



Ministry of Science and Higher Education
Republic of Poland



JAGIELLONIAN UNIVERSITY
IN KRAKÓW



EUROPEAN SPACE AGENCY

Postseismic creep on secondary faults after large earthquakes

Fringe 2026 workshop, 18/6/2026



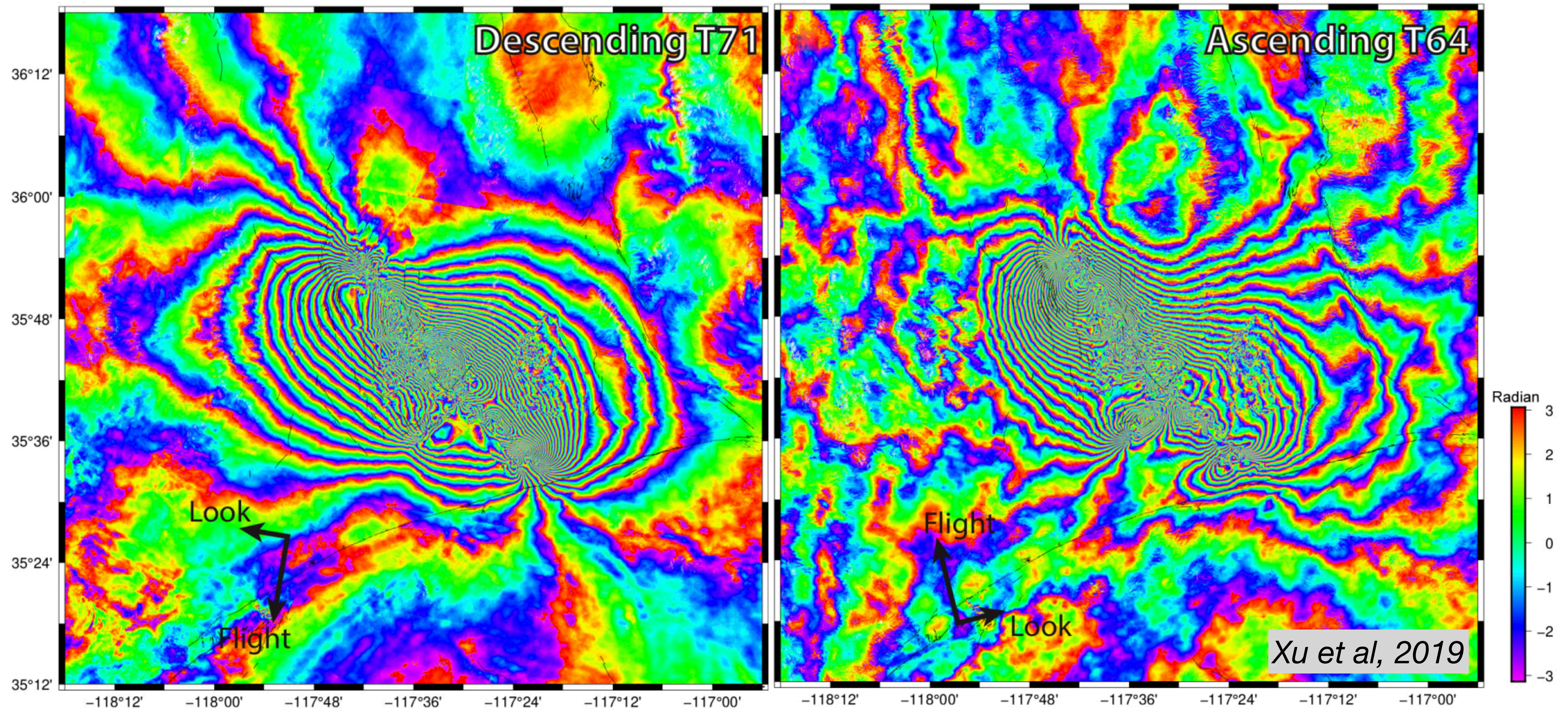
UNIVERSITÉ
PARIS
SCIENCES
& LETTRES



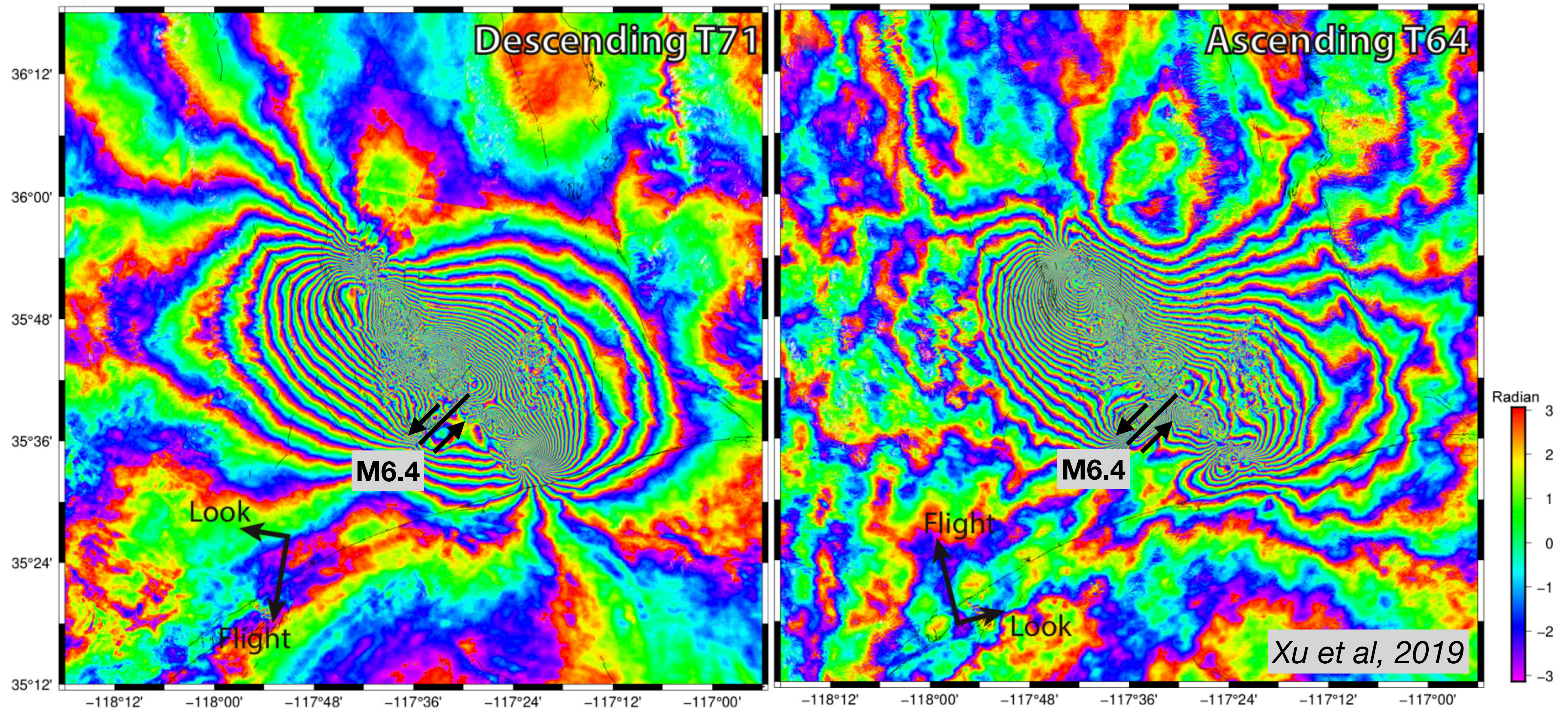
Paul Dérand, Romain Jolivet, Bryan Rimbault, Manon Dalaison, James Hollingsworth, Emilie Klein, Yo Fukushima, Yağızalp Okur, Marion Thomas, Emile Denise, Cécile Lasserre, Marie-Pierre Doin, Philippe Durand, FLATSIM team

Contact: derand@geologie.ens.fr

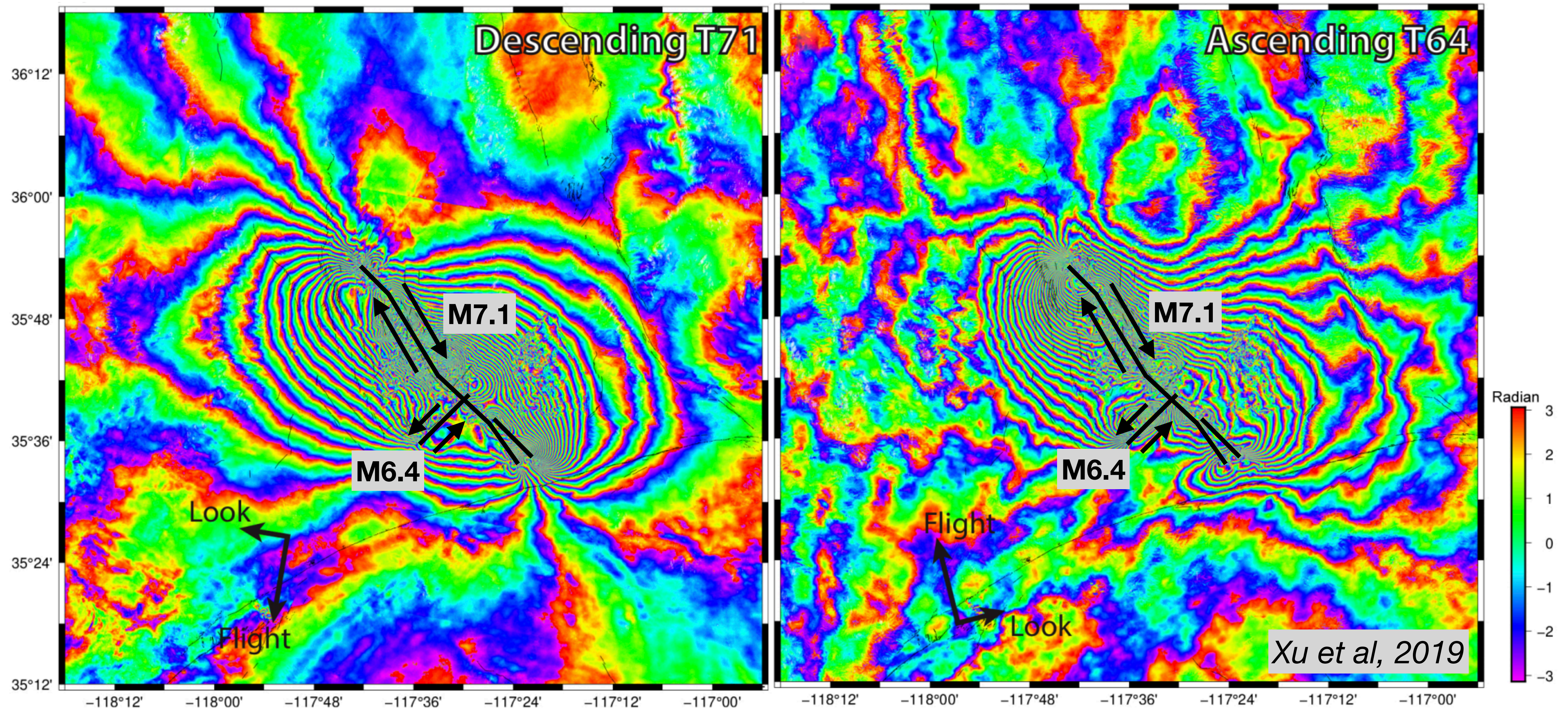
Coseismic interferograms of the 2019 Ridgecrest earthquakes (California)



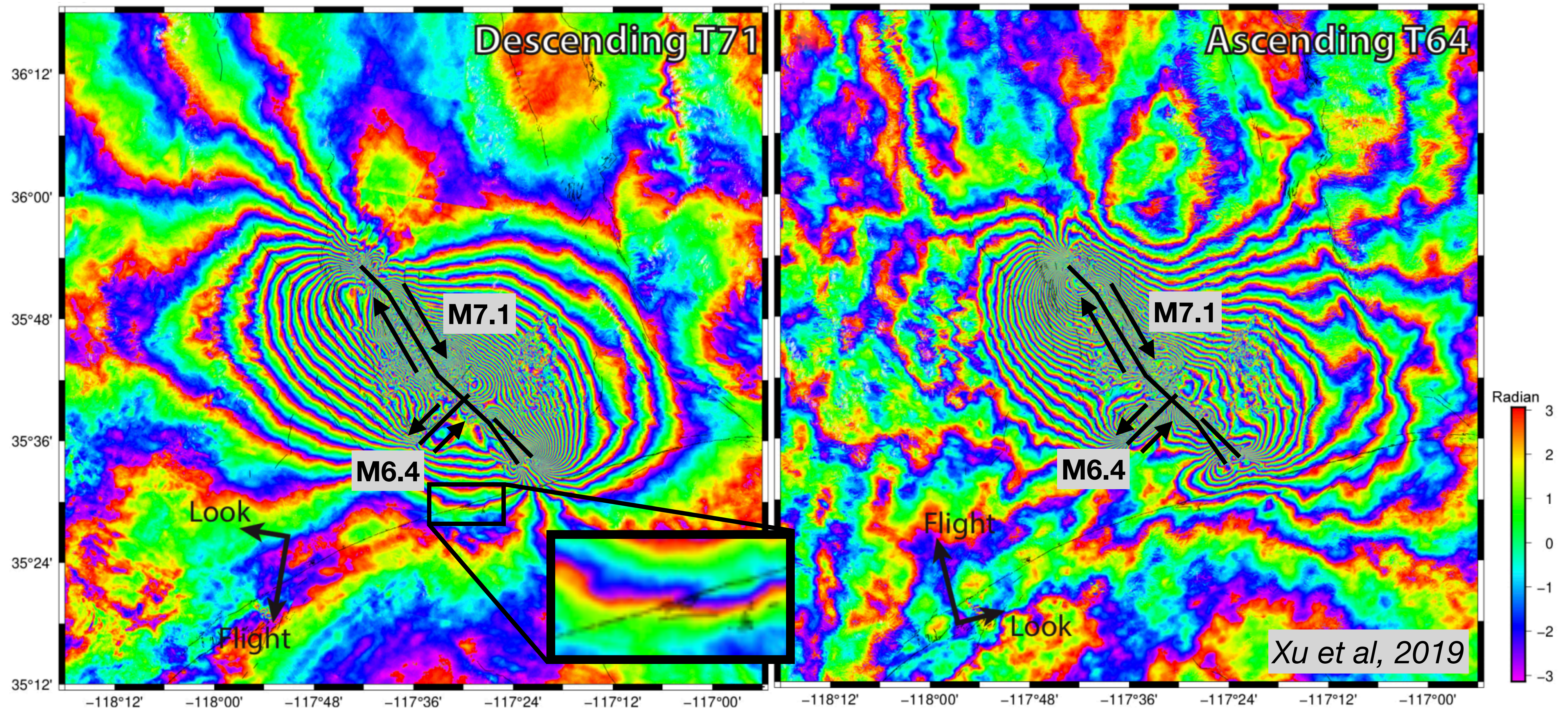
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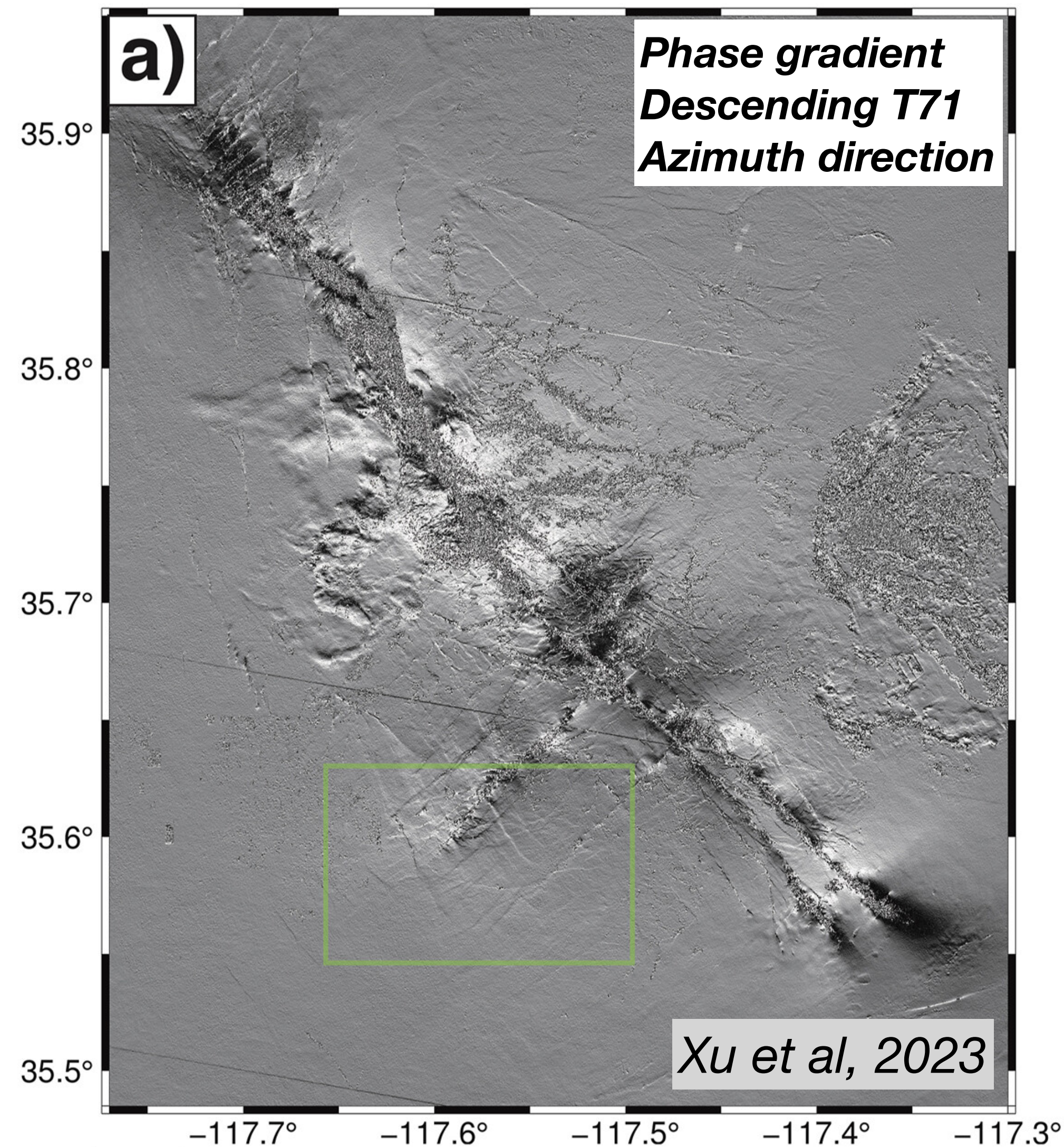
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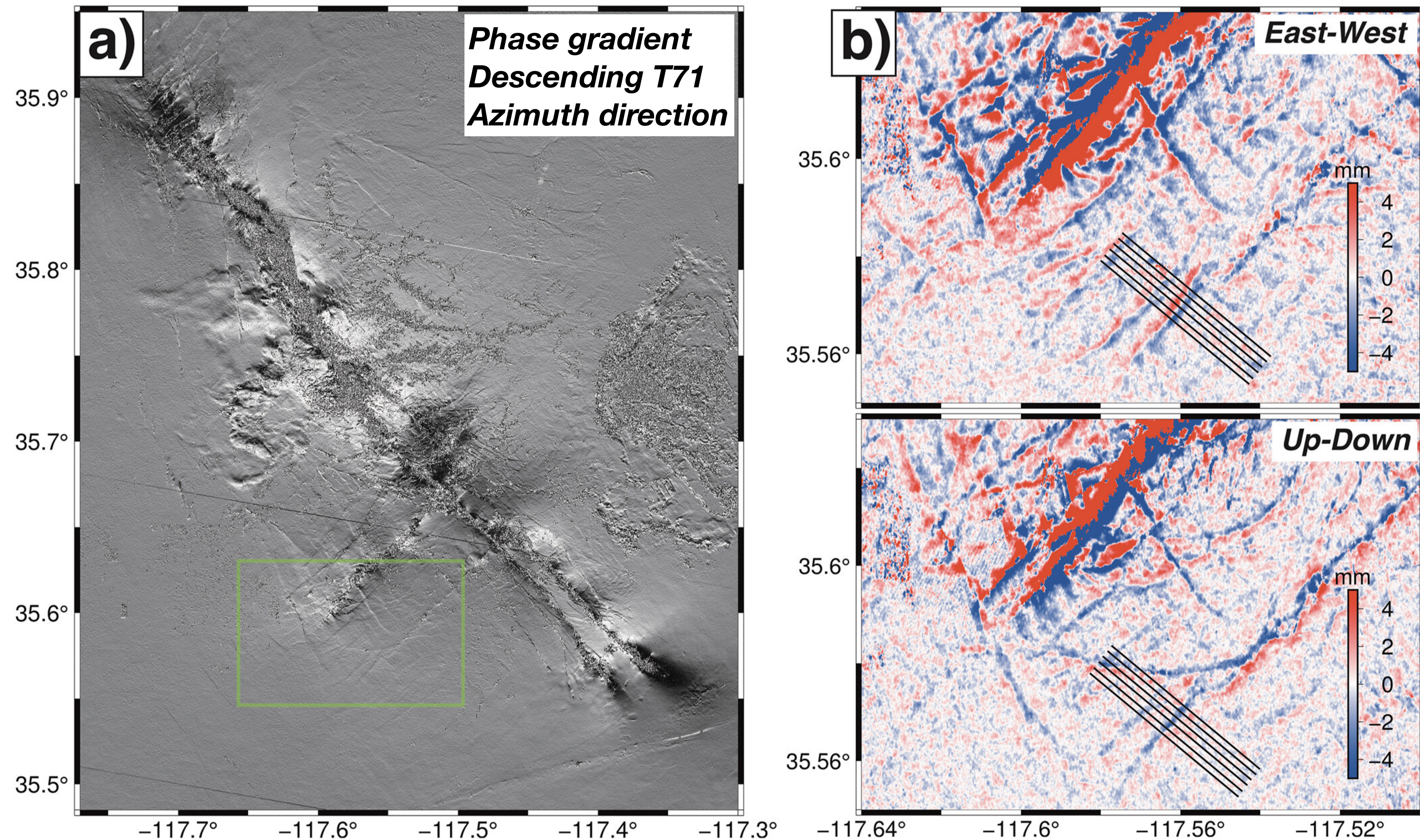
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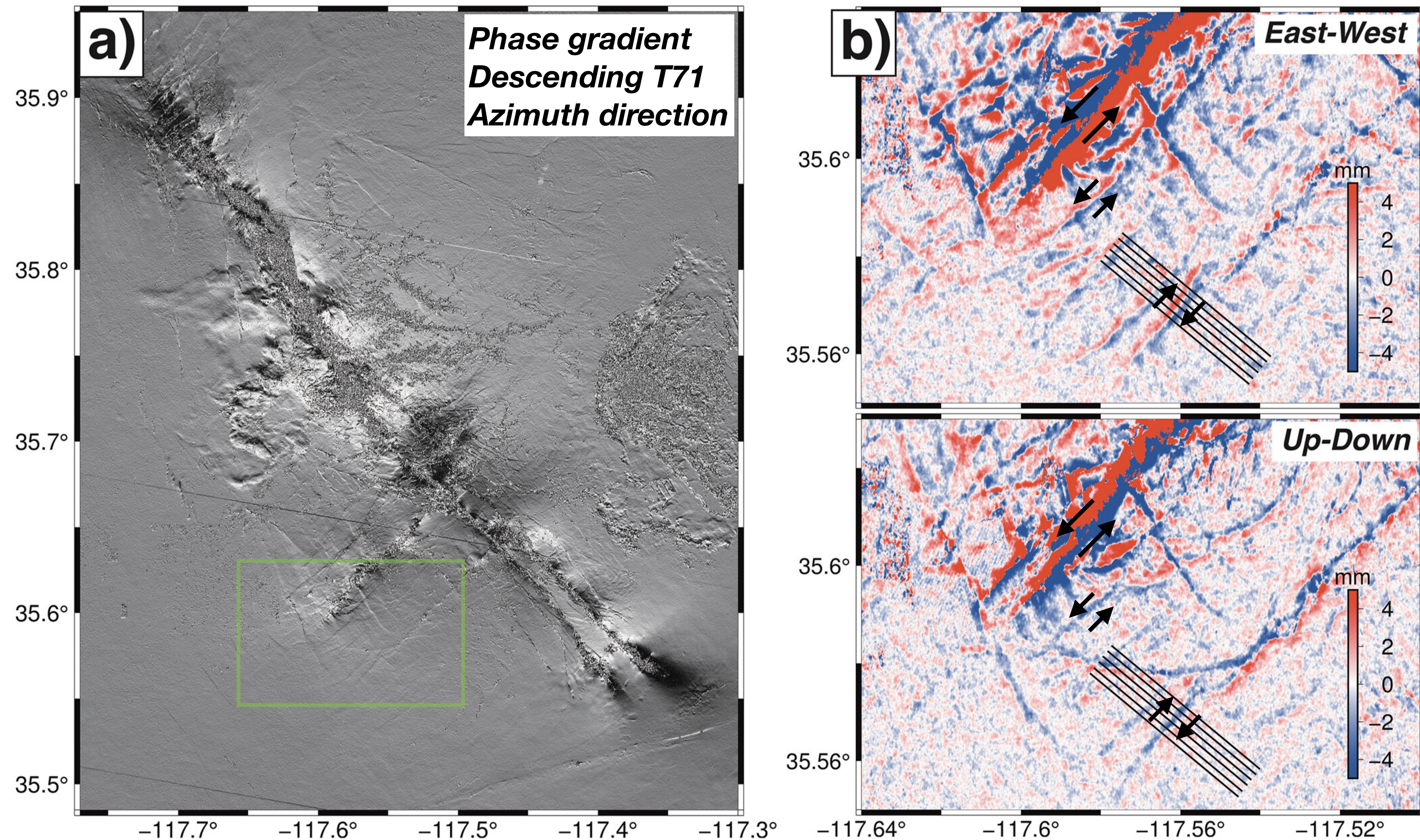
Shallow slip on secondary faults during the 2019 Ridgecrest earthquake sequence



