

Fabio Crameri¹, Valentina Magni¹, Mathew Domeier¹, Grace E. Shephard¹,
Kiran Chotalia², George Cooper³, Caroline M. Eakin⁴, Antoniette Greta Grima²,
Derya Gürer⁵, Ágnes Király¹, Elvira Mulyukova⁶, Kalijn Peters⁷, Boris Robert¹, Marcel Thielmann⁸

The trans-disciplinary and community-driven subduction zone initiation (SZI) database

Crameri et al., (in review with Nature Communications)

We built a database that puts together

Geologic evidence, Geodynamic interpretation, Plate reconstruction, and Seismic tomography
to characterise Subduction Zone Initiation (SZI) events in the last 100 Ma.



Interrupted Mollweide projection of world oceanic plates · by SZIdatabase.org



→ **Take a tour!**

Click on it!

EGU2020-15910 | D1365

¹ Centre for Earth Evolution and Dynamics (CEED), University of Oslo

² Department of Earth Sciences, University College London

³ School of Earth and Ocean Sciences, Cardiff University

⁴ Research School of Earth Sciences, Australian National University

⁵ School of Earth and Environmental Sciences, University of Queensland

⁶ Department of Geology and Geophysics, Yale University

⁷ Department of Earth Sciences, Utrecht University

⁸ Bavarian Geoinstitute, University of Bayreuth



Do not print!

What is subduction zone initiation?	3
SZI forcing end-members	4
What is the SZI database?	5
What's in the SZI Database?	6
A preview of the insights gained	7
How to access and contribute the SZI database	8
Acknowledgement	9

Click on it! 

What is subduction zone initiation?

Click on it! 

- We define "Subduction-zone initiation (SZI)" as the onset of downward plate motion forming a new slab, which later evolves into a self-sustaining subduction zone.
- All SZI events can be classified with these SZI types

SZI types

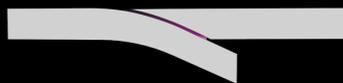
Newly destructive



Fault activation



Slab formation



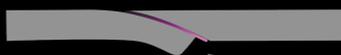
SZIdatabase.org

c.

Episodic subduction



Fault activation



Slab formation



SZIdatabase.org

d.

