

Earthquake Cycle Deformation along the East Anatolian Fault: Implications from 2023 Seismic Sequence Rupture, Fault Slip Behaviour and Historical Seismicity.

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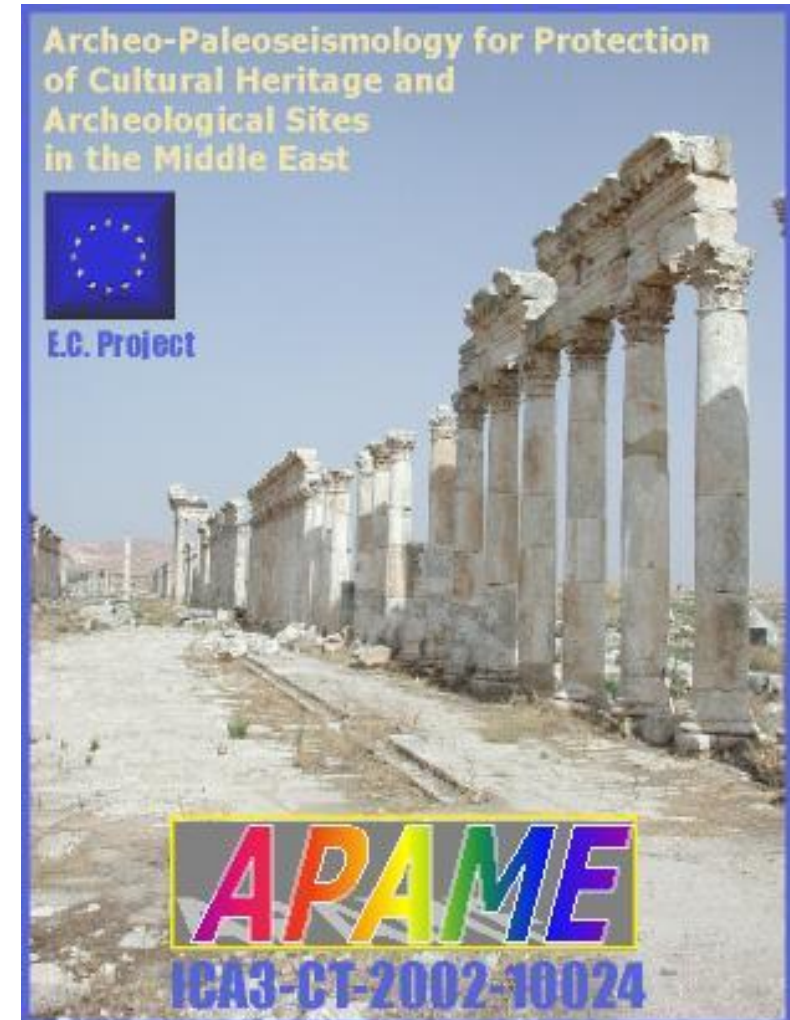
EUROPEAN PROJECT (2003 – 2007) APAME

Coordinator : Mustapha Meghraoui

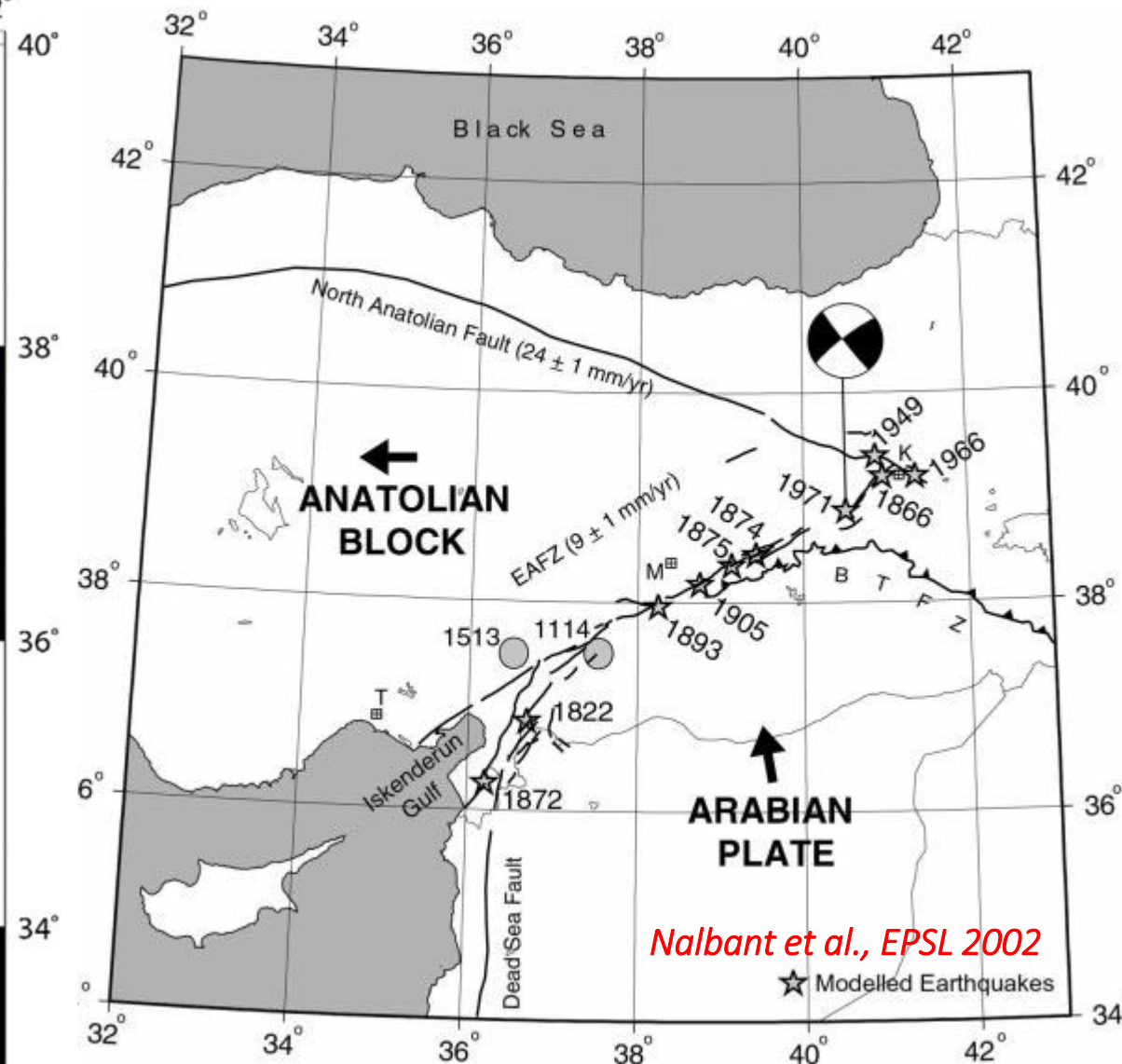
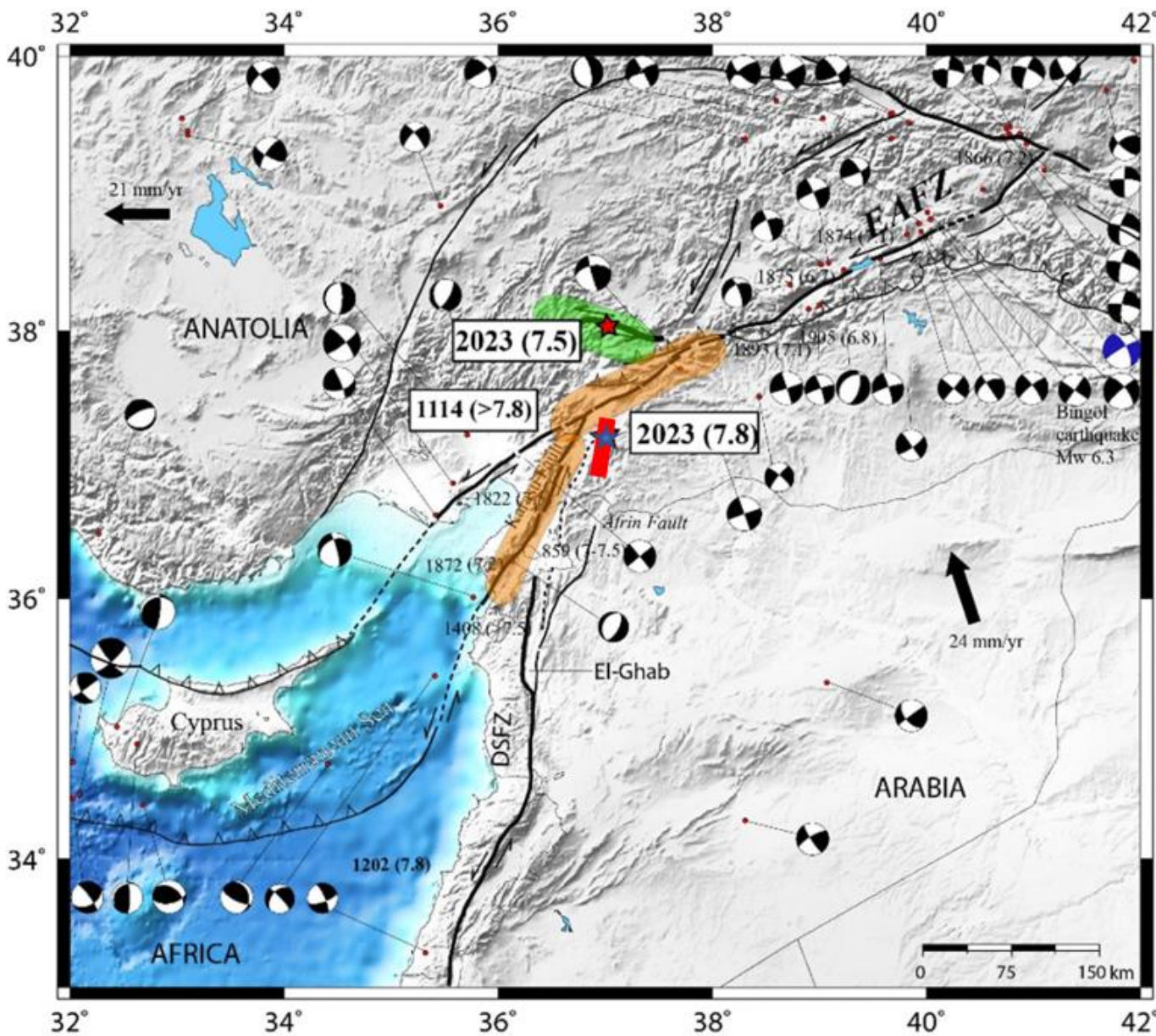
<https://cordis.europa.eu/project/id/ICA3-CT-2002-10024>

