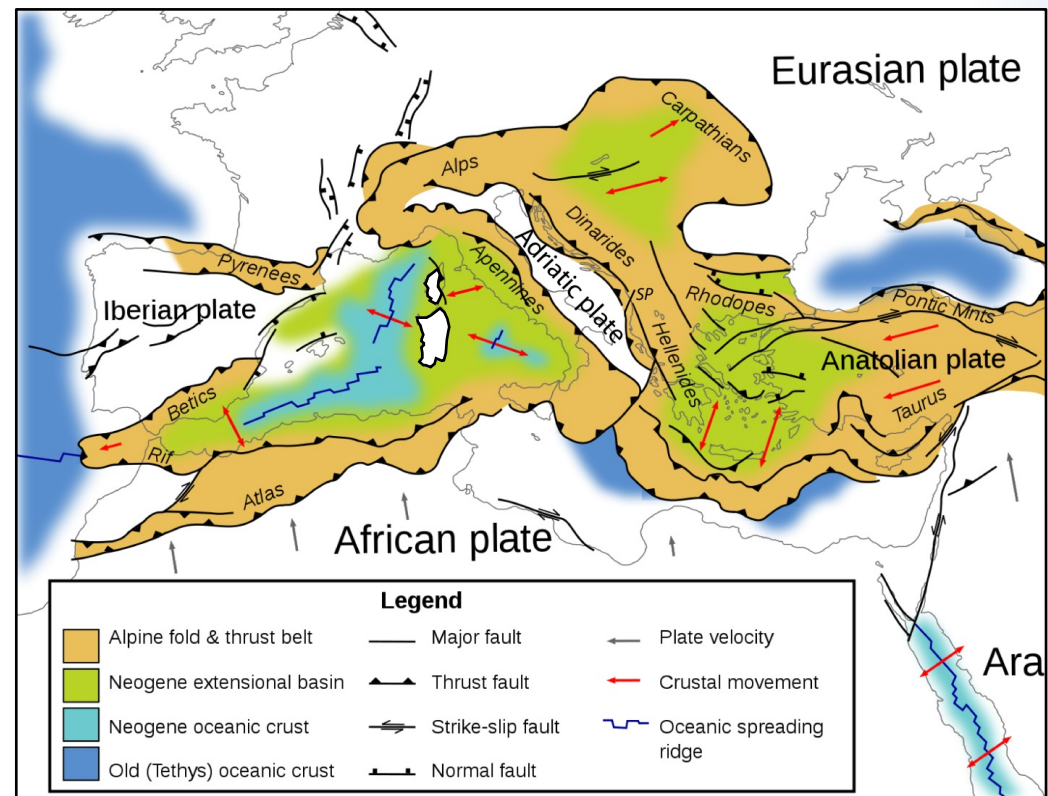


Kinematic reconstructions of the Western Mediterranean area since Triassic time: possible scenarios and their implications for the Apennines

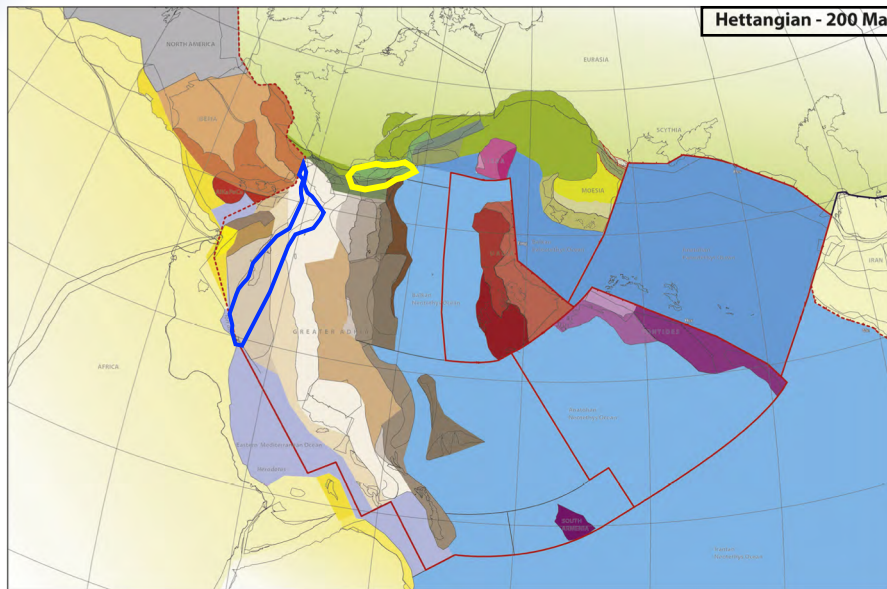
Eline Le Breton, Freie Universität Berlin

