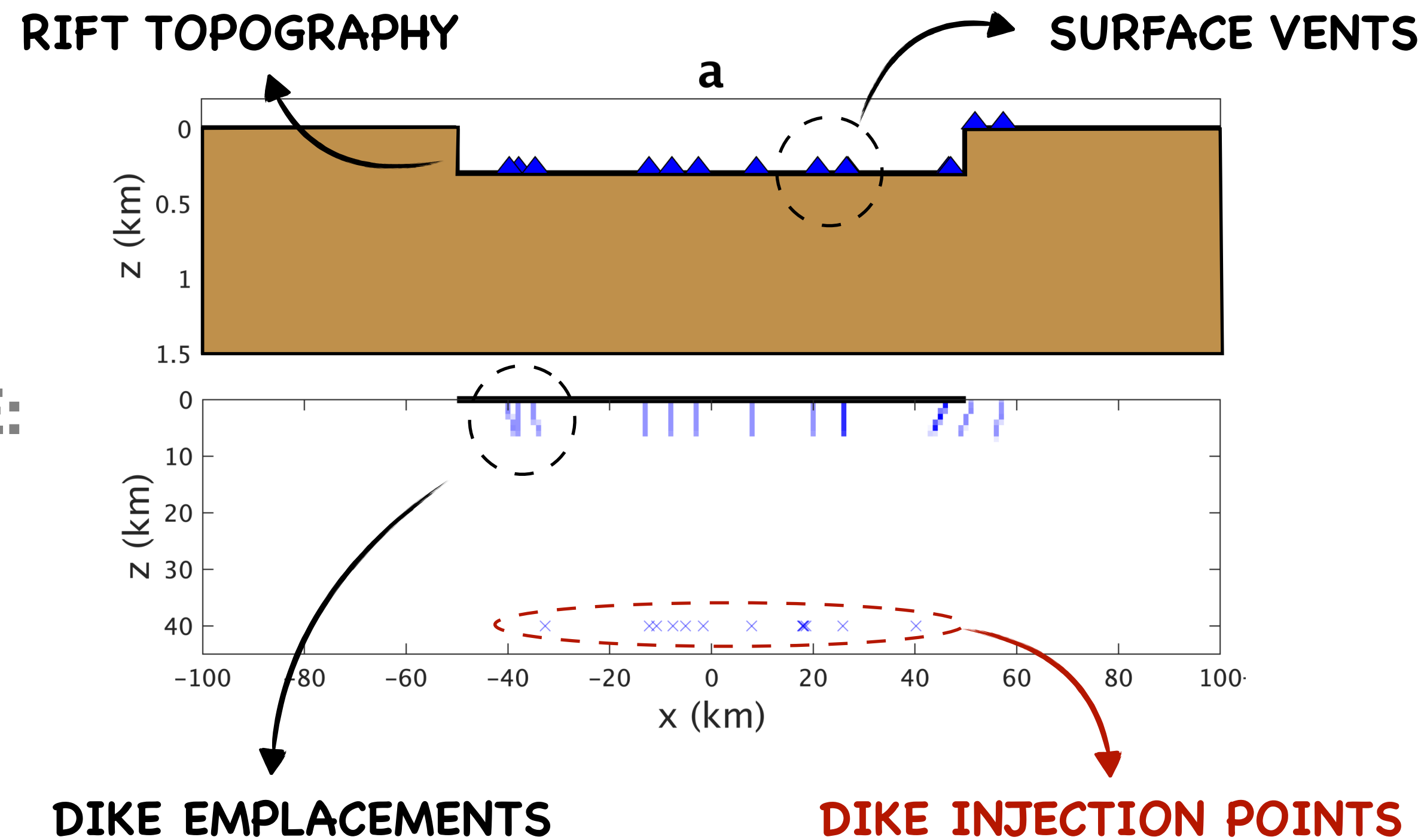
Evolution of Rift Volcanism

a. FIRST STAGE:
monogenetic
in-rift volcanism

b. SECOND STAGE:
off-rift volcanism
+
sill formation

c. THIRD STAGE:
sill stacking
+
off-rift volcanism

d. FOURTH STAGE:
axial
in-rift volcanism



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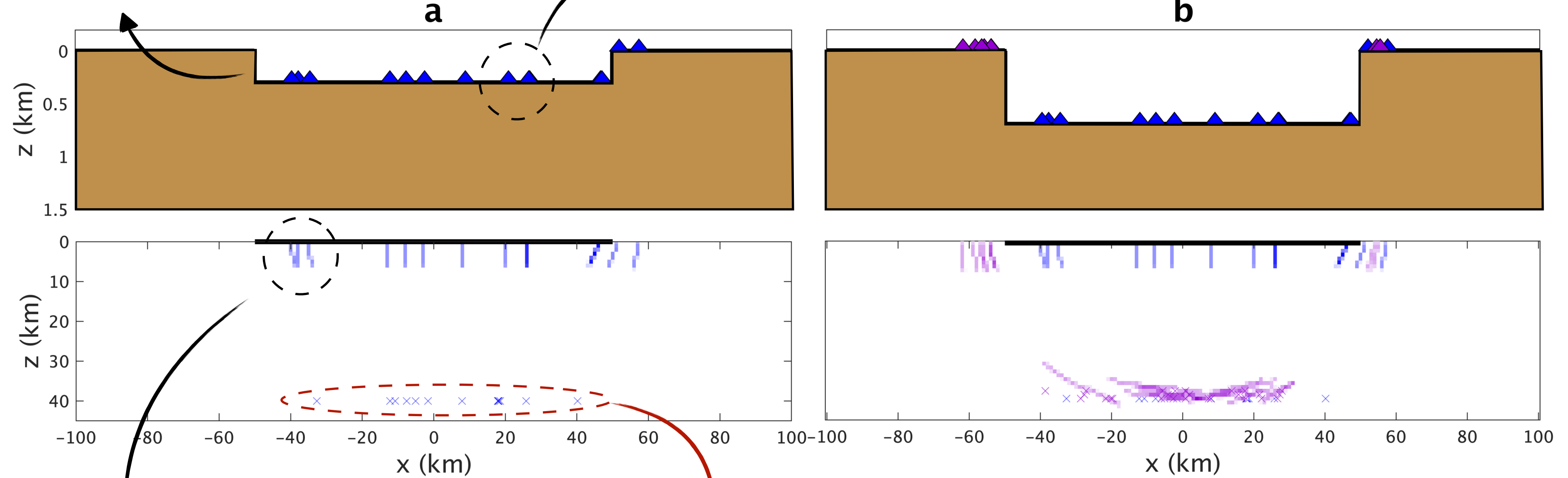
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off-rift volcanism
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RIFT TOPOGRAPHY

