Ten years of Sentinel-1 data:
Recent advances and future perspectives in geohazard monitoring and engineering applications

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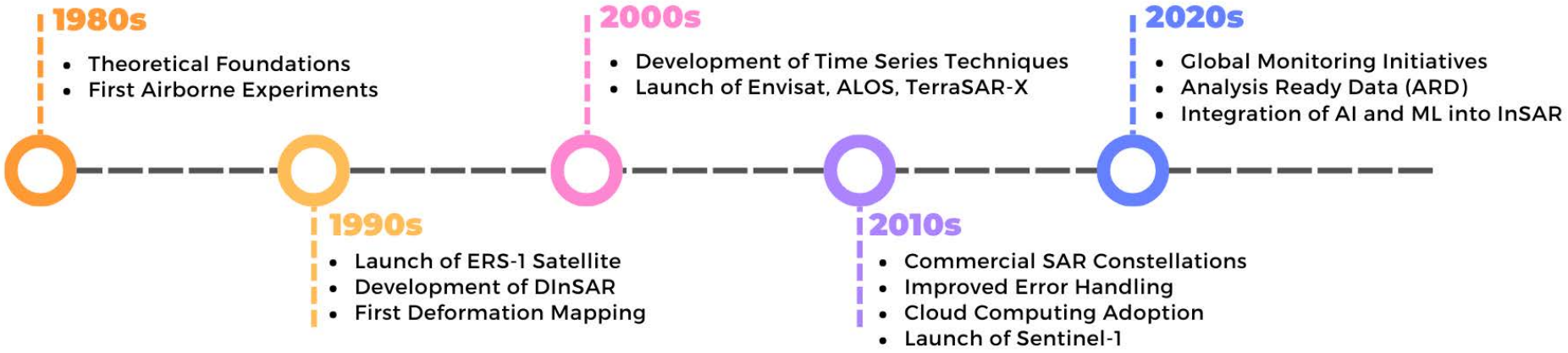
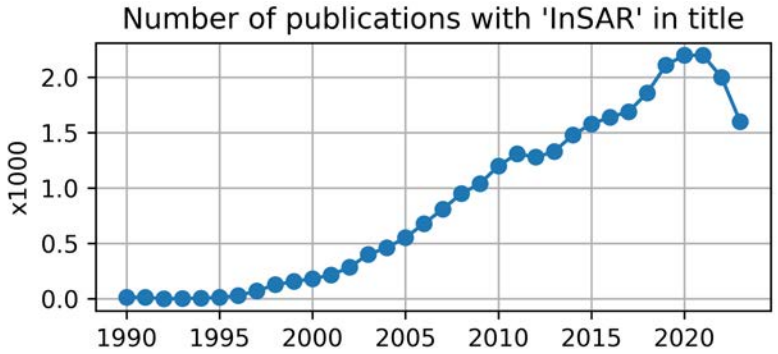
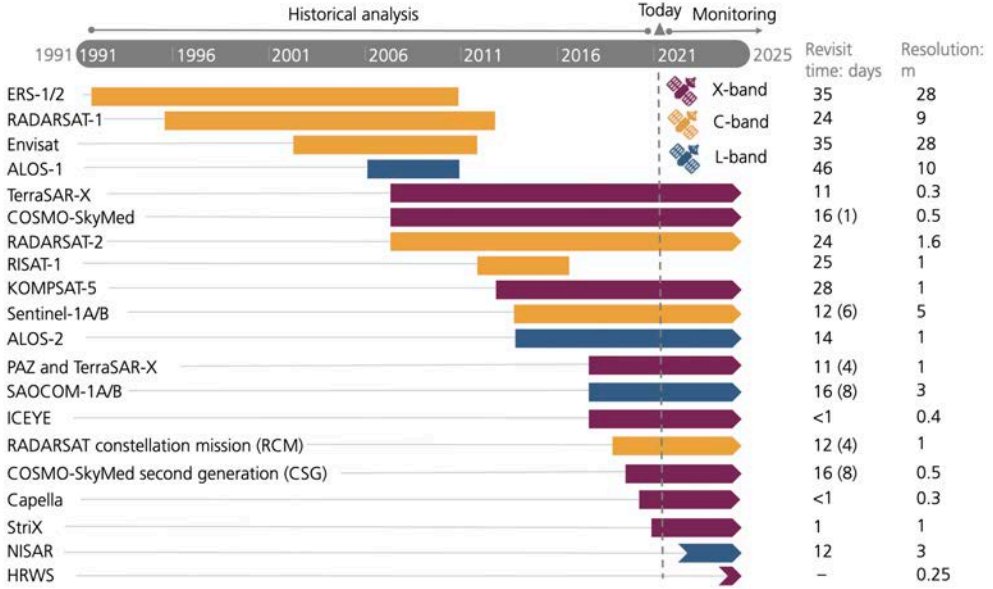
A Brief History of InSAR* for Deformation Mapping