Polarity reversal



Fault activation



Slab formation

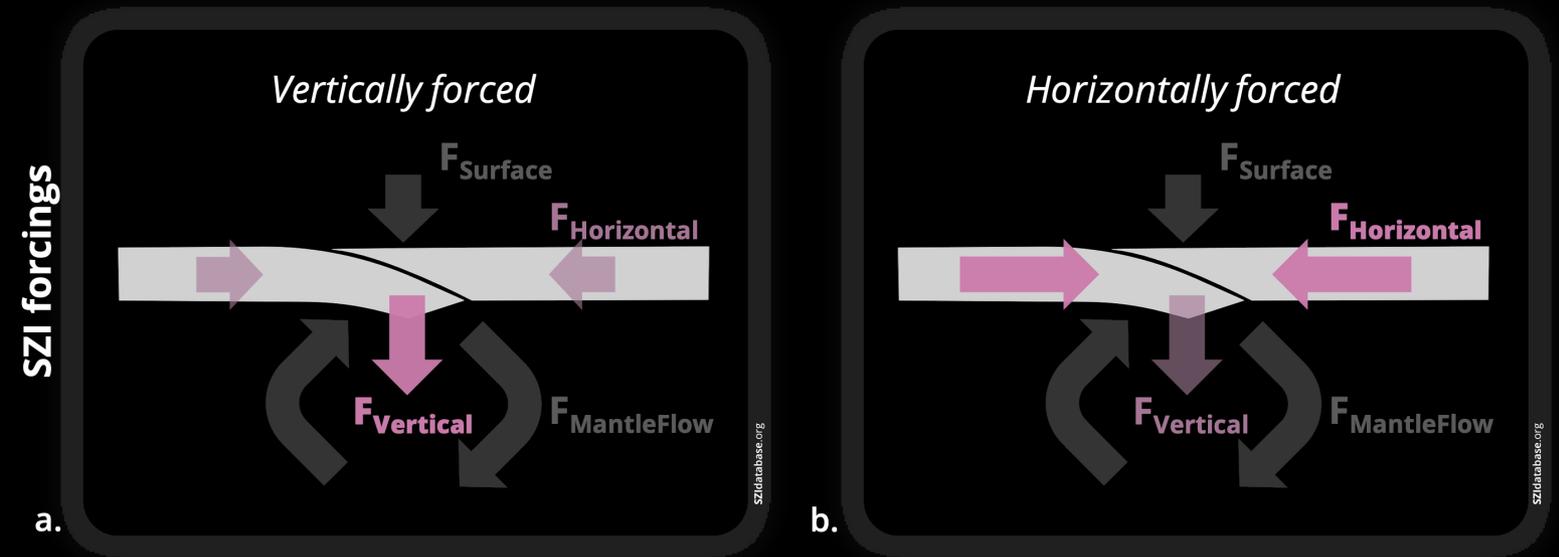


SZIdatabase.org

e.

SZI forcing end-members

SZI events are either **mainly horizontally forced**, via external forces that arise, for example, from tectonic or mantle-convection induced stresses, or **mainly vertically forced**, via a planetary gravitational force acting on density gradients in the plate-mantle system.

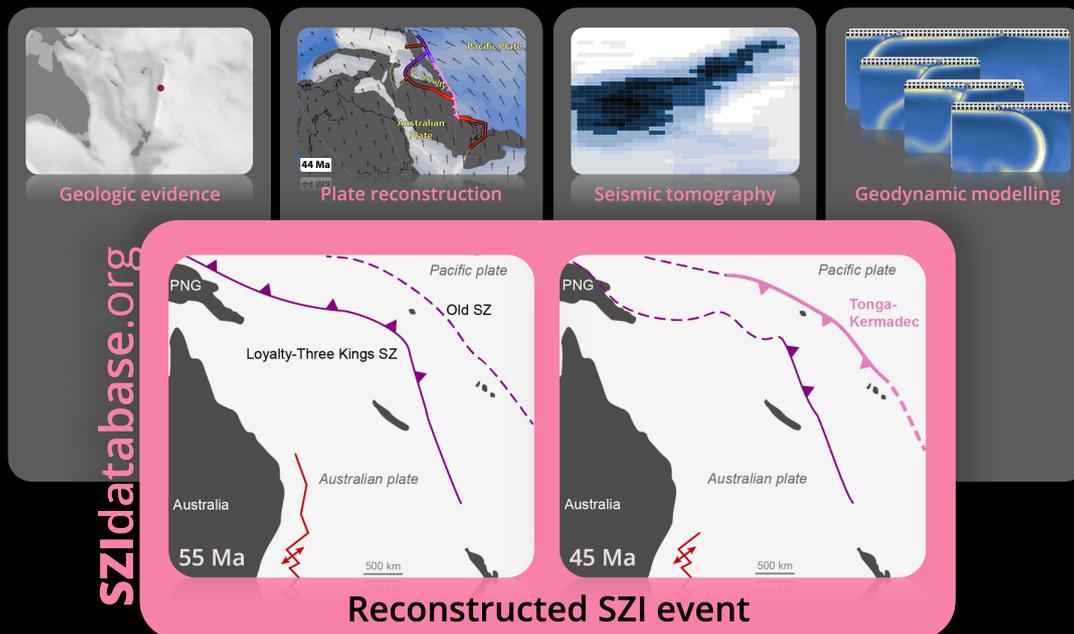


What is the SZI database?