SURFACE VENTS



DIKE EMPLACEMENTS

DIKE INJECTION POINTS

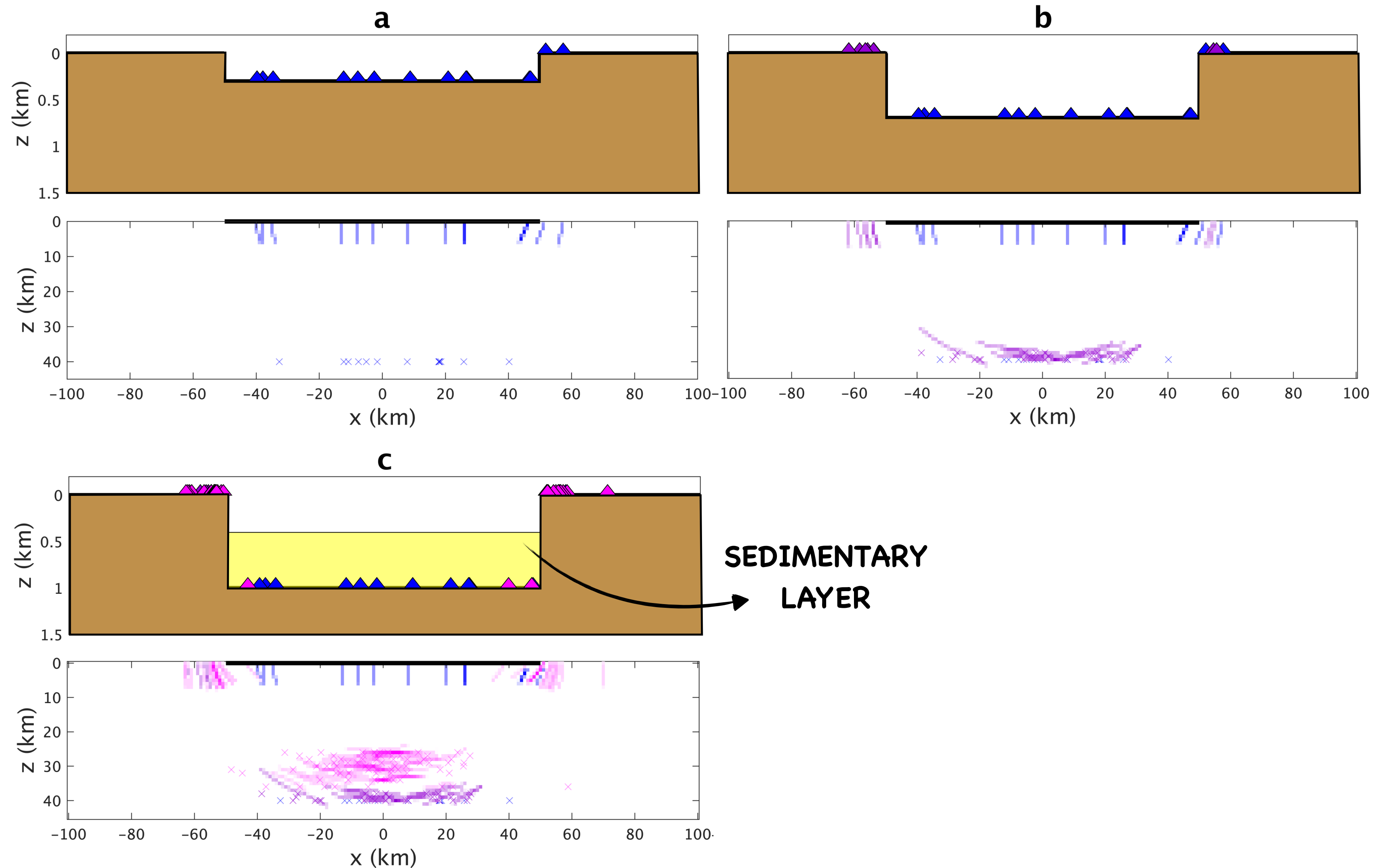
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