*Interferometric Synthetic Aperture Radar

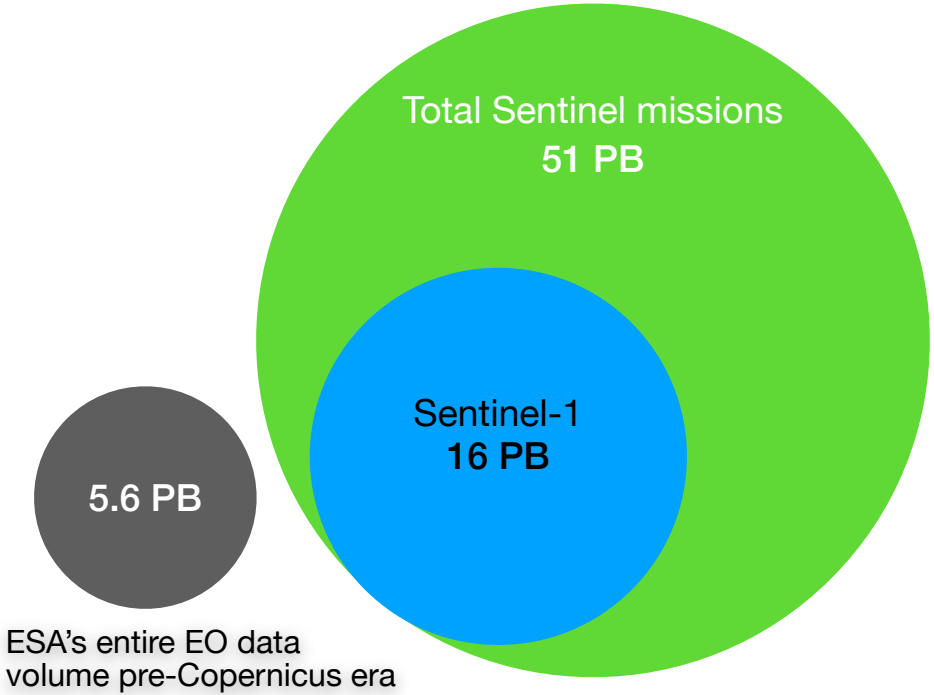


Rapid Growth of InSAR Applications

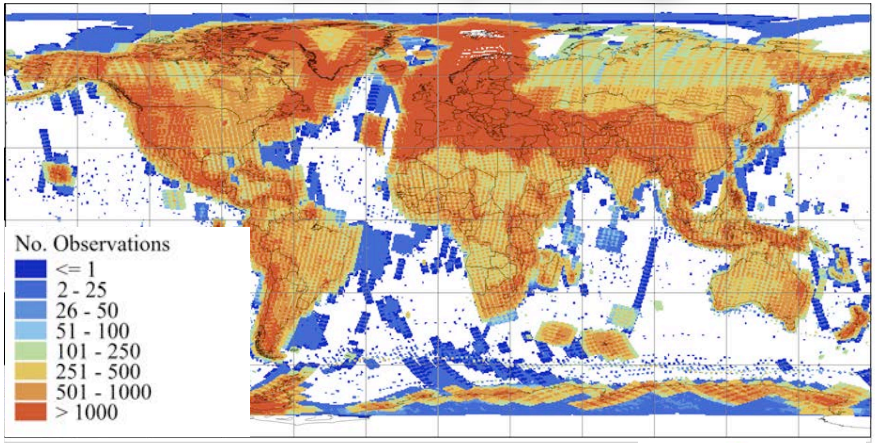




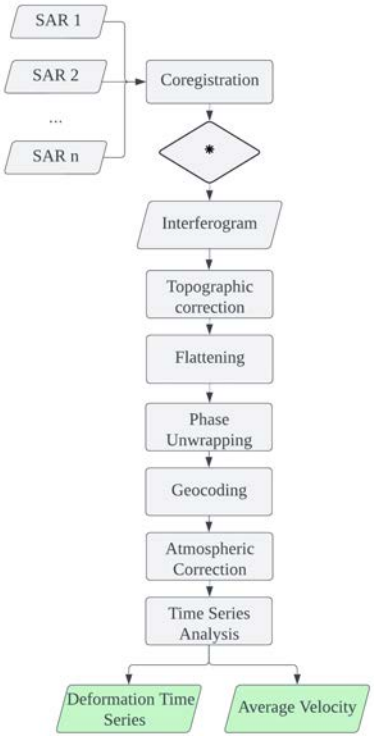
Comprehensive Global Coverage of Sentinel-1