Our vision is to create a

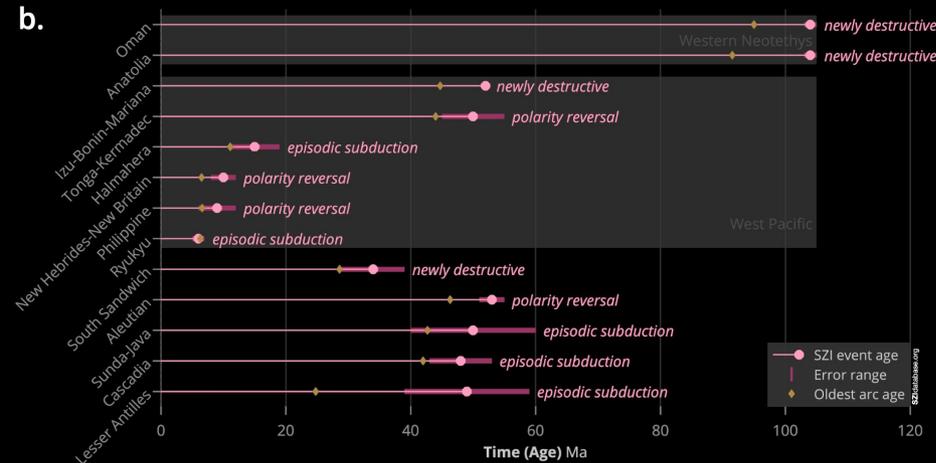
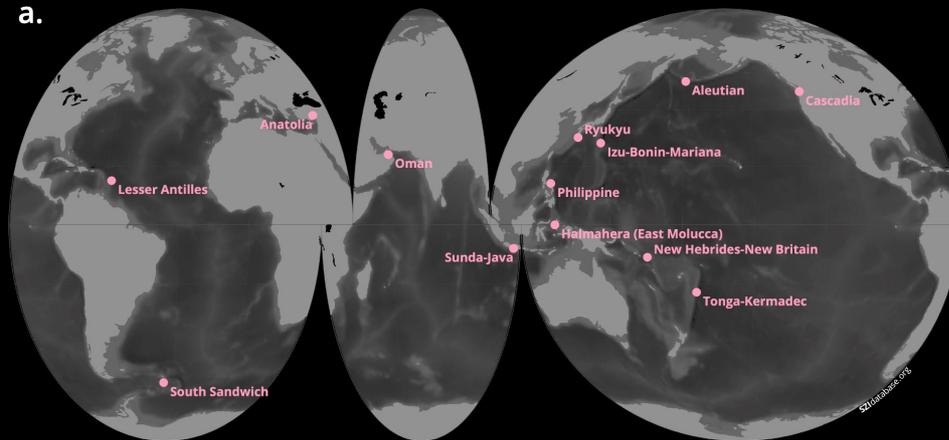
- ✓ Trans-disciplinary
- ✓ Community driven
- ✓ Accessible
- ✓ Inclusive

database that can be used *and* improved by the community via an online platform.



What's in the SZI Database?

13 SZI events



100 data entries per SZI event

➔ Direct evidence (ages)

- Metamorphic sole formation & cooling
- Youngest and oldest Early basalts (,FABs)
- Youngest & oldest Boninites
- Oldest arc rocks
- ...