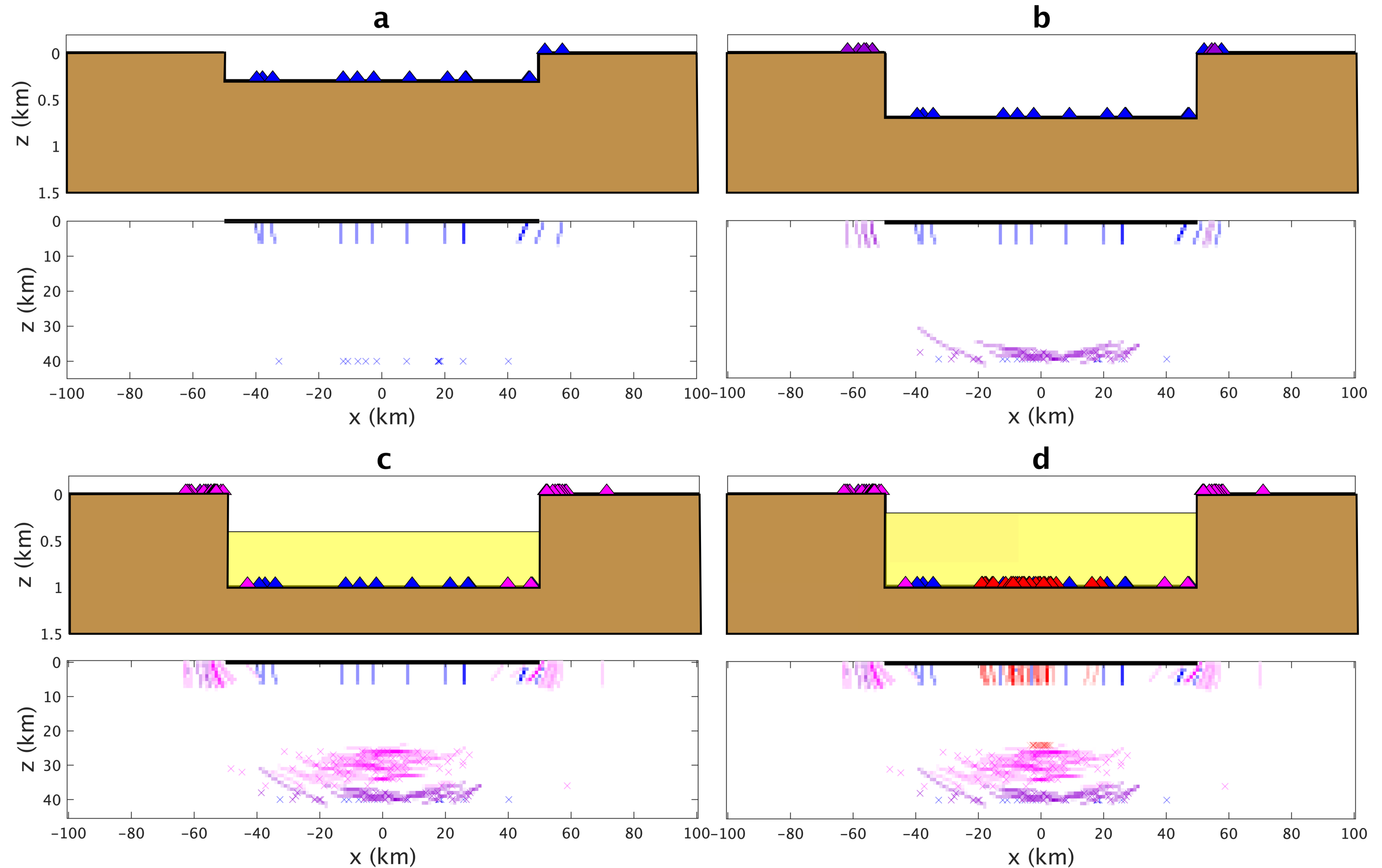
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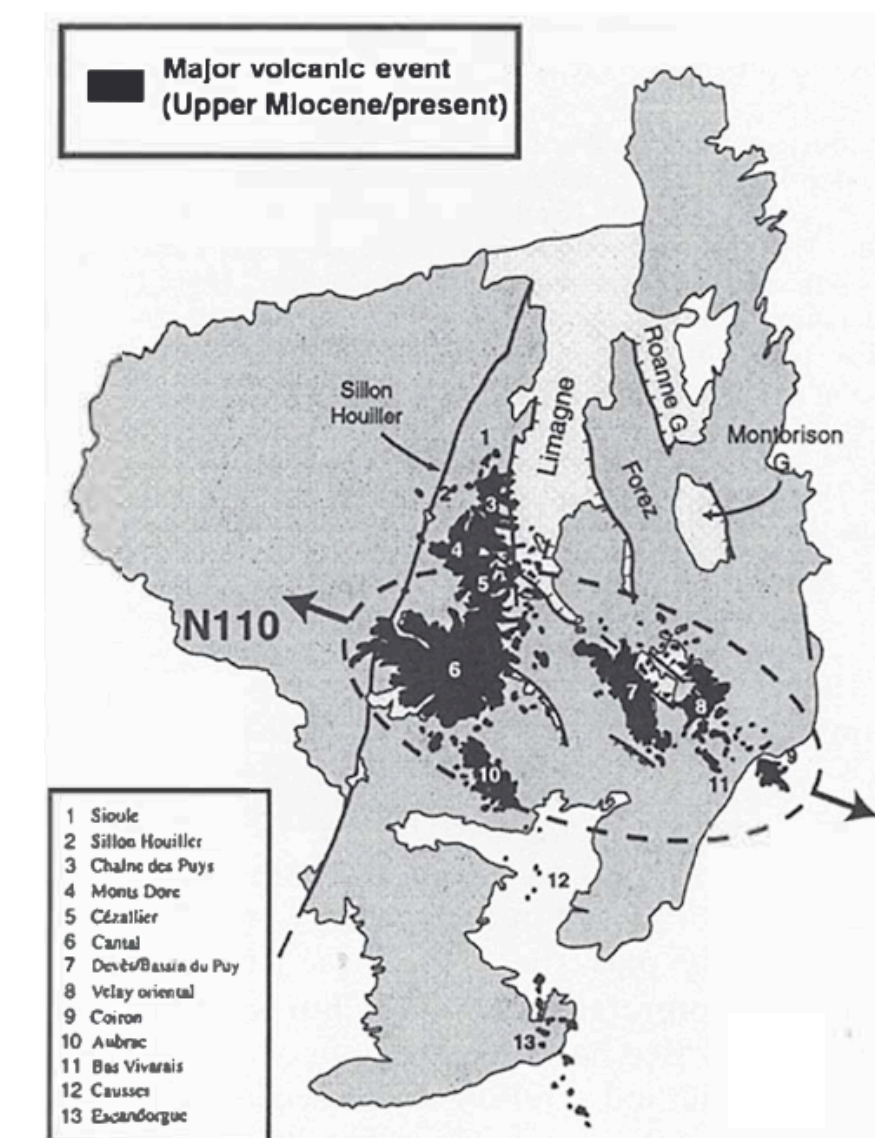