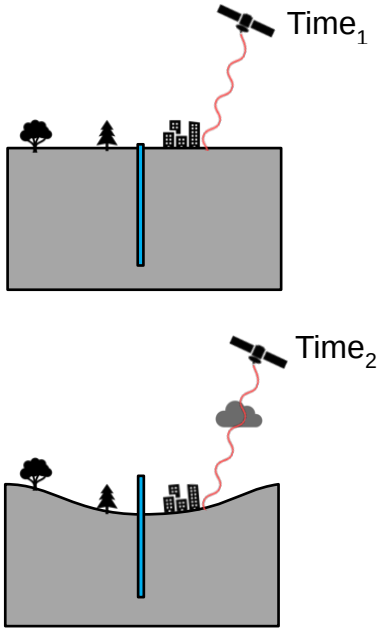


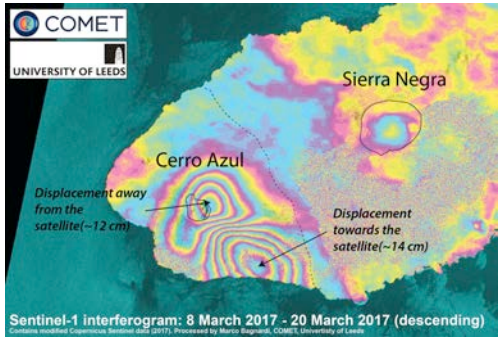
Sentinel-1's global coverage



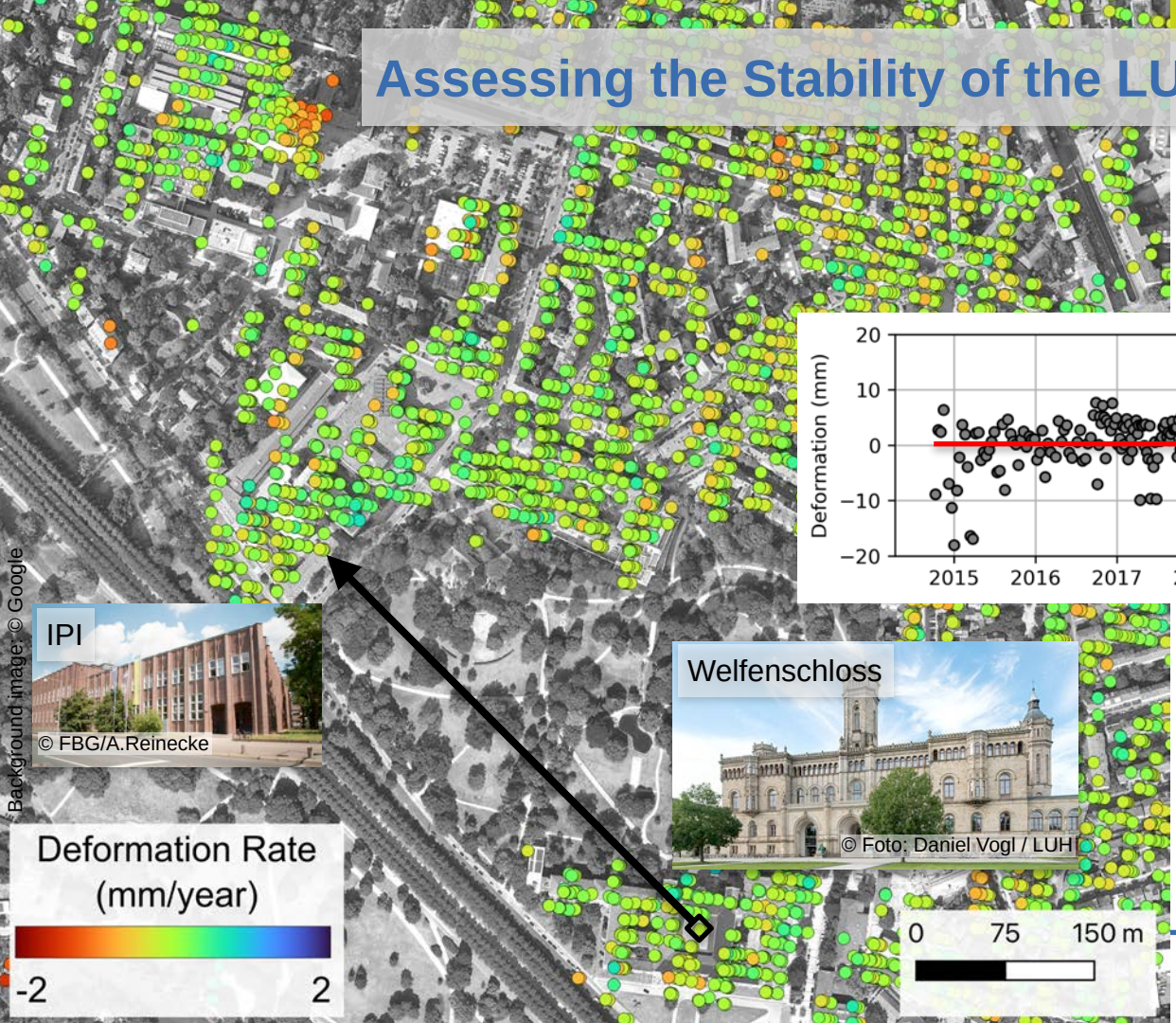
How InSAR Maps Deformation

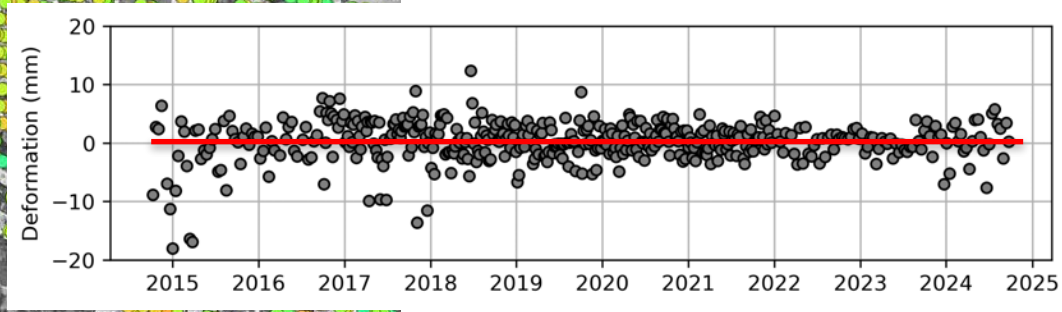






Assessing the Stability of the LUH Campus





