



ICDP Proposal on Drilling the **Ivrea-Verbano zone**, Italy

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DIVE Workshop Participants

DIVE

DRILLING THE
IVREA-VERBANO
ZONE

icdp



INTERNATIONAL
CONTINENTAL SCIENTIFIC
DRILLING PROGRAM

(Not funded yet!)

1 
UNIL | Université de Lausanne

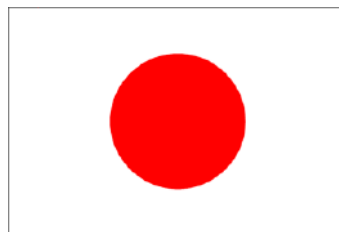
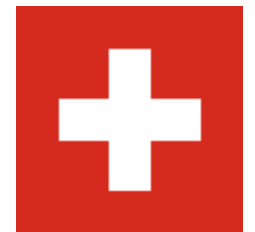
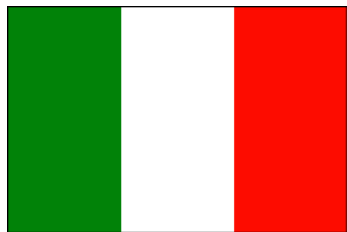
2  UNIVERSITY OF
GEORGIA

3  Consiglio
Nazionale
delle Ricerche

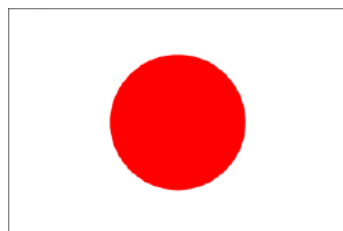
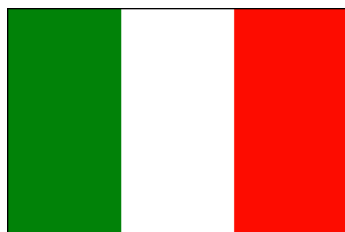
4  UNIVERSITÀ
DEGLI STUDI DI TRIESTE

5  **MONTAN**
UNIVERSITÄT

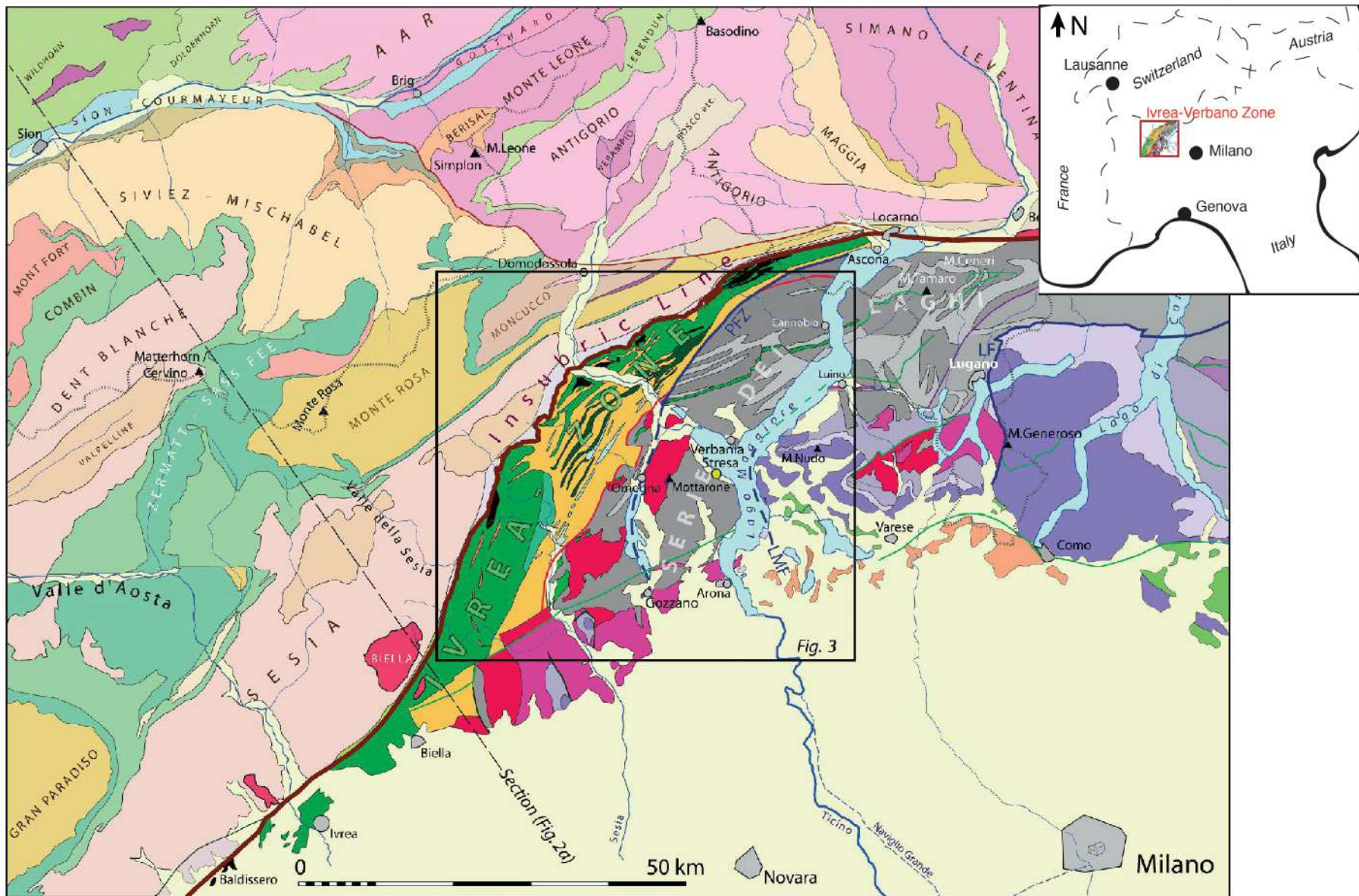
ICDP DIVE Workshop (May 2017), Baveno, Italy



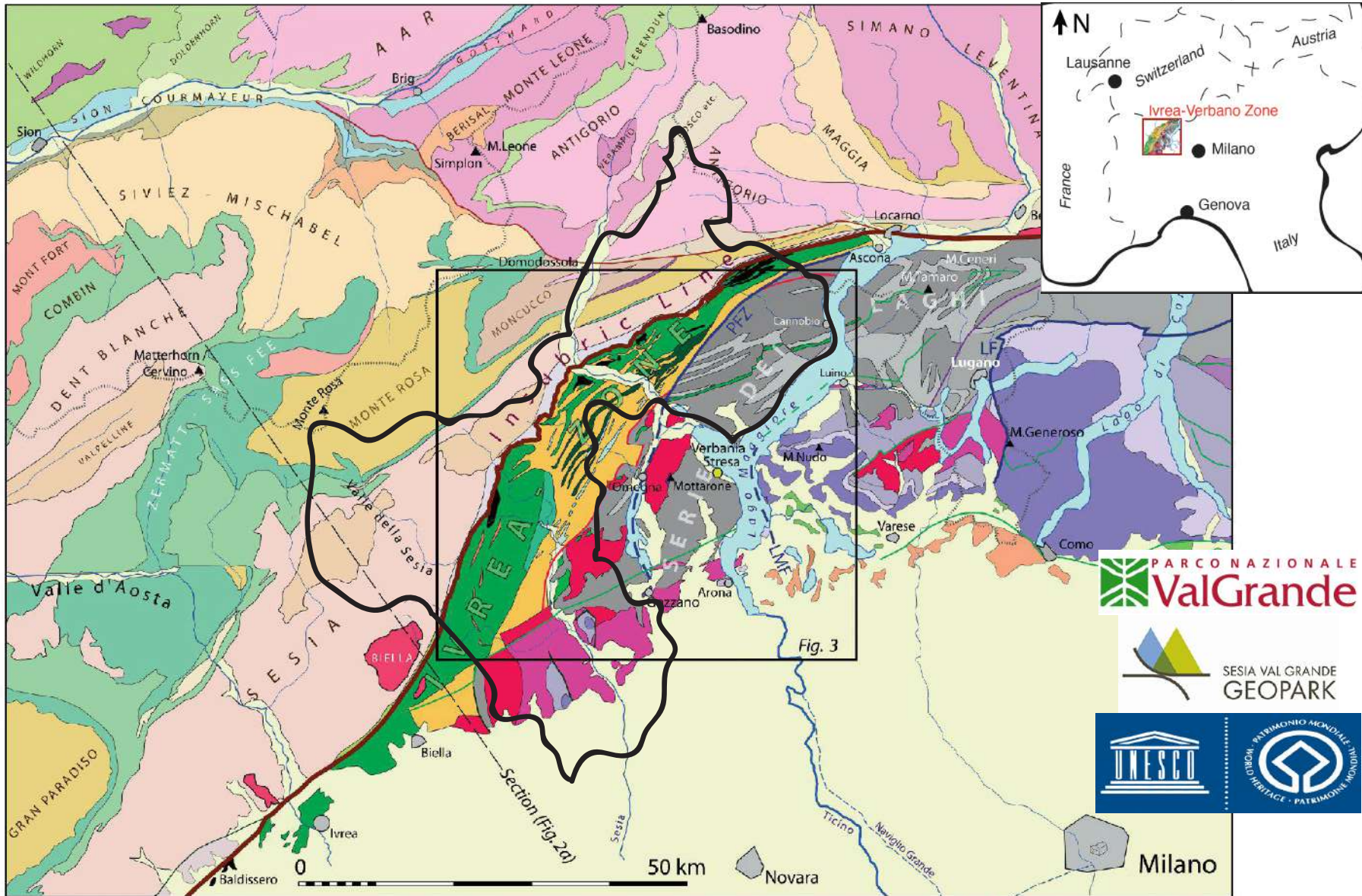
ICDP DIVE Workshop (May 2017), Baveno, Italy