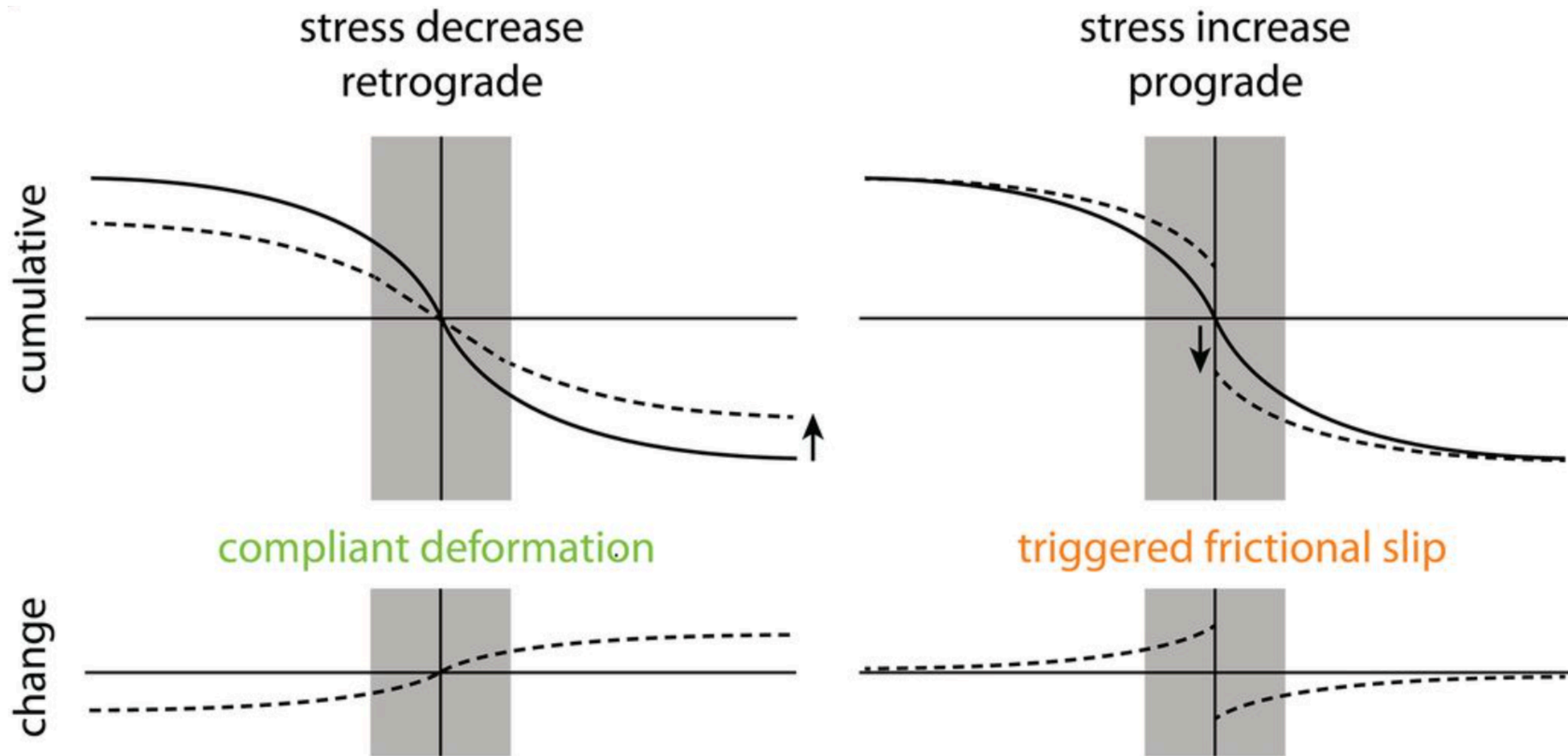
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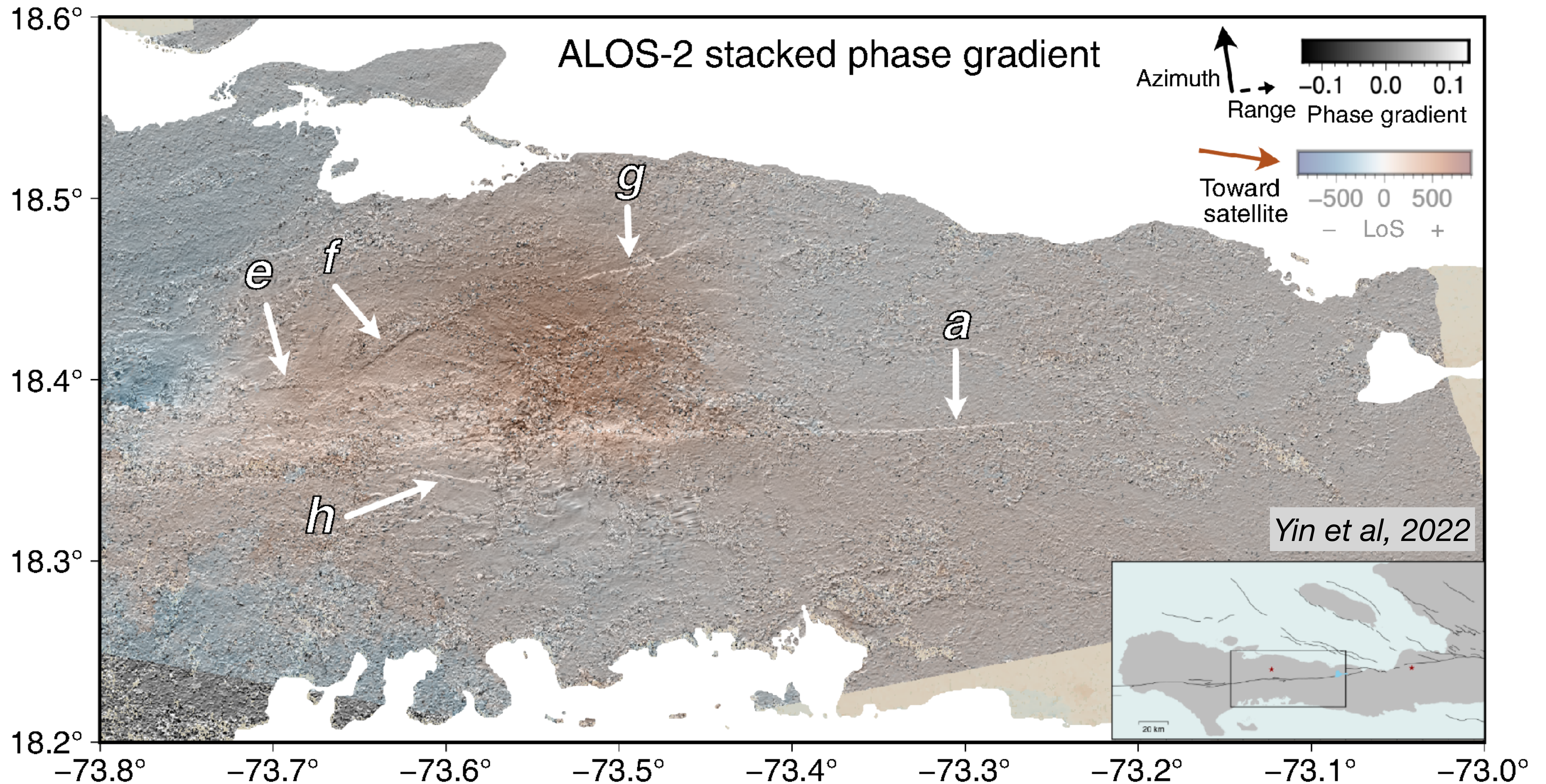
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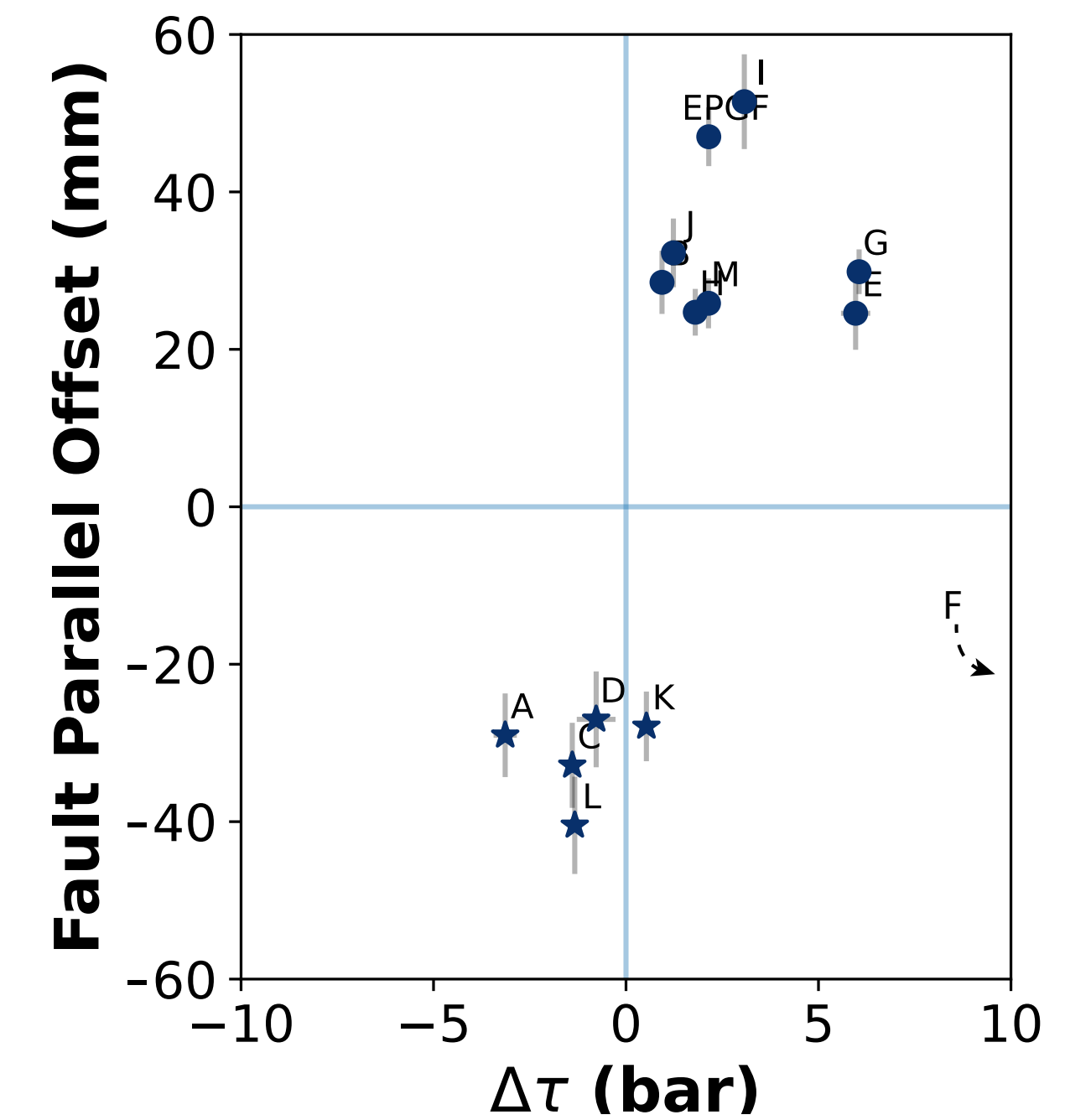
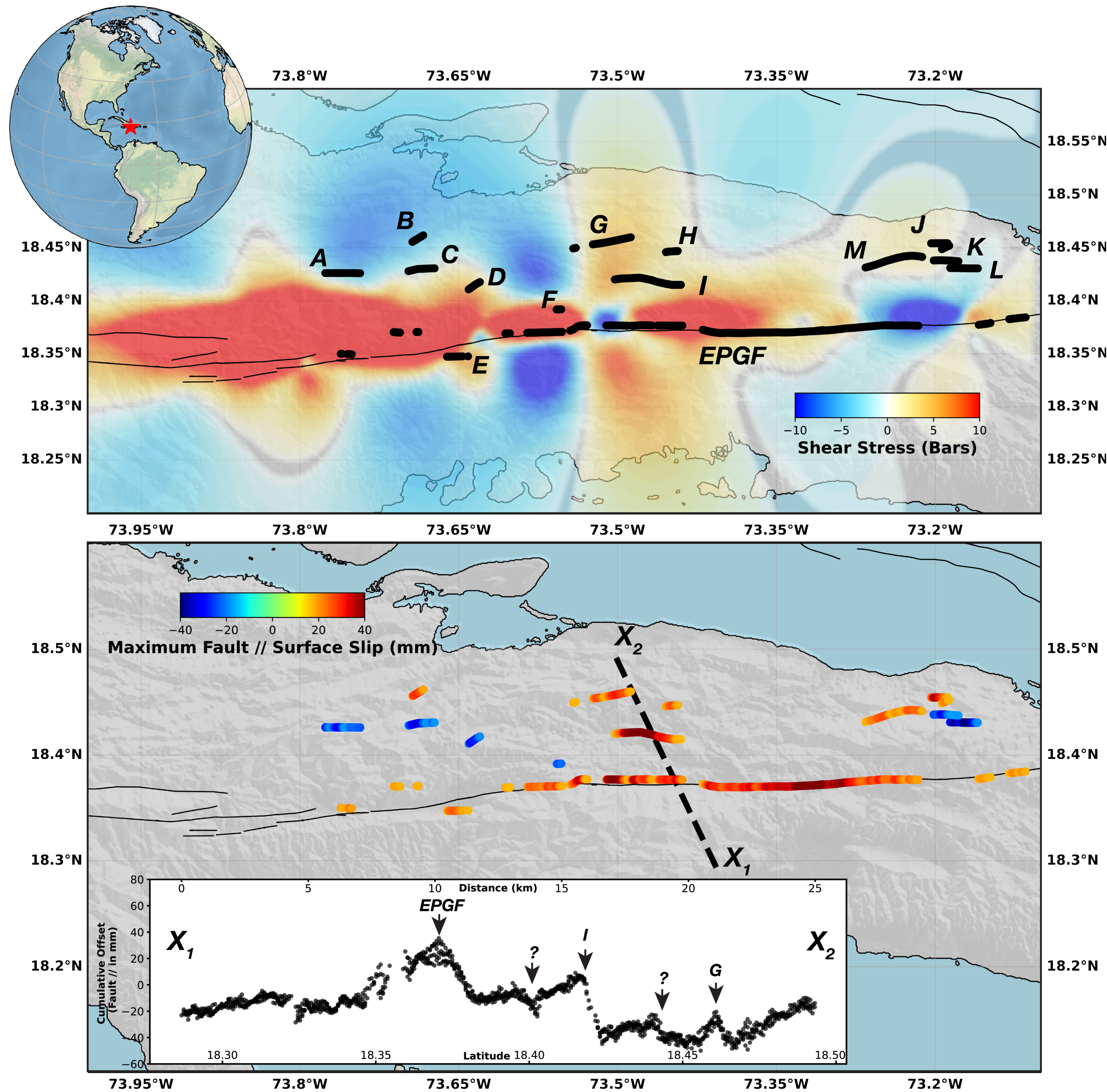


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Shallow creep on secondary faults after the 2021 Nippes earthquake (Haiti)

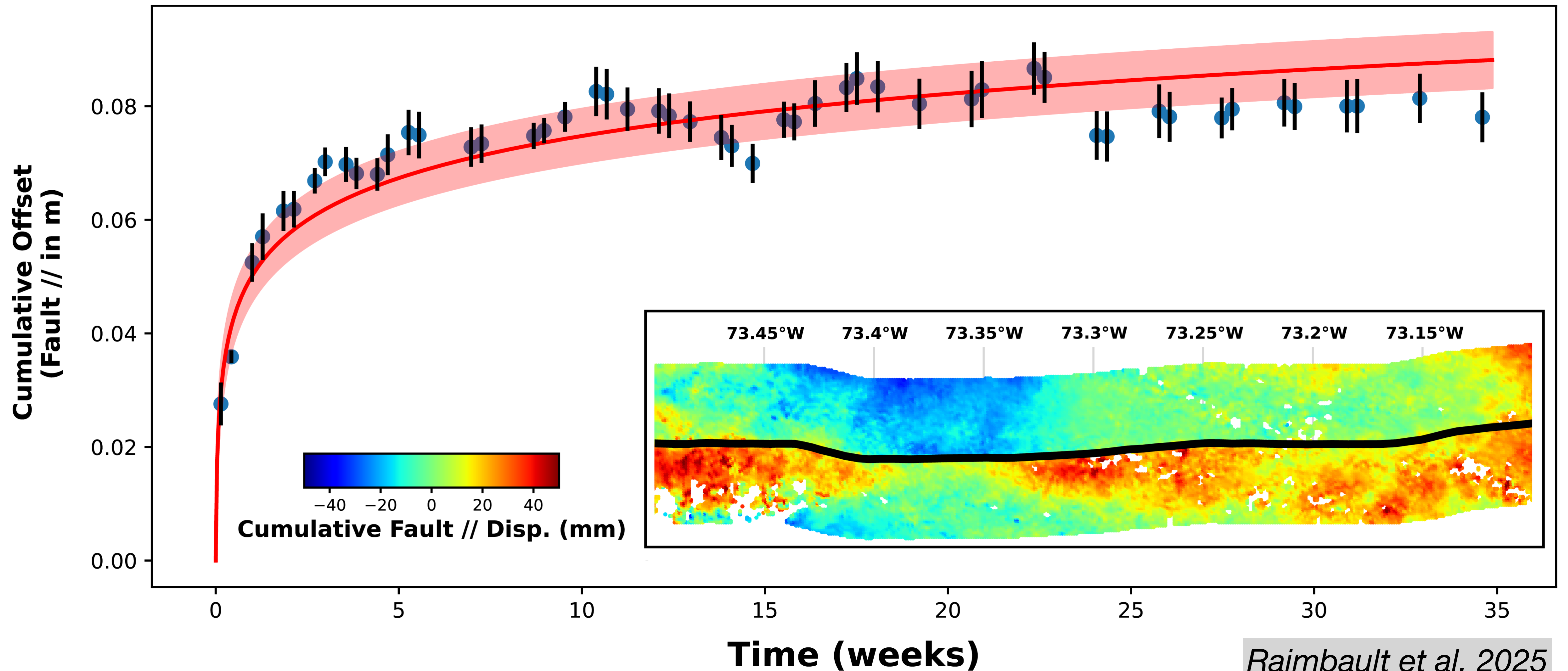




**Shallow creep on
secondary faults after
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earthquake (Haiti)**

Raimbault et al, 2025

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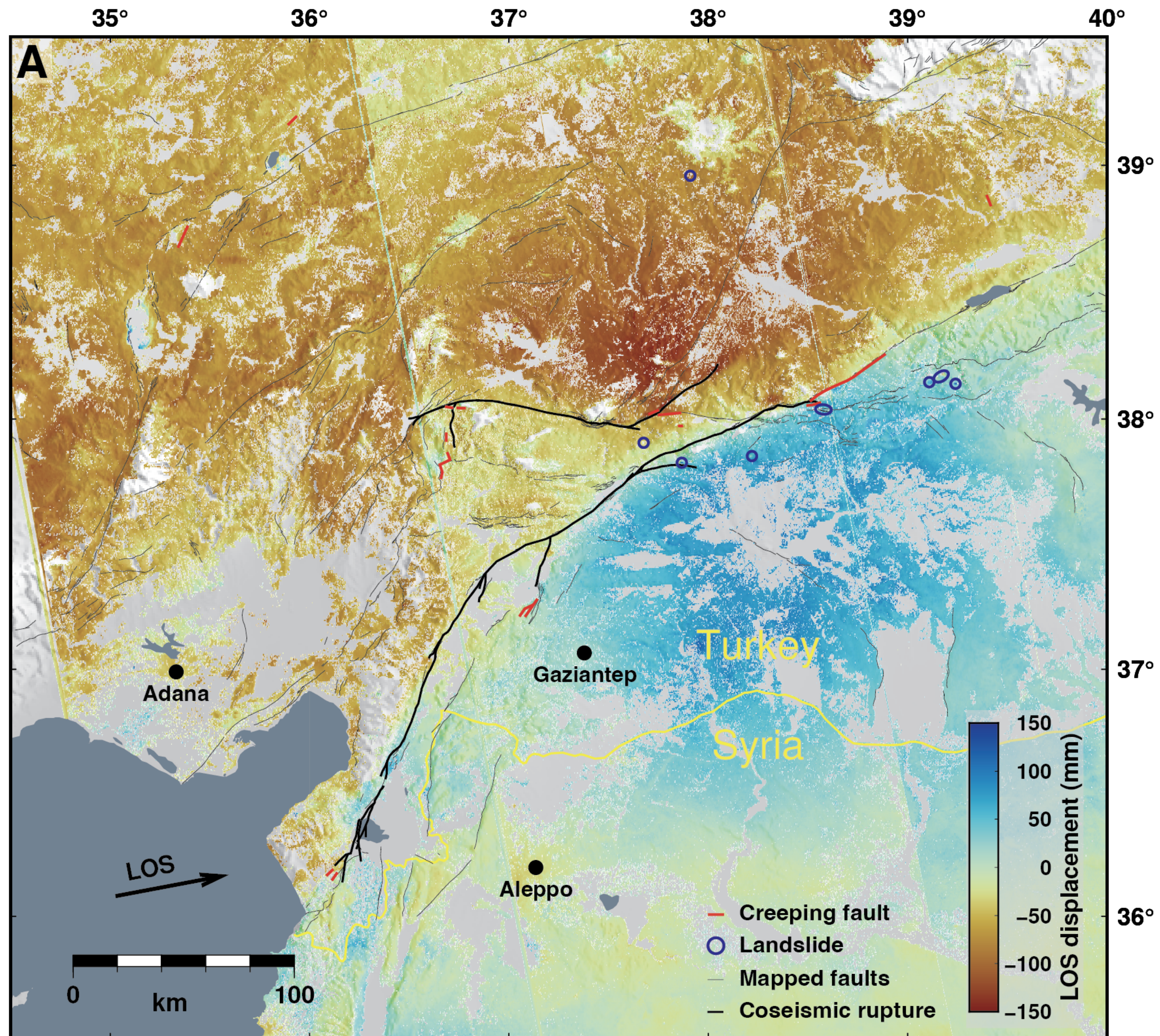
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What are the mechanisms of postseismic creep on secondary faults ?