Archeoseismology and PAleoseismology for the protection of
cultural heritage and archaeological sites in the Middle East
(Jordan, Lebanon, Syria and Turkey)

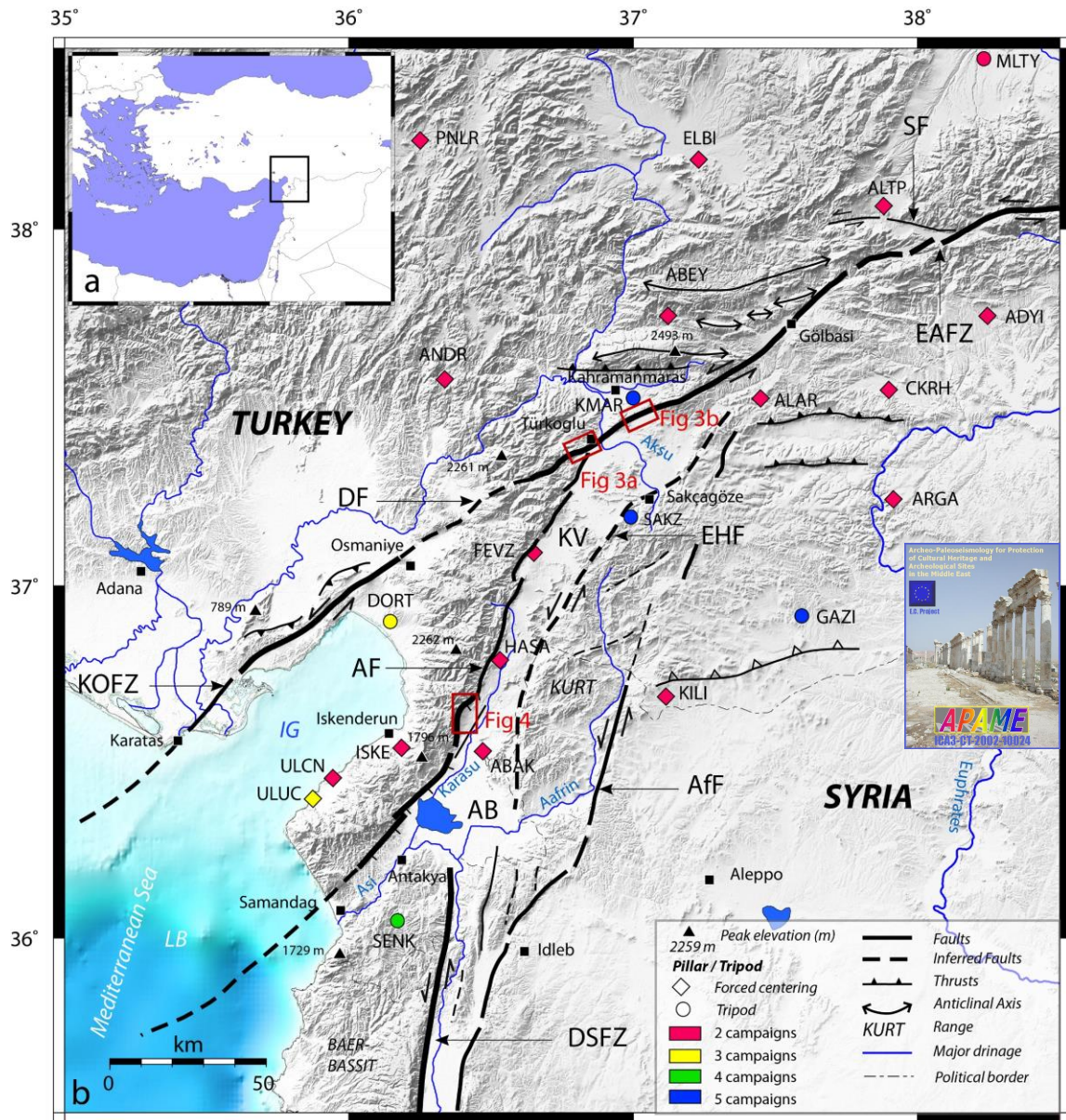
Implications for the Seismic Hazard Assessment