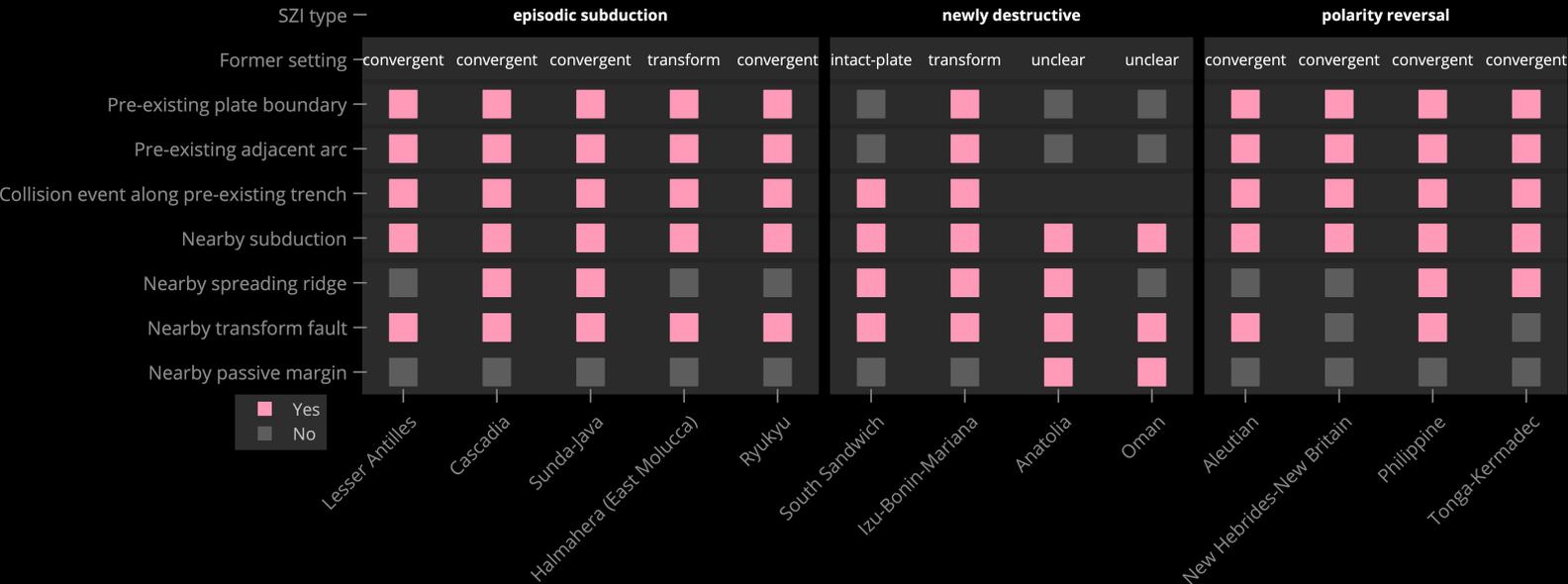
➔ Plate reconstruction

- Nature of overriding and parent plate
- Proximity to plate boundaries
- Other subduction zones
- Ridges
- Transform faults
- Passive margins
- Pre-existing volcanic arcs
- Collision events
- Plate reorganisation events
- ...

➔ Seismic tomography

- Location with respect to LLSVPs
- Location of the present-day slab
- Presence of mantle plume
- ...

A preview of the insights gained



- ➔ Subduction zones form preferentially at or near a pre-existing plate weakness.
- ➔ Purely plate-buoyancy driven (“spontaneous”) SZI is unlikely on the present-day Earth.
- ➔ Collision of buoyant features with pre-existing subduction trenches is often a precursor of SZI events.
- ➔ *Subduction breeds subduction.*

How to access and contribute the SZI database

- *For a convenient overview:*

www.SZIdatabase.org

- *Detailed glossary:*

www.SZIdatabase.org > **Glossary**

- *Download data and event summaries:*

www.SZIdatabase.org > **Resources** > **Data**

- *Contribute to the database:*

www.SZIdatabase.org > **Contribute**

- *Community-wide discussions in the online SZI Forum:*

www.SZIdatabase.org > **Forum**

Acknowledgement

The research behind the database: Cramer, F., Magni, V., Domeier, M., Shephard, G., Chotalia, K., Cooper, G., Eakin, C. M., Grima, A. G., Guerer, D., Király, Á., Mulyukova, E., Peters, K., Robert, B., & Thielmann, M. (2020), **A trans-disciplinary and community-driven database to unravel subduction zone initiation**, *Nature Communications (in review)*

The database version: Cramer, F., Magni, V., Domeier, M., Shephard, G., Chotalia, K., Cooper, G., Eakin, C. M., Grima, A. G., Guerer, D., Király, Á., Mulyukova, E., Peters, K., Robert, B., & Thielmann, M. (2020). **Subduction zone initiation (SZI) Database (Version 1.0)**, *Zenodo*. <https://doi.org/10.5281/zenodo.3756716>

Any relevant references contained in the individual database files (see Data Source and/or Comments fields in the database sheets).

Follow the SZI Database project

www.SZIdatabase.org

[@CEEDoslo](https://twitter.com/CEEDoslo)

[#SZIDatabase](https://twitter.com/SZIDatabase)