- What is the **temporal evolution of slip** on these secondary faults ?
=> **InSAR time series**
- How do these structures **react to coseismic stress changes** ?
=> **Coseismic slip modeling for static stress computation**

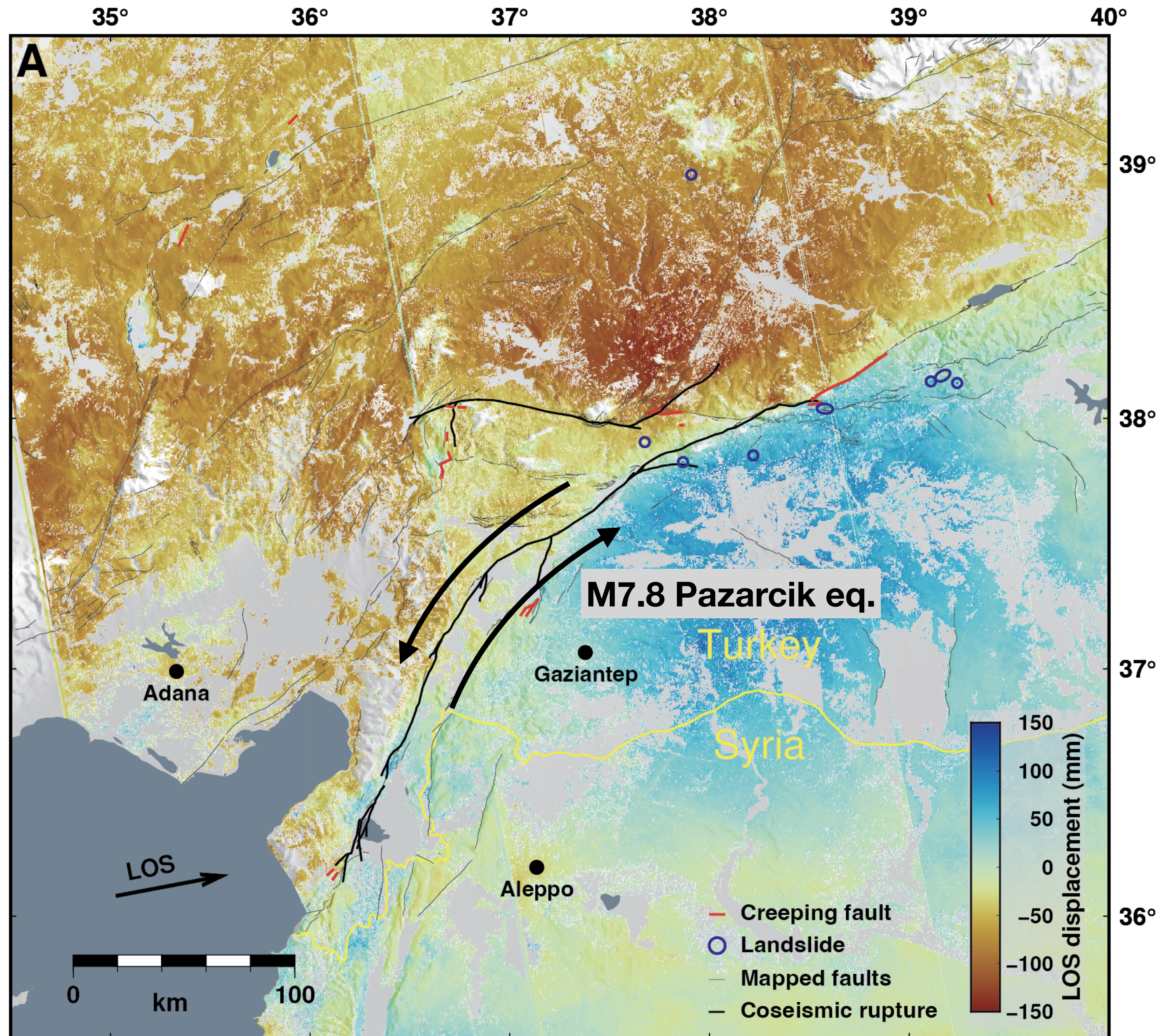
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- What is the **temporal evolution of slip** on these secondary faults ?
=> **InSAR time series**
- How do these structures **react to coseismic stress changes** ?
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- Do we observe similar structures after **other large earthquakes** ?
=> **Kahramanmaraş (2023), Ridgecrest (2019)**



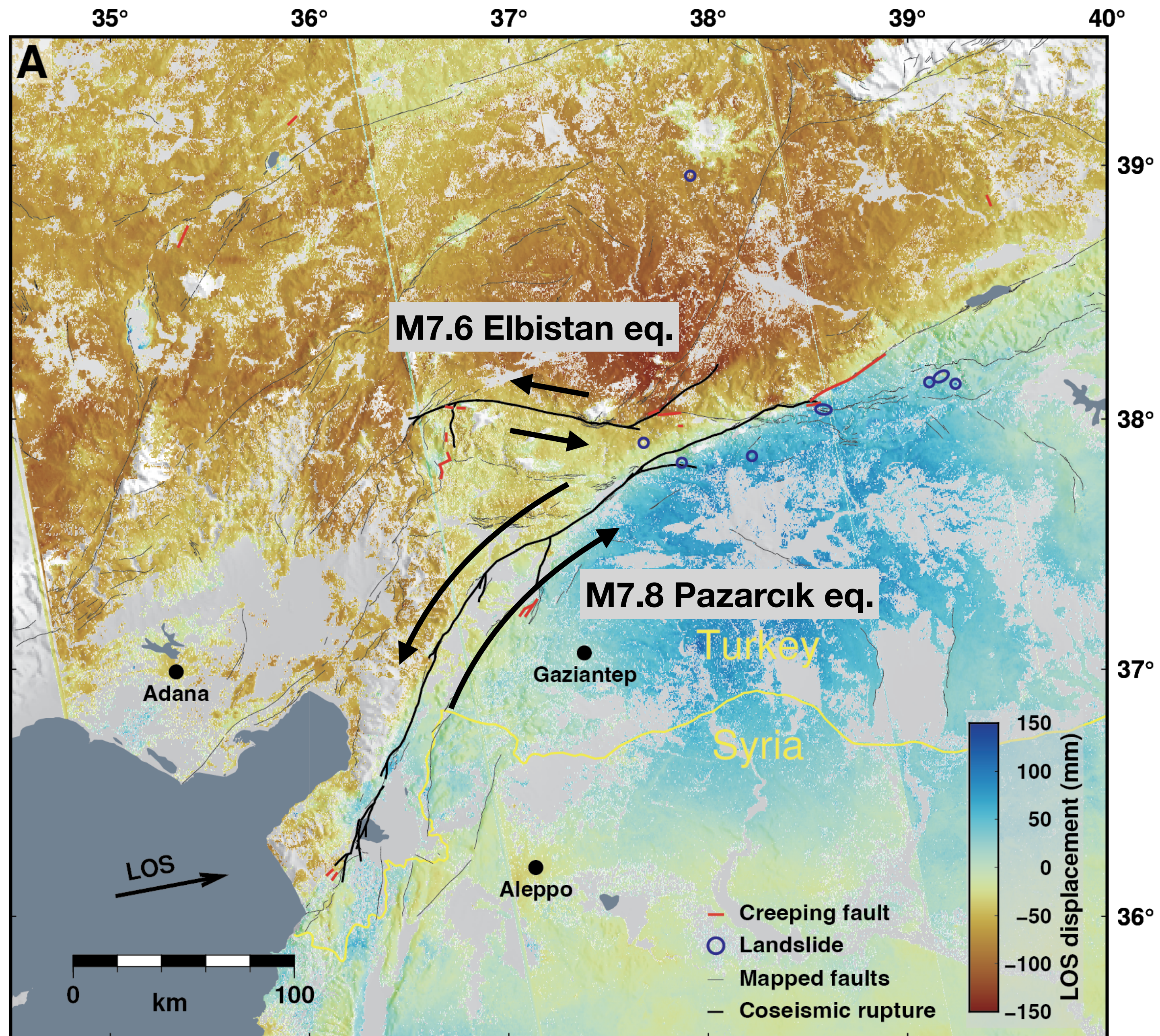
Cumulative 2-year postseismic displacement map

*Sentinel-1 data processed with ISCE2
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Time Series (Dalaion & Jolivet, 2020).*



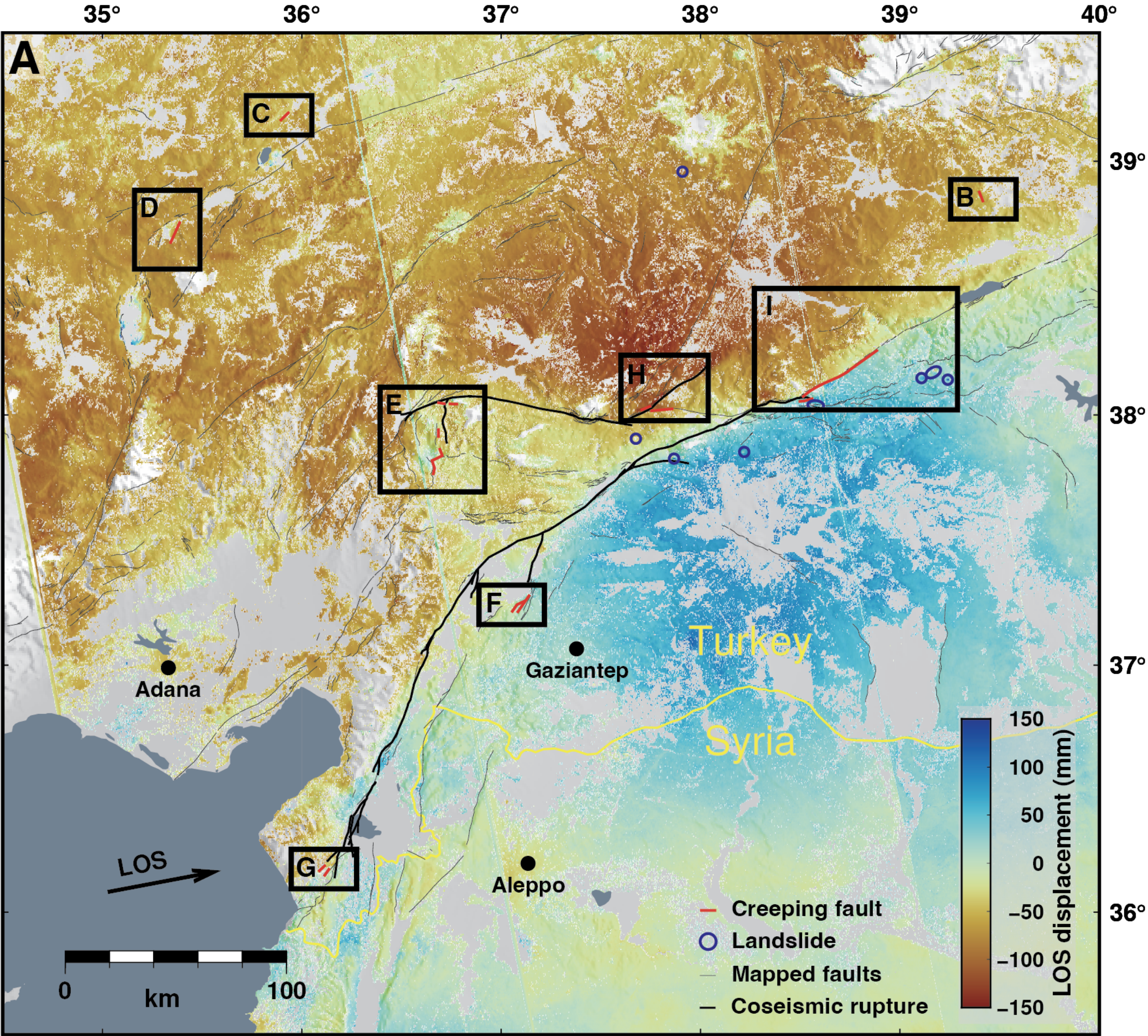
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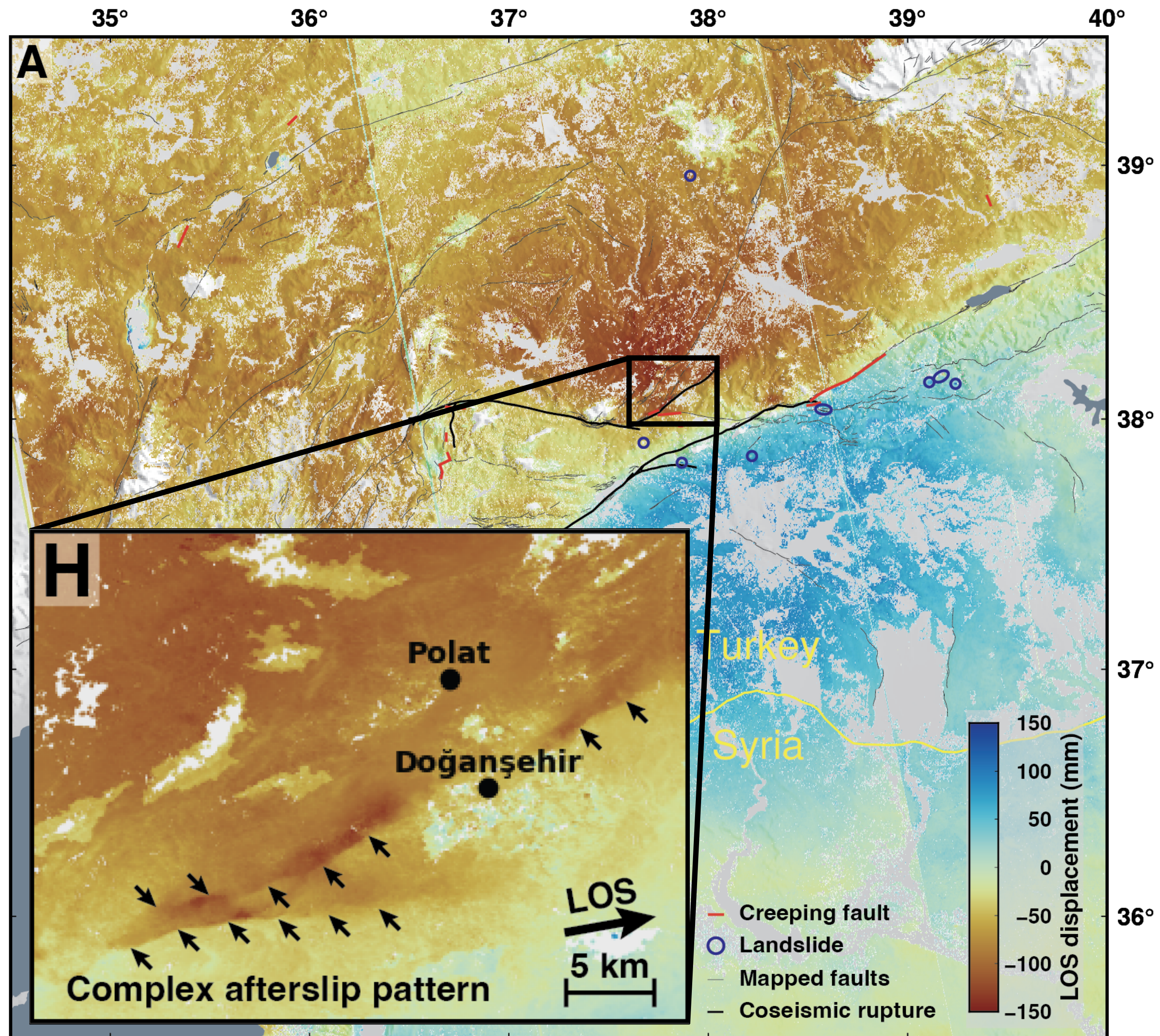
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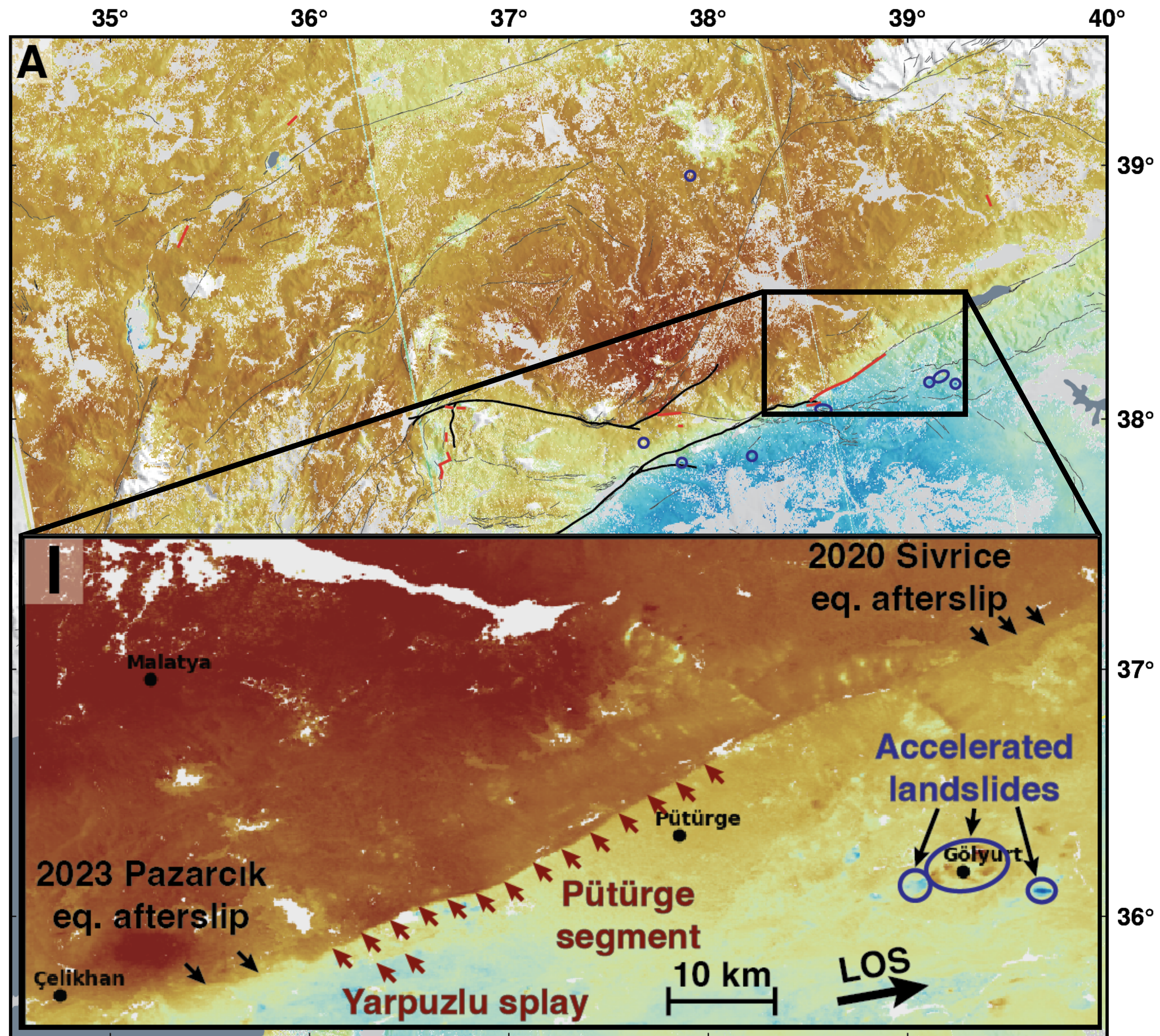
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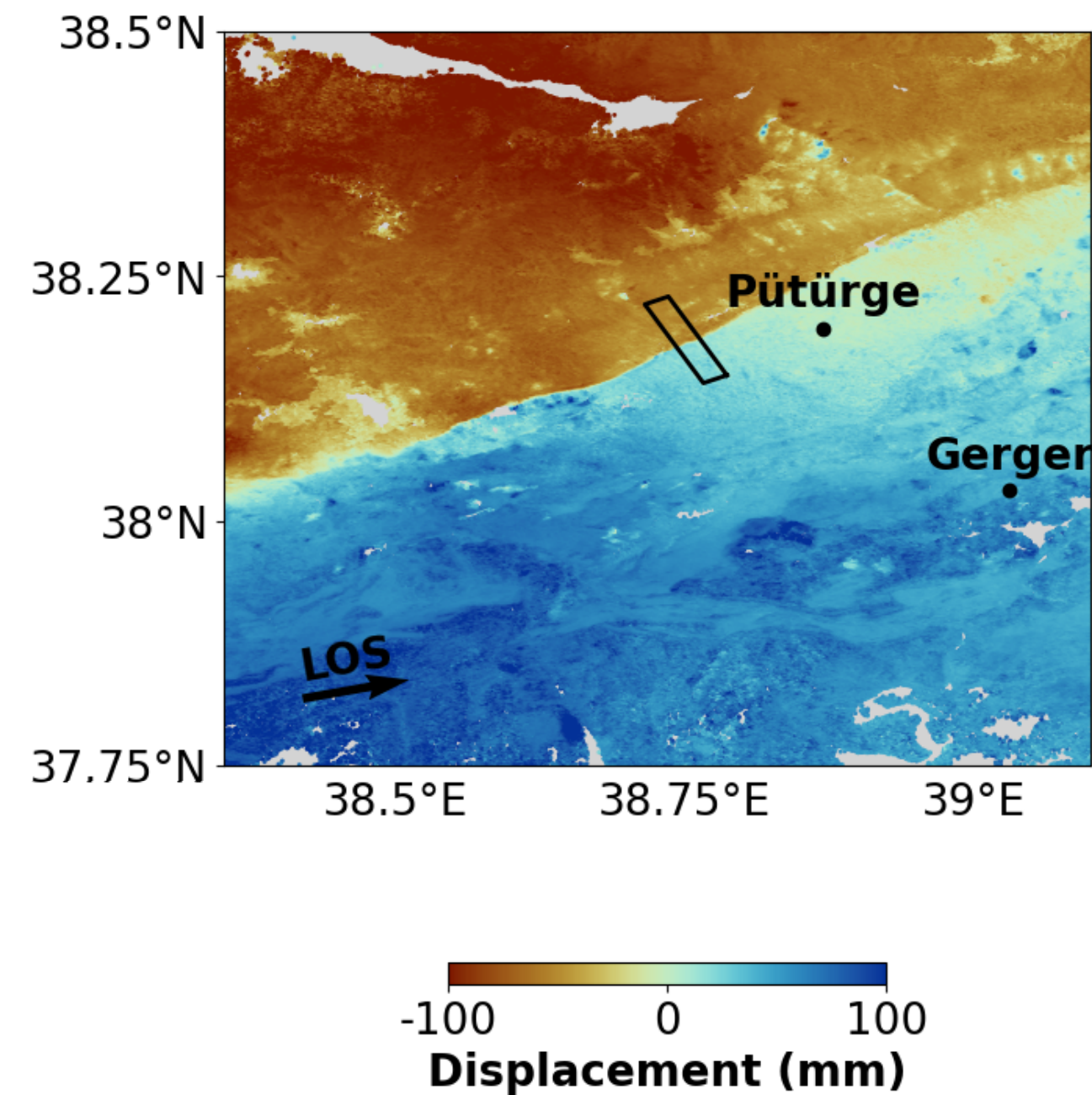
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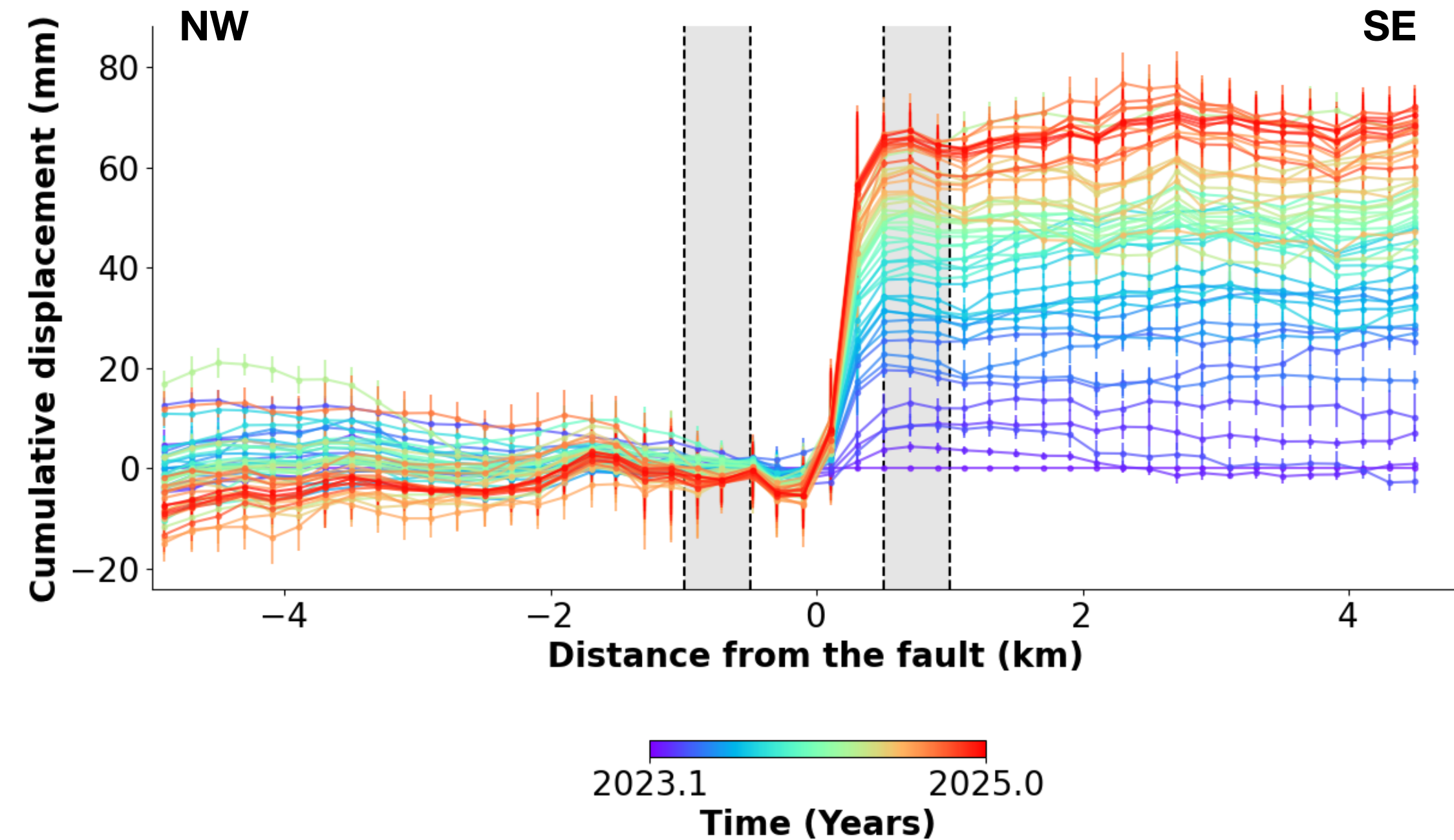
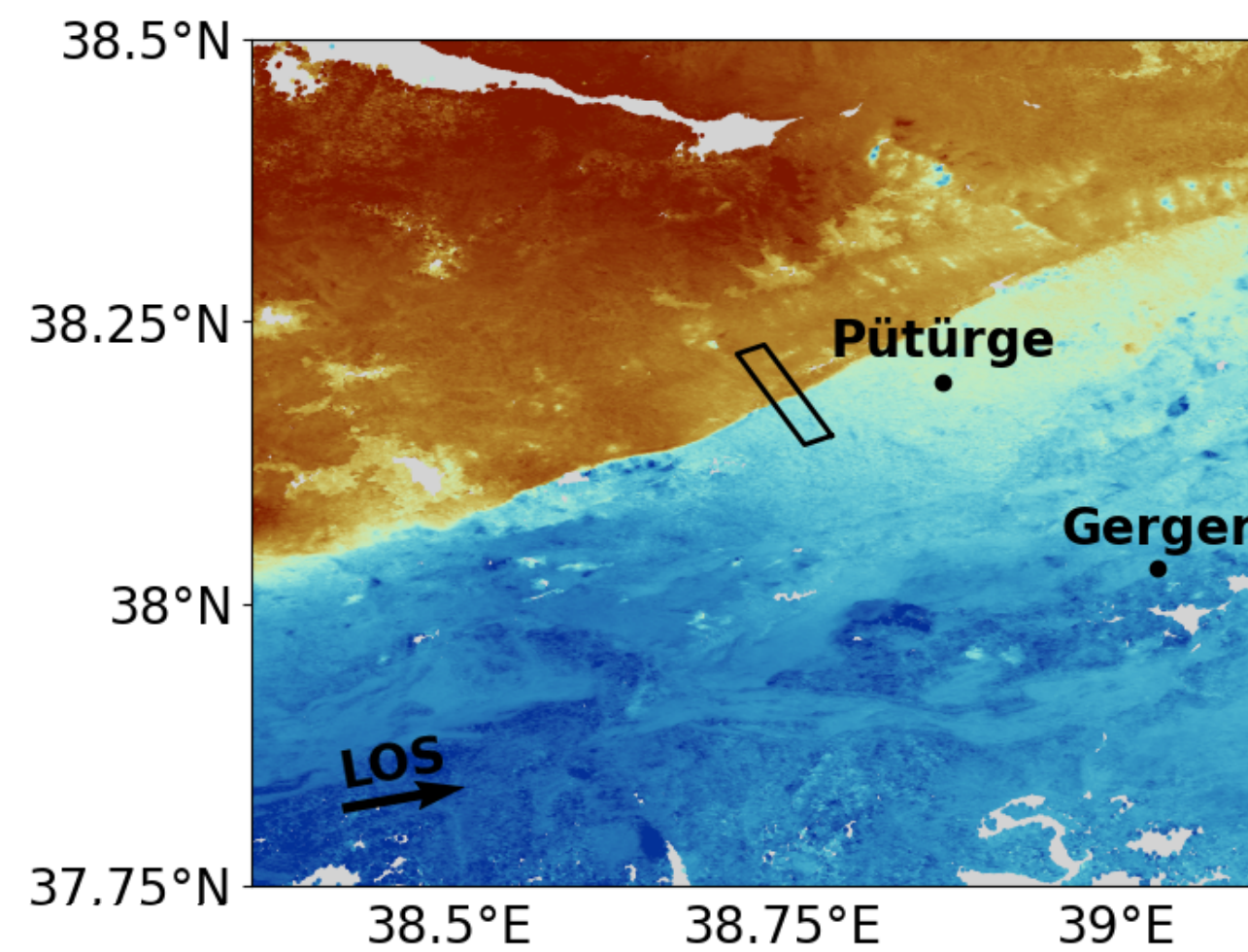
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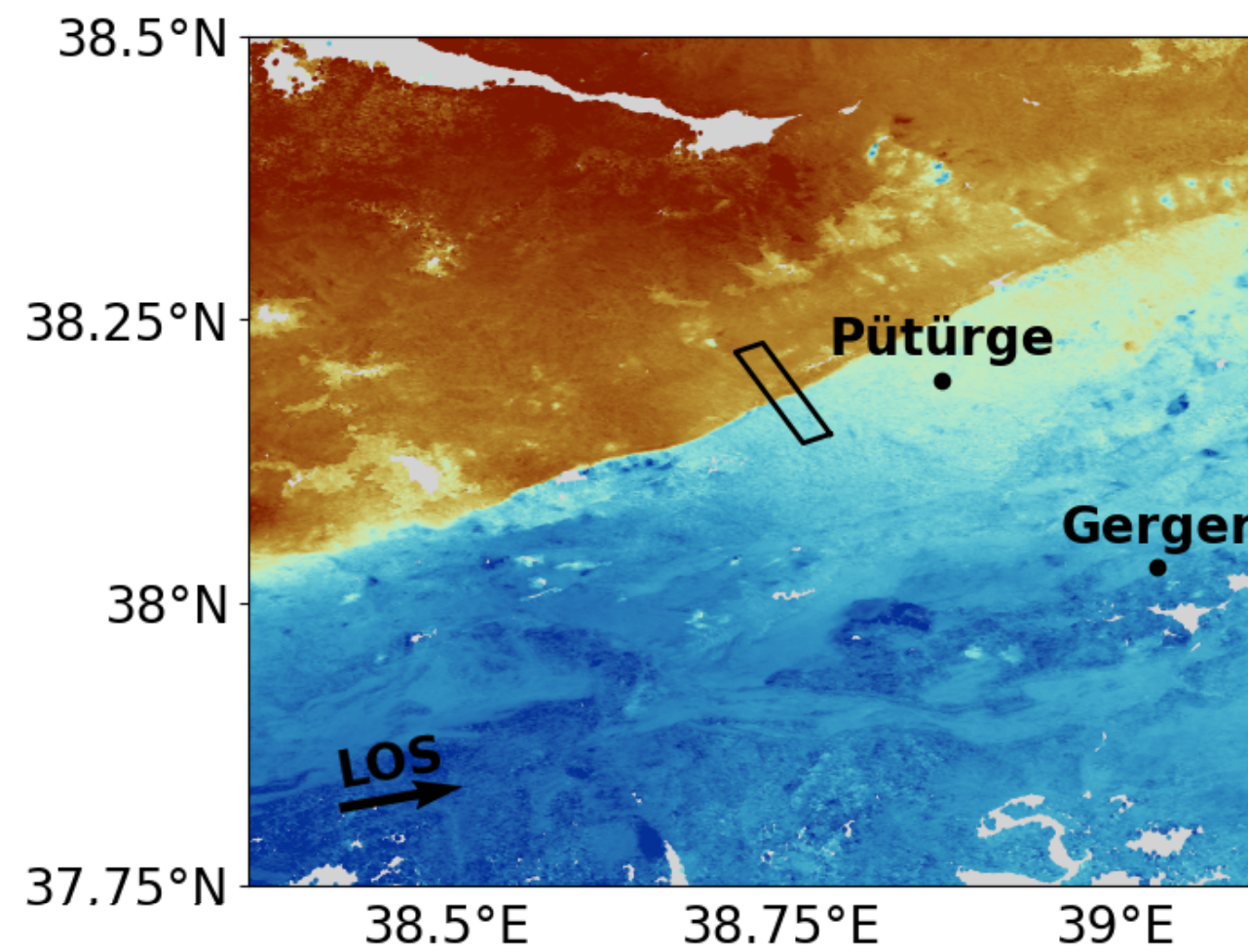
Across-fault displacement profiles (ascending track 116, Pütürge segment)