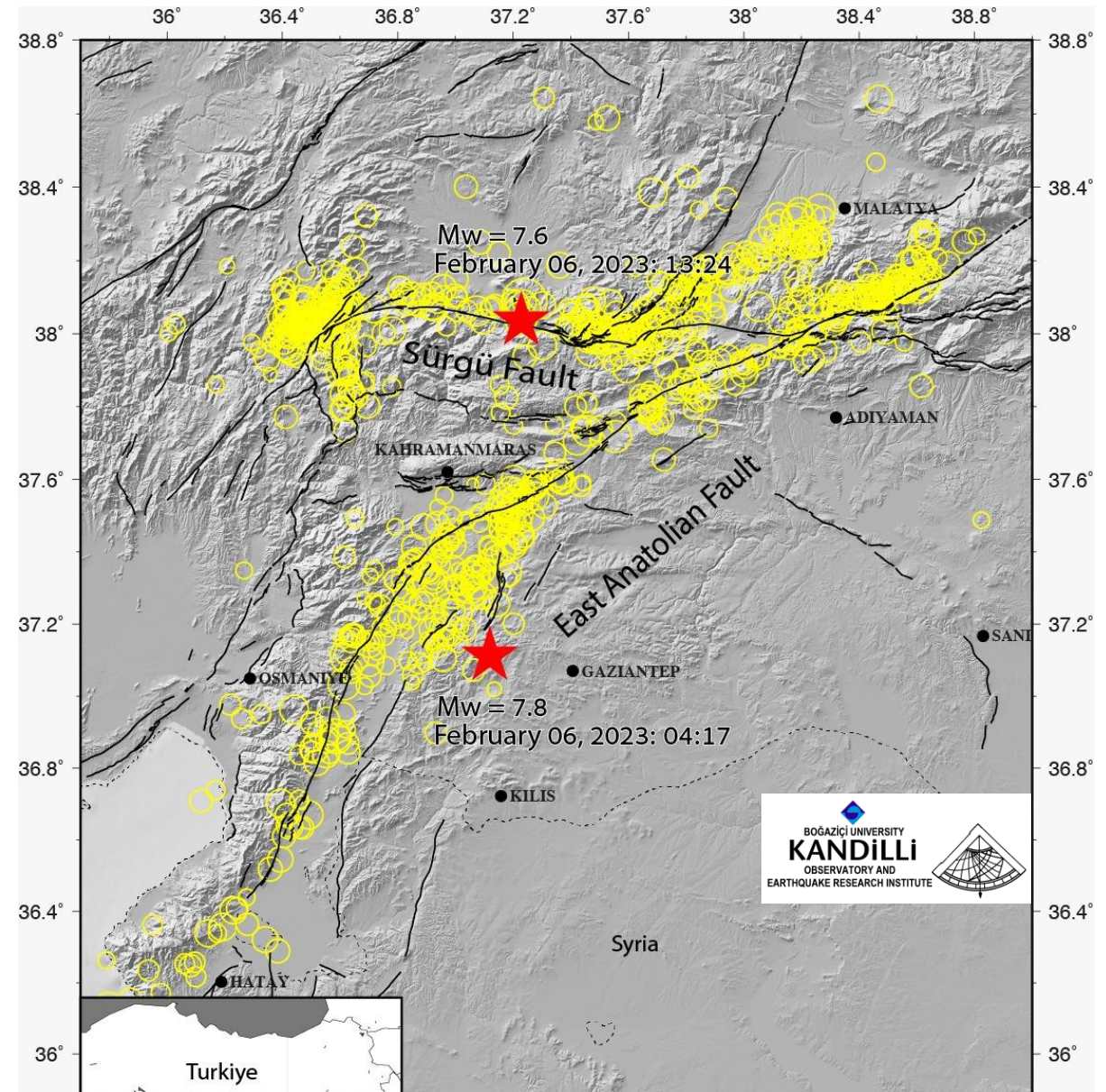
The East Anatolian Fault & Triple Junction



The 2023 Earthquake Sequence



Meghraoui et al., APAME Final Report, 2007

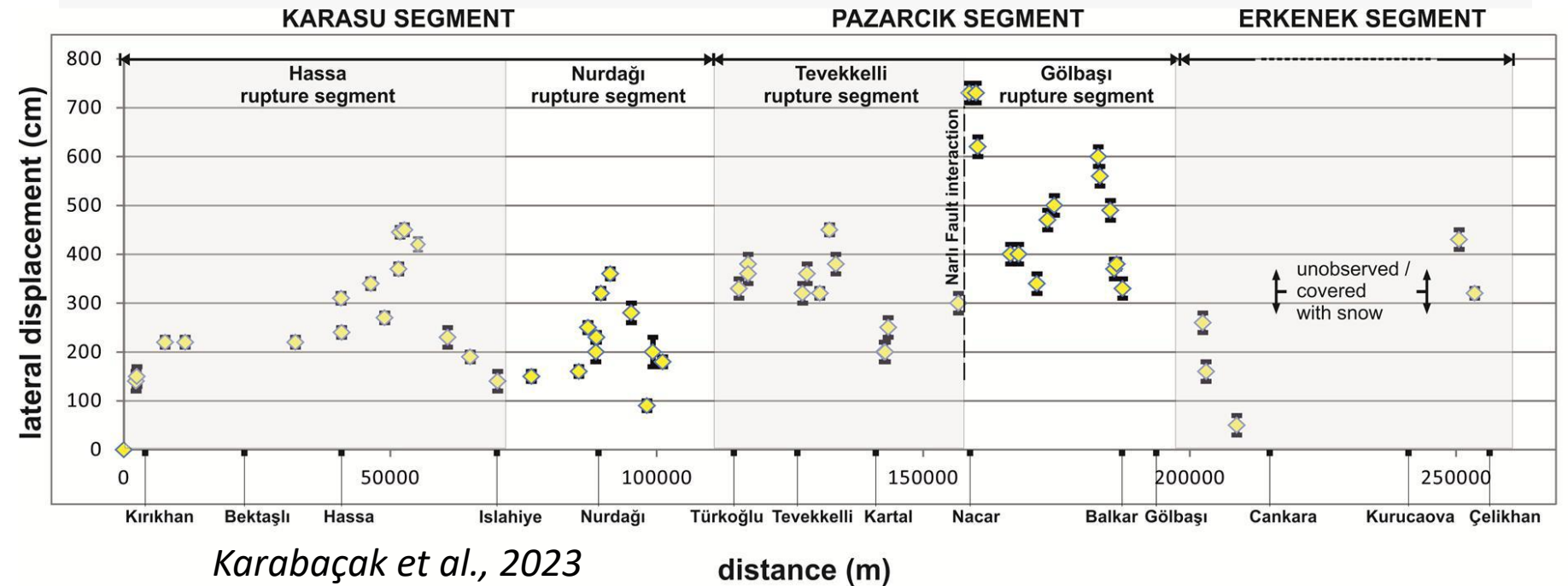
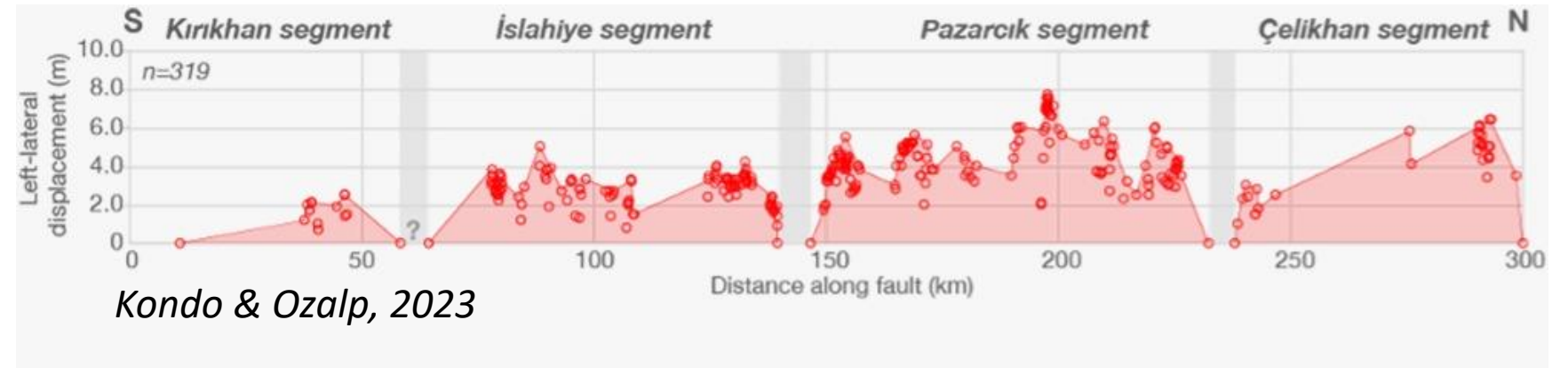




- 2023 SURFACE FAULTING
- ~ 350 km
- Mw 7.8



Coseismic slip distribution (Mw 7.8)



East Anatolian Fault Exposure

(northern branch, positive flower structure)