eline.lebreton@fu-berlin.de

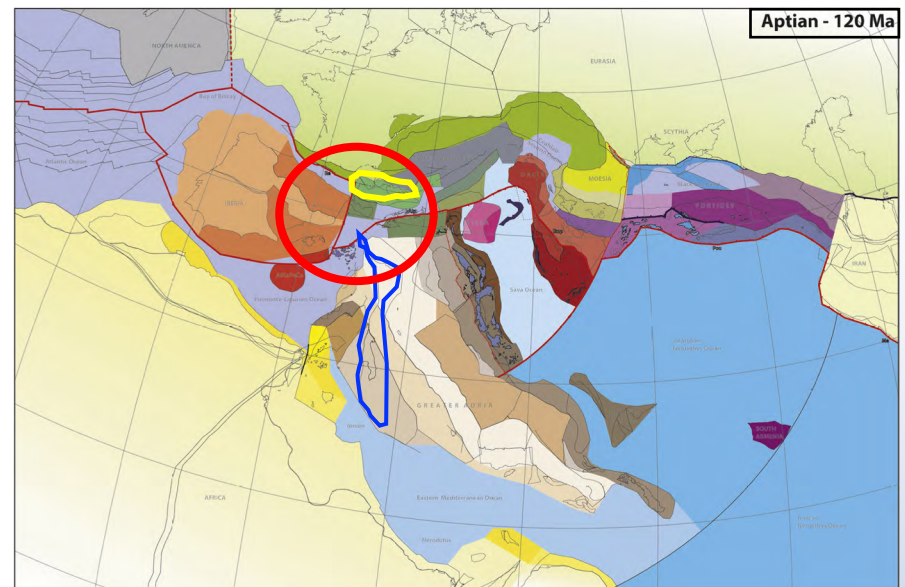
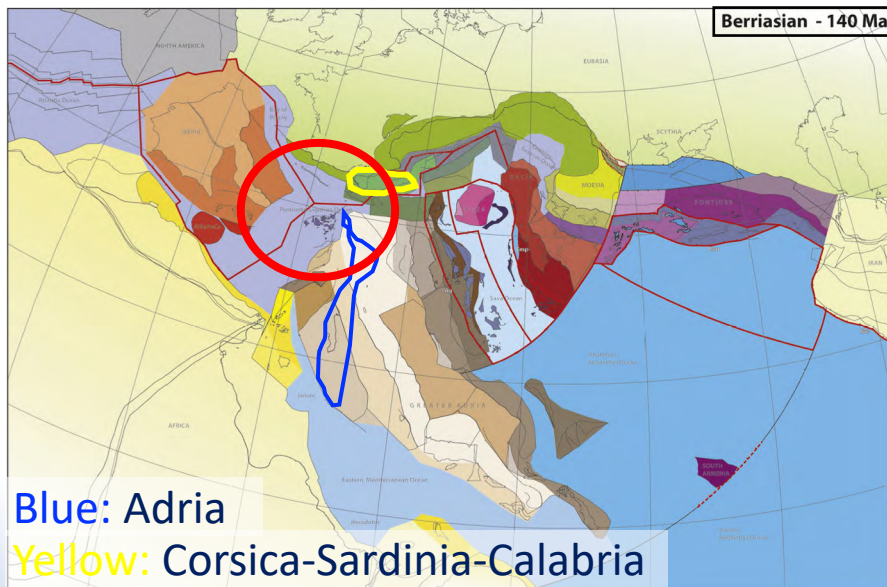
- Comparison of two recent kinematic scenarios for Alpine-Mediterranean back to 200 Ma
- Where lie the main differences?
- Why those differences?
 - ⇒ Depends on past motions of key players: **Iberia, Adria, Corsica-Sardinia**
- Ways to look forward and possibly reconcile different datasets?
- Focus on the Apennines