Ivrea-Verbano Zone (IVZ), Italy



Ivrea-Verbano Zone (IVZ), Italy



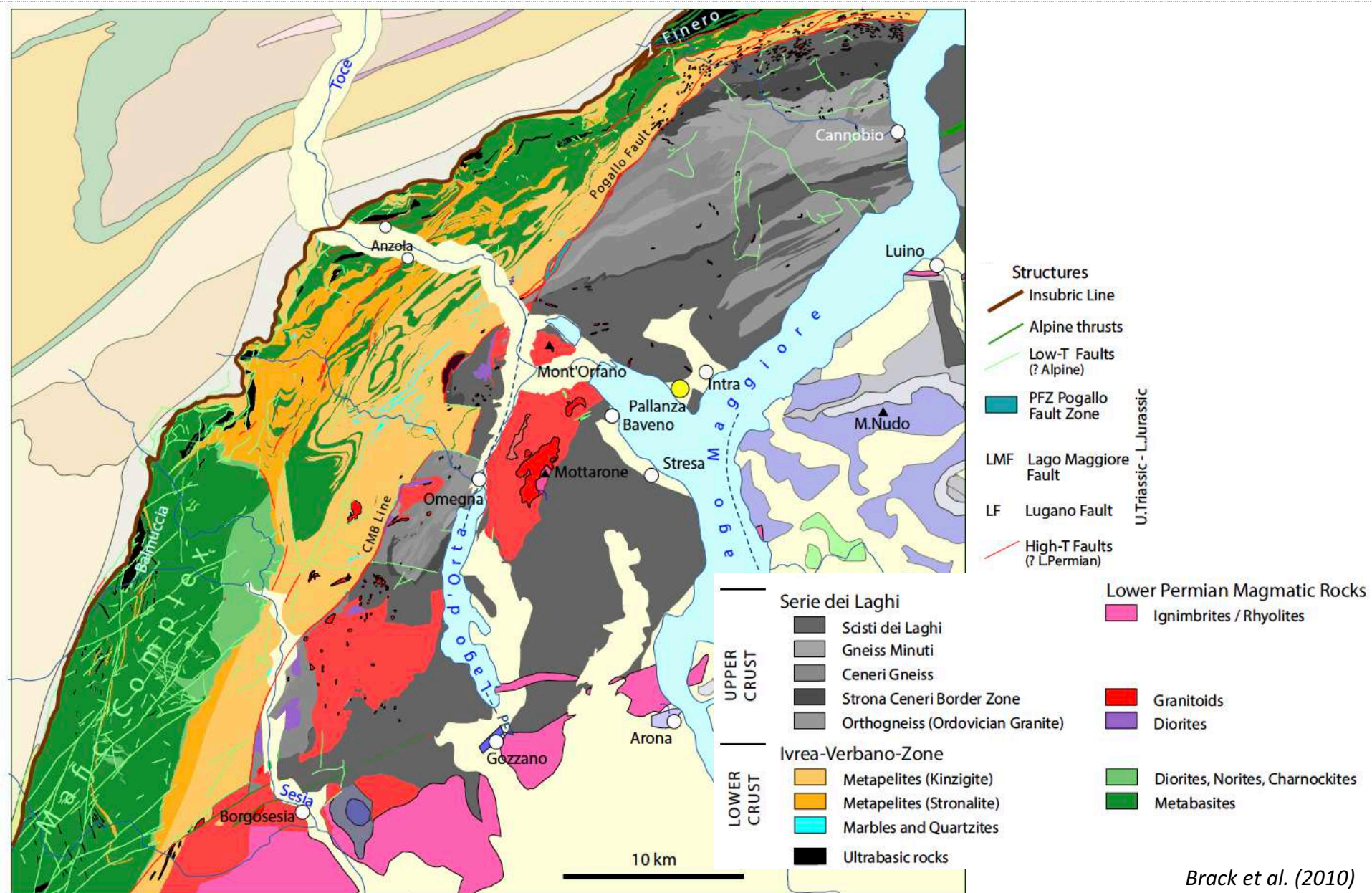
Scientific Motivation to DIVE

- Most complete, time-integrated crust-upper mantle archive in the world (well studied over 50 years)
- Resolving some unknowns of the continental crust–mantle transition
- Unique preserved “true” continental lithospheric section, with no (?) mantle serpentinisation
- Best place for refining global lower crustal models from a geophysical and petrological perspective
- Exploiting the limits of the deep biosphere and fluids, with inferences for exoplanet research

Major Scientific Challenges

- Geochemical/physical Identity = Continental crust composition and architecture
- Physico-Geochemical Dynamics = Processes forming and modifying the continental crust through geological time
- In-situ core logging and long-term geophysical monitoring along a major plate boundary
- Hydrology and microbiology of the continental crust
- Deep biosphere (drilling one of the freshest peridotites on Earth: beginning of serpentization / carbonation!)

Geological Map of the IVZ



IVZ: Today

Serie dei Laghi (= Upper Crust)

- mica schist
- Ceneri gneiss, gneiss minuti
- amphibolite
- orthogneiss
- granite

Ivrea-Verbano Zone (= Lower Crust)

Host rocks

- sill-bt schist (kinzigite), migmatitic gneiss
- gt-sill gneiss (stronalite)
- marble
- amphibolite
- peridotite + pyroxenite

Intrusive complex

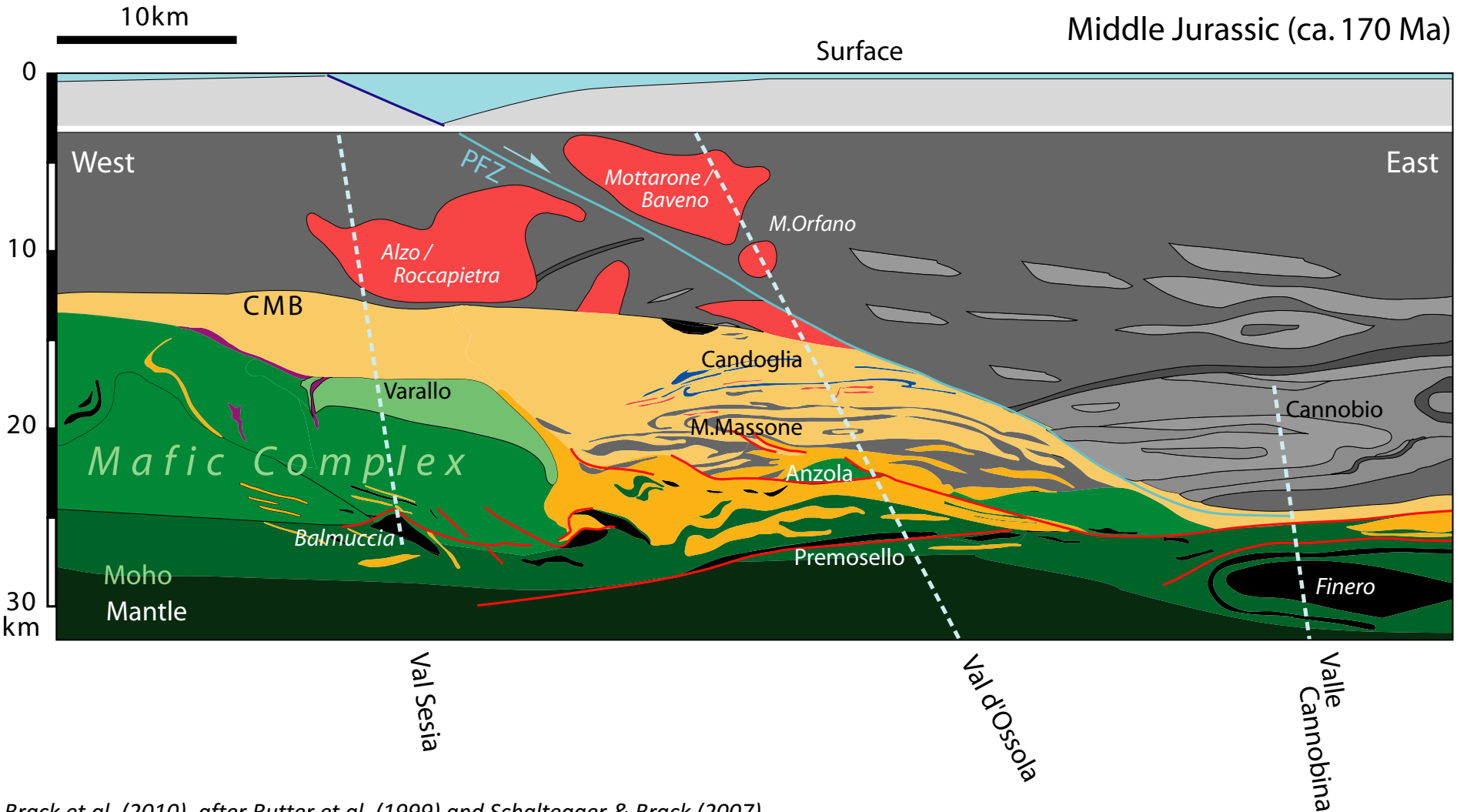
- charnockite
- diorite (e.g. Val Mastallone)
- gabbro, gabbro diorite, plag-hbl-cpx granofels, norite
- gt-px-plag granofels

Brack et al. (2010),
after Rutter et al. (1999)