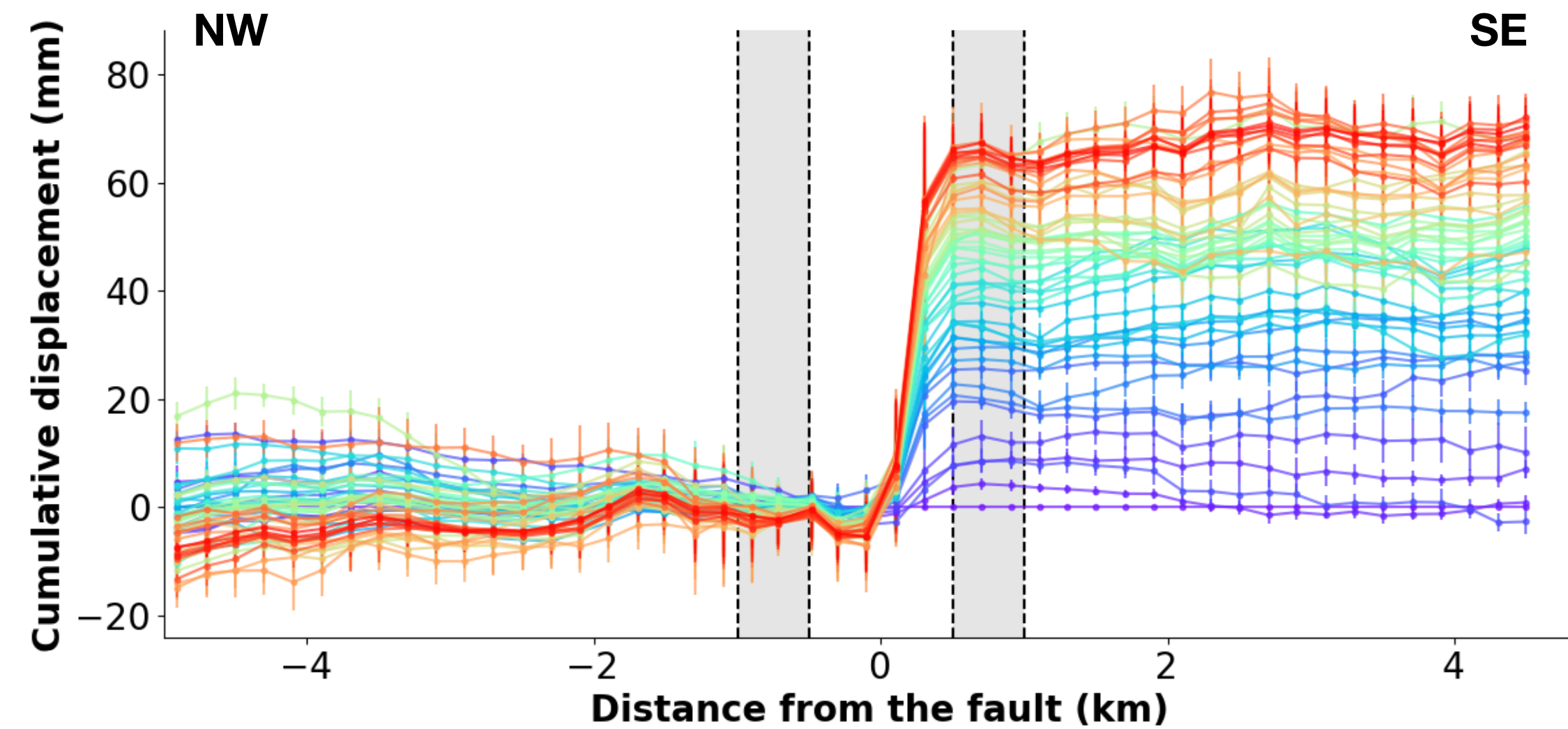
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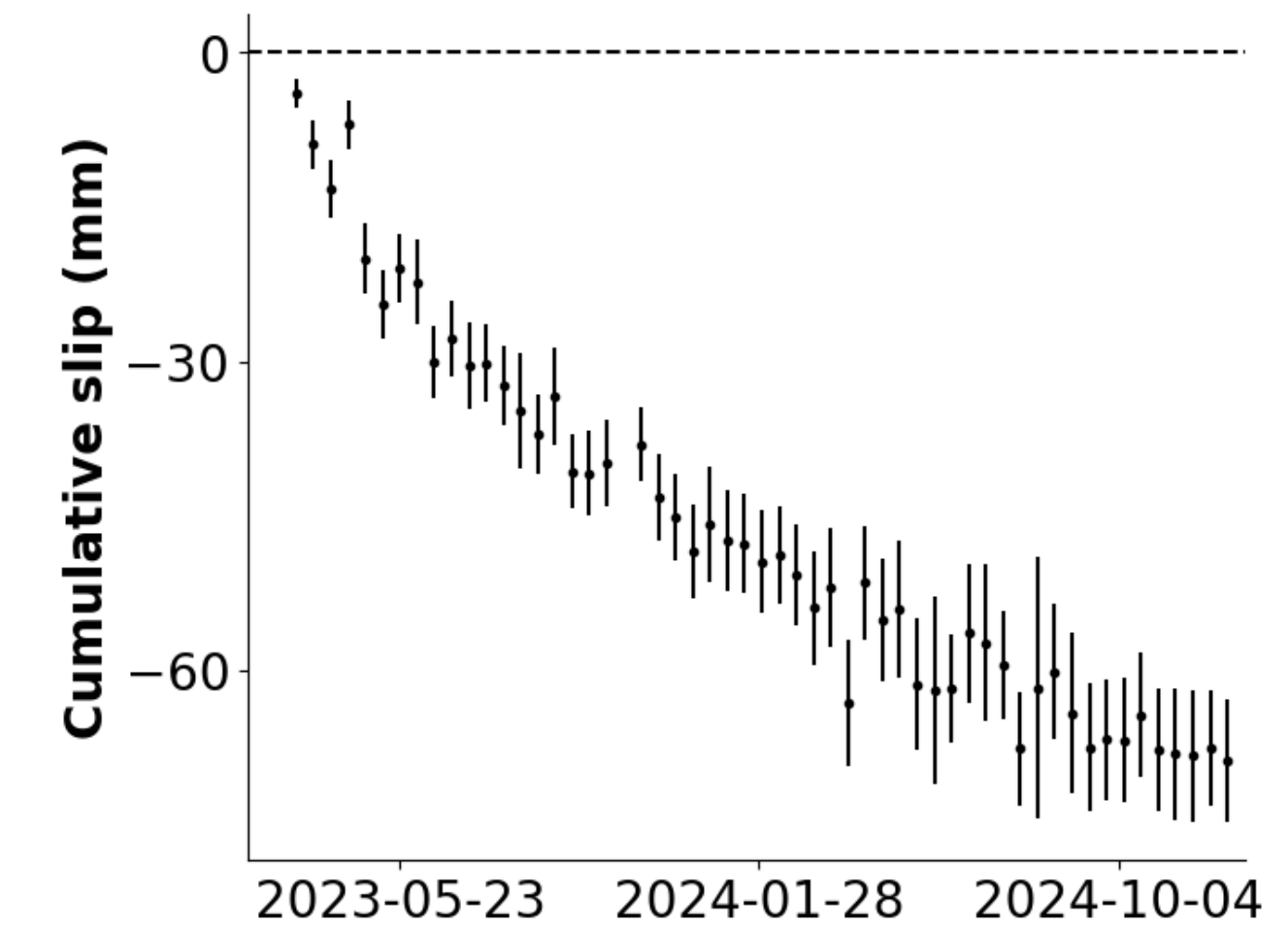
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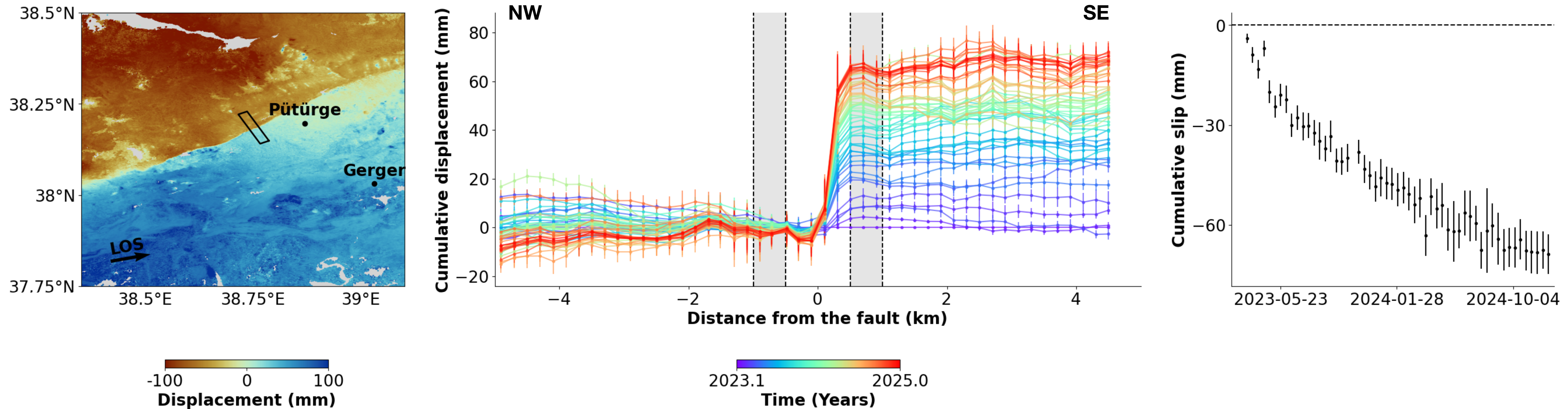
-100 0 100
Displacement (mm)



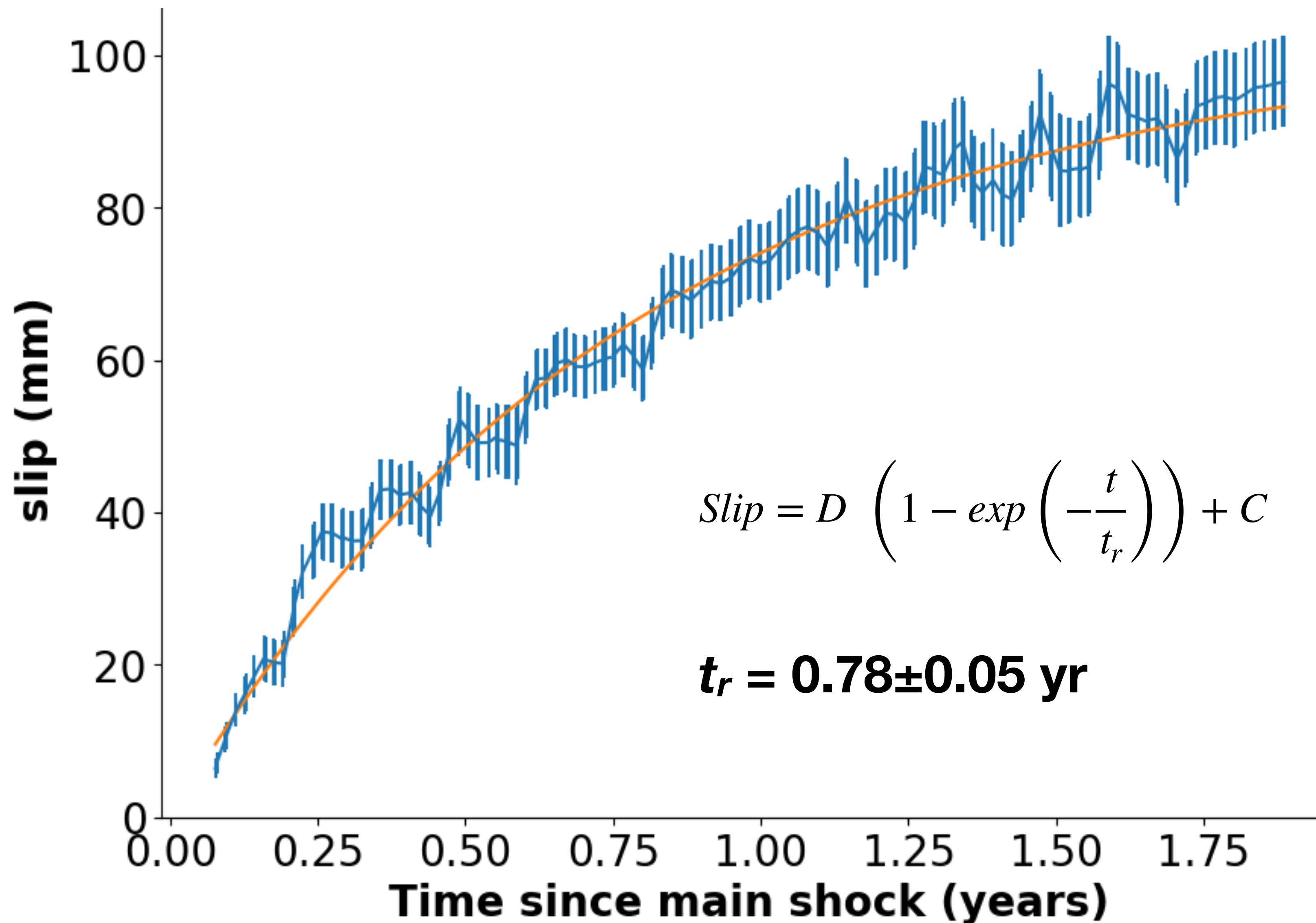
2023.1 2025.0
Time (Years)



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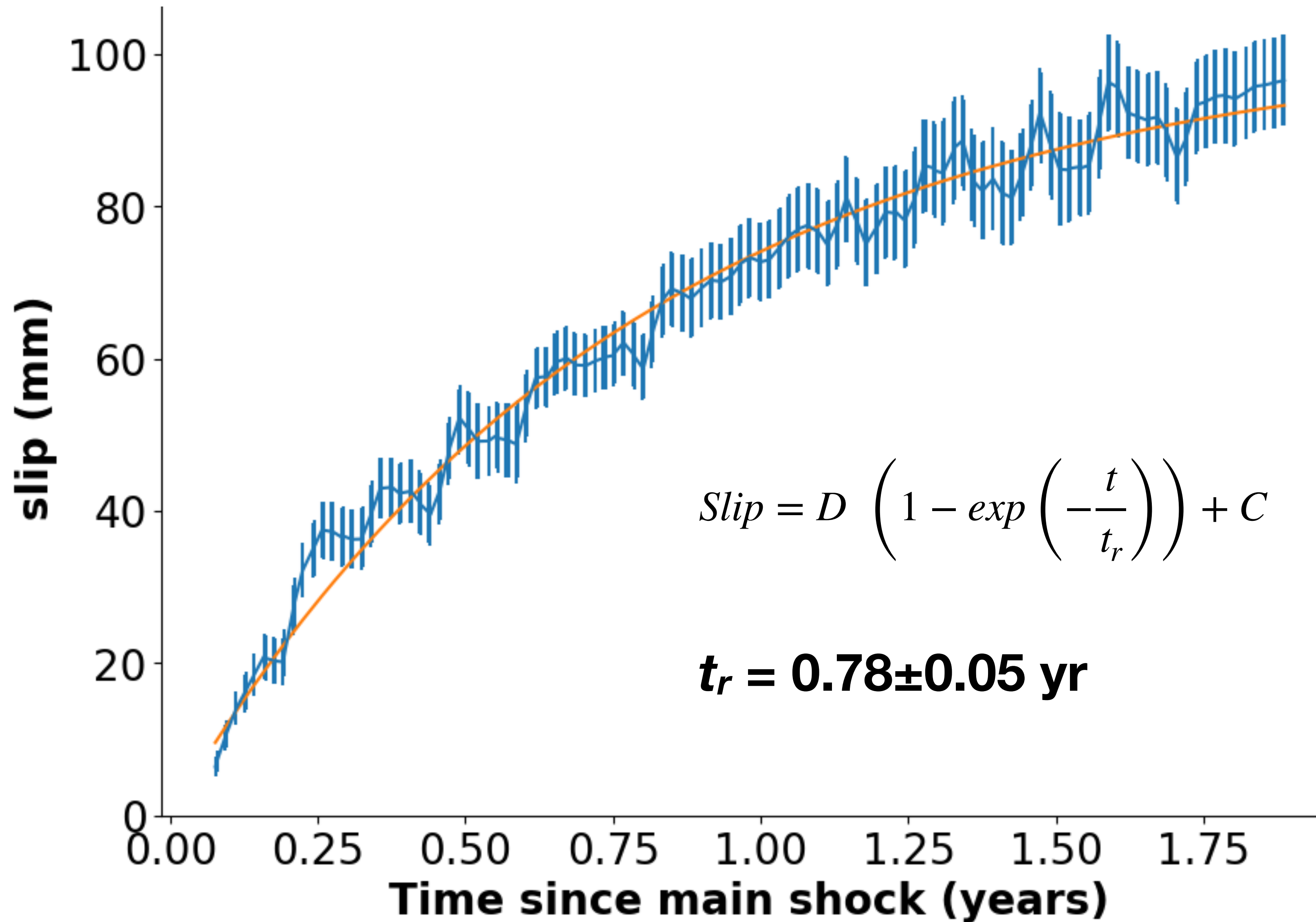


We then combine tracks to estimate fault-parallel and vertical motion.