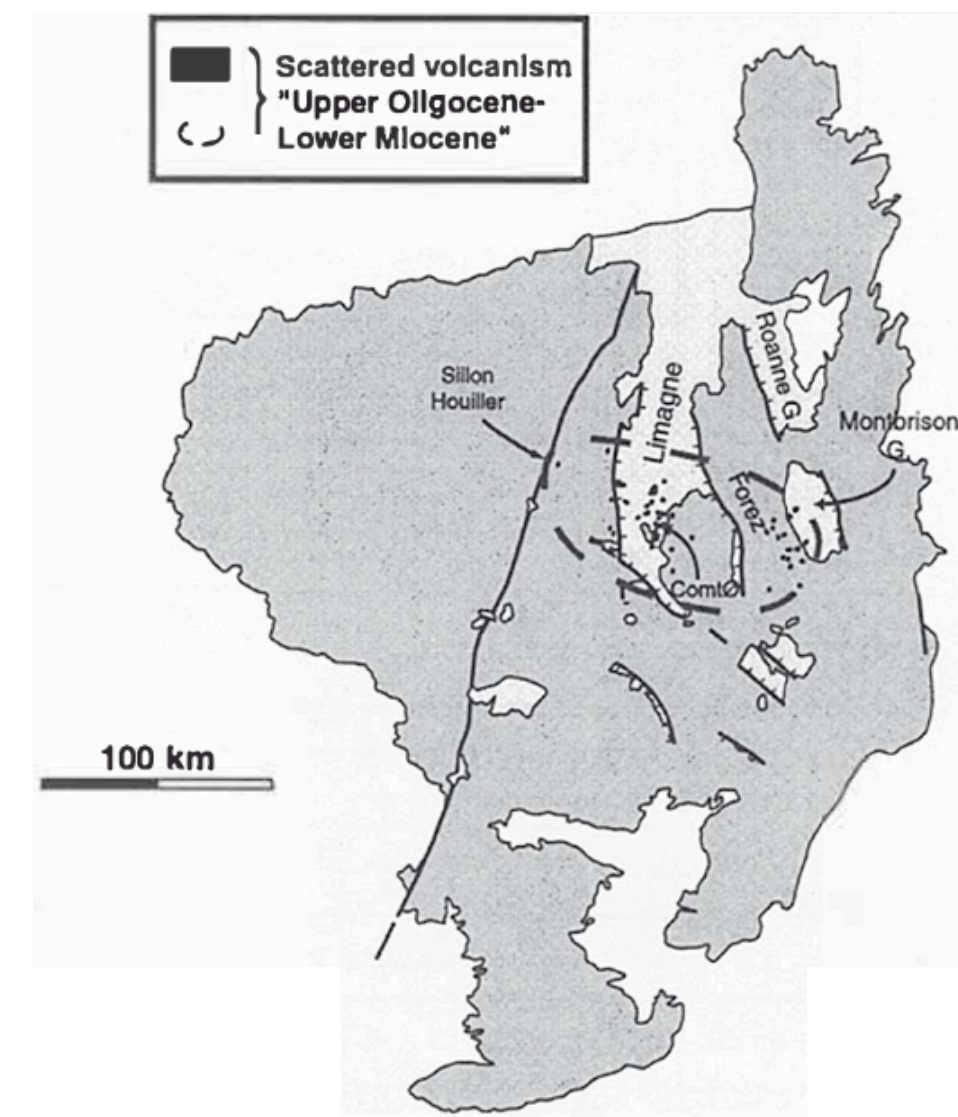
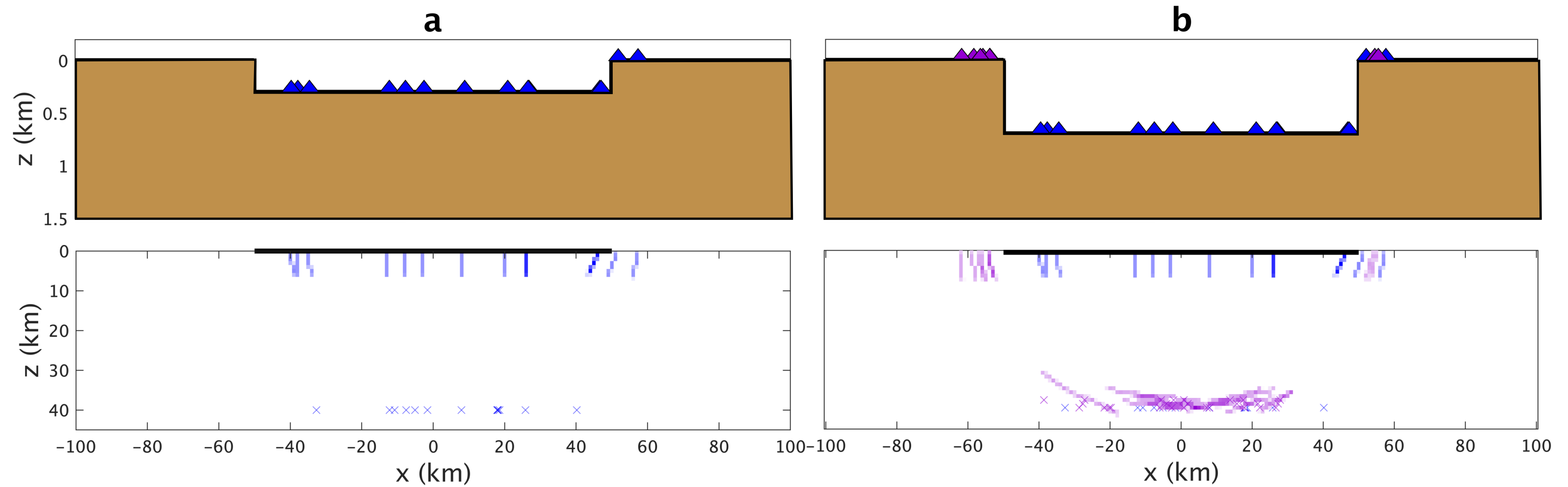
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Michon & Merle, 2001