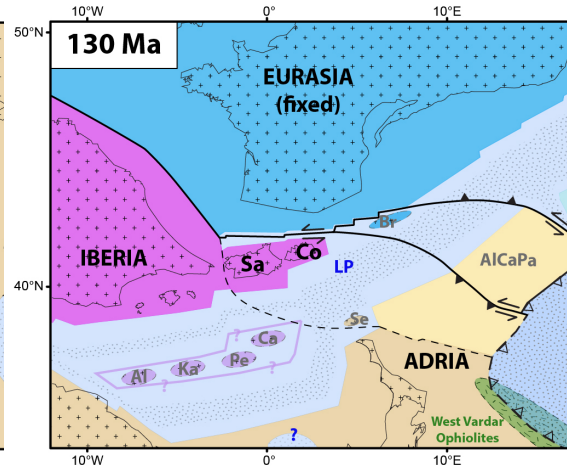
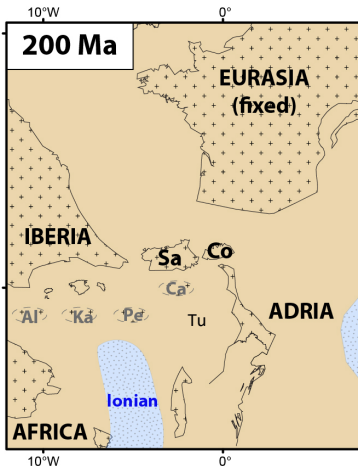


© Woudloper, wikipedia

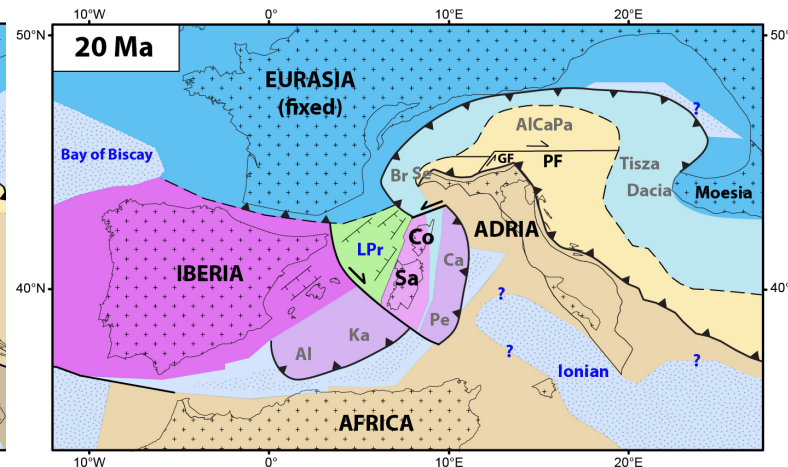
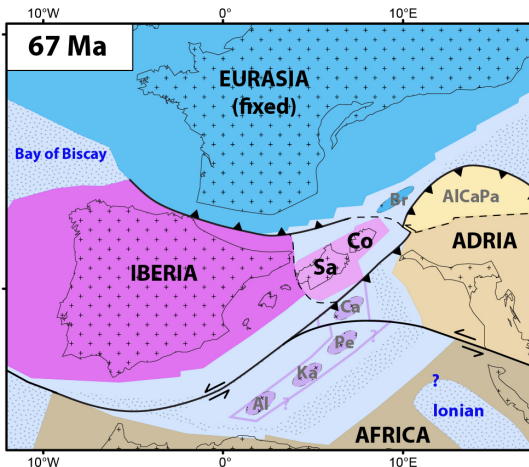


- Fits paleomagnetic data of entire Mediterranean area
- Implies convergence between NE Iberia and southern Sardinia (c. 500 km) and closure of Liguro-Piemont (LP) Ocean in the Pyrenees and in the N. Apennines in Lower Cretaceous (140-120 Ma, red circle)
- Implies a paleogeographic separation of Sardinia-Calabria (in yellow) and Tuscany (in blue) in Trias/Permian time