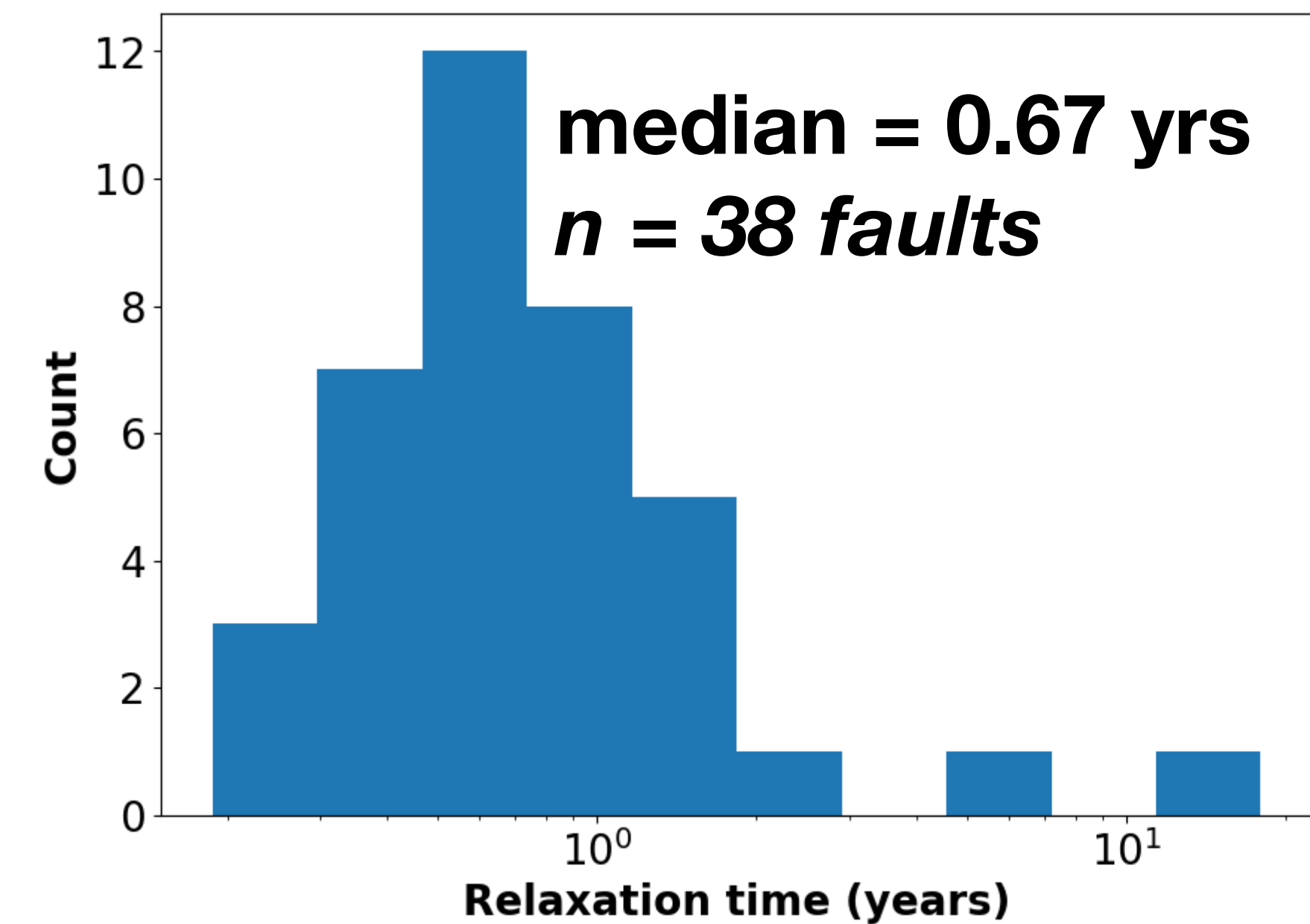
**Fitting relaxation times
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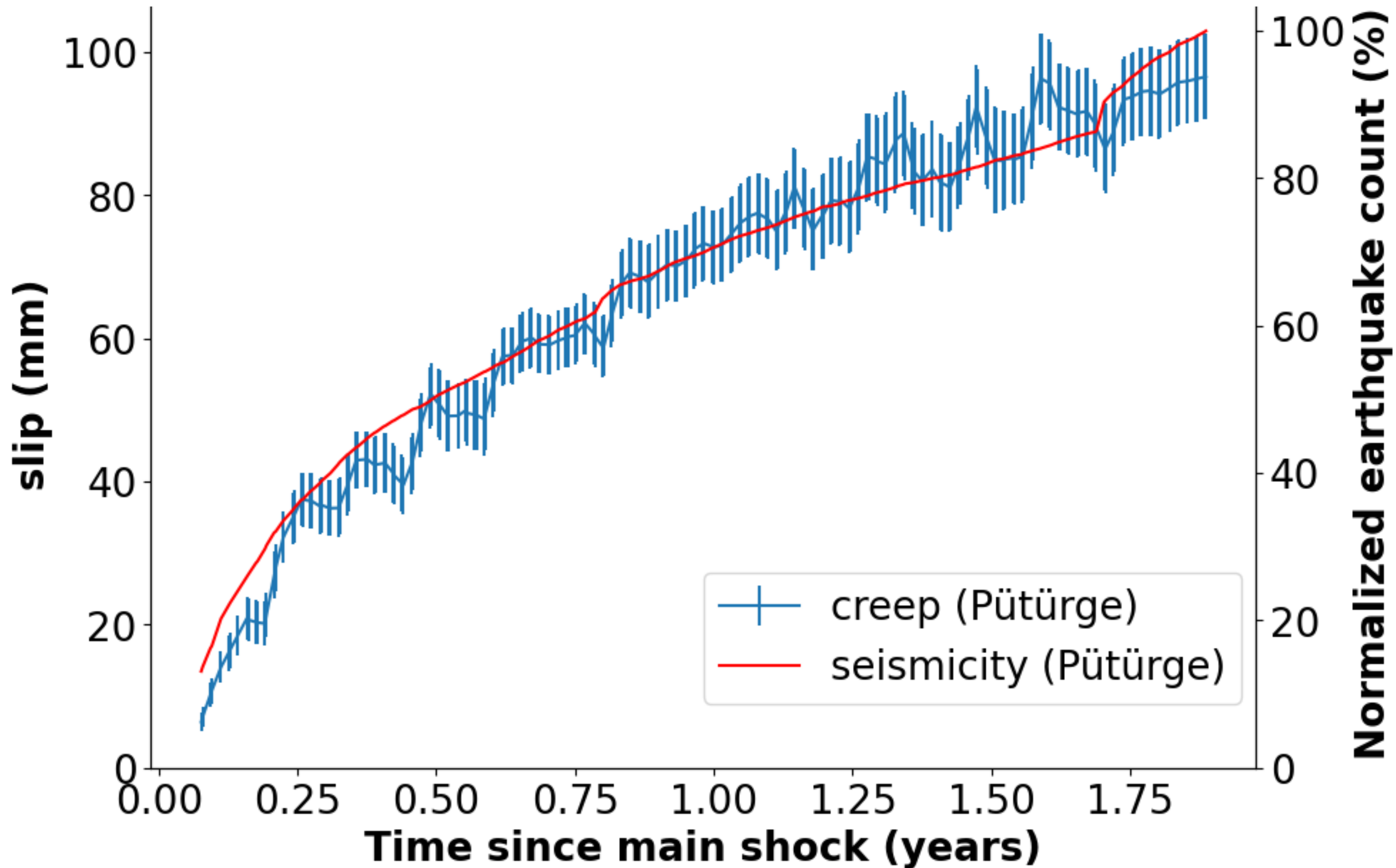
*(After removal of the
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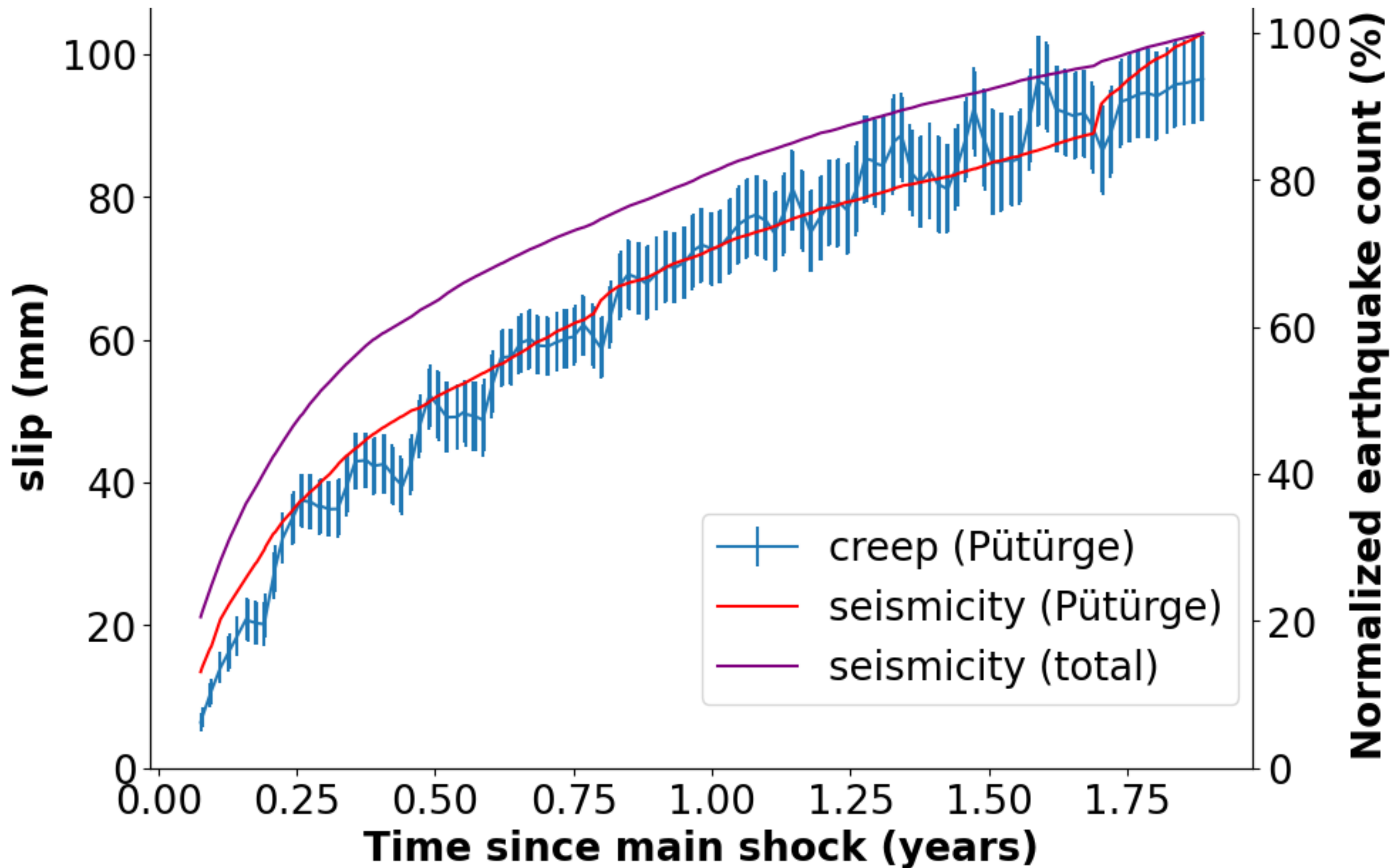
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Slip decays on the same time scale as aftershocks

Seismicity from Lomax (2023)

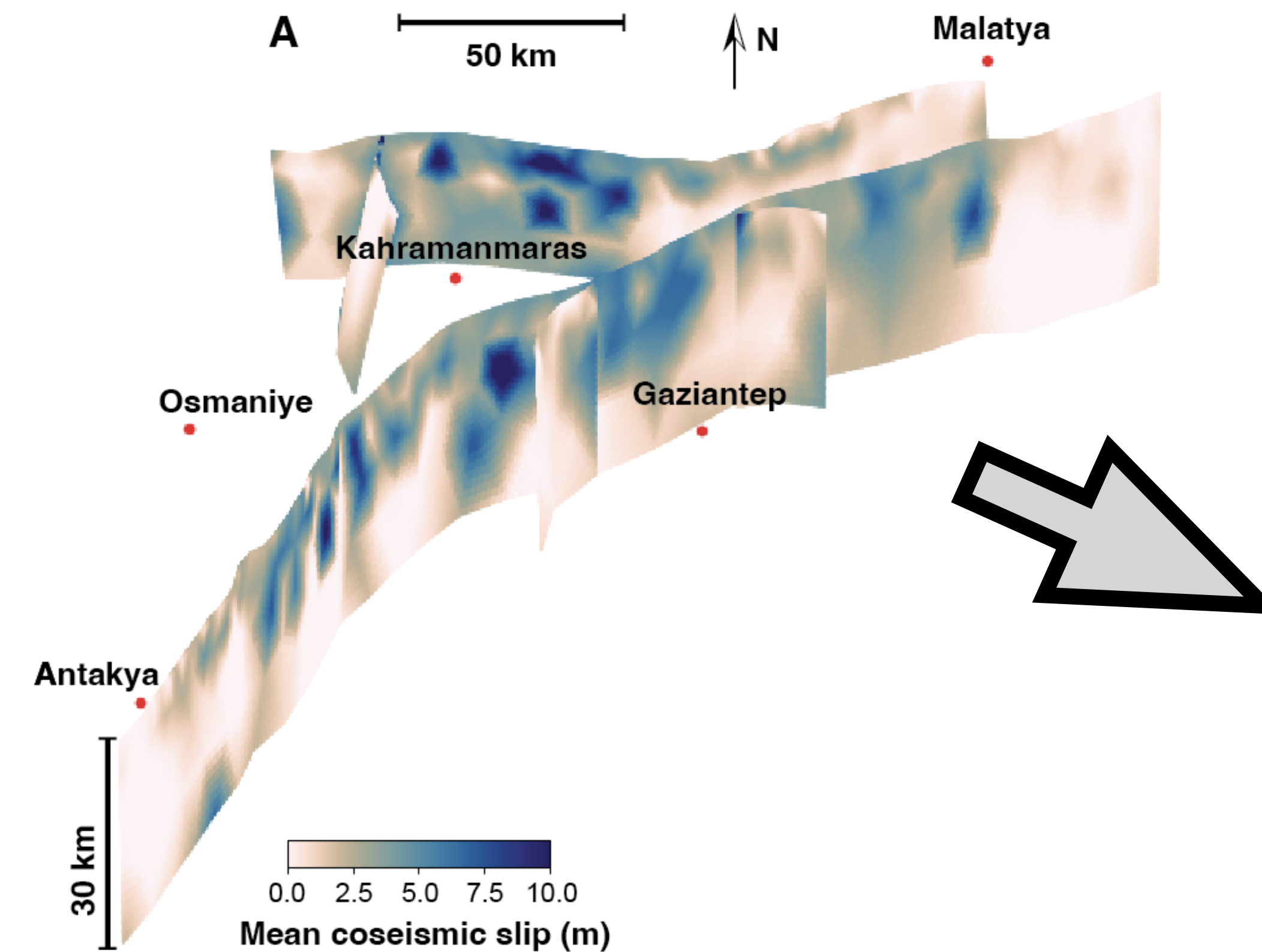


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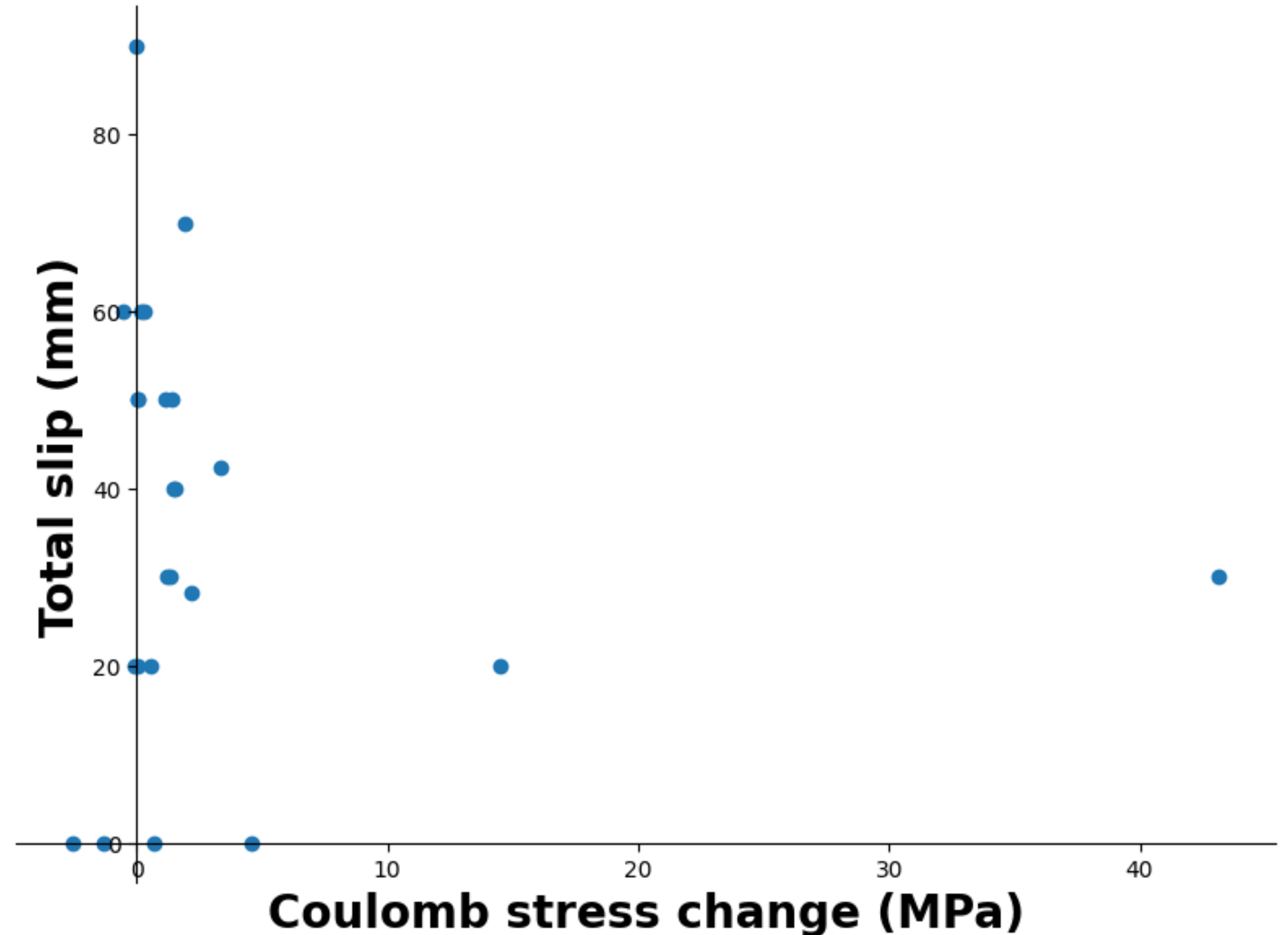
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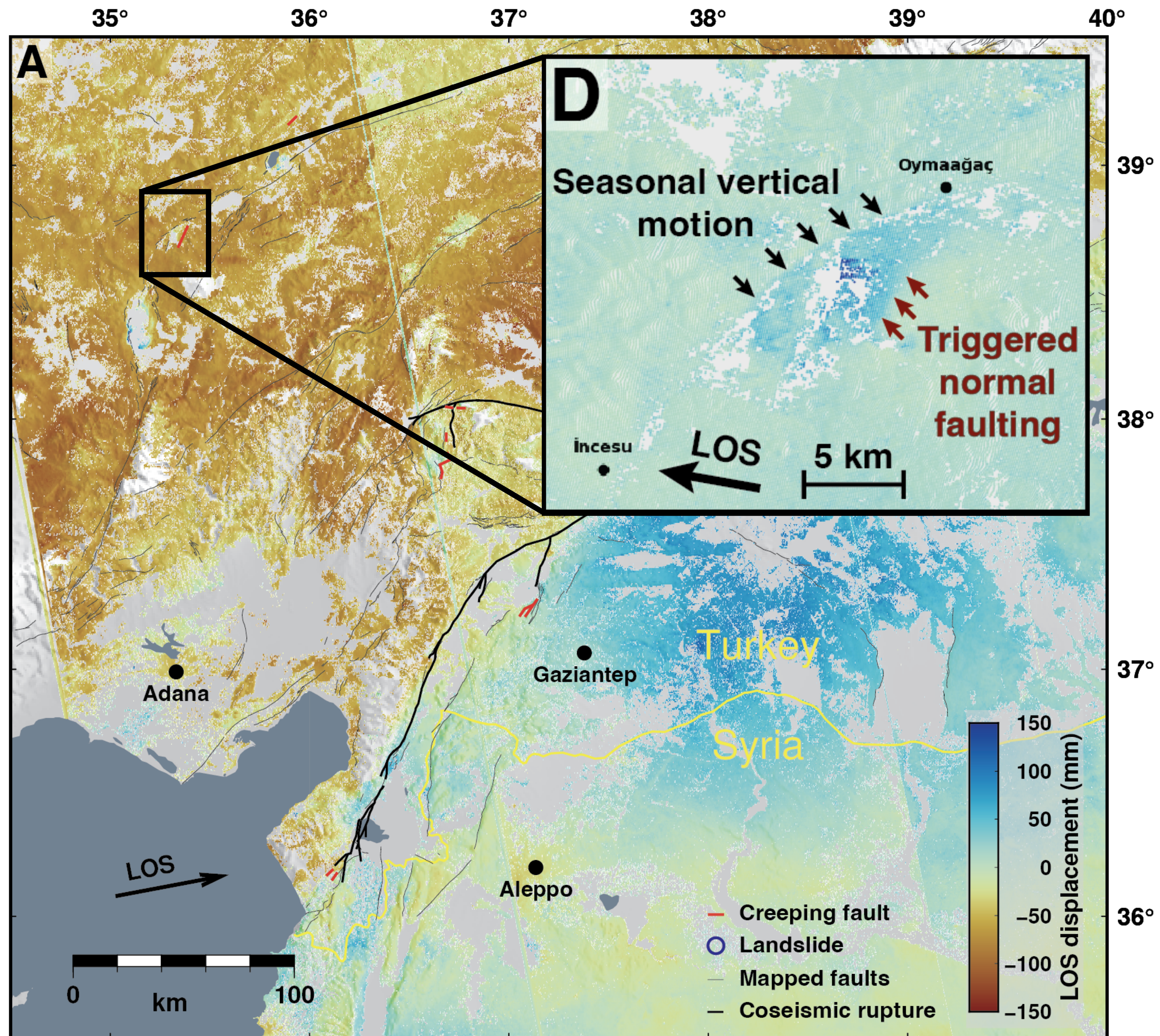
Coseismic slip model from geodetic data