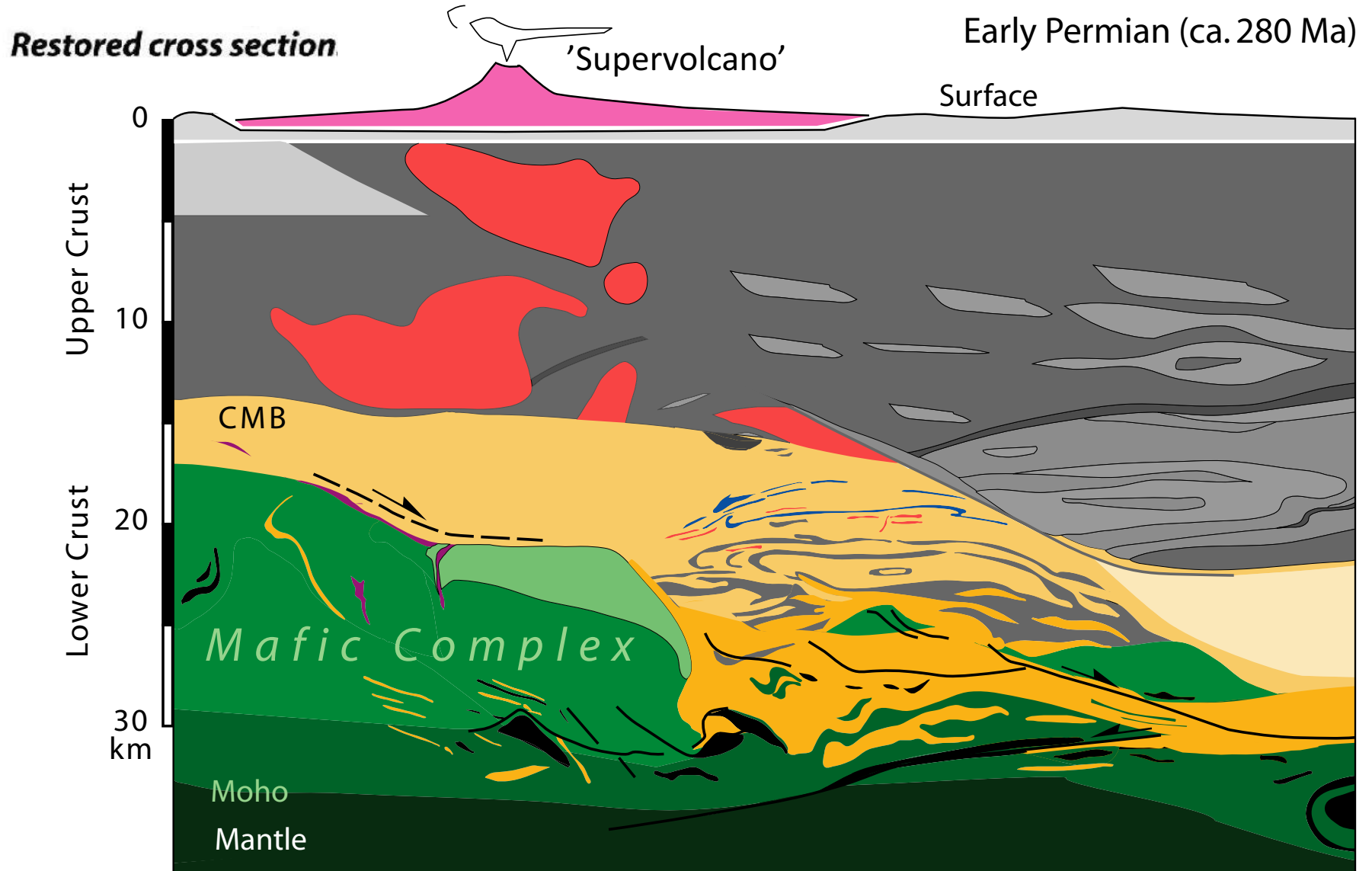
IVZ: ~170 Ma

Restored cross section

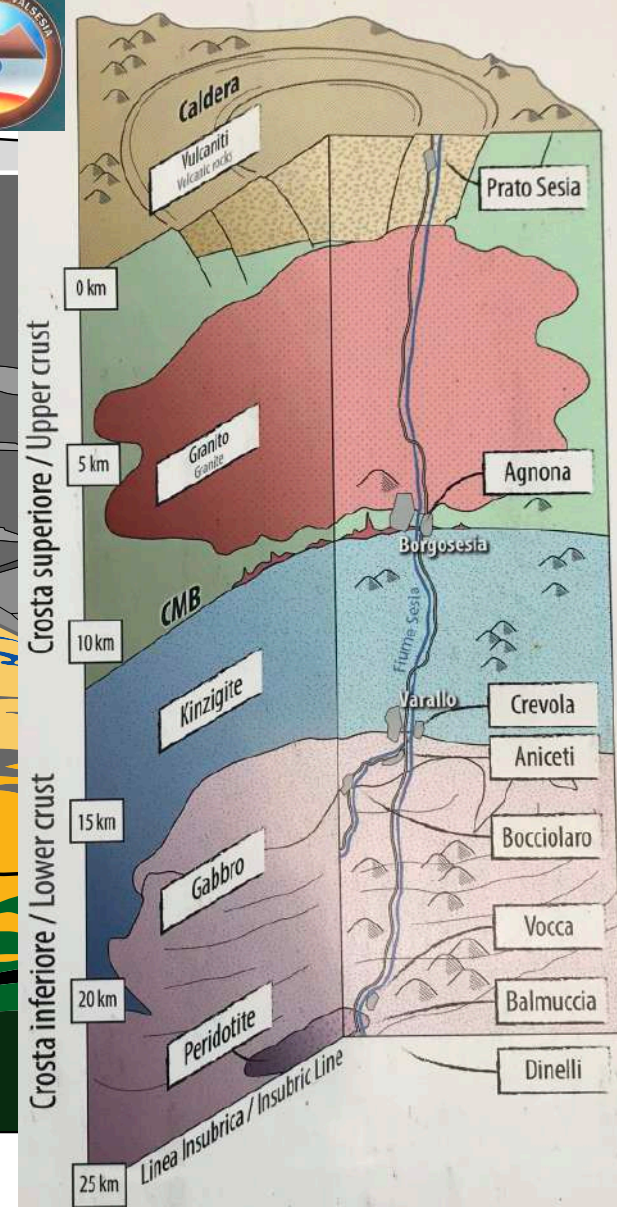
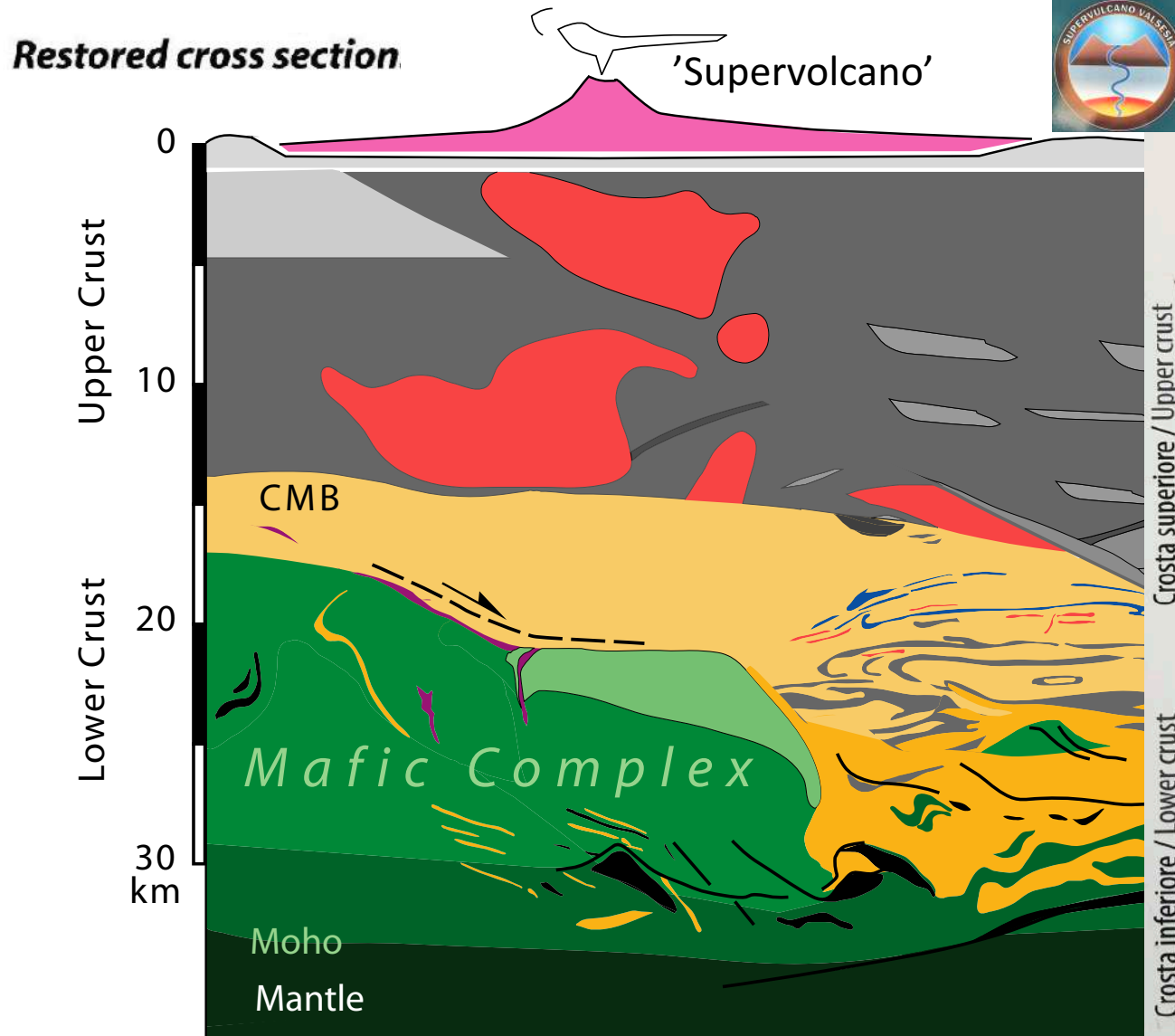


Brack et al. (2010), after Rutter et al. (1999) and Schaltegger & Brack (2007)

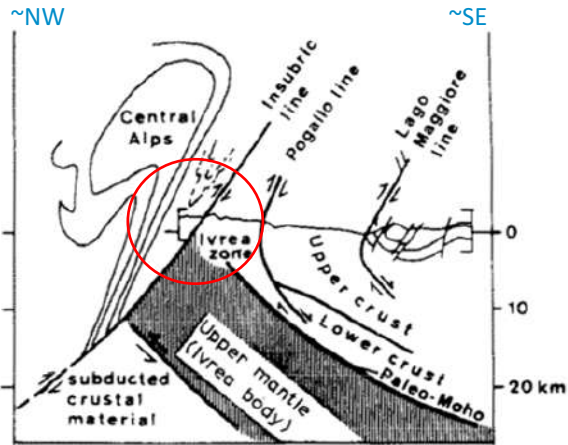
IVZ: ~280 Ma



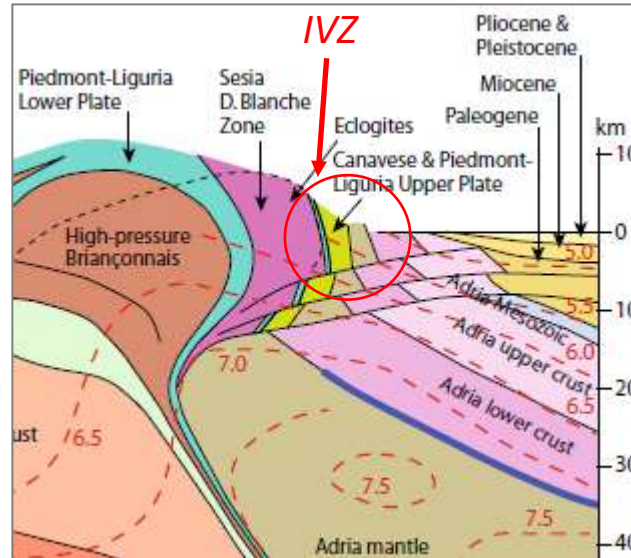
IVZ: ~280 Ma



Tectonics of the IVZ

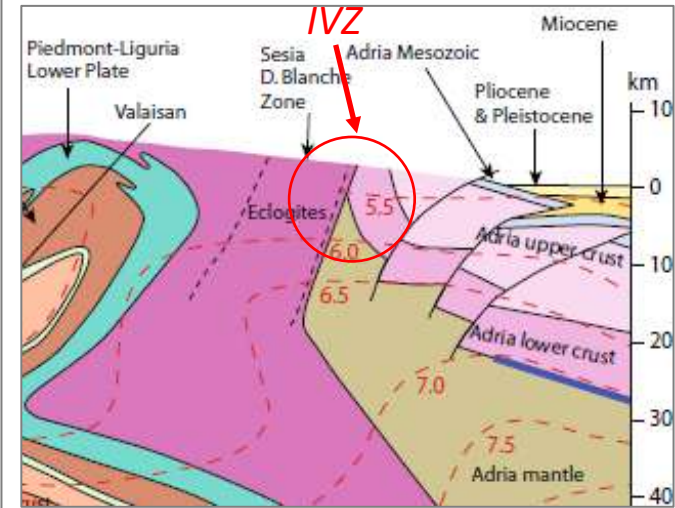


Zingg et al. (1990)



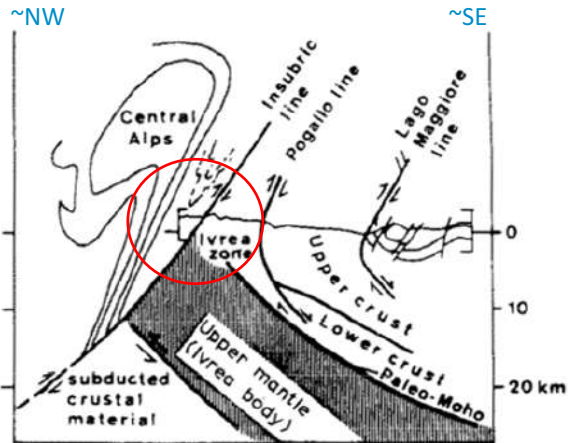
ECORS-CROP (southern IVZ)

After Schmid et al. (2017), modified

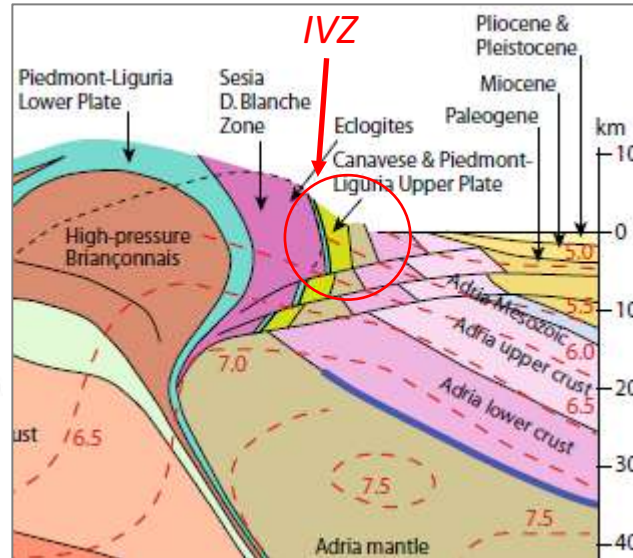


NFP20W (central IVZ)