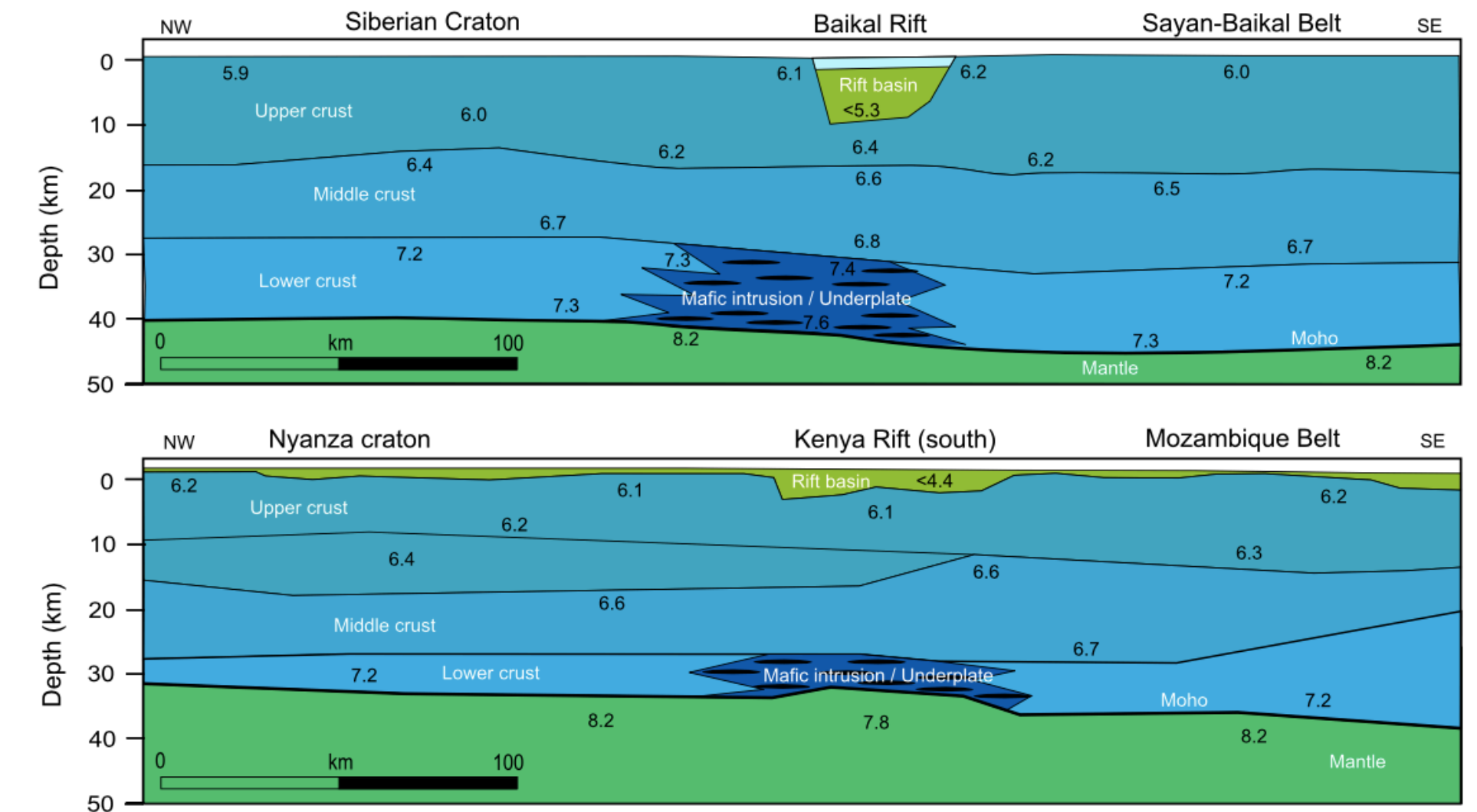
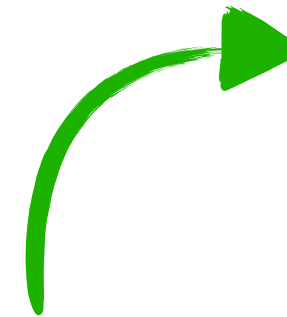
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