Poster 075

A closer look at interseismic creep and postseismic deformation on the Pütürge segment of the East Anatolian Fault

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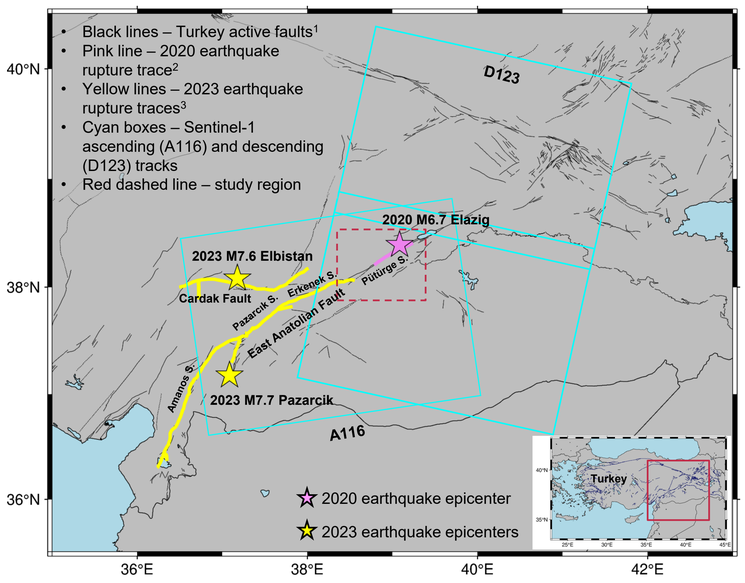
1. Motivation

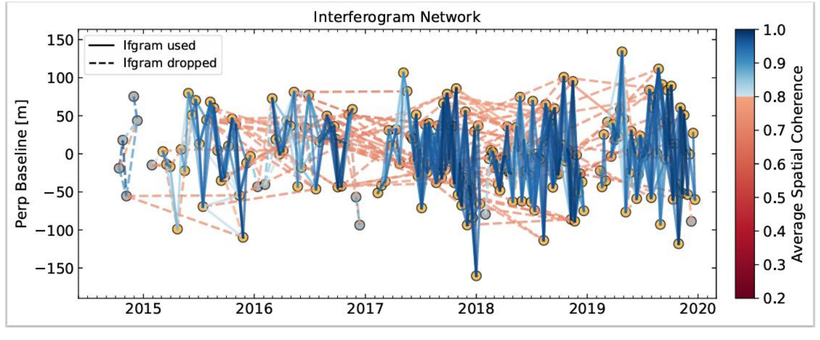
- Two large earthquakes have ruptured the East Anatolian Fault in recent years, leaving a ~30 km gap.
- Why did the Pazarcık earthquake fail to rupture the Pütürge segment?
- This study investigates **spatiotemporal variations of shallow creep behavior** along the Pütürge segment from 2014 to 2024.

Recent earthquakes on the East Anatolian Fault



2. InSAR Datasets

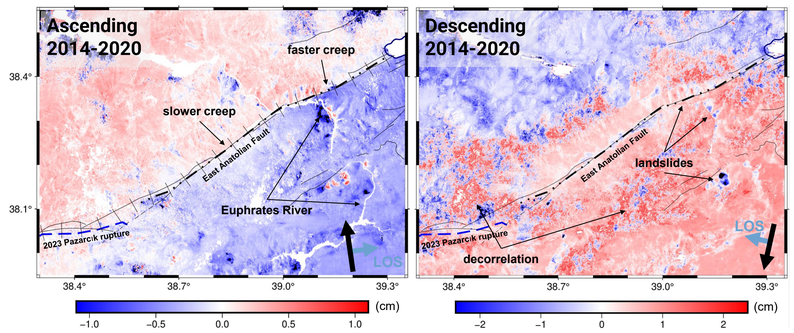
- Three periods: interseismic (2014-2020) and two postseismic (2020-2023 and 2023-2024), to exclude the Elazig and Pazarcık earthquakes.
- Combined, we processed over 2,000 interferograms.
- For track A116 (2014-2020, 2020-2023): we use ARIA standard product Geocoded UNWrapped (GUNW) interferograms[4,5] for each period.
- For track A116 (2023-2024) and D123 (2014-2020, 2020-2023, 2023-2024), we use ISCE2 software to generate our own interferograms.



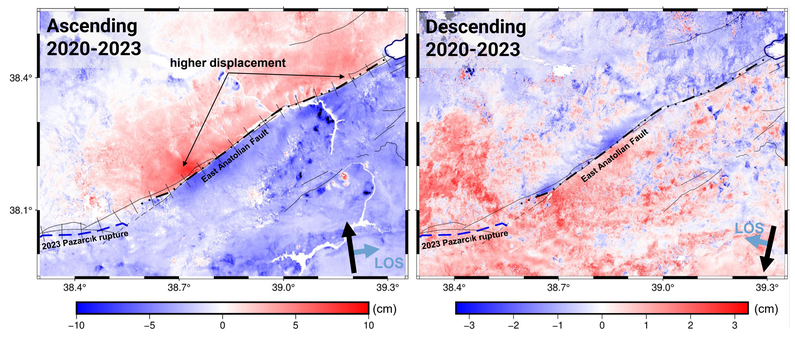
3. Methodology

MintPy software[6] is used to build the timeseries and generate velocity and cumulative displacement maps.