- Paleogeographic continuity between Sardinia (Sa), Calabria (Ca) and Tuscany (Tu) in Trias/Permian time (see also Molli et al., abstract [EGU2020-1341](#))
- Opening of LP Ocean fits geological record (ages of syn-rift sediments, rift-related fault activity, mafic rocks – see also abstract [EGU2020-11228](#))
- Closure of LP Ocean in Late Cretaceous-Cenozoic time which fits age of flysch deposits



- Implies significant strike-slip motion between Europe and Iberia-Sardinia (in total c. 600 km, North Pyrenean Fault) and within Adria (c. 200 km, Mid Adriatic Ridge)

Link to gplates files and animations:

https://www.earthbyte.org/webdav/ftp/Data_Collections/Muller_et_al_2019_Tectonics/

The main differences lie in the reconstruction of Iberia and Sardinia-Corsica in **Mesozoic time**:

- ⇒ Debate on interpretation of magnetic anomalies in the North Atlantic, paleomagnetic data onshore Iberia and geological evolution of the Pyrenees (for example see: Neres et al., 2013; Barnett-Moore et al. 2016, comment & reply; Nirrengarten et al. 2016, ...) and in Sardinia (part of Europe or Iberia?)
- ⇒ Depending on the motion of Iberia and Sardinia-Corsica, Adria is a single plate or split into two plates.

Way to look forward and potentially reconcile different datasets?

- ⇒ Better constrain intraplate deformation within Iberia and within Adria (Mid-Adriatic Ridge)
- ⇒ Better constrain the opening of the Liguro-Provençal Basin which may explain the rotation of Sardinia? -> Work in progress within the AlpArray/4DMB project using new geophysical survey (LOBSTER, <http://www.spp-mountainbuilding.de>)

- Barnett-Moore, N., Hosseinpour, M., Maus, S., 2016. Assessing discrepancies between previous plate kinematic models of Mesozoic Iberia and their constraints. *Tectonics*, 35 (8), 1843-1862.
<https://doi.org/10.1002/2015TC004019>
- Comment from Van Hinsbergen, D.J.J., Spakman, W., Vissers, R.L.M., van der Meer, D.G., 2017,
<https://doi.org/10.1002/2016TC004418>
- Reply to comment from Barnett-Moore, N., Font, E., Neres, M. 2017, <https://doi.org/10.1002/2017TC004760>
- Müller R.D., S. Zahirovic, S.E. Williams, J. Cannon, M. Seton, D.J. Bower, M.G. Tetley, C. Heine, E. Le Breton, S. Liu, S.H.J. Russel, T. Yang, J. Leonard & M. Gurnis, 2019. A Global Plate Model Including Lithospheric Deformation Along Major Rifts and Orogens Since the Triassic. *Tectonics*, 38, 1884-1907,
<https://doi.org/10.1029/2018TC005462>
- Neres, M., Miranda, J.M., Font, E., 2013. Testing Iberian kinematics at Jurassic-Cretaceous times. *Tectonics*, 32 (5), 1312-1319. <https://doi.org/10.1002/tect.20074>
- Nirrengarten, M, Manatschal, G., Tugend, J., Kusznir, N., Sauter, D., 2016. Nature and origin of the J-magnetic anomaly offshore Iberia-Newfoundland: Implications for plate reconstructions. *Terra Nova*, 29,
<https://doi.org/10.1111/ter.12240>
- Van Hinsbergen, D.J.J., Torsvik, T.H., Schmid, S.M., Matenco, L.C., Maffione M., Vissers R.L.M., Gürer, D., Spakman, W., 2019. Orogenic architecture of the Mediterranean region and kinematic reconstruction of its tectonic evolution since the Triassic. *Gondwana Research*, 81, 79-229.
<https://doi.org/10.1016/j.gr.2019.07.009>

Interested in the opening of the Liguro-Piemont Ocean? -> [EGU2020-11228](#)

Interested in geodynamic modelling of the Alpine-Mediterranean area? -> [EGU2020-11134](#)

Questions/Comments?: eline.lebreton@fu-berlin.de