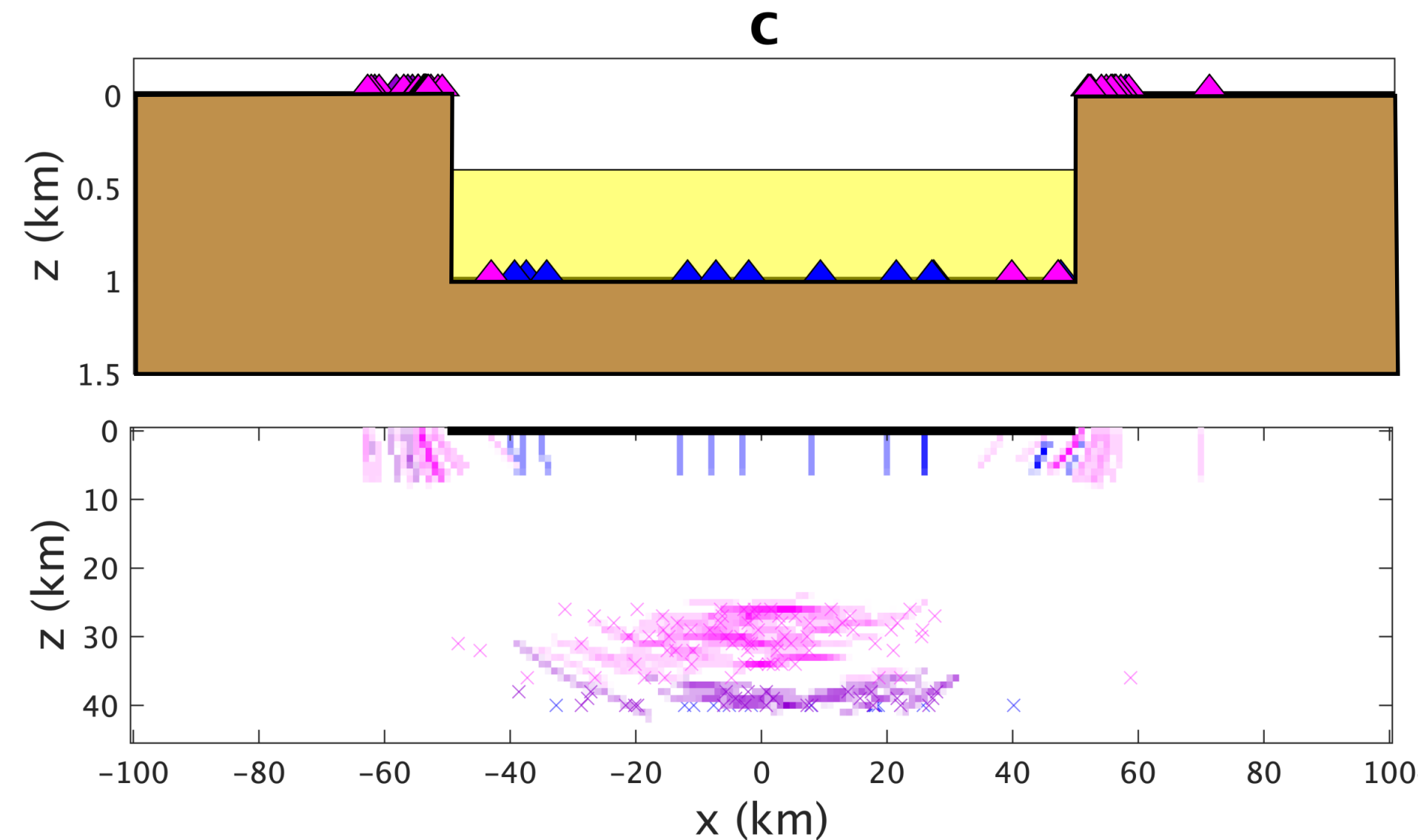
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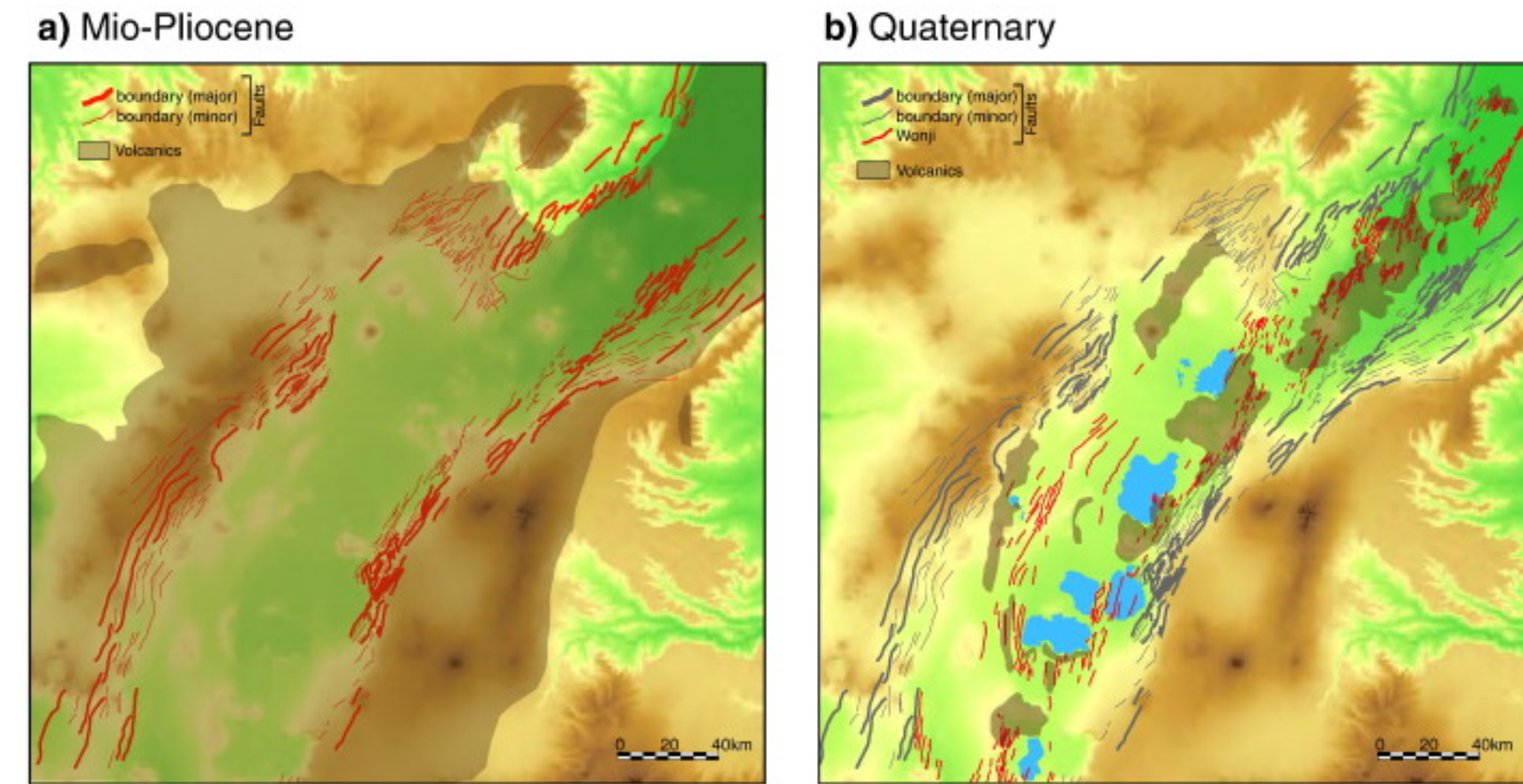