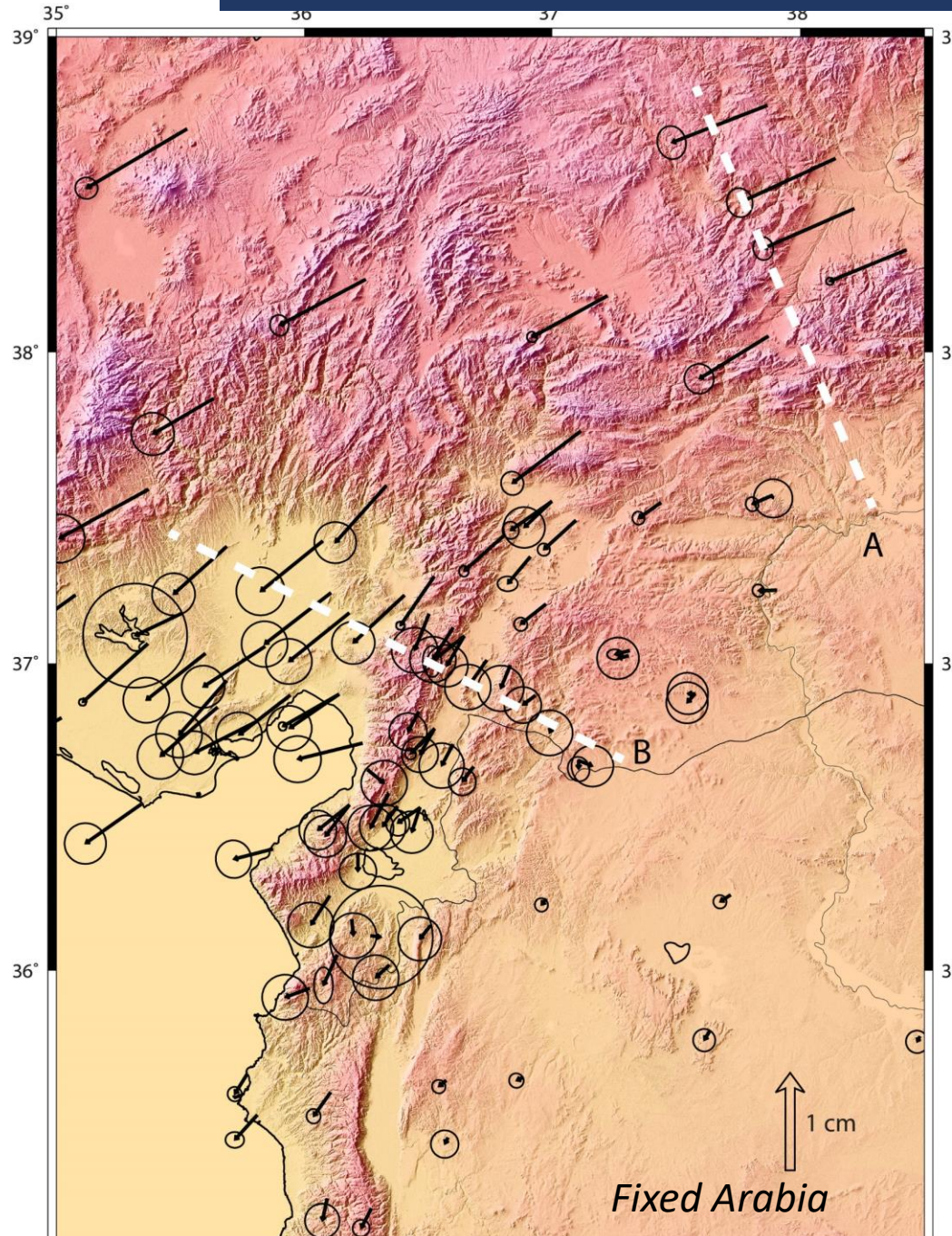
2007



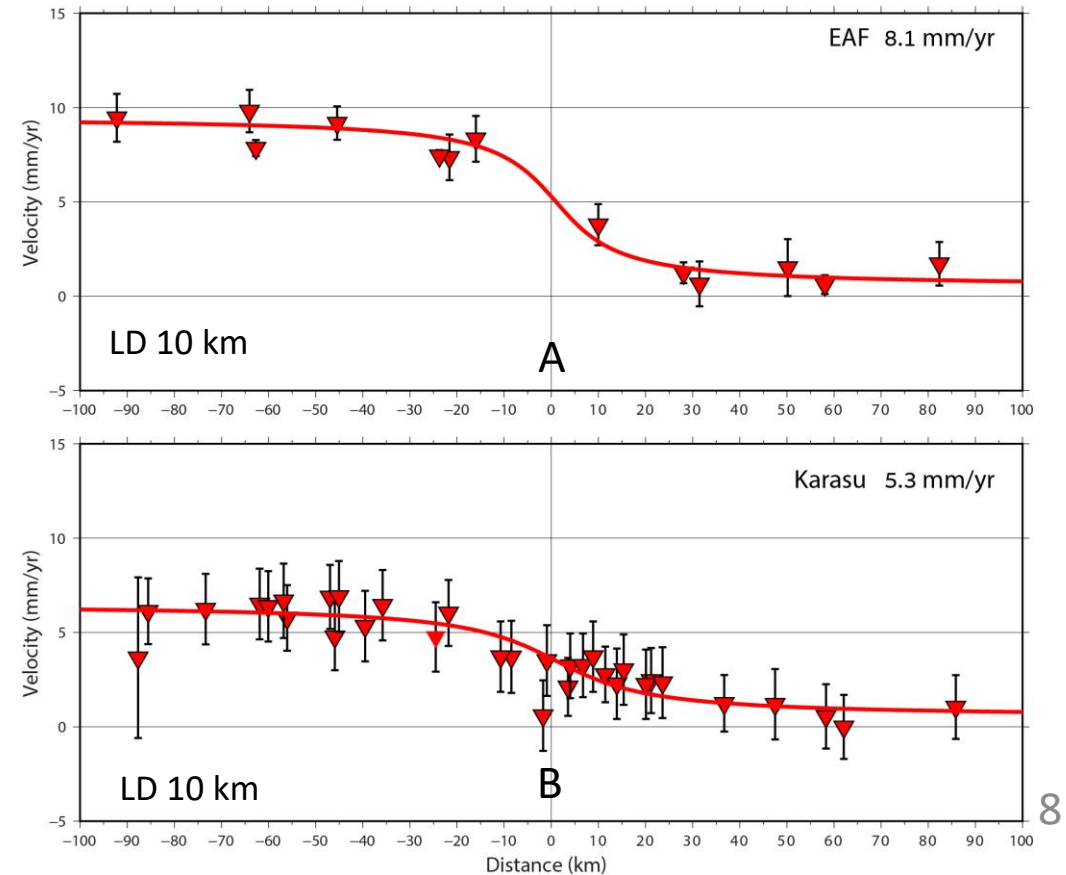
2023



CRUSTAL DEFORMATION



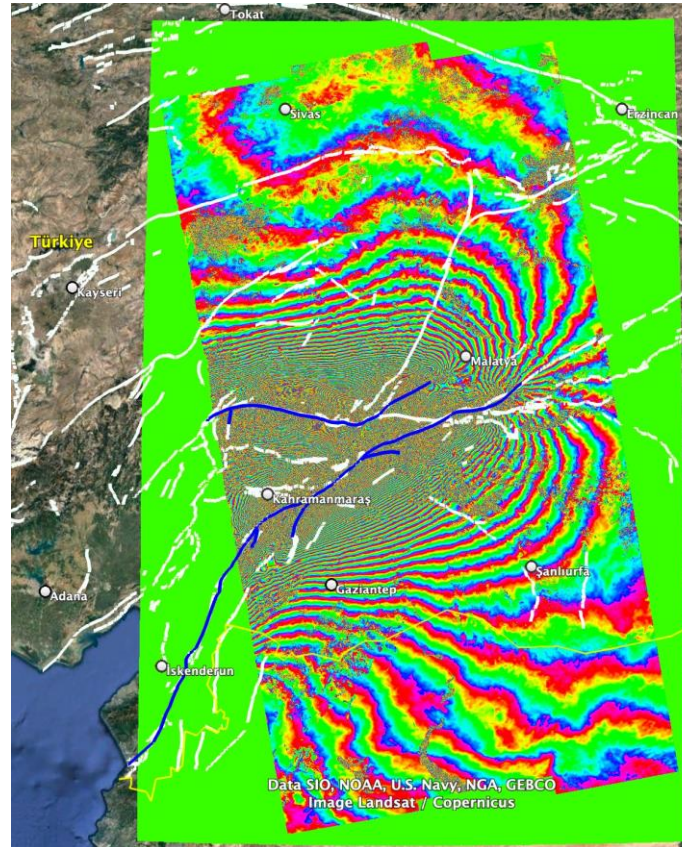
- GPS records of active deformation
- Reilinger et al., 2006 (from 2002)
 - TUTGA sites (2002 – 2020)
 - Campaign network 2009-2010-2011-2019
Özkan et al., Tectonophysics 2023