Tectonics of the IVZ

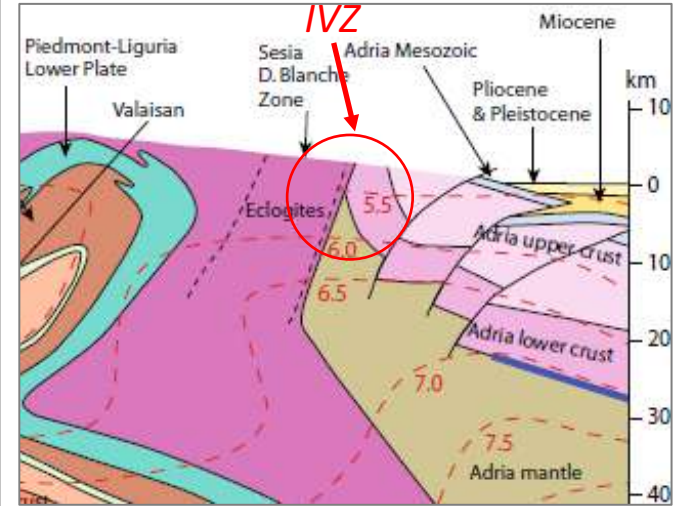


Zingg et al. (1990)

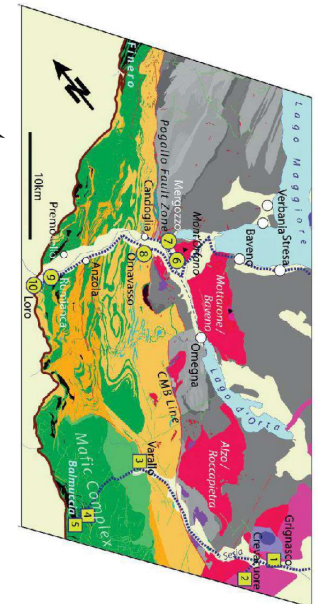
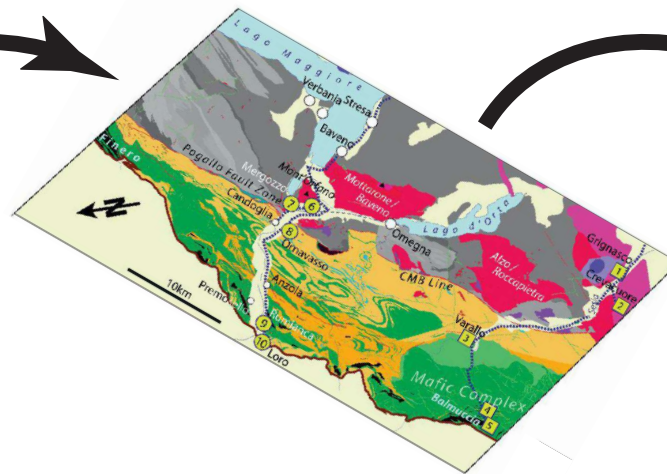
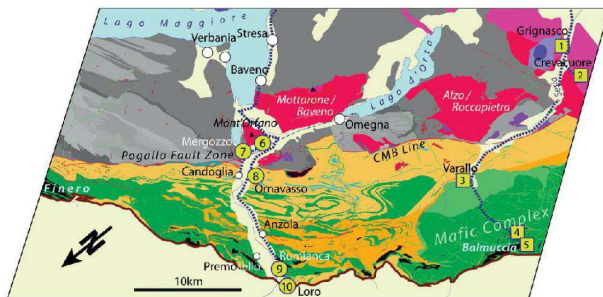


ECORS-CROP (southern IVZ)

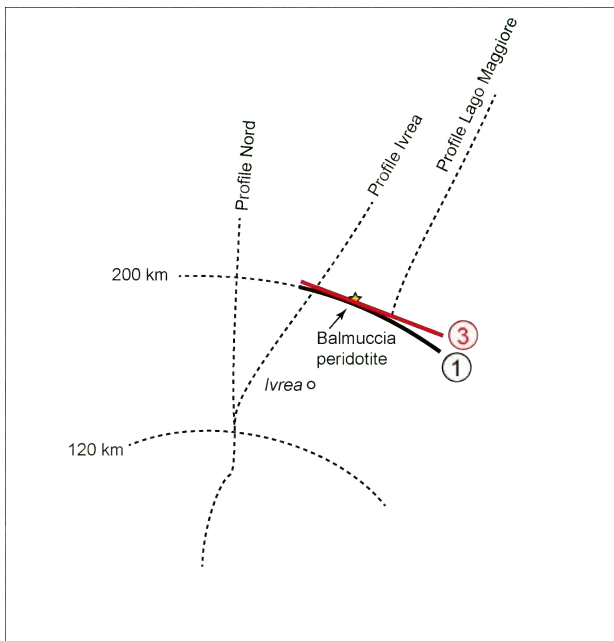
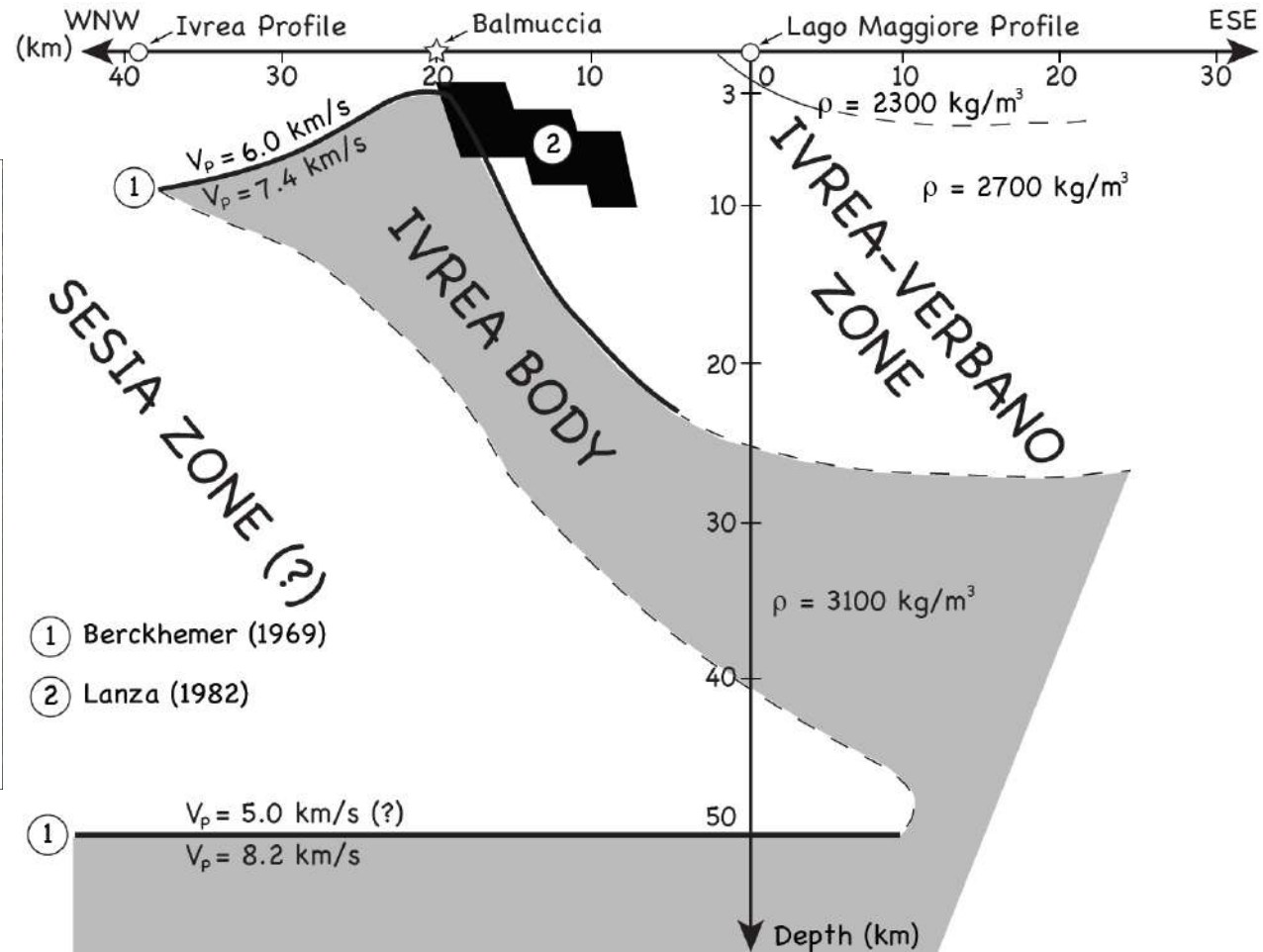
After Schmid et al. (2017), modified