Coseismic static stress changes on secondary faults vs postseismic fault motion



Dérاند et al, submitted



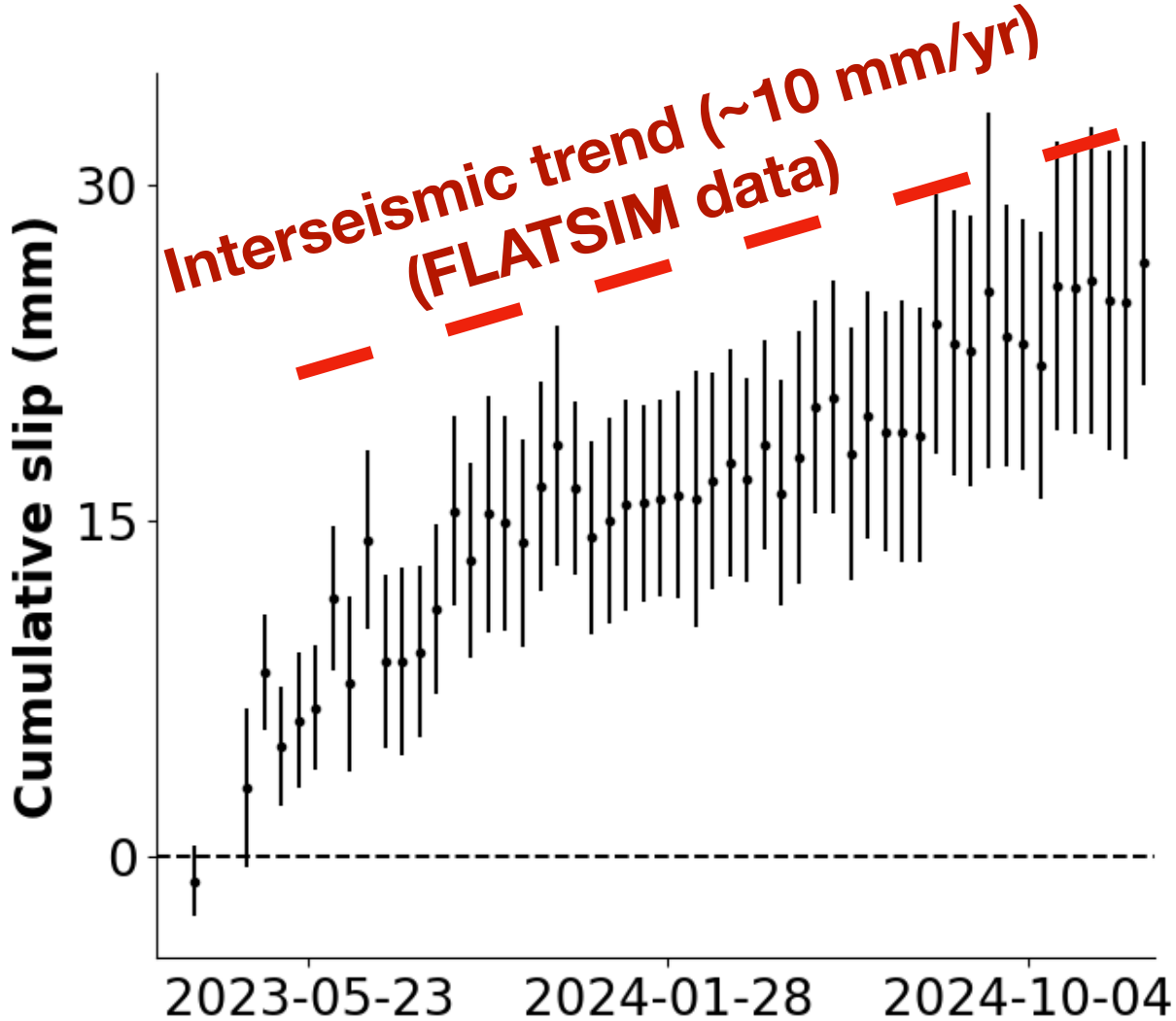
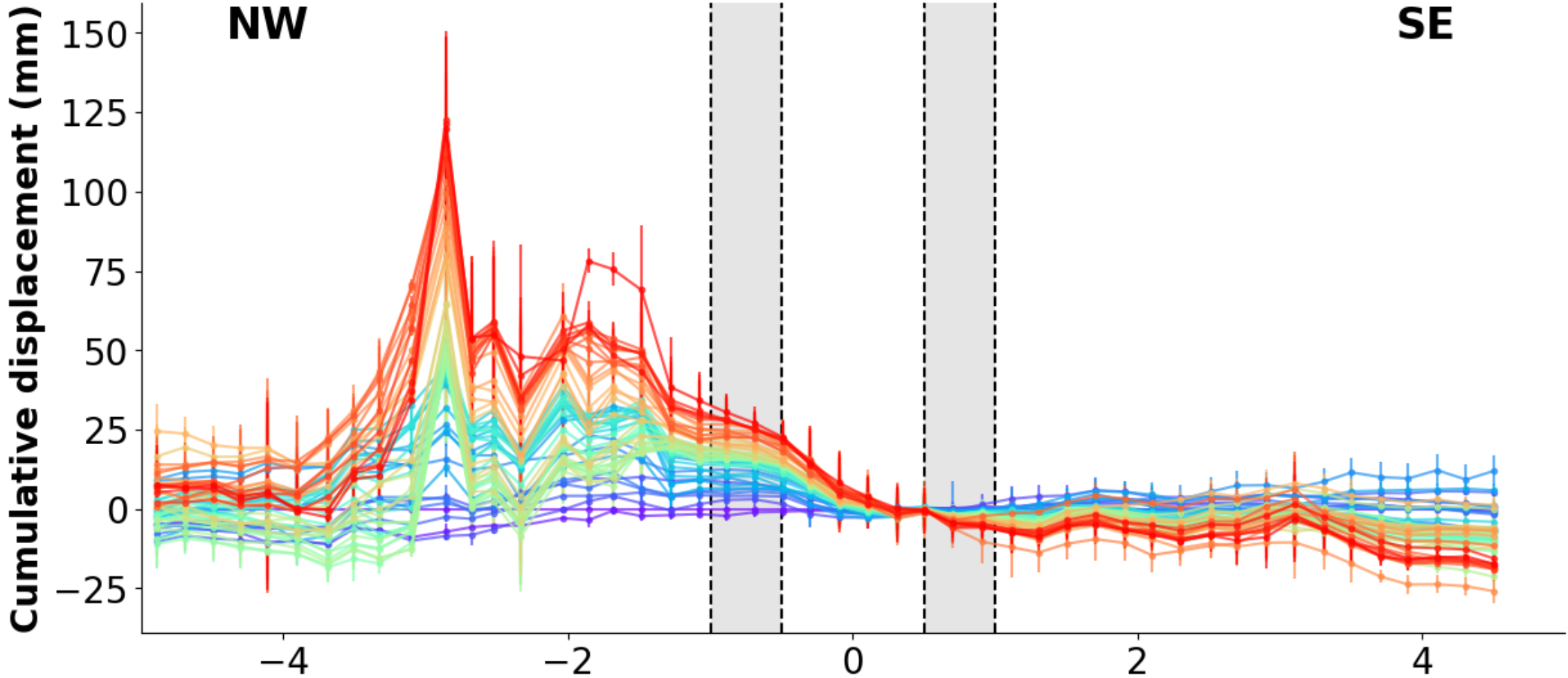
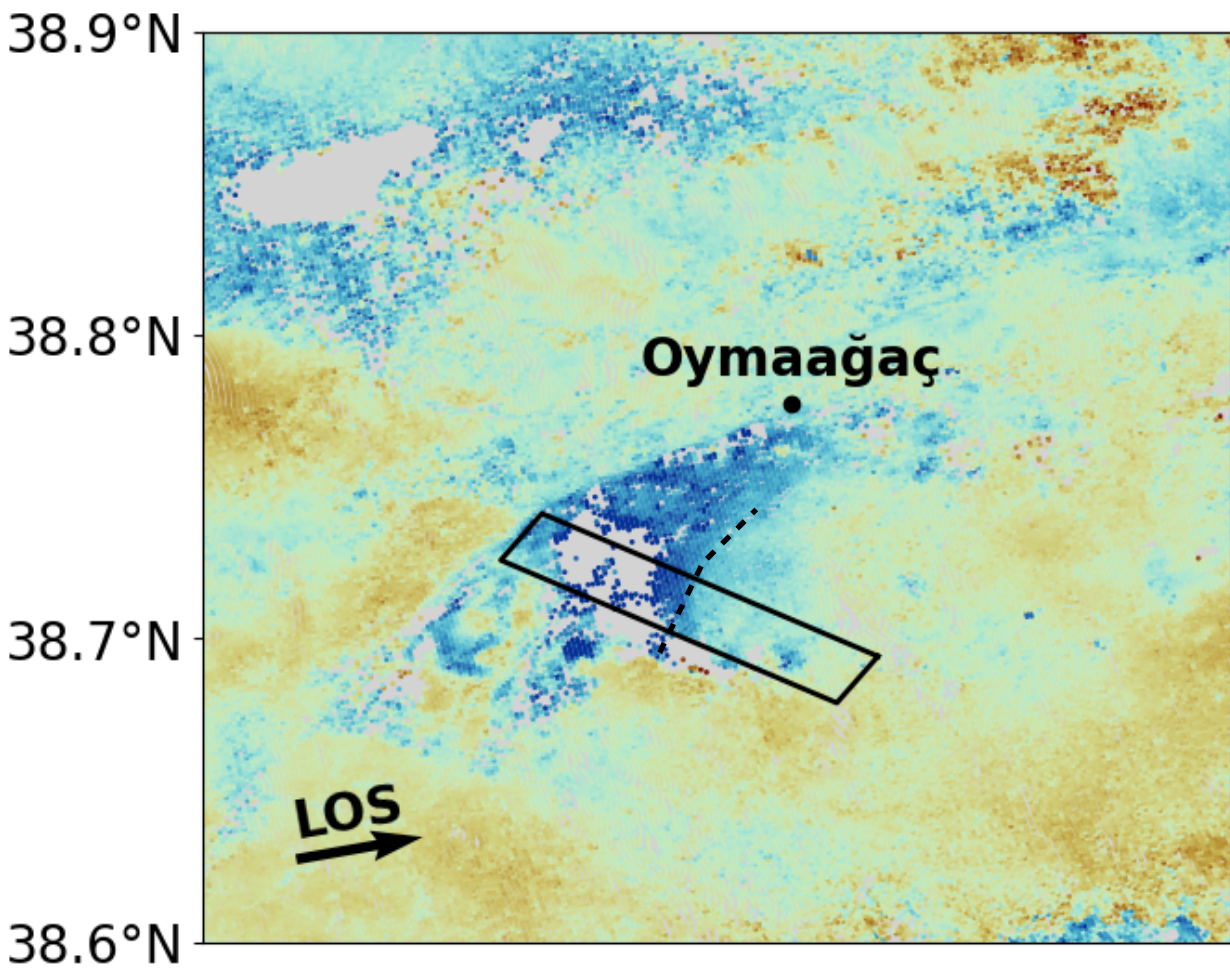


Accelerated normal faulting and subsidence W of Kayseri

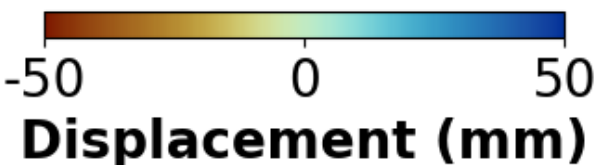
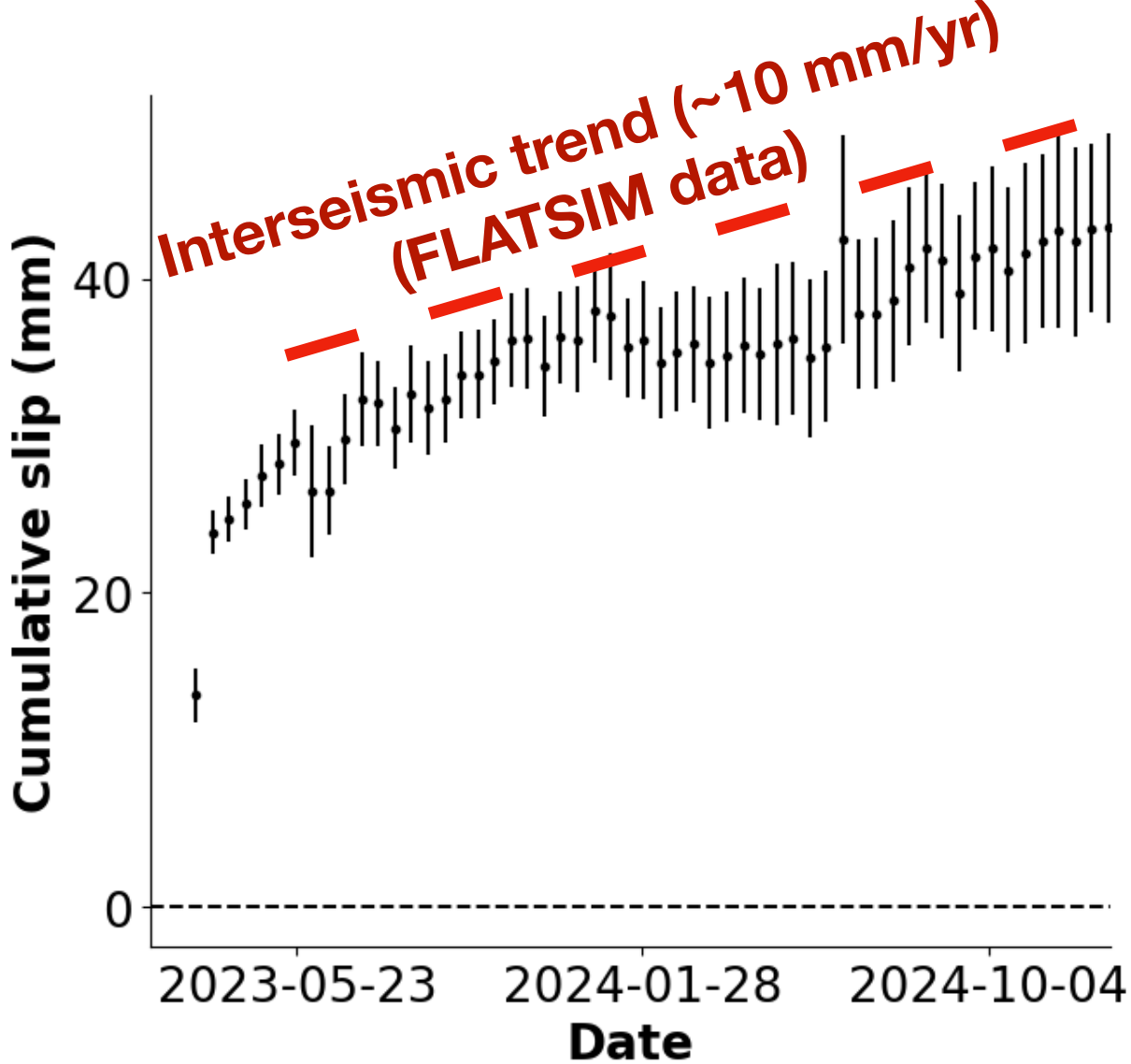
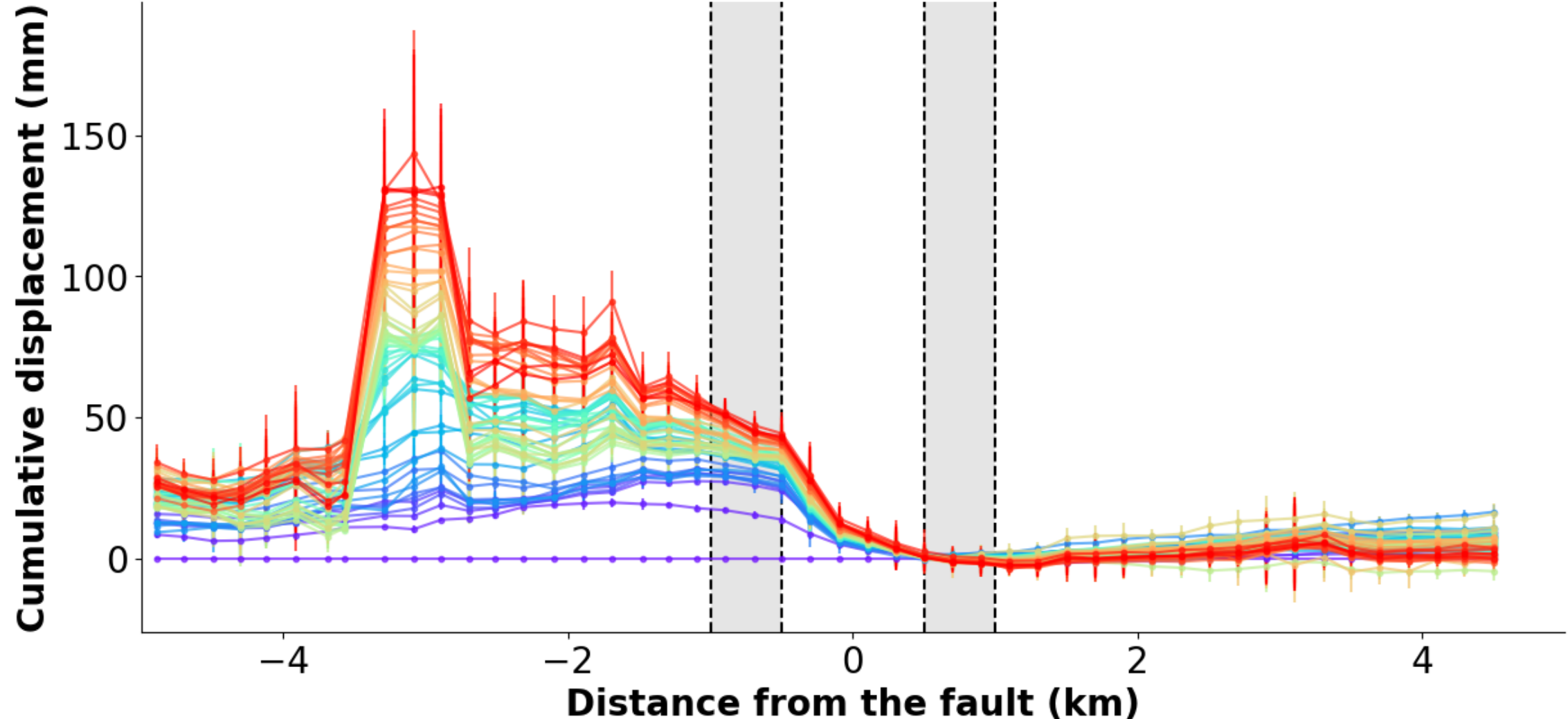
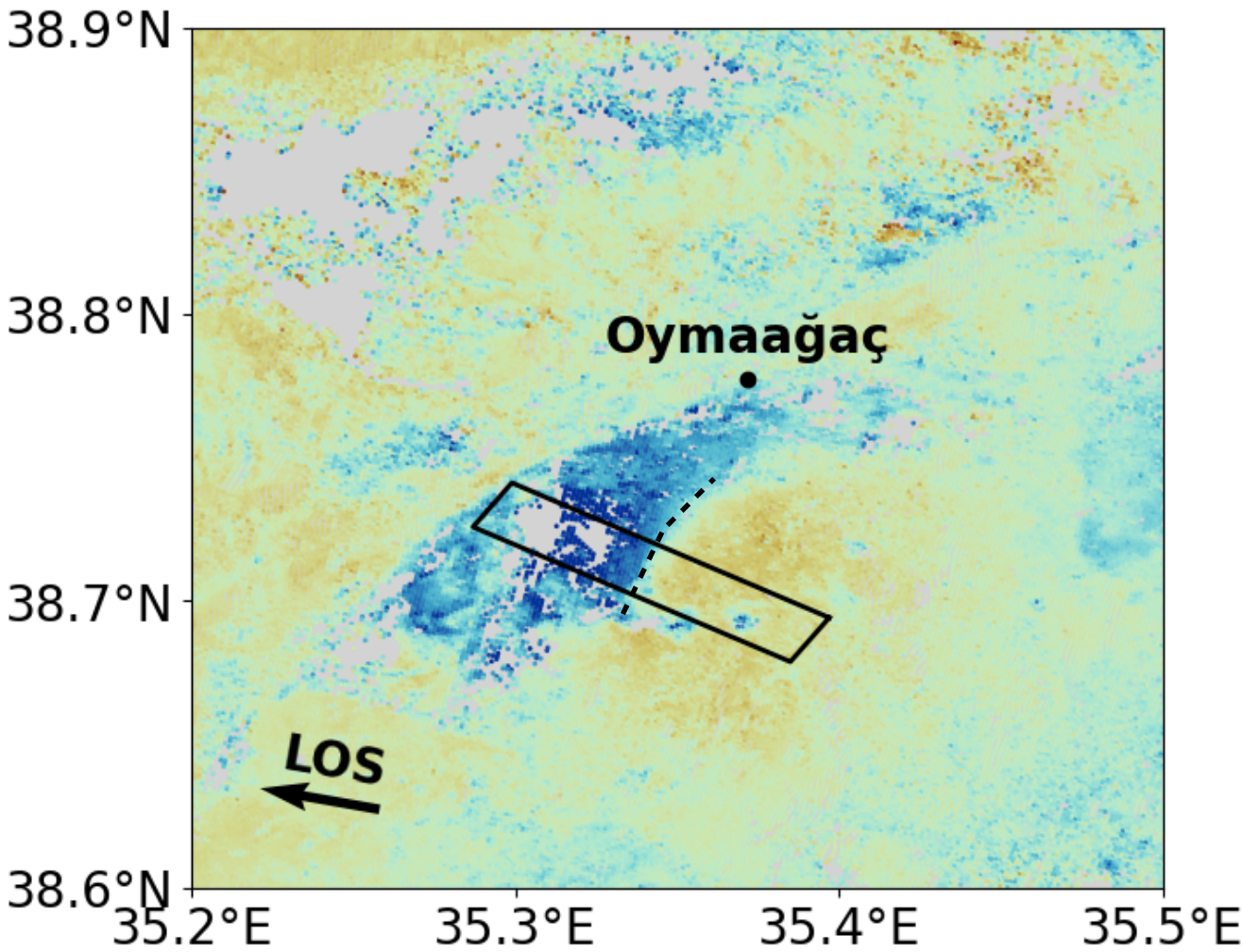
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T14

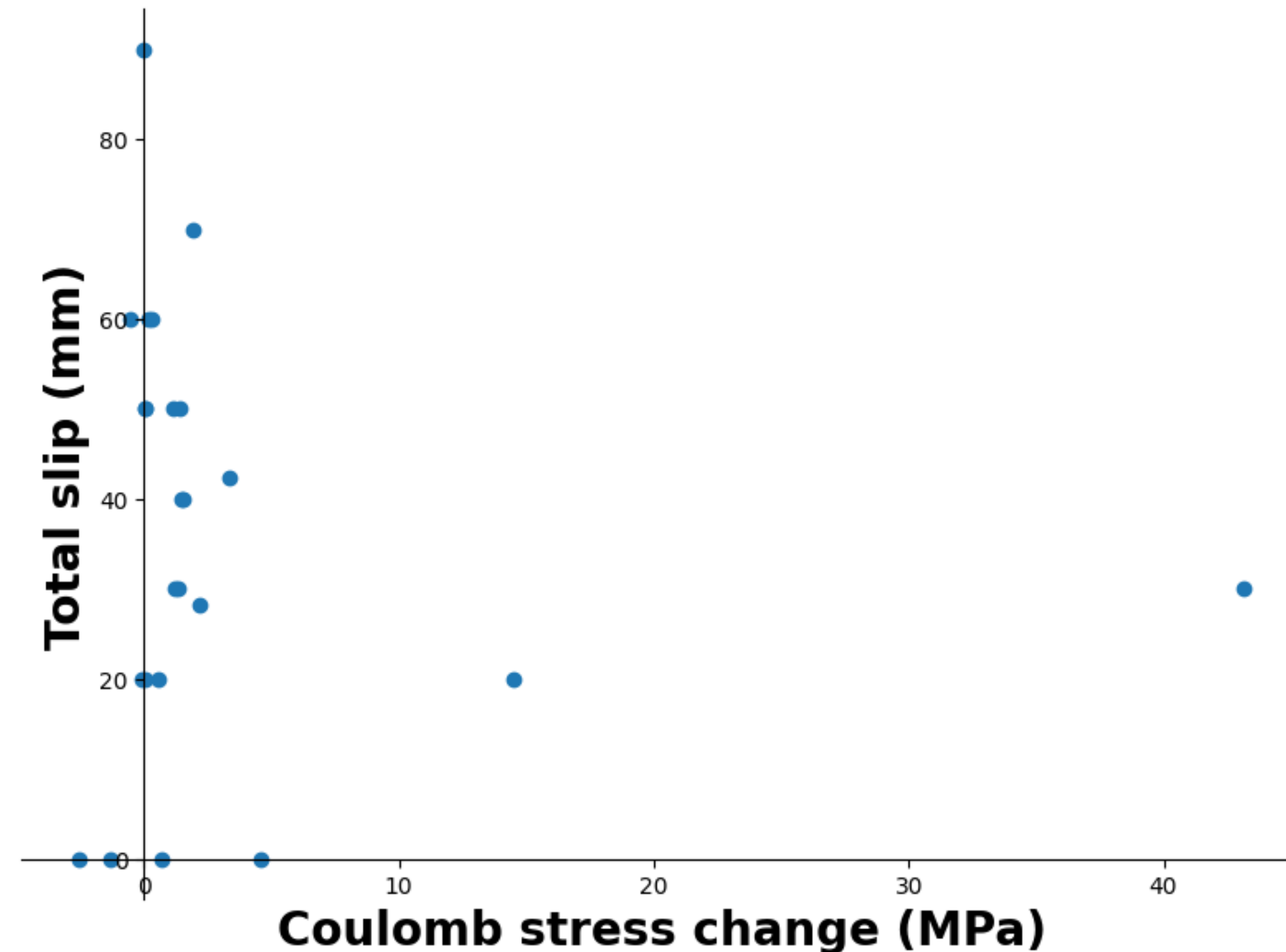


T94



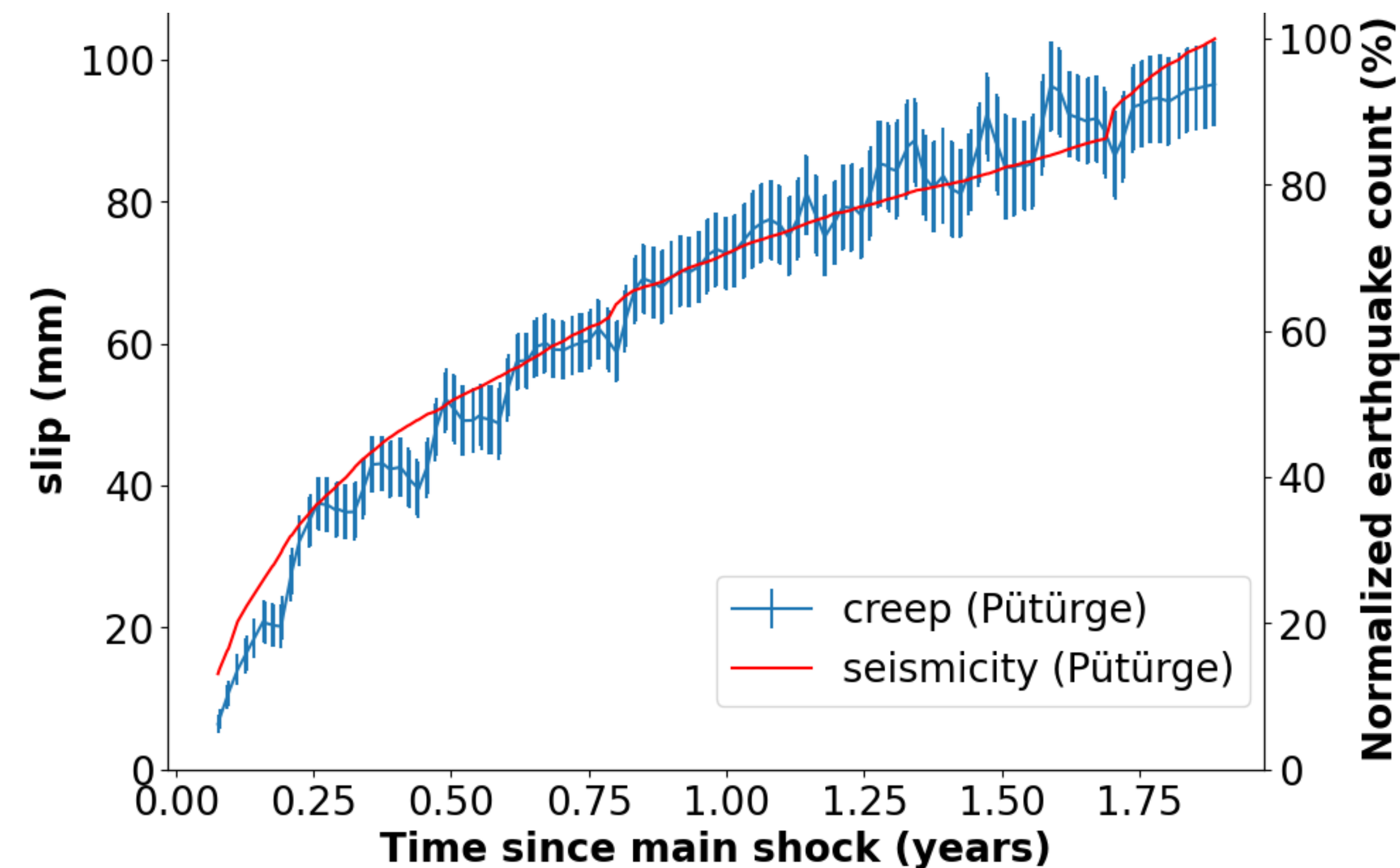
Postseismic creep triggered on secondary faults :