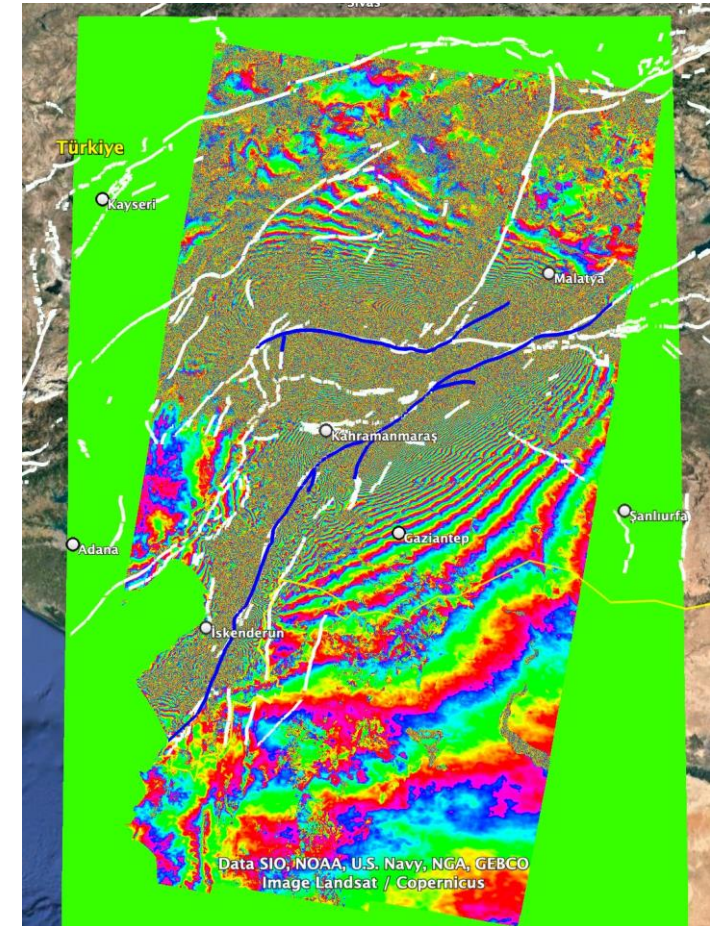
InSAR

- Observed and modeled coseismic Sentinel 1A interferograms (Cakir et al., in preparation)

Ascending



Descending



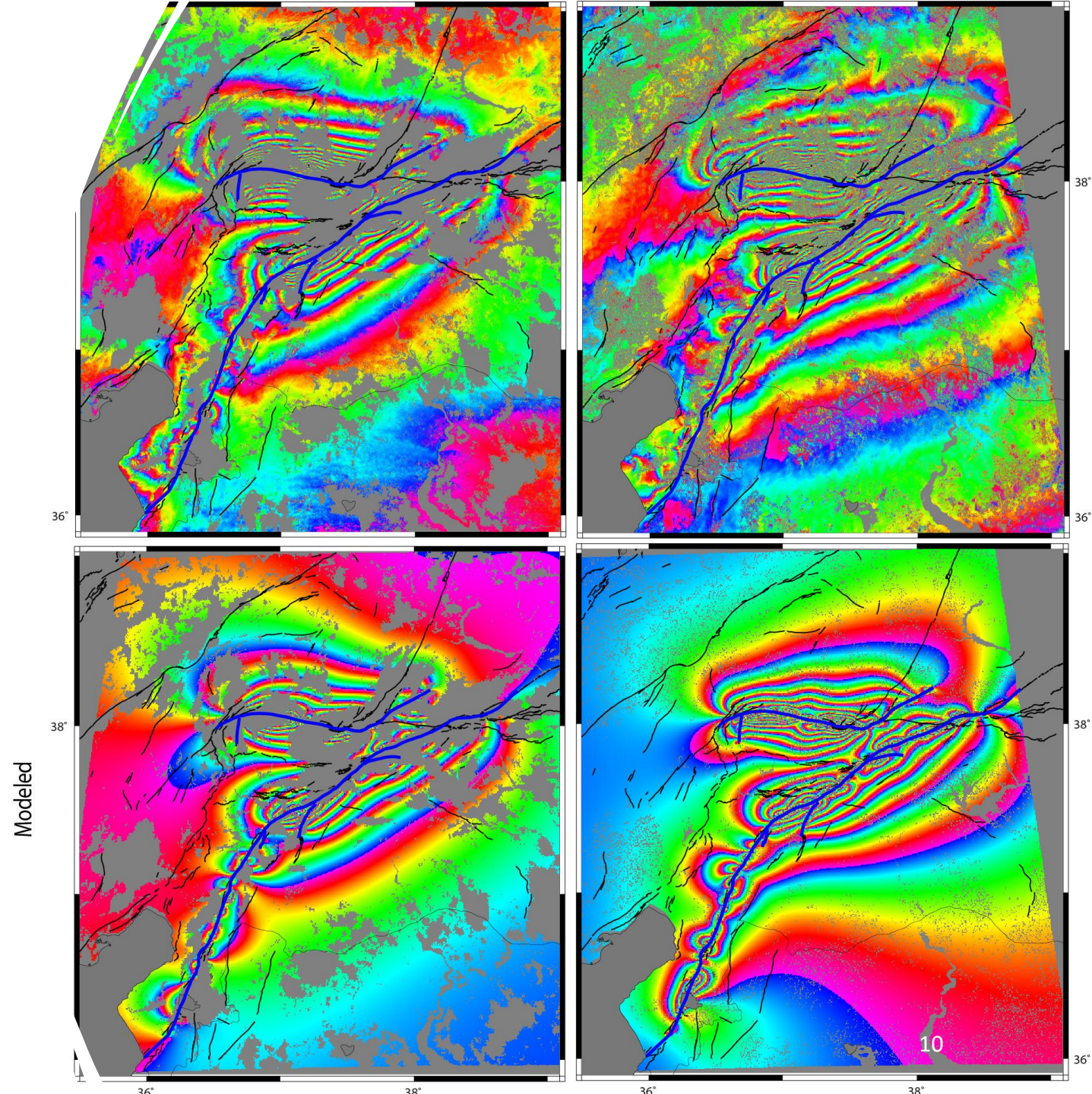
Fringe 2023

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InSAR

- Observed and modeled coseismic ALOS ScanSAR interferograms (Cakir et al., in preparation)