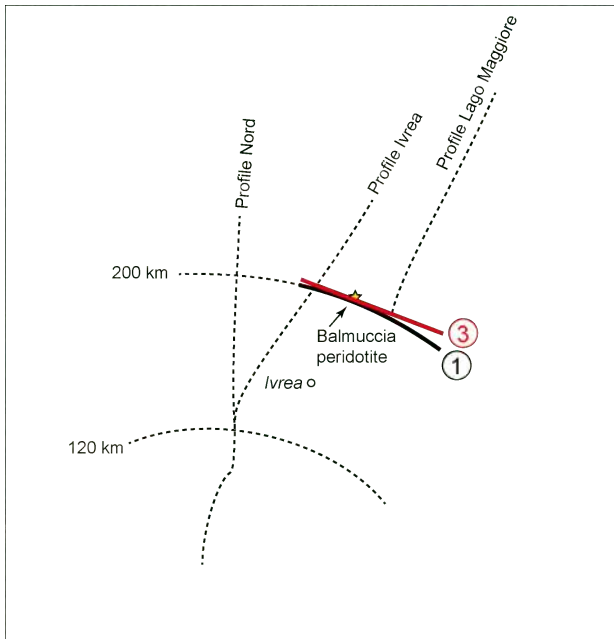
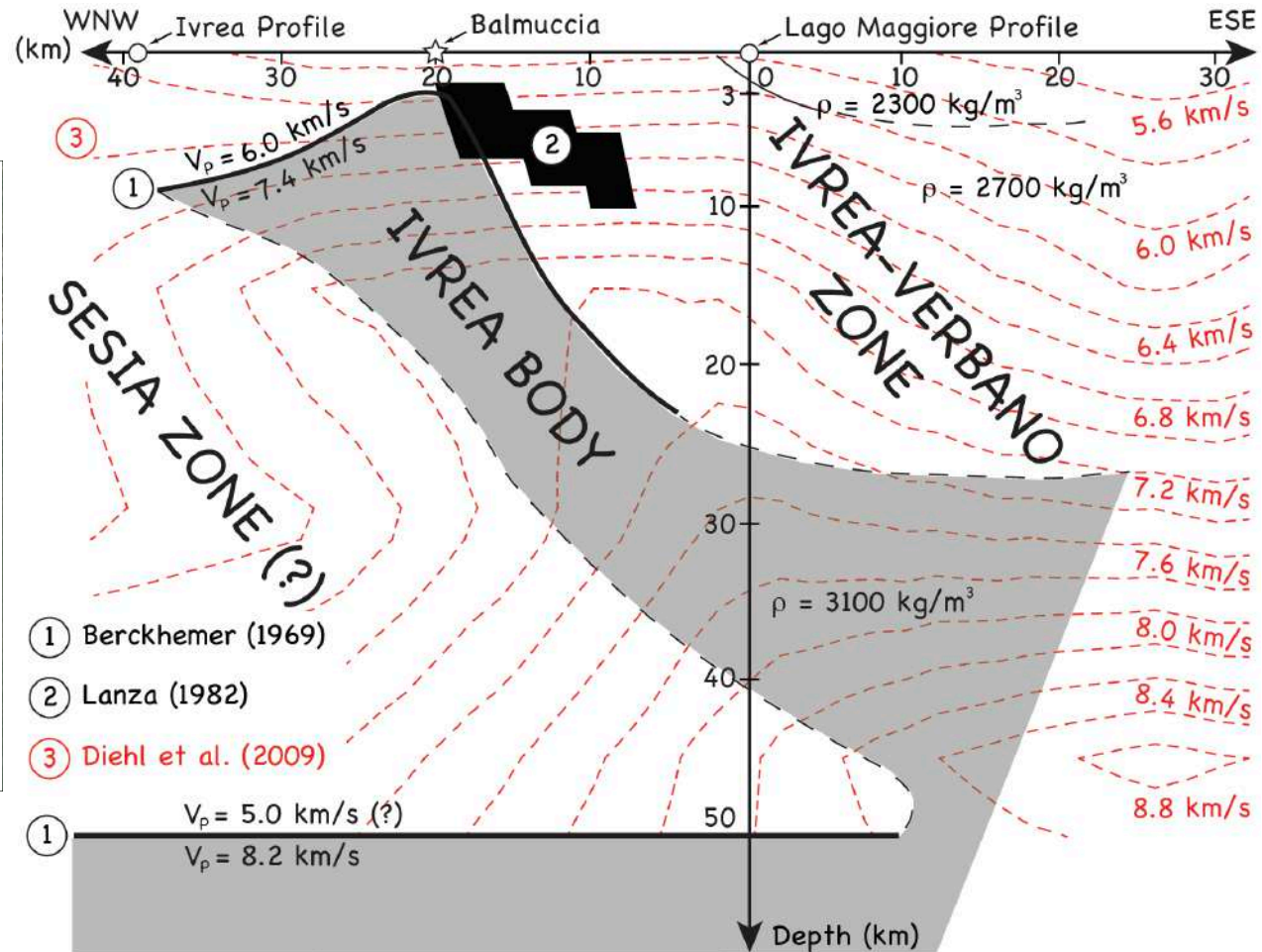
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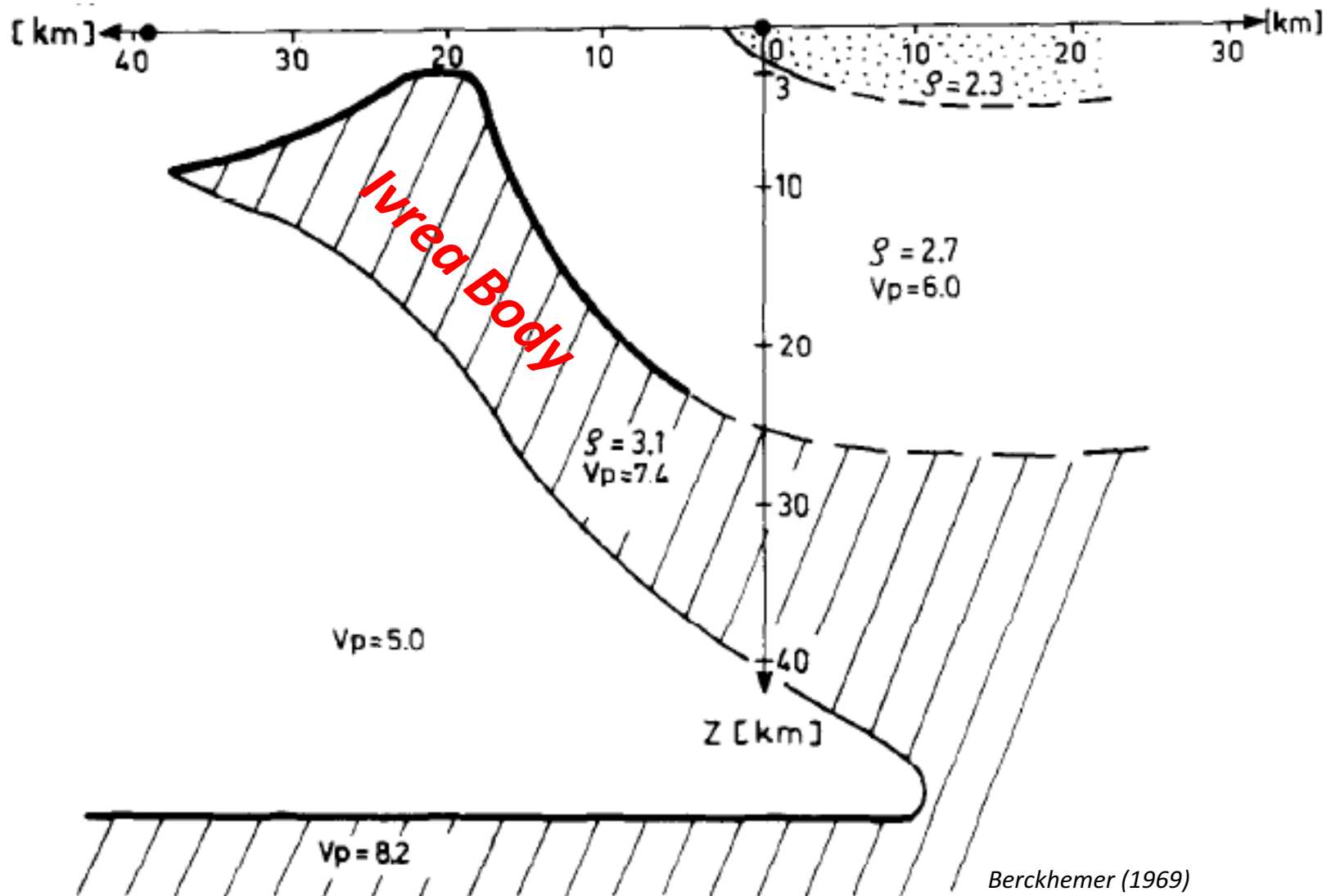
Geophysics of the IVZ