- is generally **compatible with regional tectonic motion and enhanced by static Coulomb stress changes.**



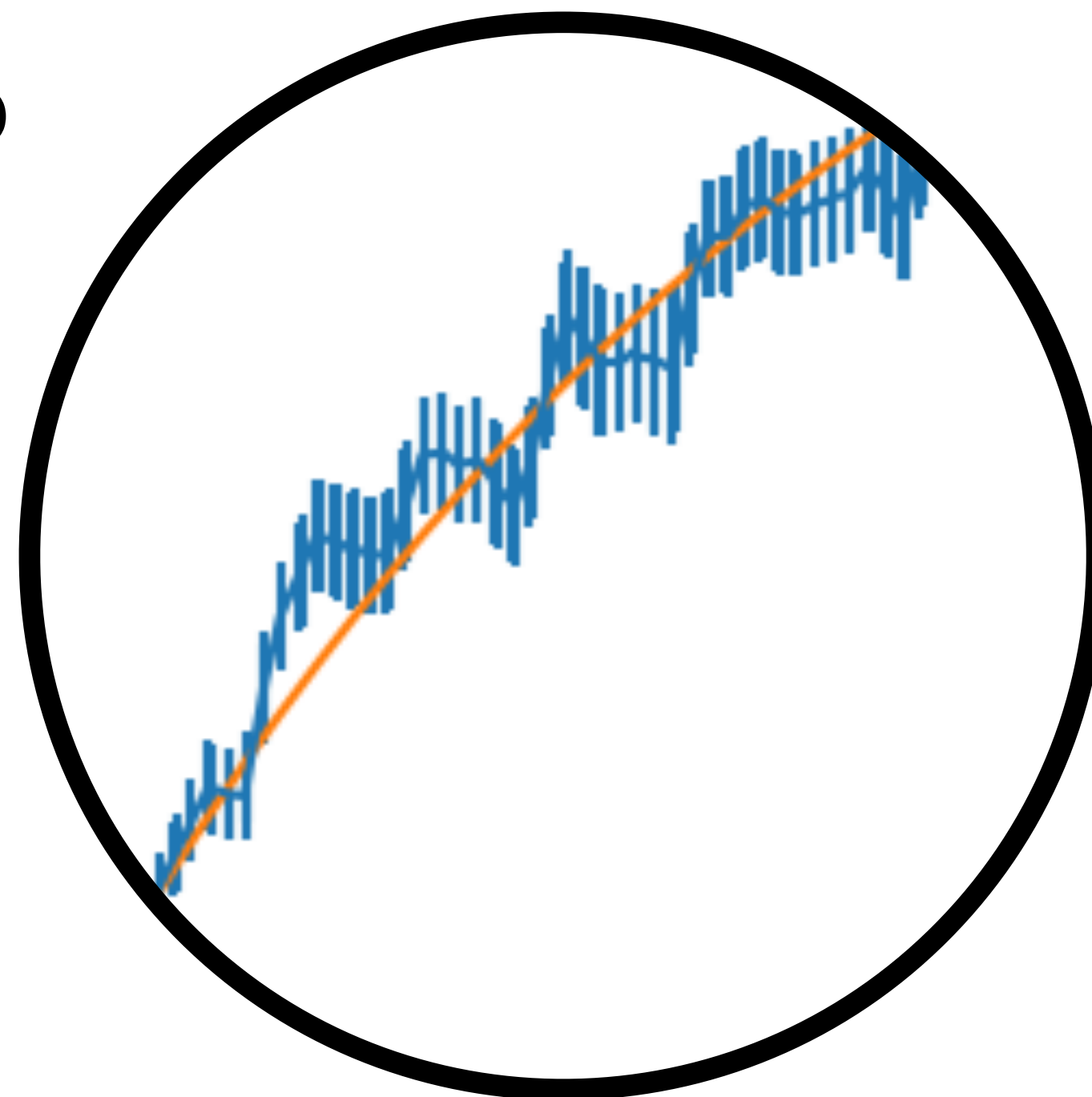
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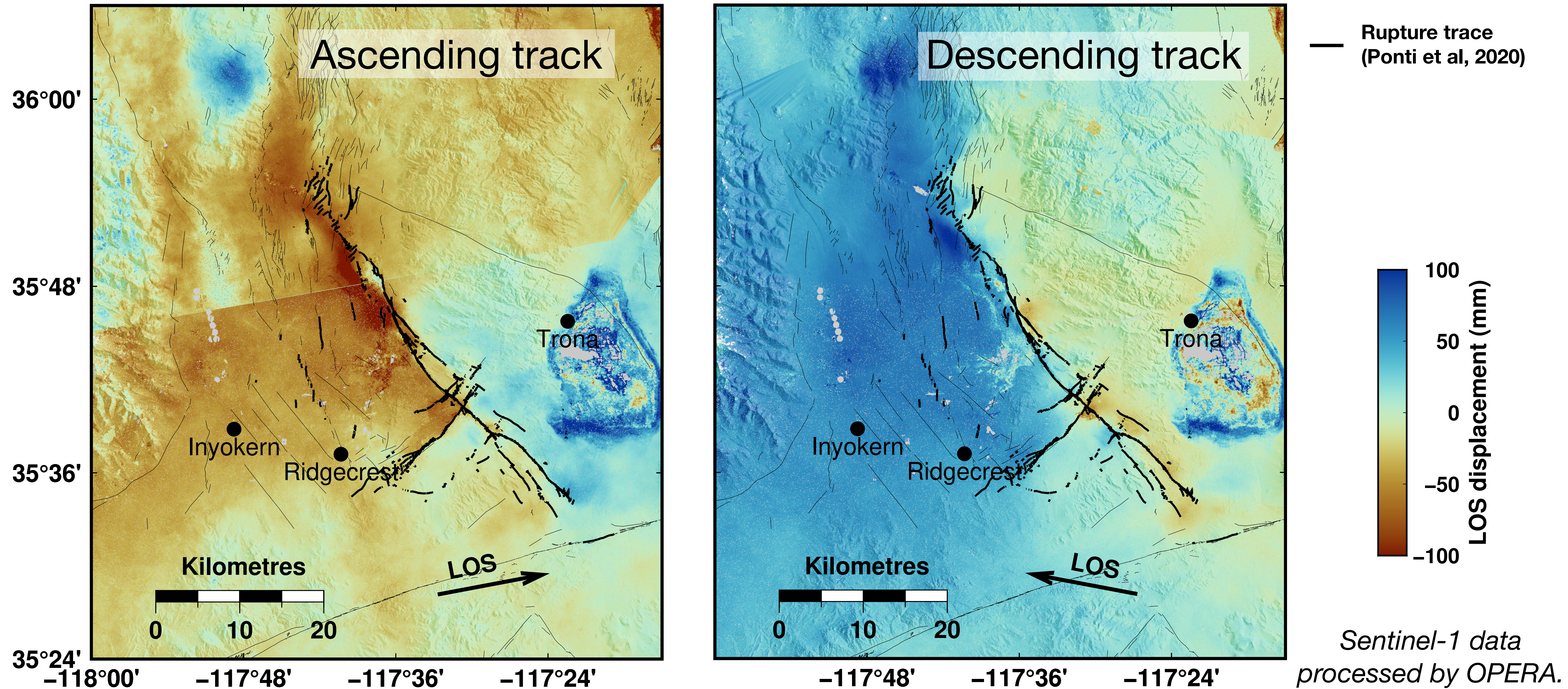


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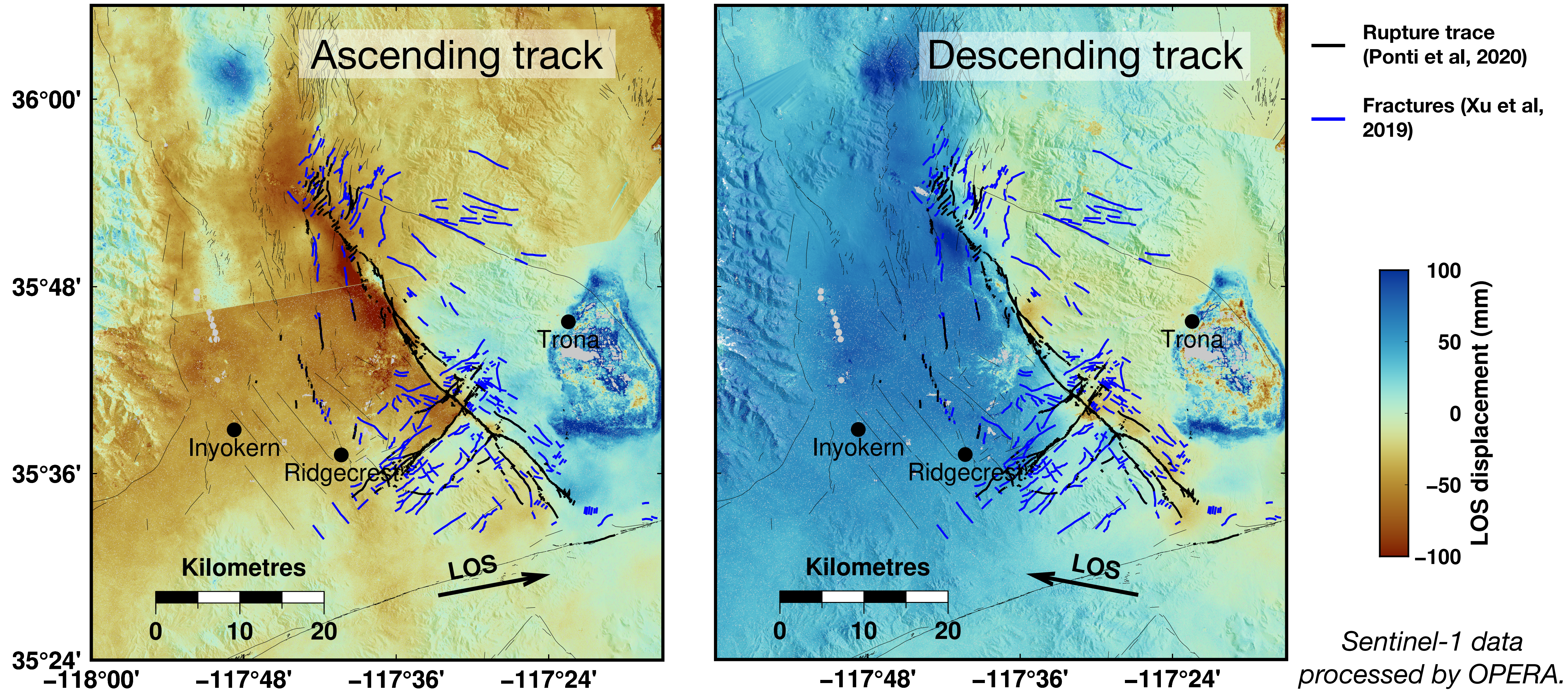
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Possible mechanisms: relaxation of coseismic static stress changes, dynamic weakening of secondary faults after interseismic loading

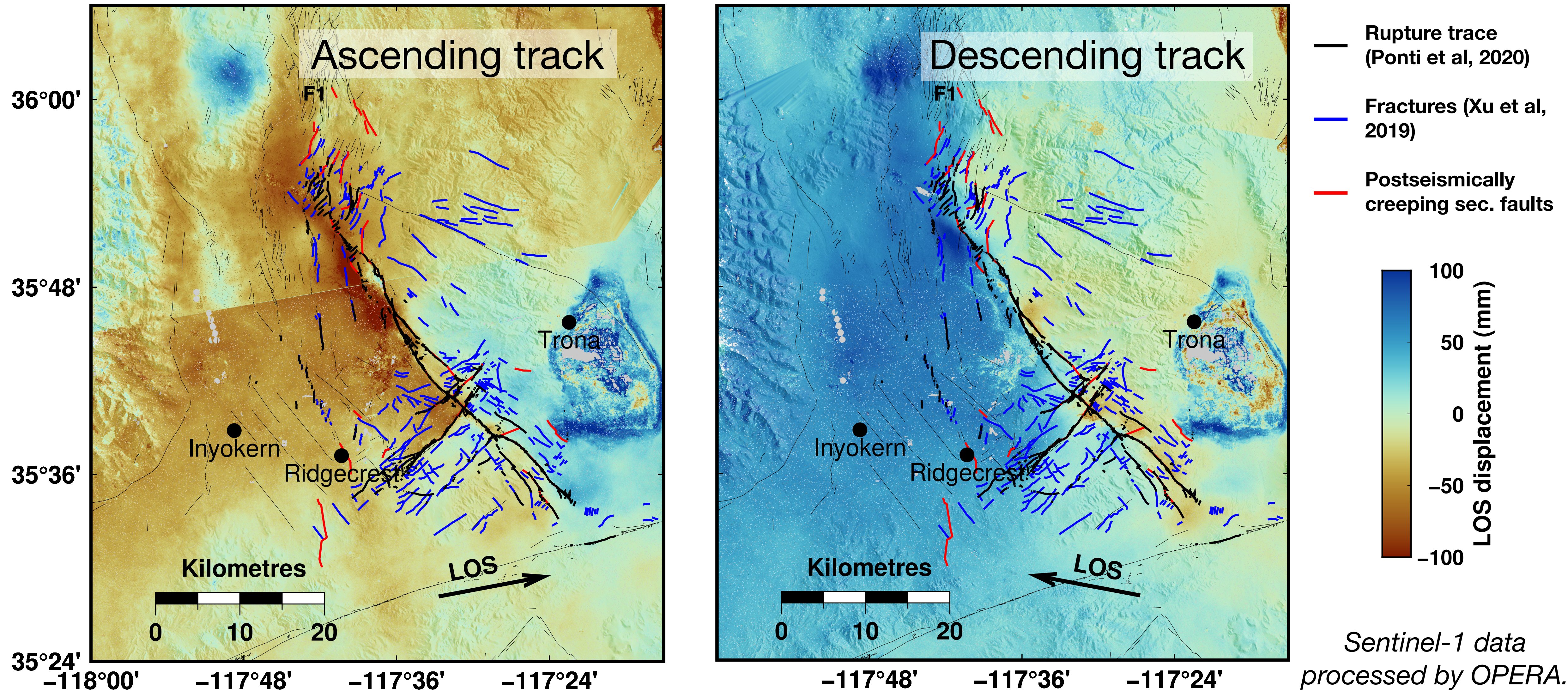
Cumulative 5-year postseismic displacement maps



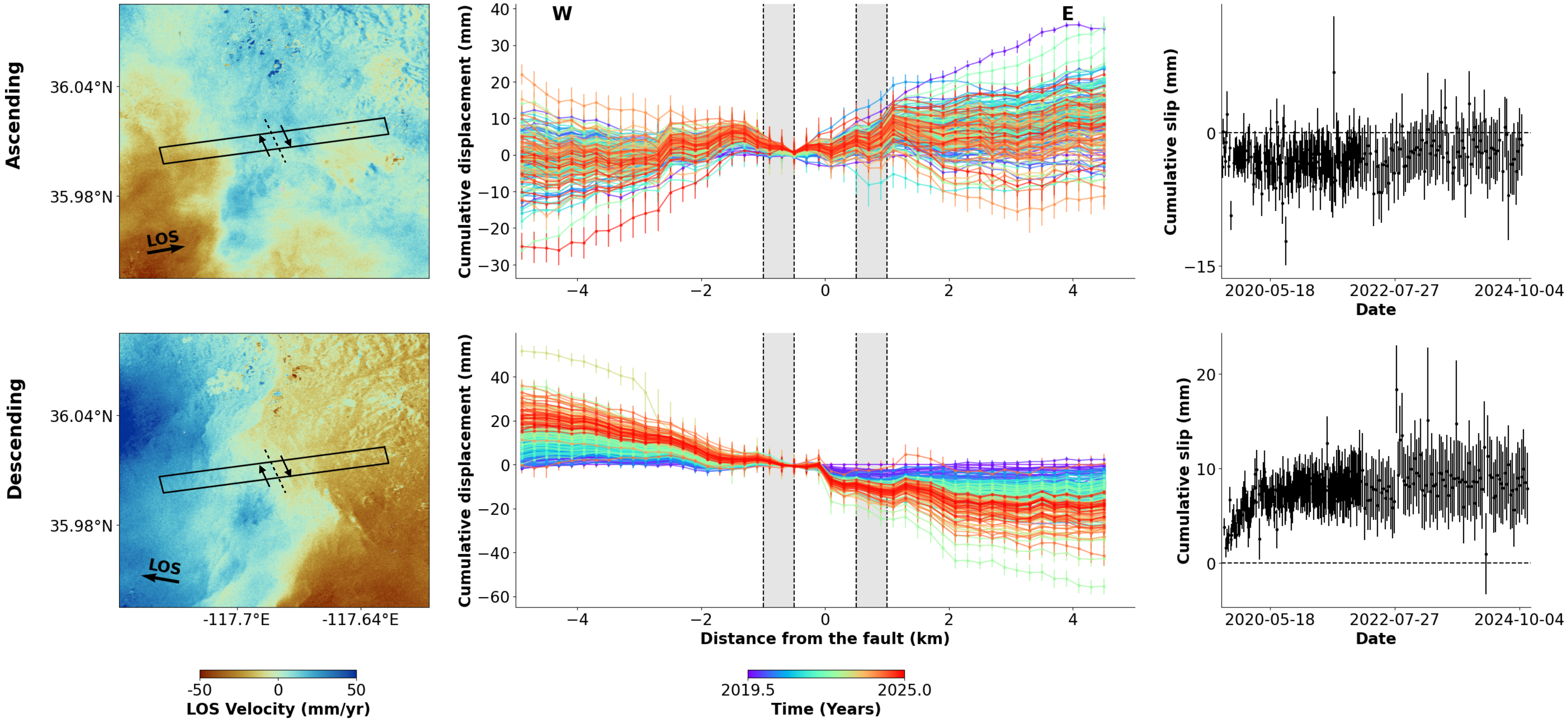
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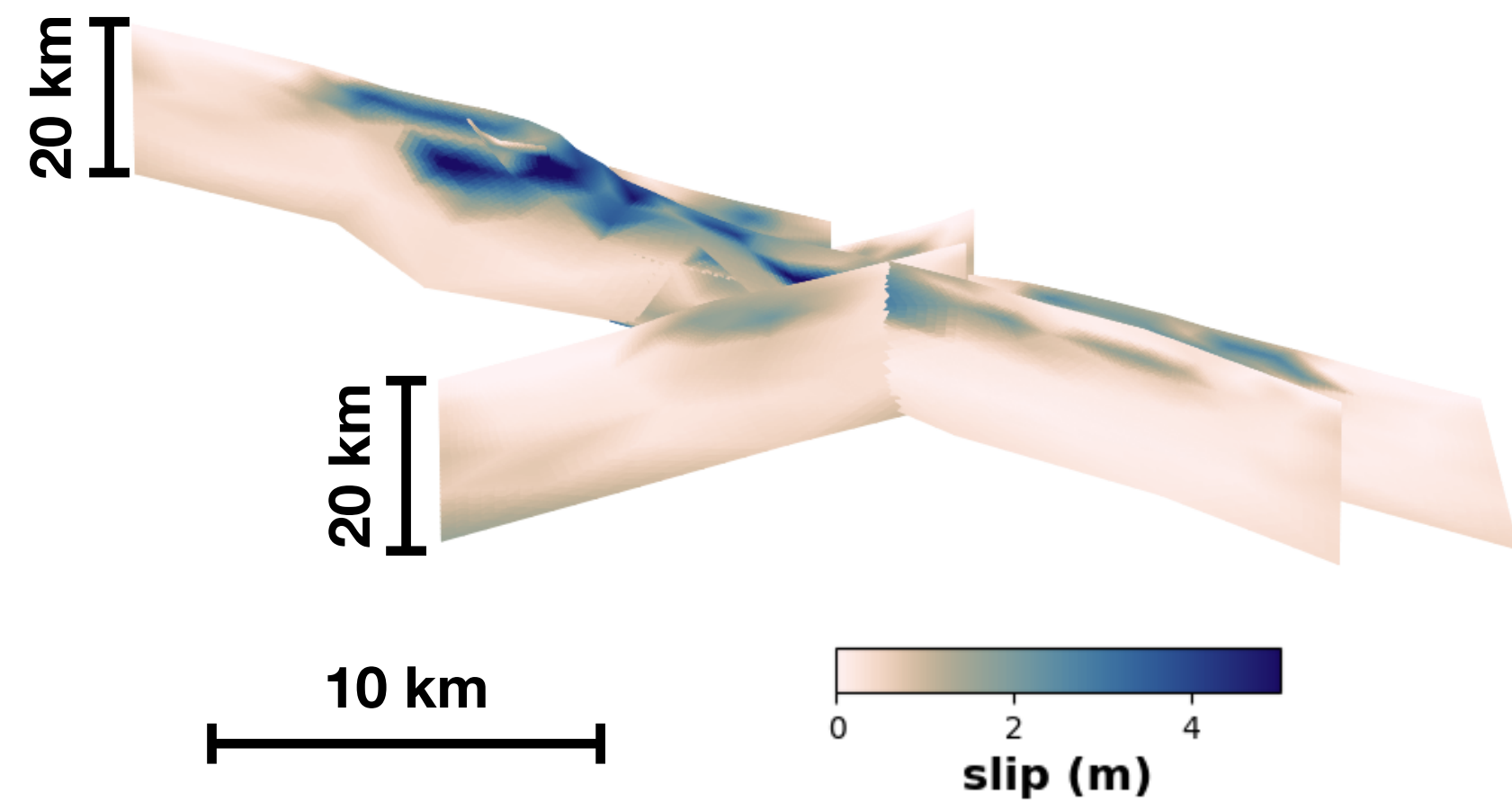
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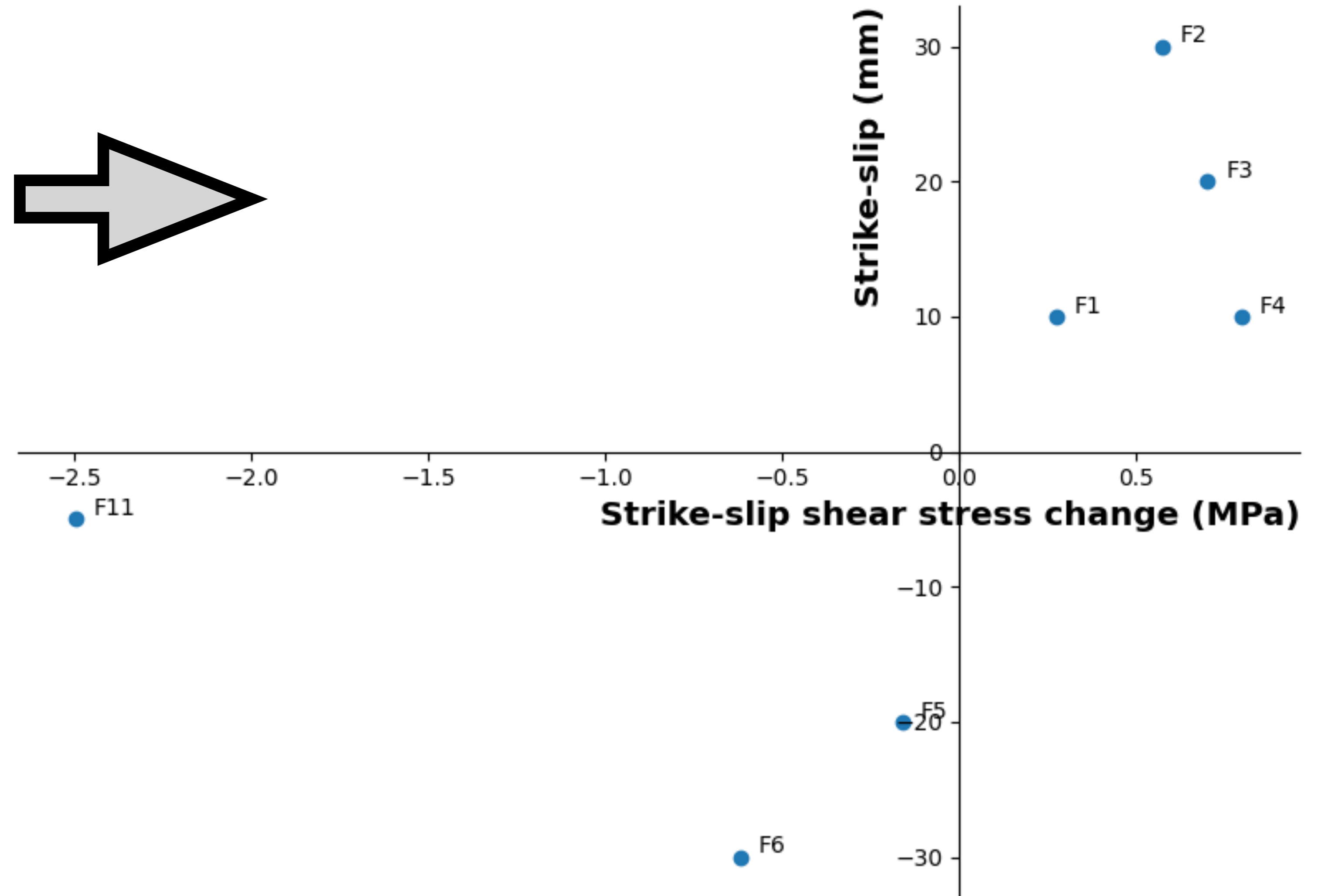
Cumulative postseismic LOS displacement profiles across fault F1