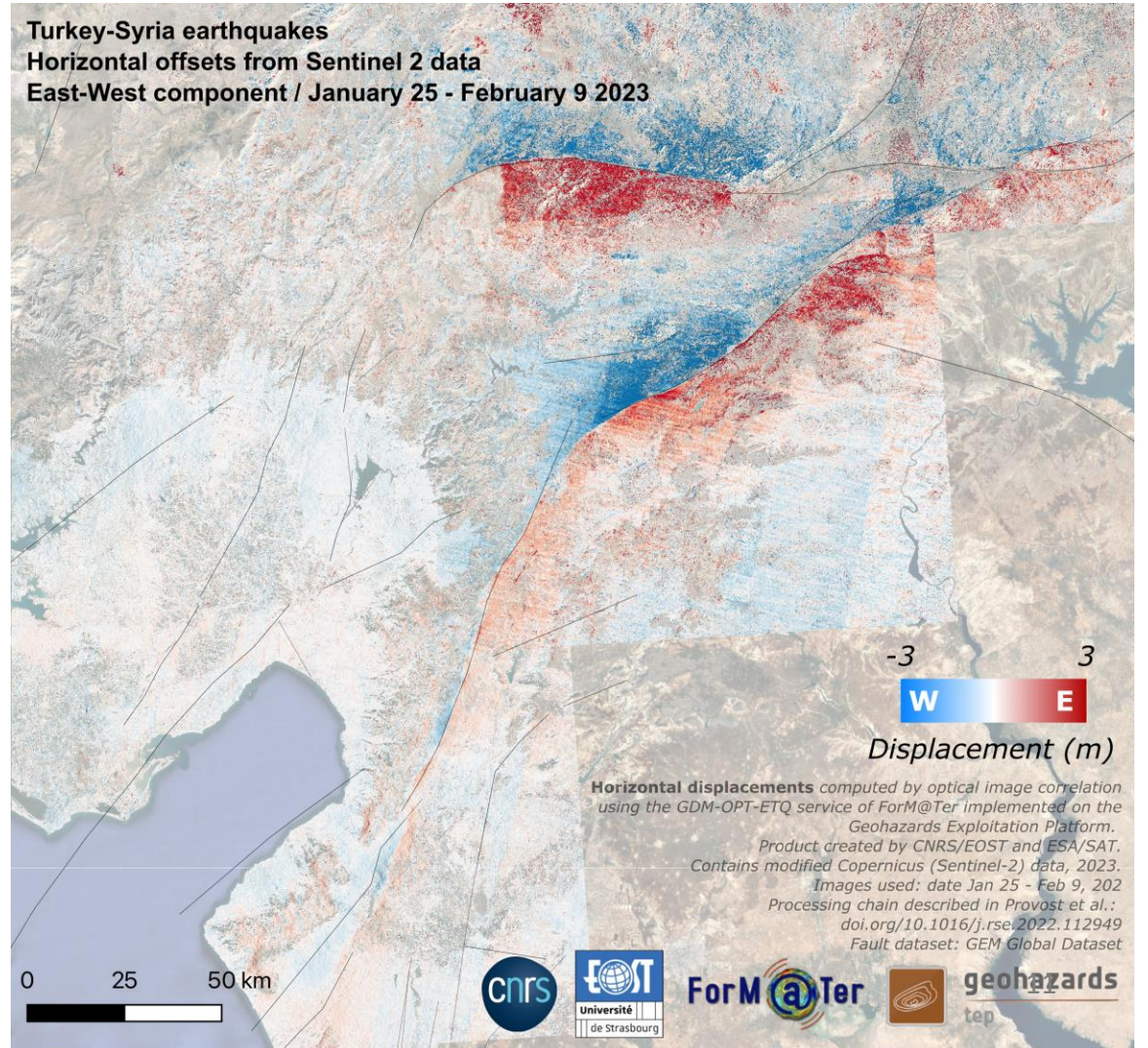
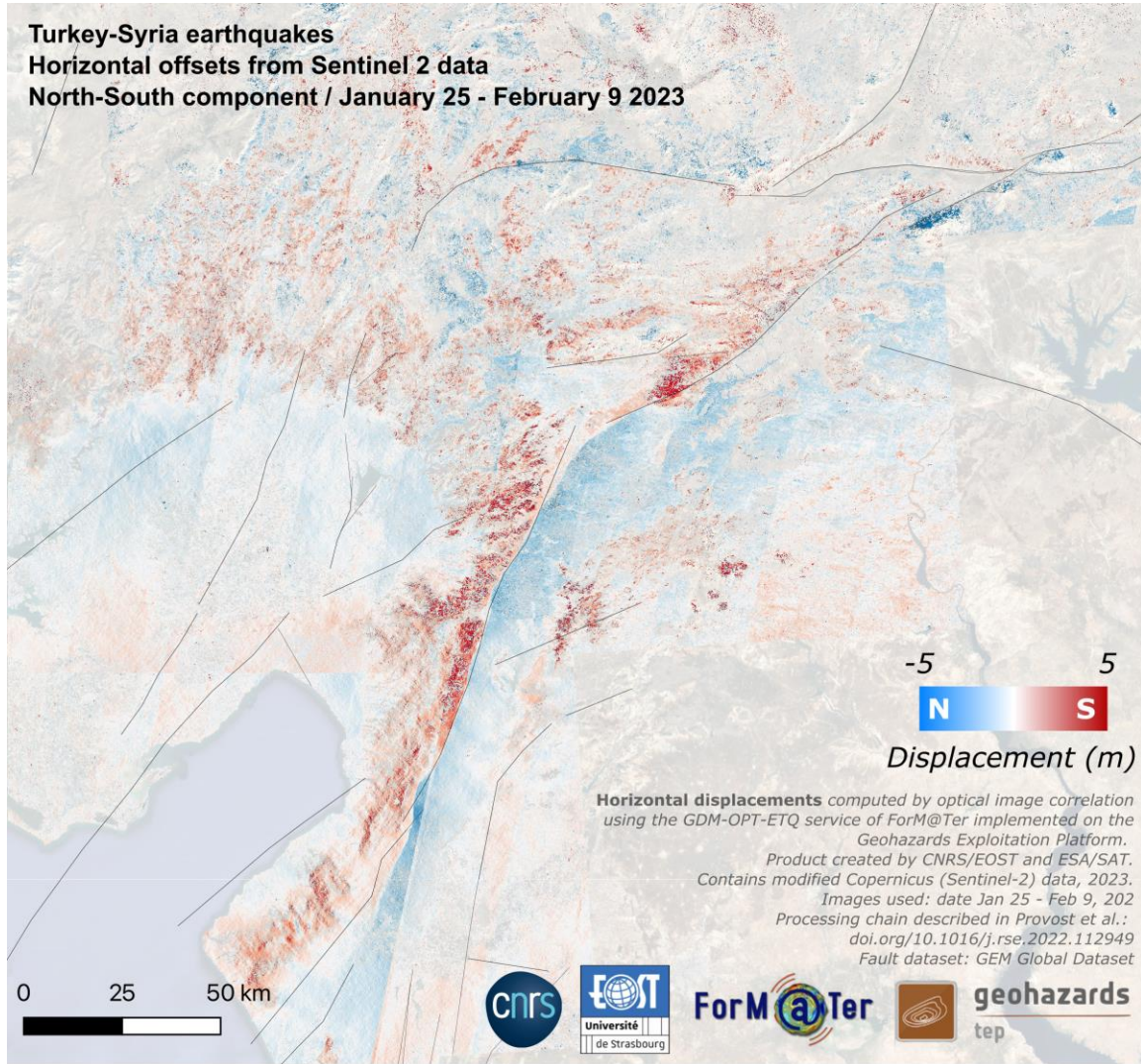
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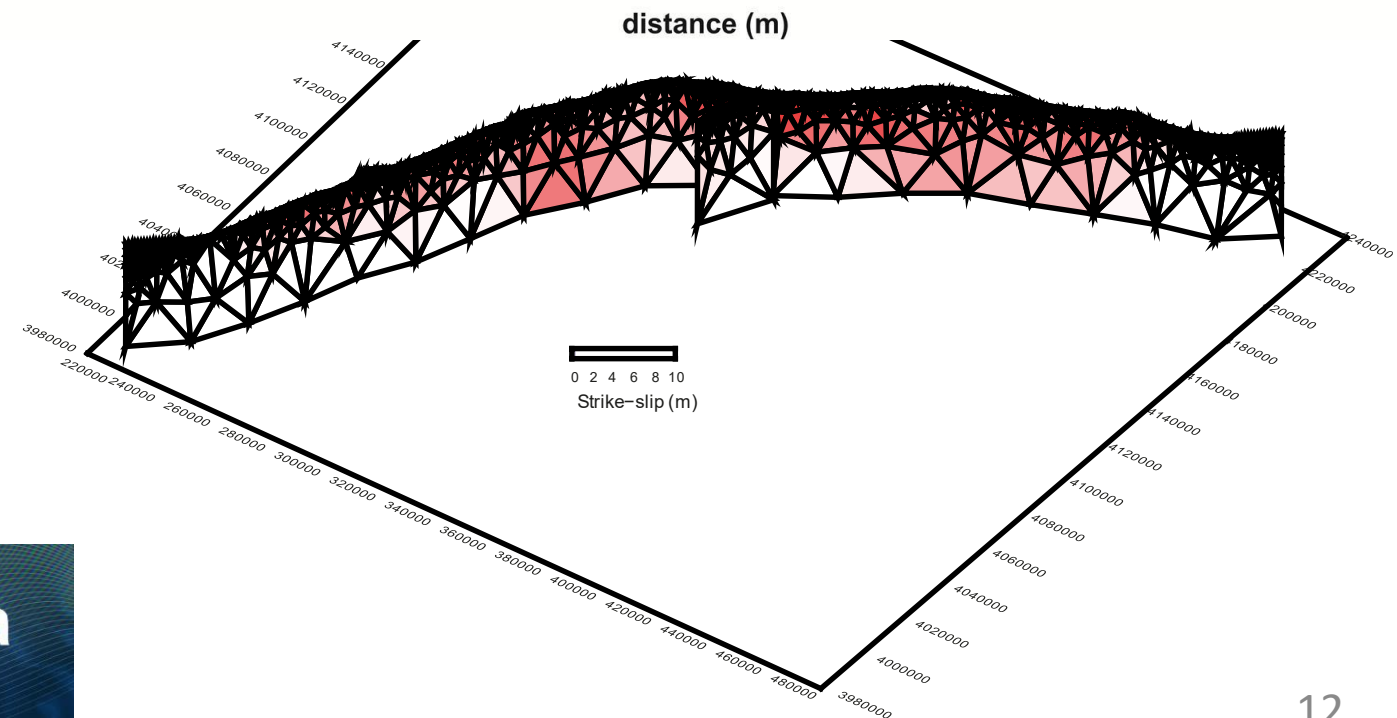
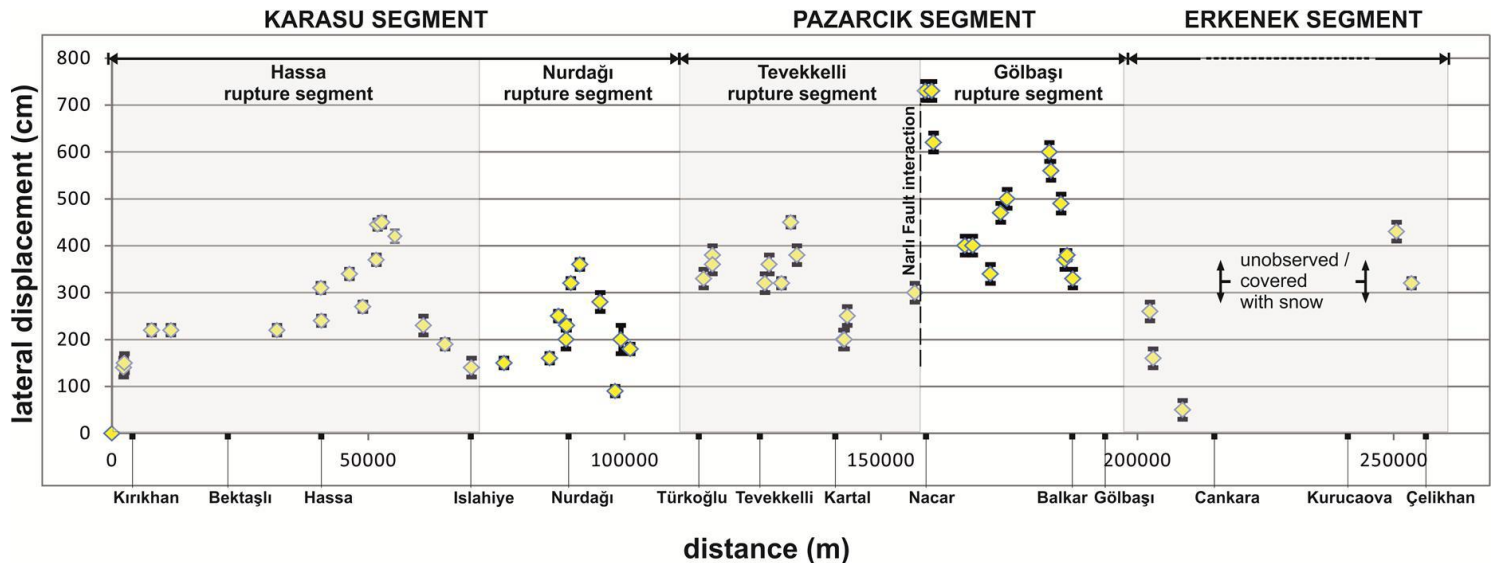
Image Correlation