Geophysics of the IVZ

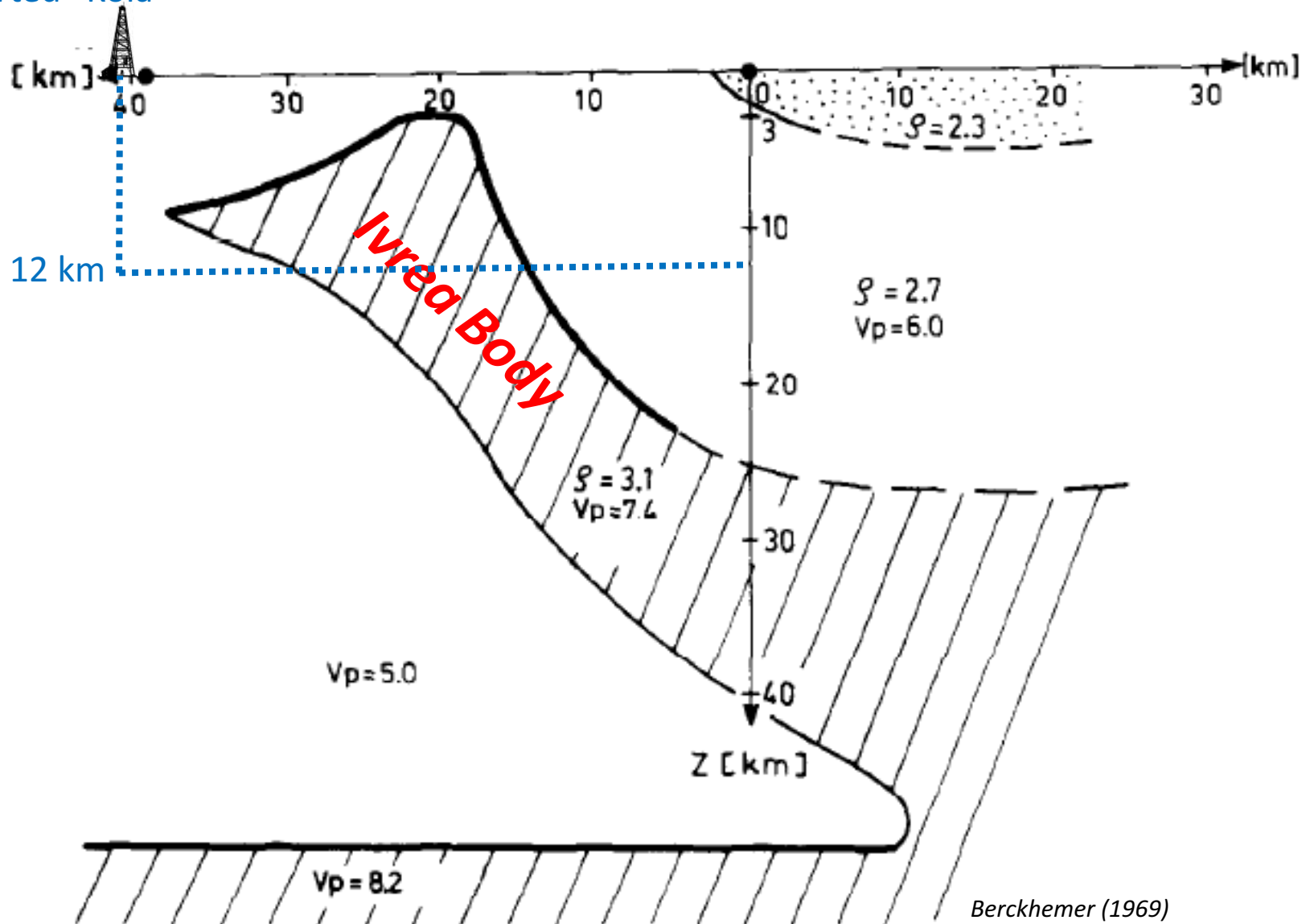


Geophysics of the IVZ



Geophysics of the IVZ

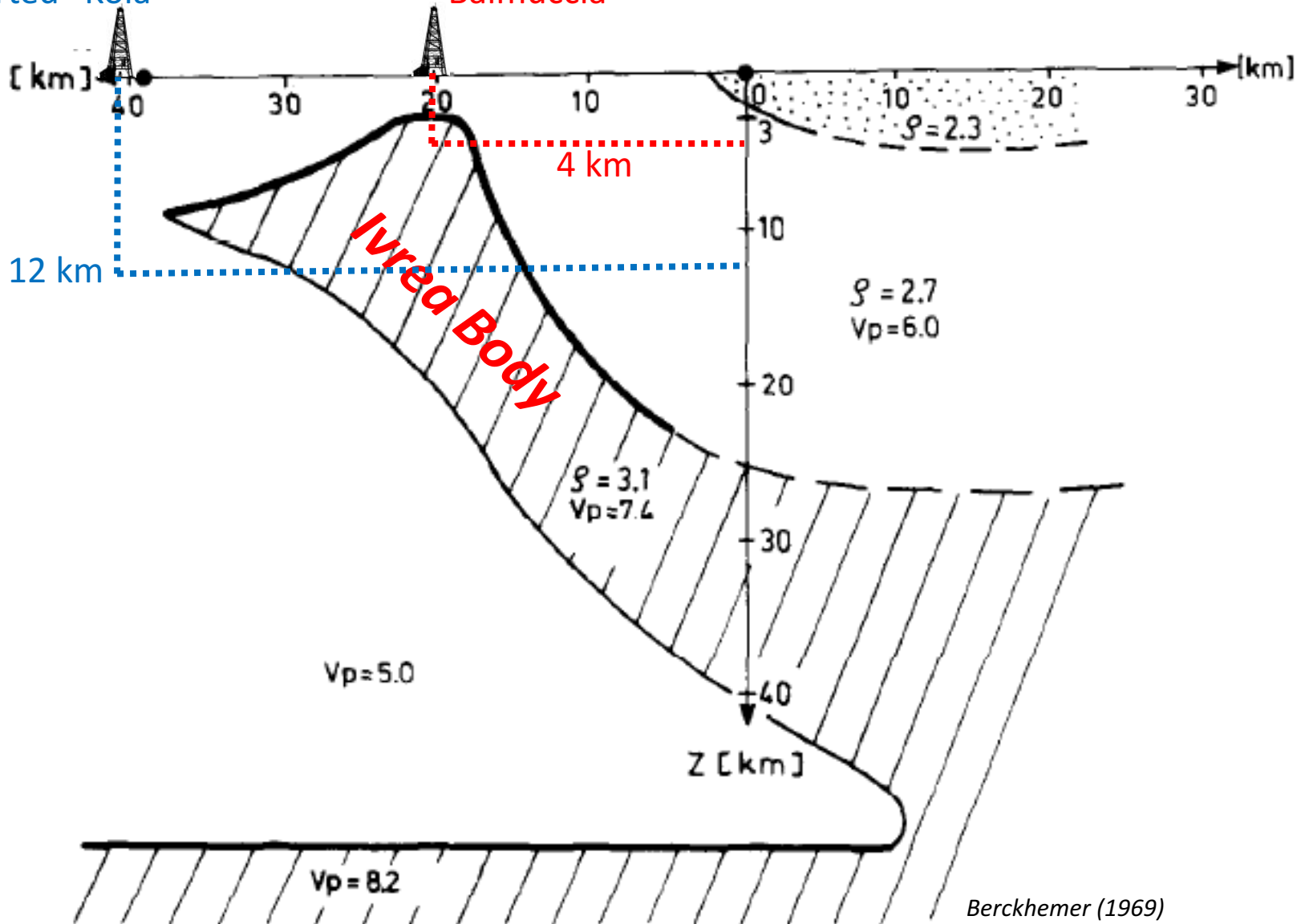
“Imported” Kola



Geophysics of the IVZ

“Imported” Kola

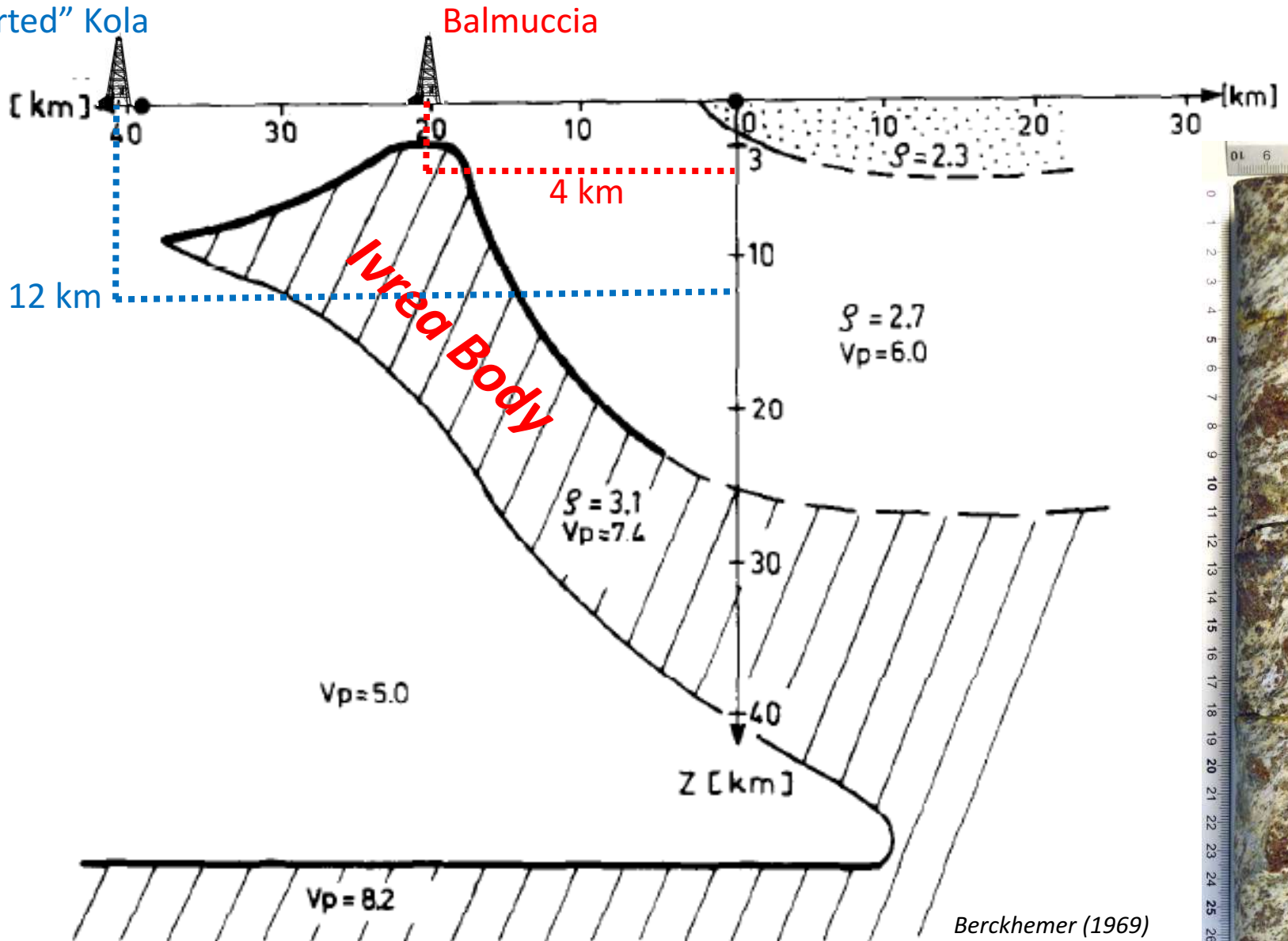
Balmuccia



Berckheimer (1969)

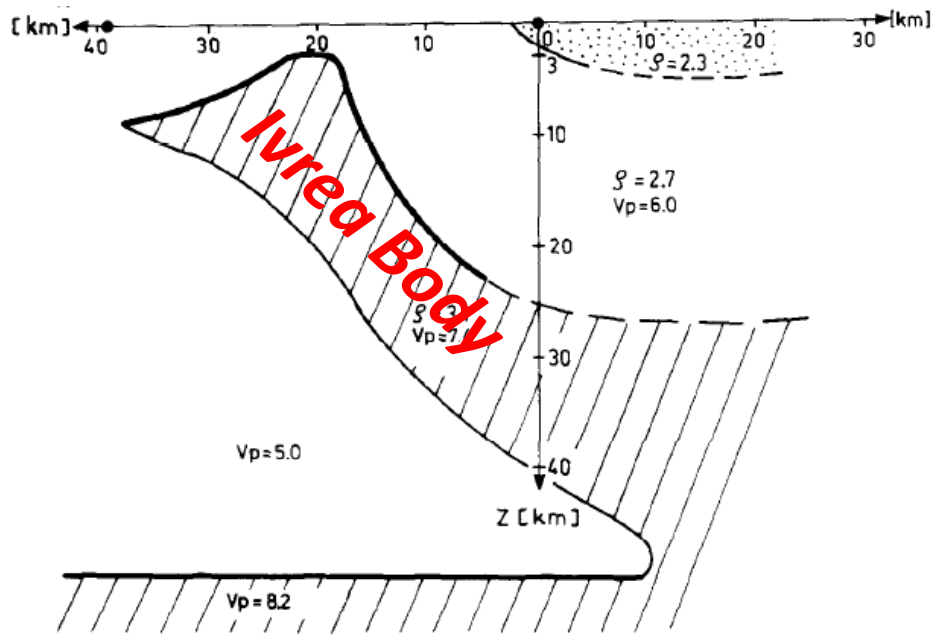
Geophysics of the IVZ

“Imported” Kola



Berckheimer (1969)