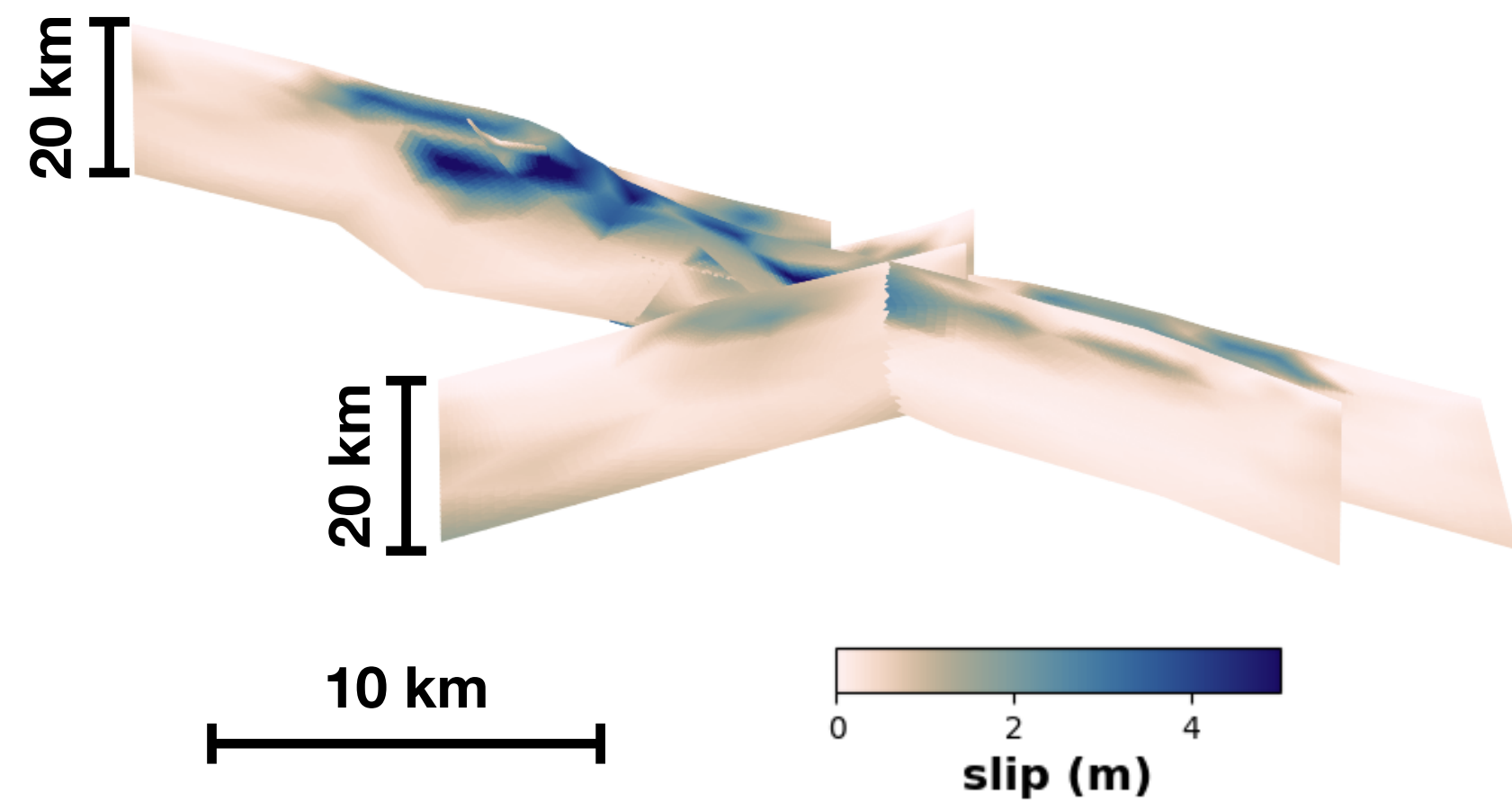
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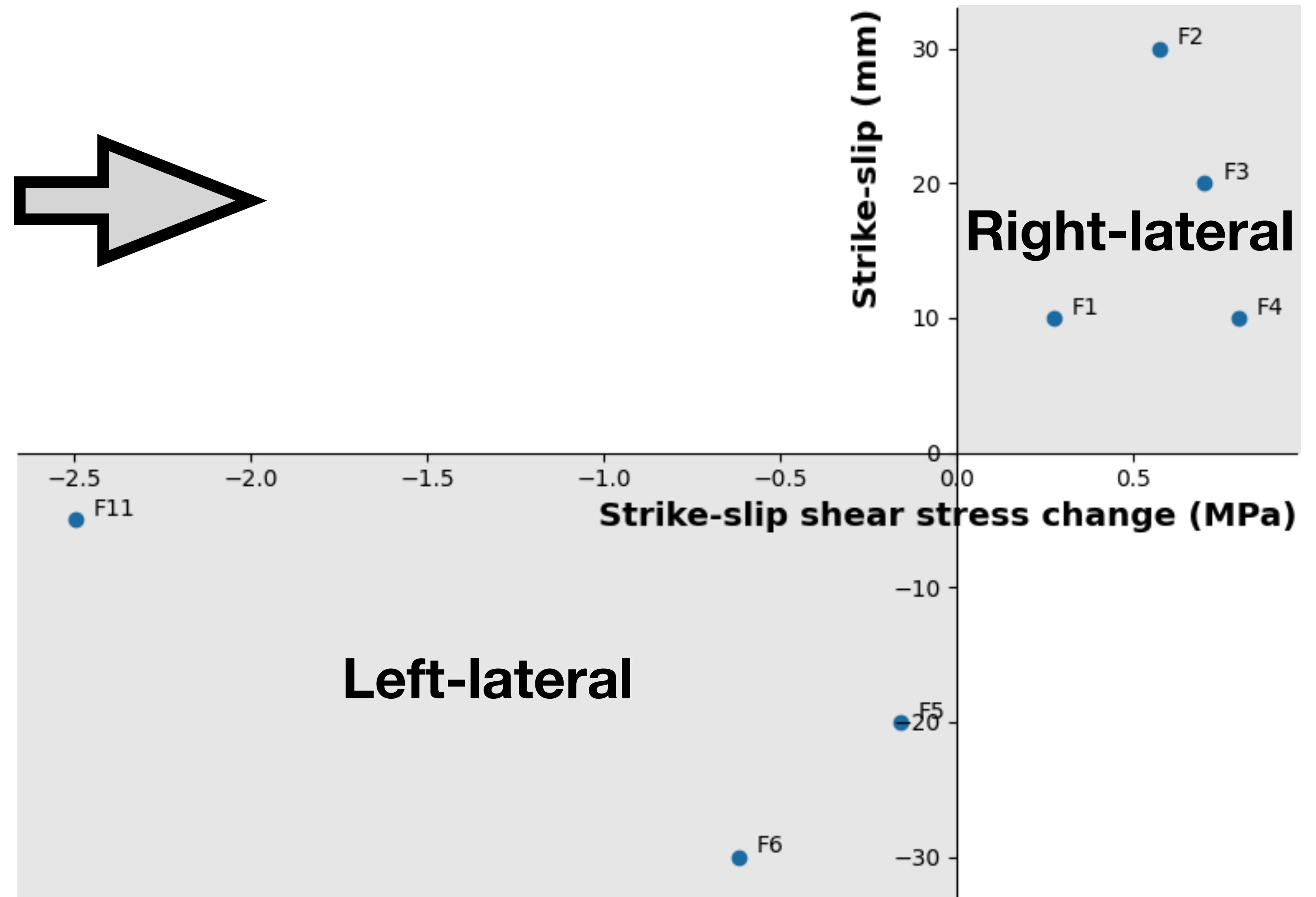
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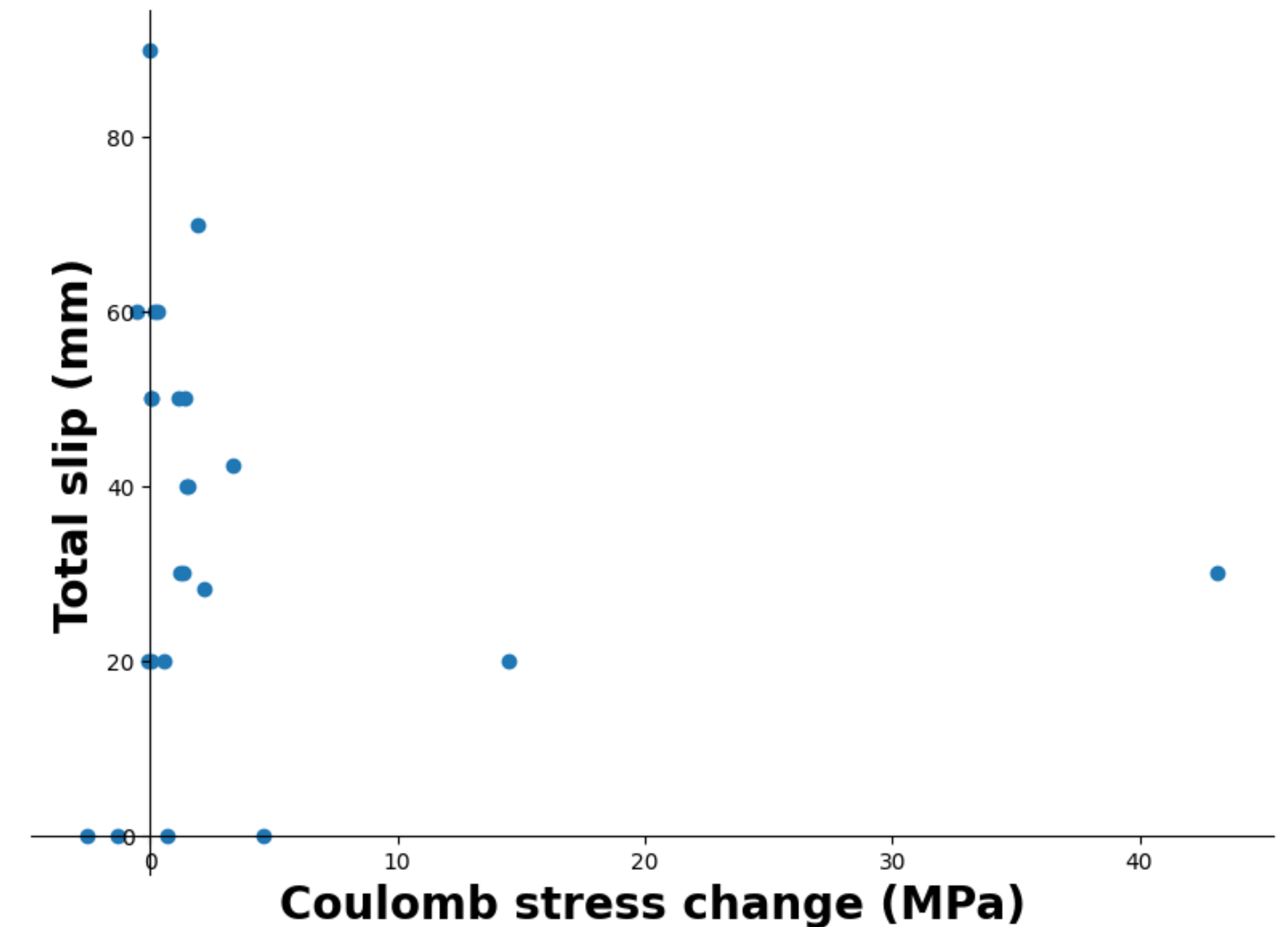


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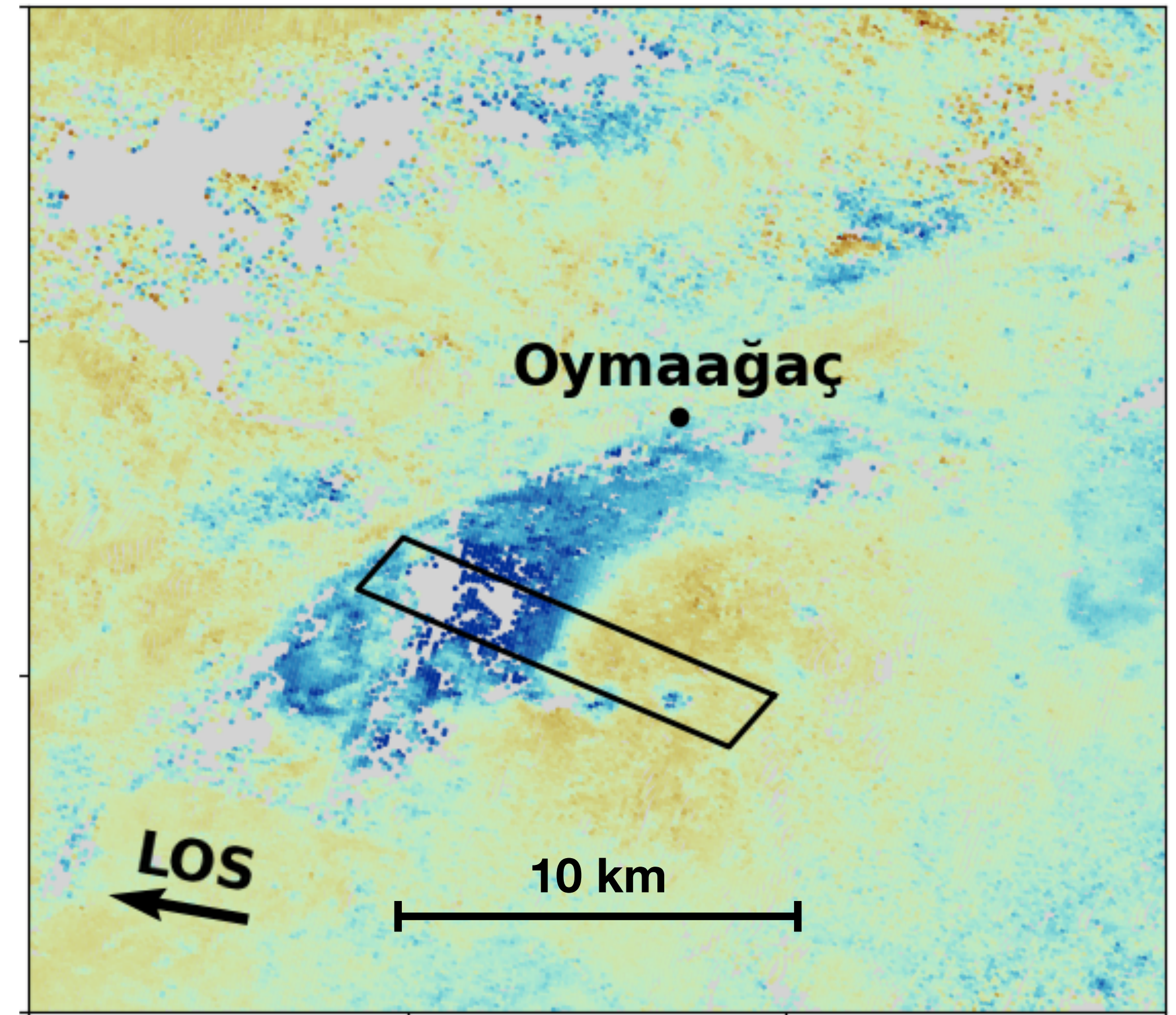


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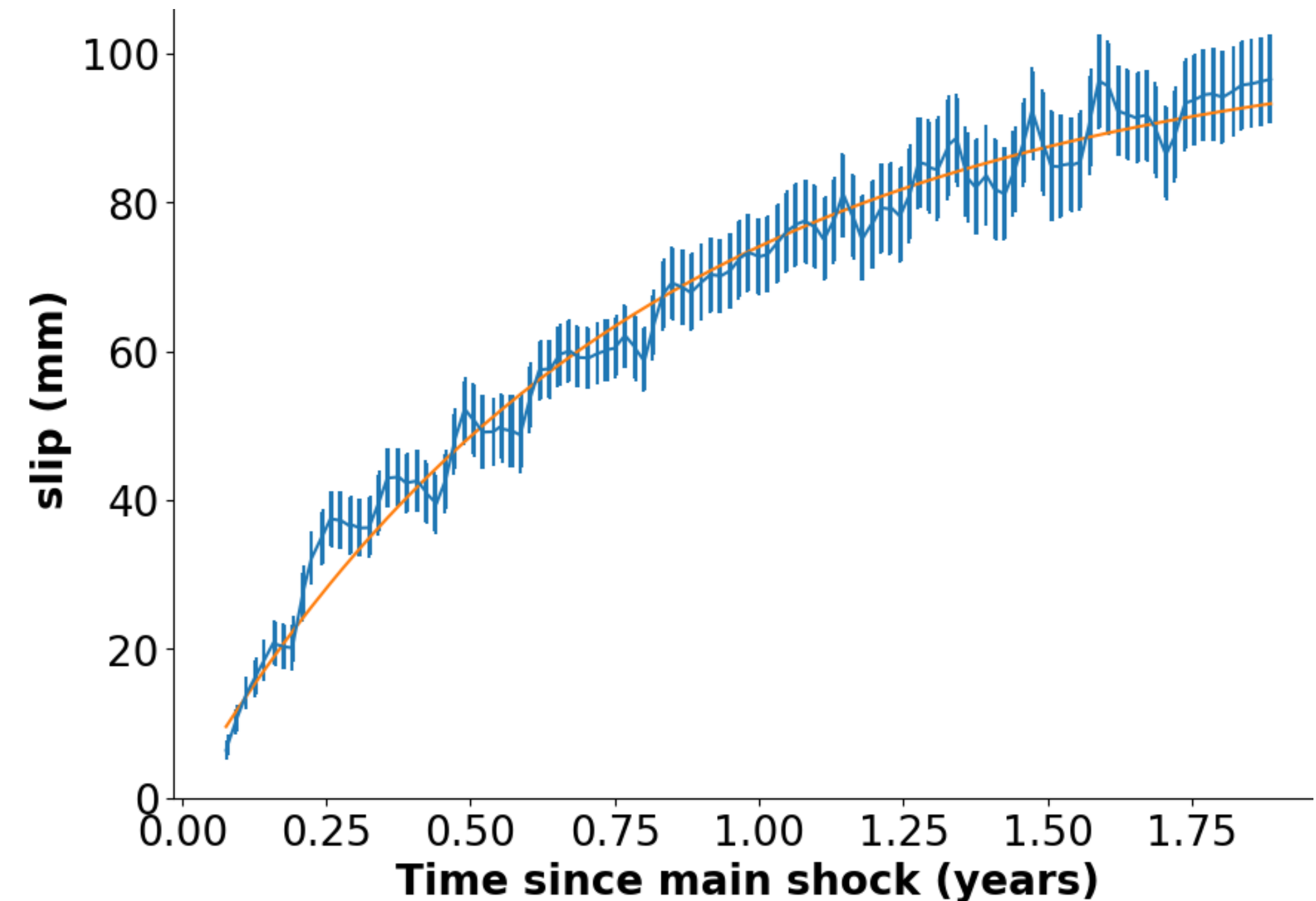
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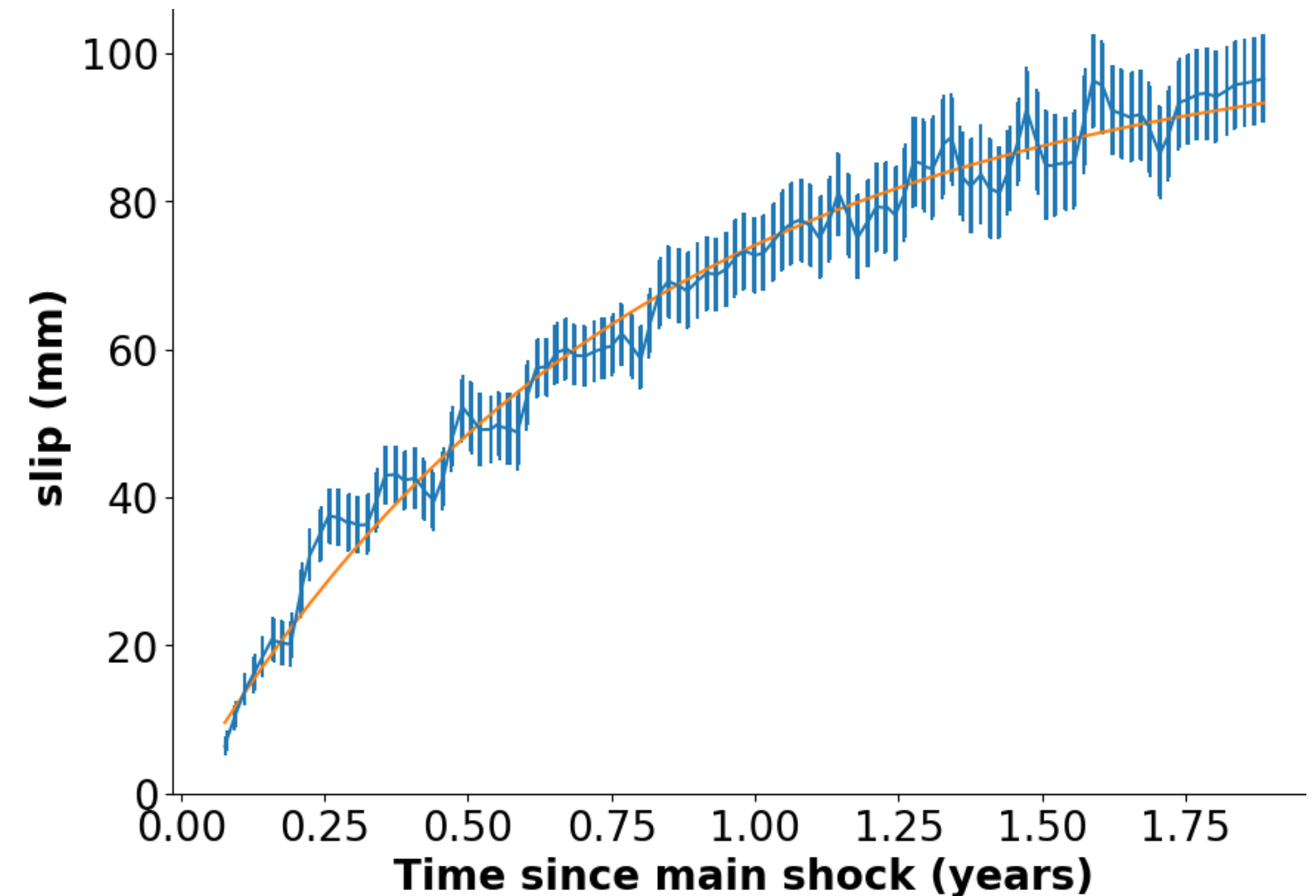
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Thank you for your attention!