Image correlation from Sentinel 2 (Provost et al., 2023)



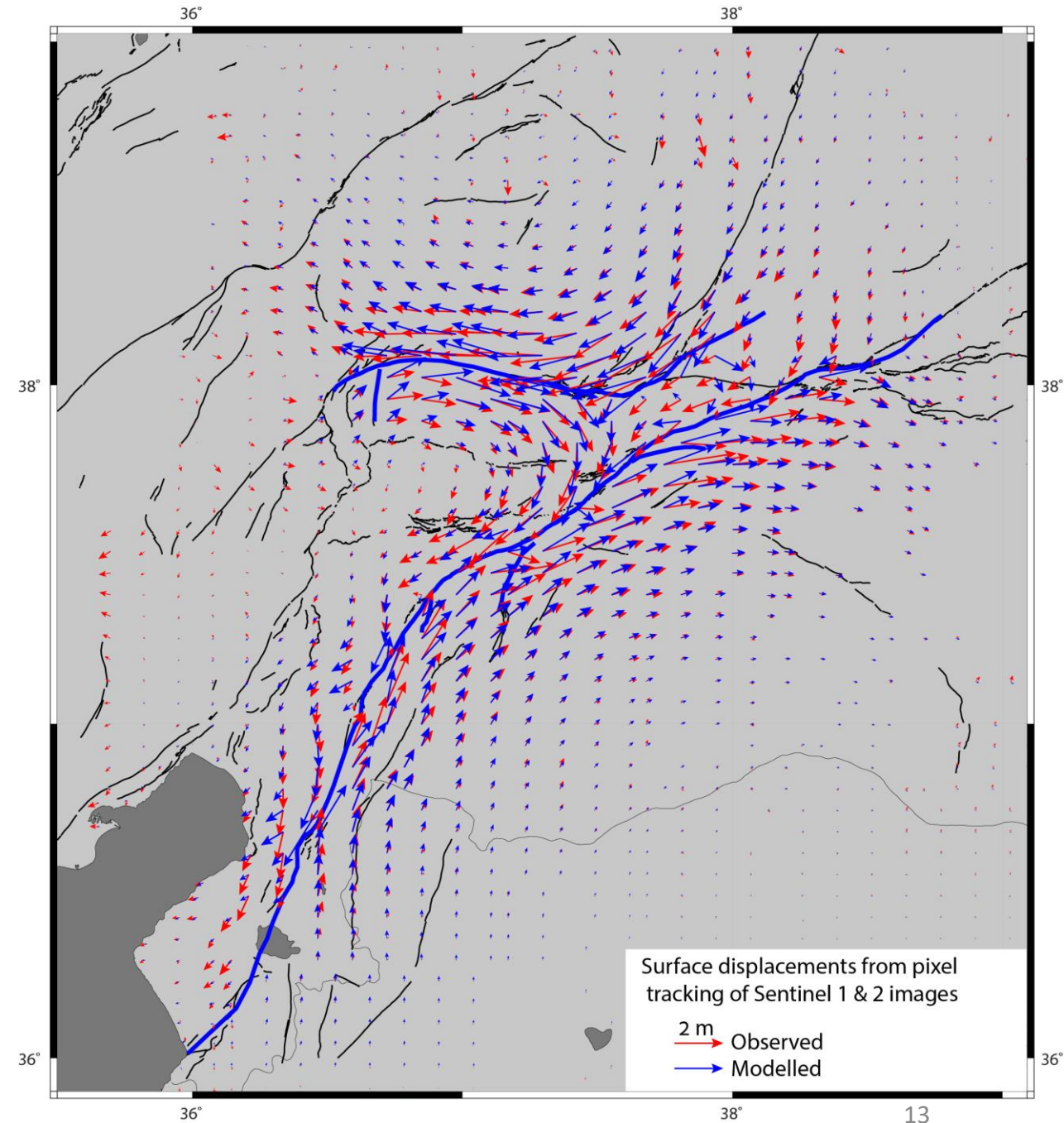
MODELLING (Mw 7.8)