The DIVE Mission



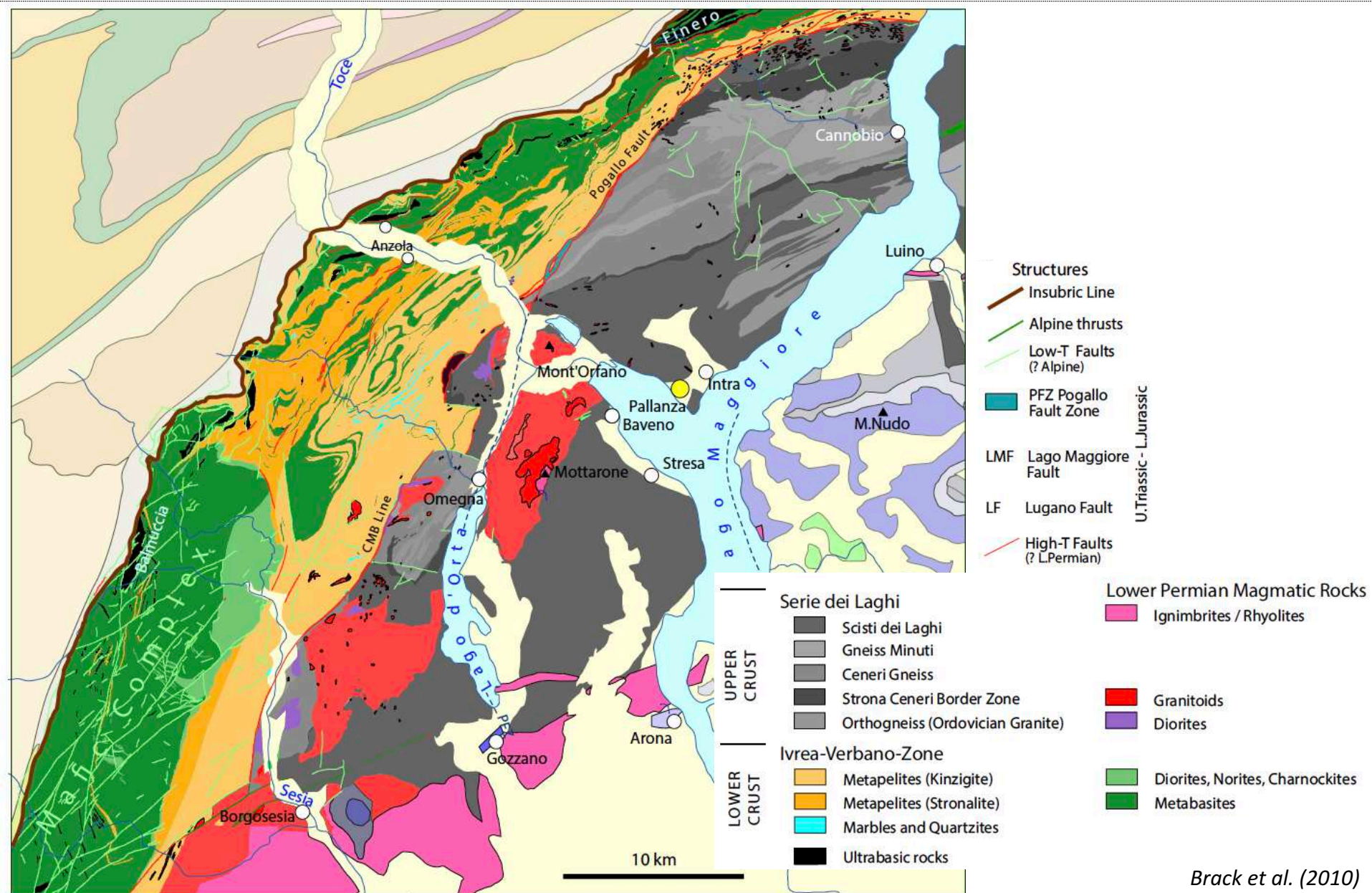
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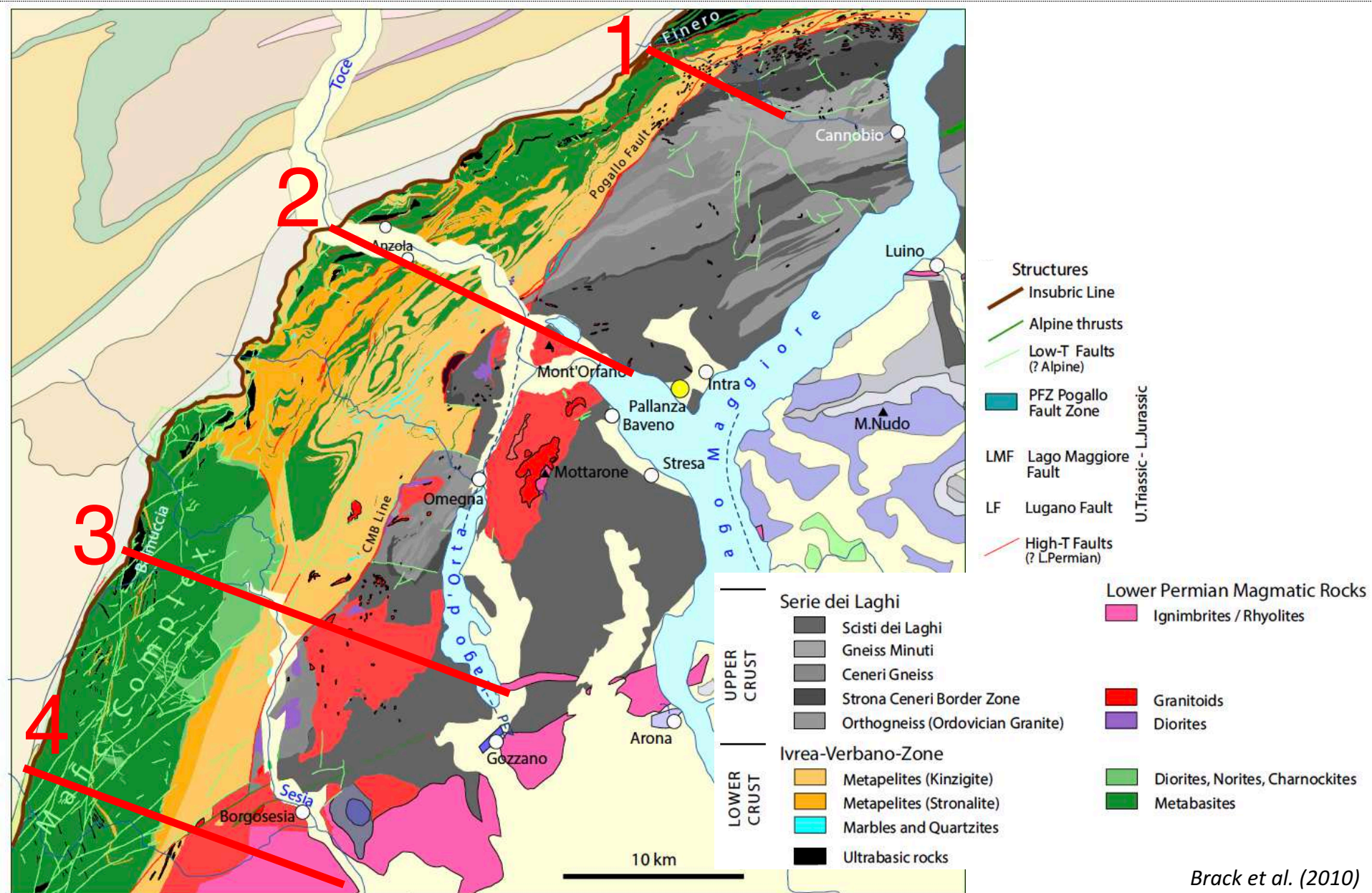


Luigi Burlini

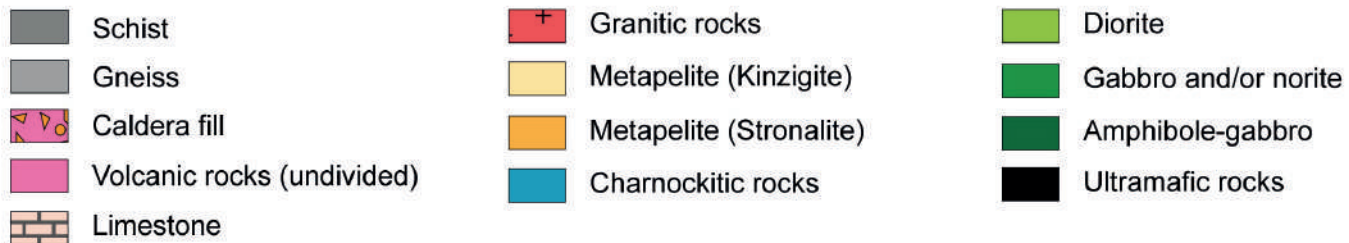
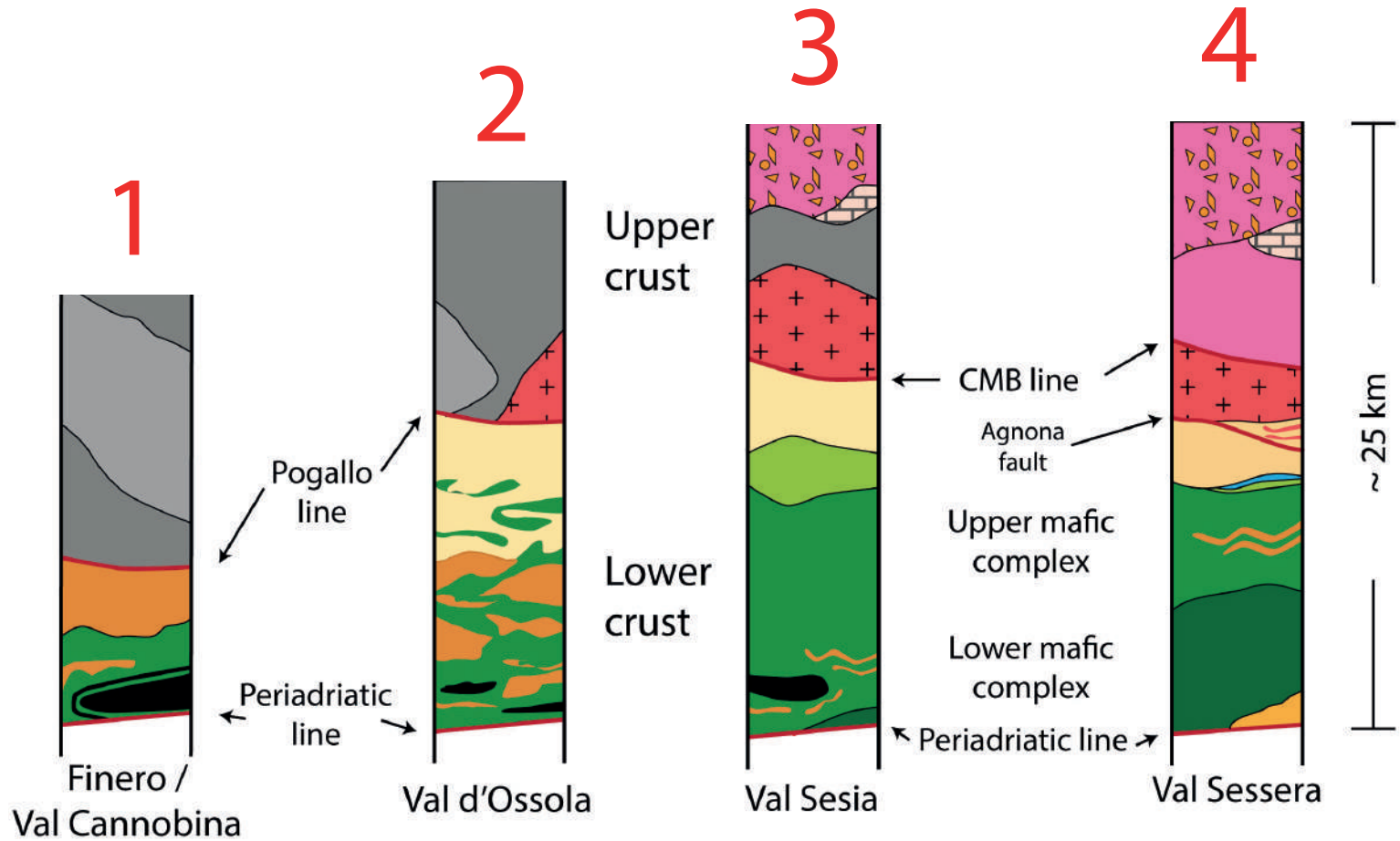
Geological Map of the IVZ