Thybo & Artemieva, 2013

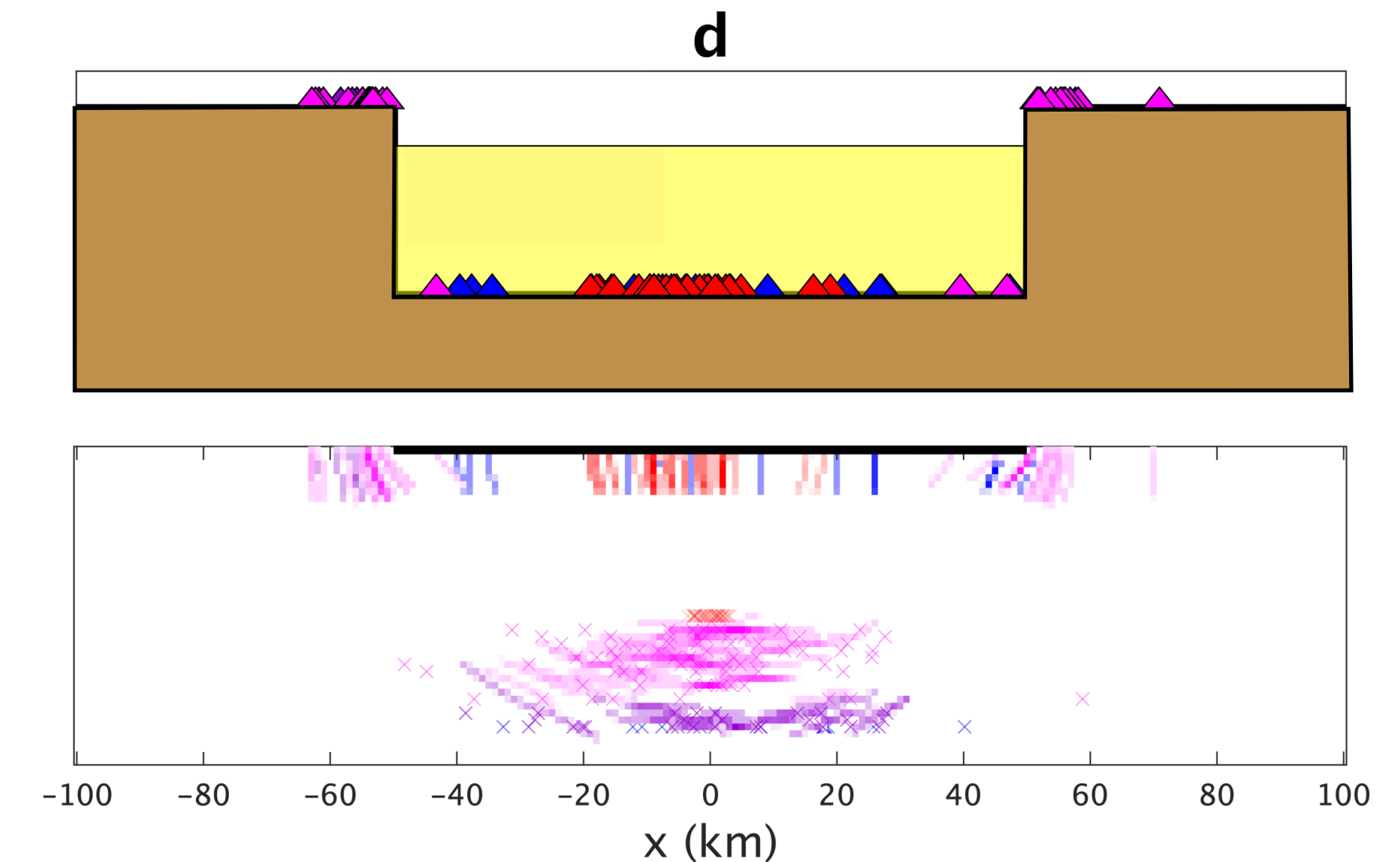


Evolution of Rift Volcanism

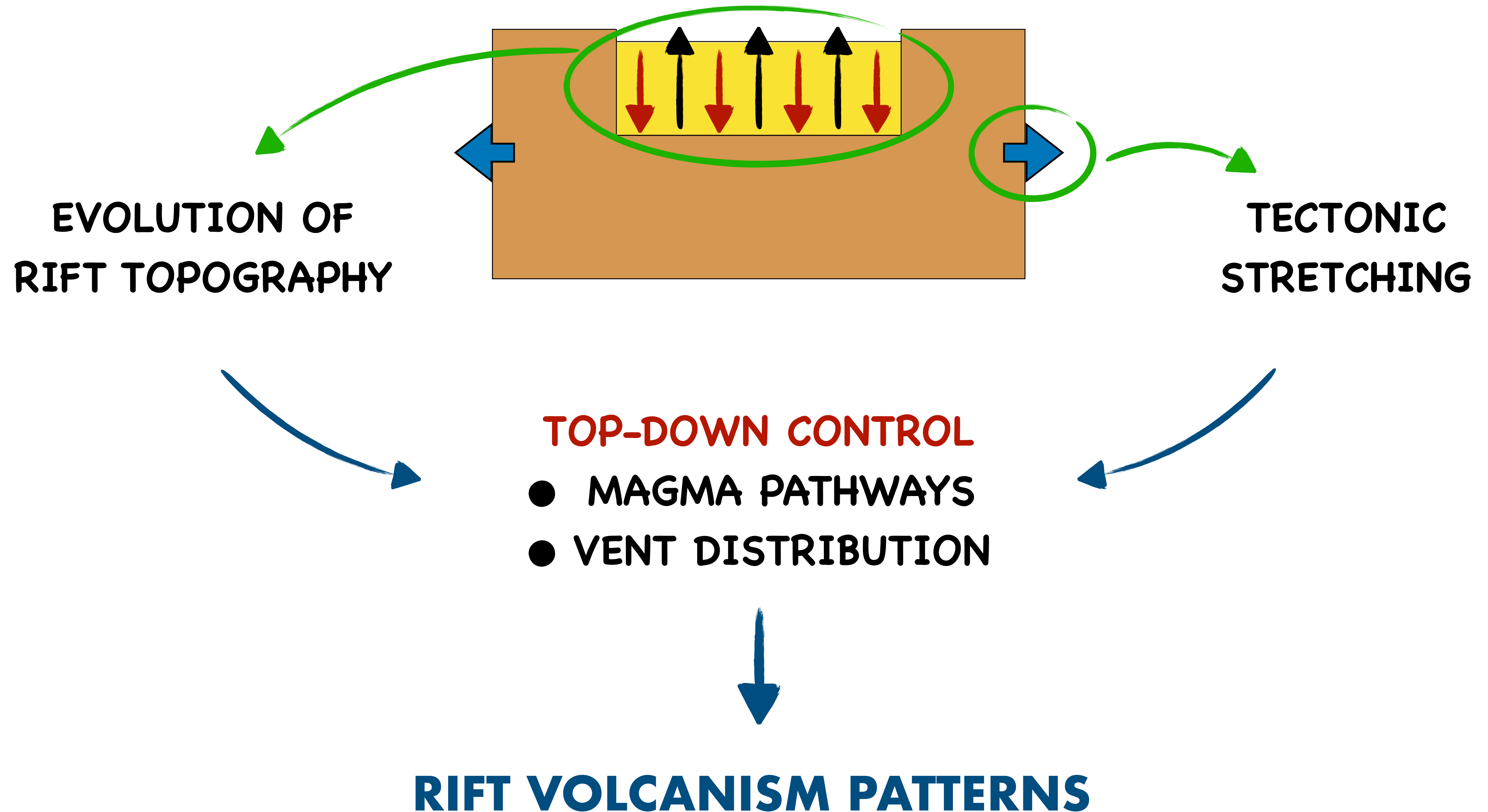
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