Coseismic slip distribution inverted from InSAR and pixel offset measurements



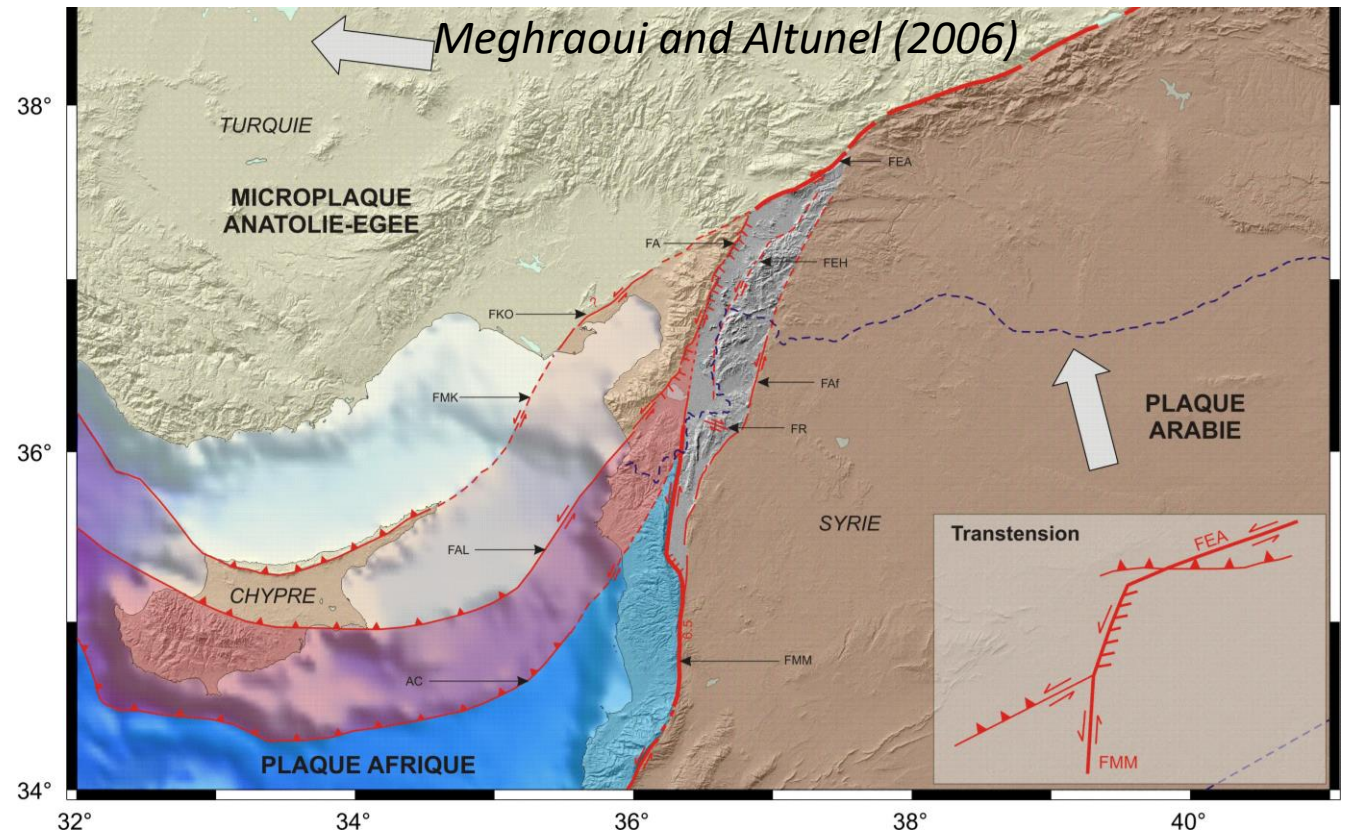
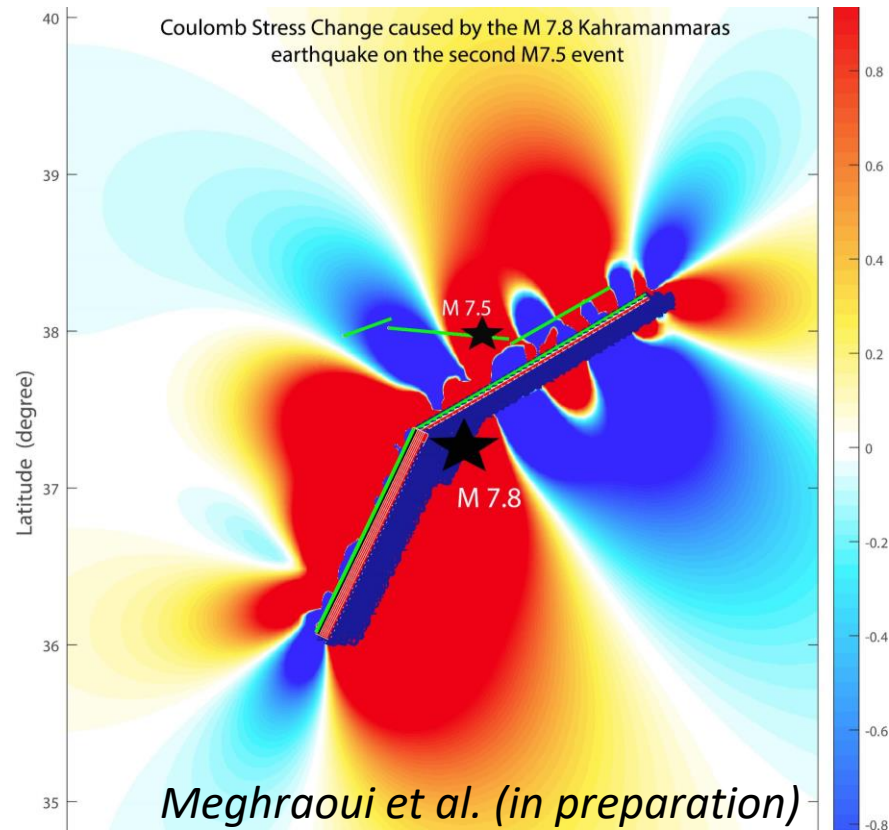
MODELLING

- Surface slip distribution obtained from InSAR and optical image correlation (Qu et al., 2023) and field measurements (Karabaçak et al., 2023).



Tectonic Model Triple Junction

- Increase of failure stress
- Transpressive system
- Local transtension



Conclusive Remarks

- Surface faulting & fault rupture geometry
- Seismic strain accumulation since 1114
- GNSS and tectonic results of slip rate at ~ 8 mm/yr
- Contribution of InSAR (Sentinel – ALOS) & image correlation
- Earthquake ruptures / Seismic cycle / Stress change /

Earthquake forecast ?

Acknowledgements

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Thank you !

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Previous work

Cumulative Offset

Tectonic Geomorphology & DGPS

(Meghraoui et al., 2007)