Geological Map of the IVZ

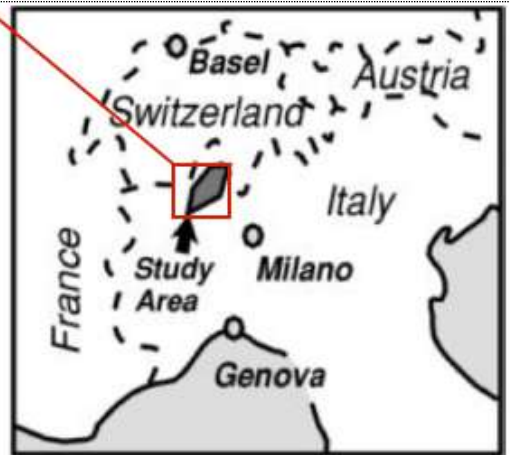
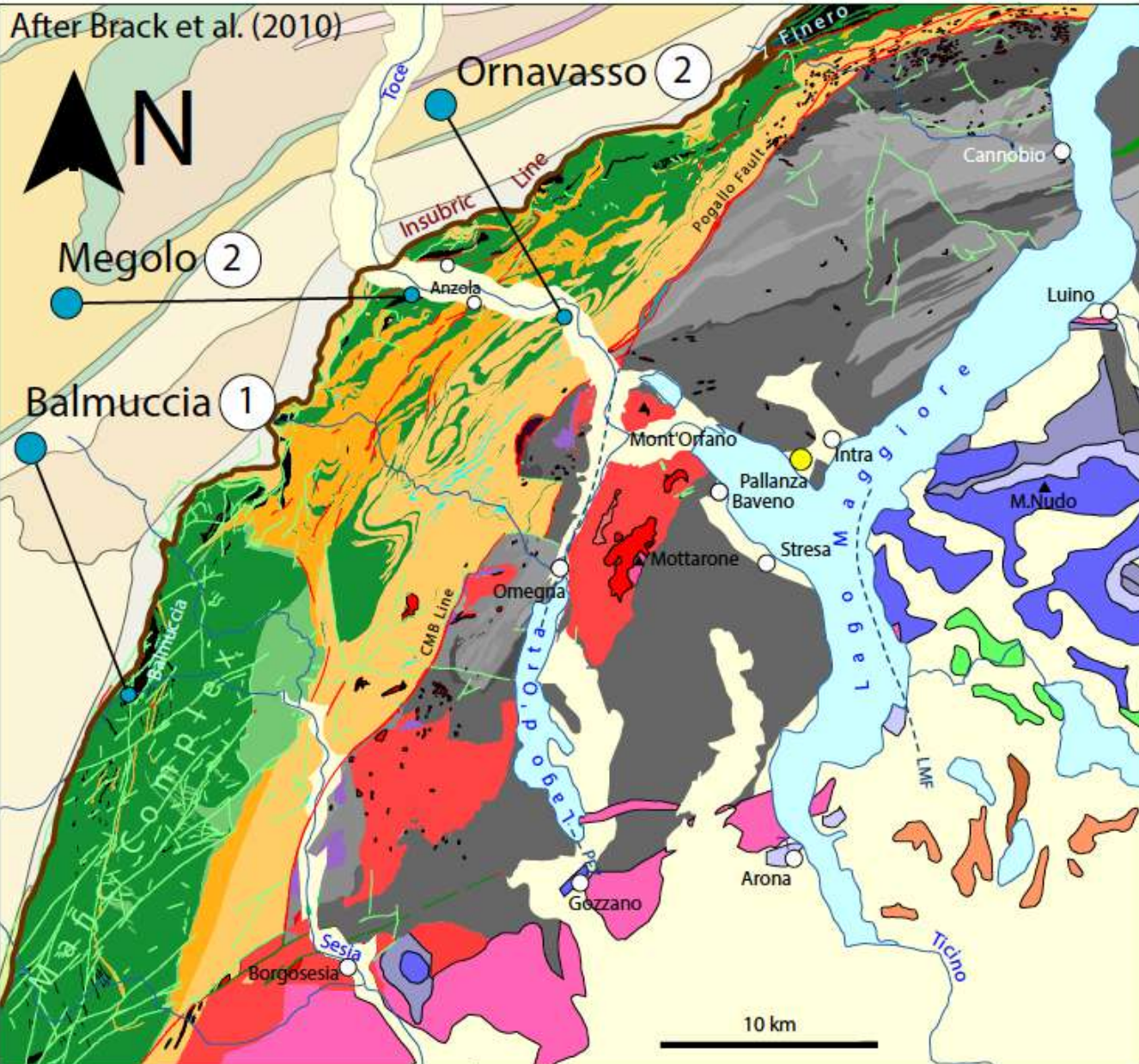


Cross-sections of the IVZ



Proposed Drilling Sites of DIVE Project

After Brack et al. (2010)



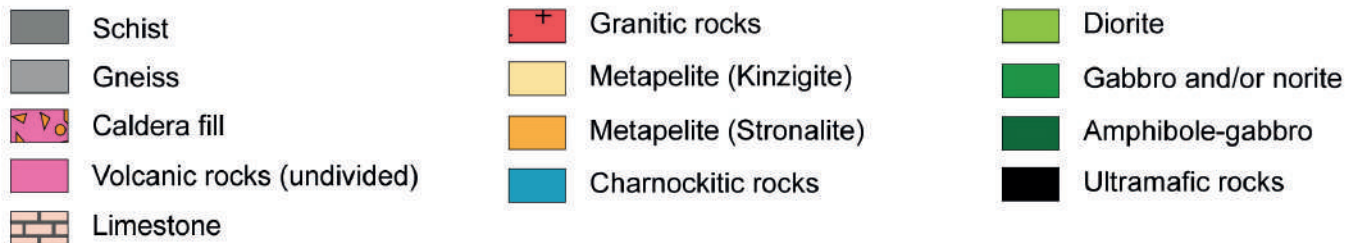
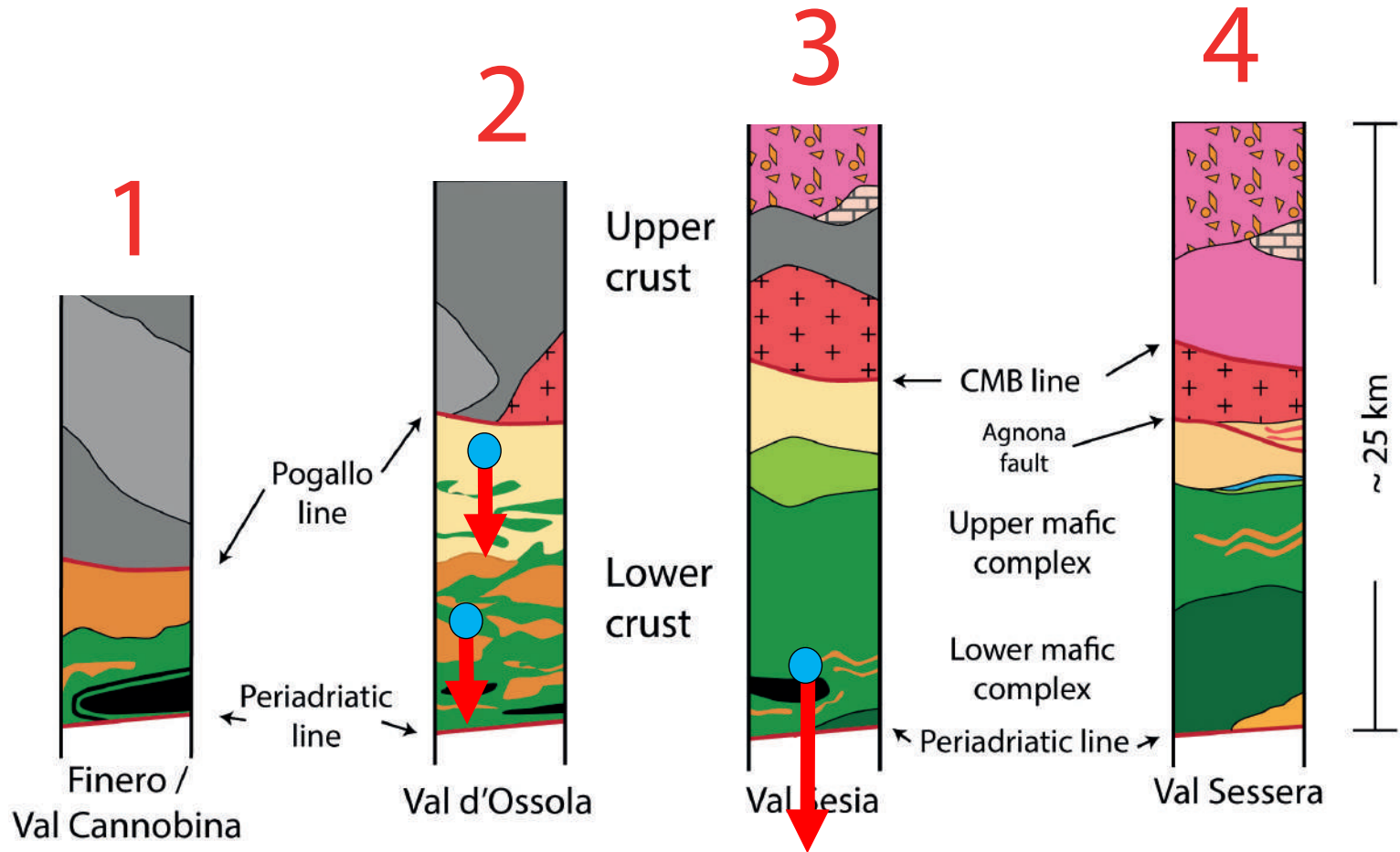
- Proposed Drilling Sites
- ① Permian transcrustal igneous section
- ② pre-Permian metasedimentary section

DIVE



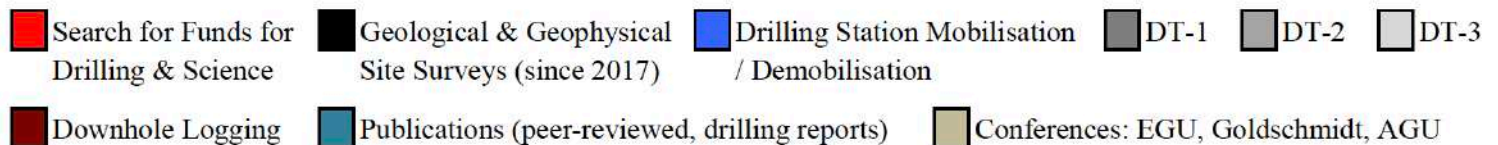
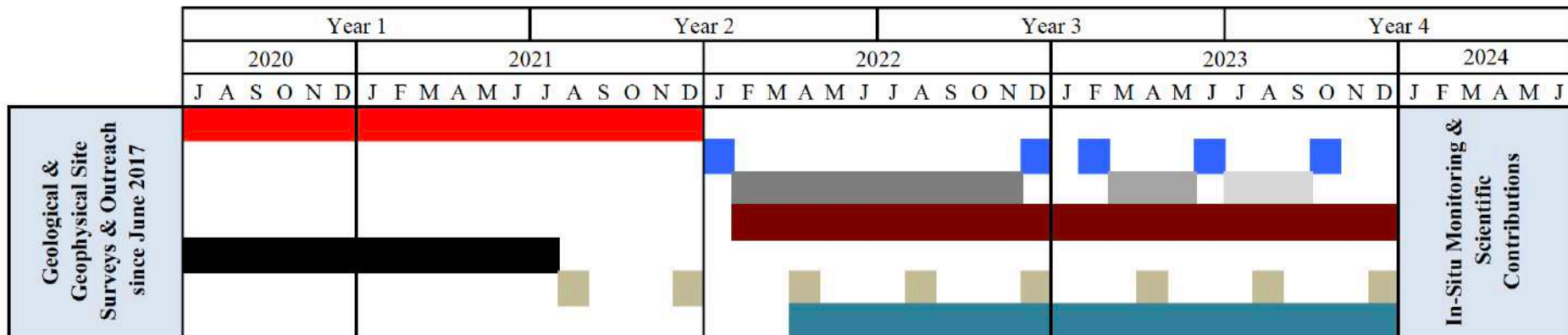
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Cross-sections of the IVZ: Drilling Plan



Next Steps

- Deep (up to 5-km depth) geophysical site survey (PI: Michael Weber, GFZ-Potsdam): SEismic imaging of the Ivrea Zone (SEIZE) proposal, submitted to DFG in August 2019
Geophysical Campaign in Summer 2020 (if decision is positive in March 2020)
- Ongoing gravity survey and seismo-experiment (Matteo Scarponi & György Hetényi)
- Involvement of local communities and representatives of National Parks / Geoparks
- Submission of the full DIVE Proposal in January 15th 2020



More infos about DIVE

Visit:

<http://www.icdp-online.org/projects/world/europe/ivrea/>

Contact the PIs:

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**Report on the ICDP workshop DIVE (Drilling the
Ivrea–Verbano zone)**

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