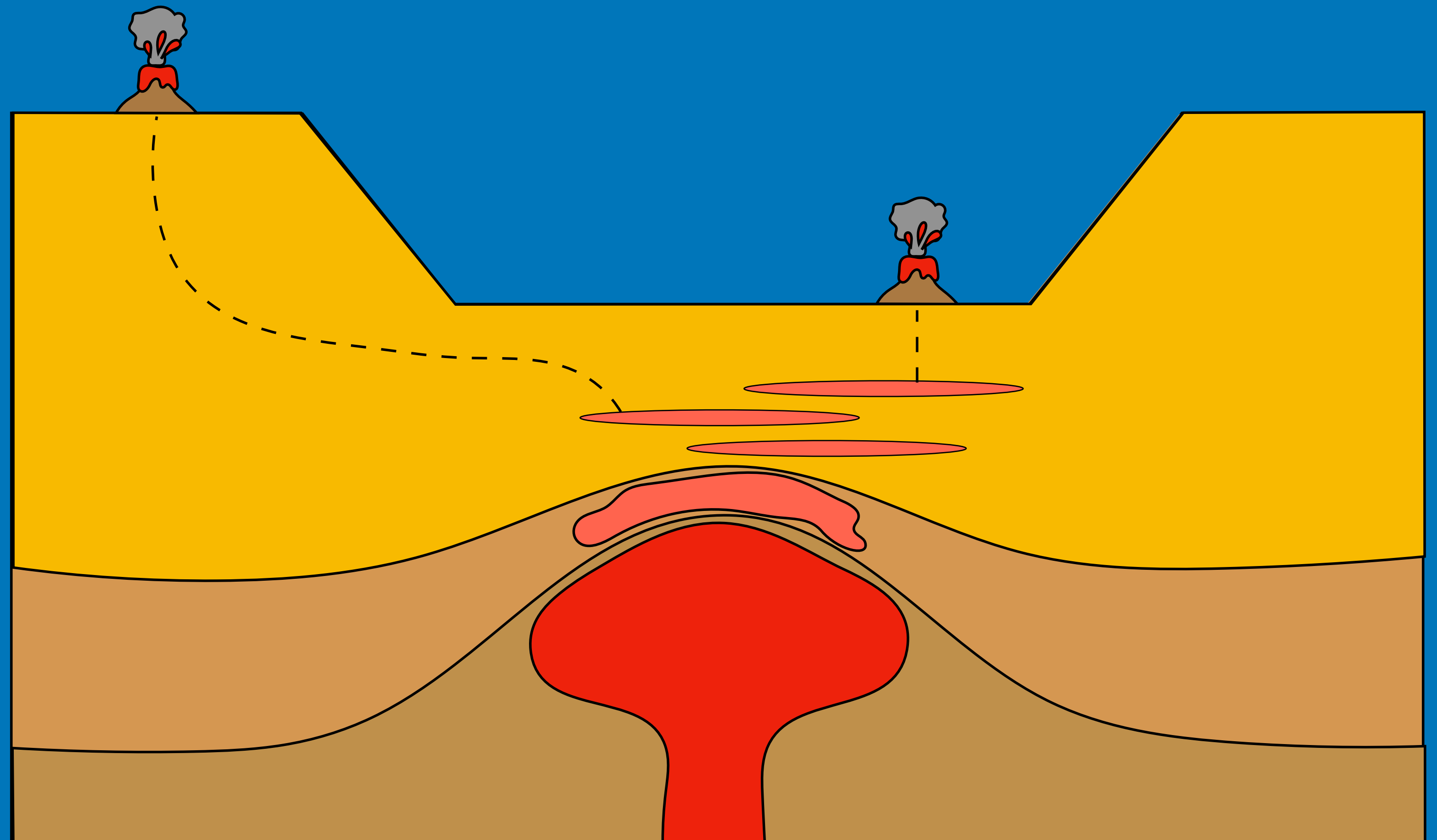
Corti, 2009



Conclusions



Thank you for your attention!



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