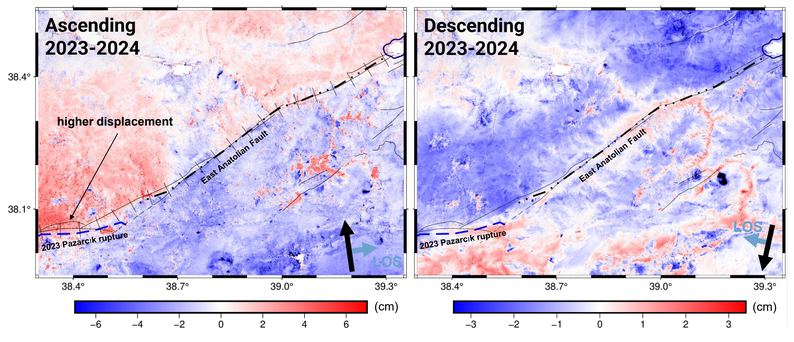
Velocity Maps: Interseismic Shallow Creep



Cumulative Displacement Maps: Post-Elazig Earthquake



Cumulative Displacement Maps: Post-Pazarcık Earthquake

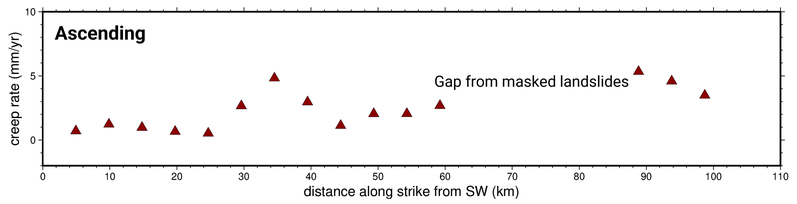


Red is motion towards the satellite.
Blue is motion away from the satellite.

4. Results

The velocity map is used to make the shallow creep rate distribution graph for the interseismic period, 2014-2020, when the displacement rate is linear.

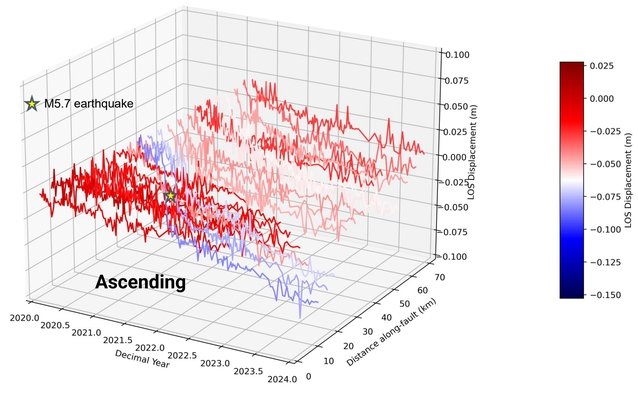
Creep Rate Distribution



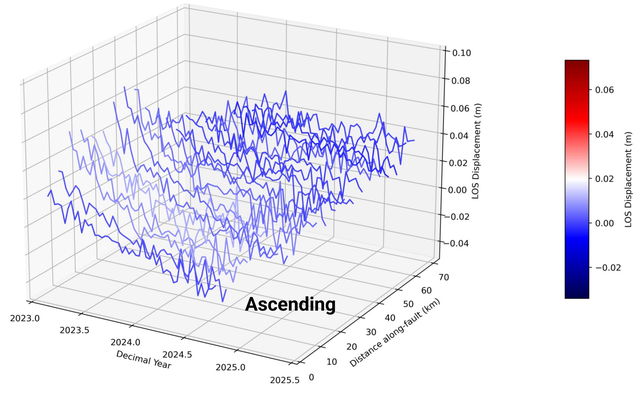
Time Series Graphs

We also generated time series graphs from the cumulative displacement maps for periods 2020-2023 and 2023-2024. The time series graphs are double-differenced to show the non-linear afterslip pattern.

Displacement Time Series: 2020-2023



Displacement Time Series: 2023-2024



5. Findings

- For the period 2014-2020, we observe creep rates up to ~0.5 cm/yr.
- For the period 2020-2023, cumulative afterslip is up to 12 cm.
- For the period 2023-2024, up to 12 cm of afterslip is also observed.

Acknowledgements

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References

1 Emre et al., 2018
2 Cakir et al., 2023
3 Reitman et al., 2023
4 Buzzanga et al., 2020
5 Dataset: ARIA S1 GUNW, NASA 2023. Contains modified Copernicus Sentinel data, retrieved from ASF DAAC June 20,2025
6 Yunjun et al., 2019