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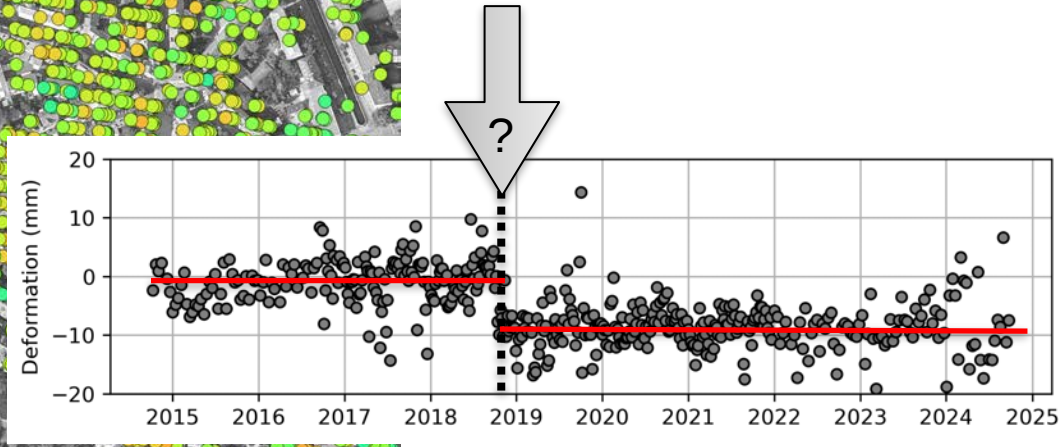
Assessing the Stability of the LUH Campus



Background image: © Google

Deformation Rate
(mm/year)
-2
2

0 75 150 m

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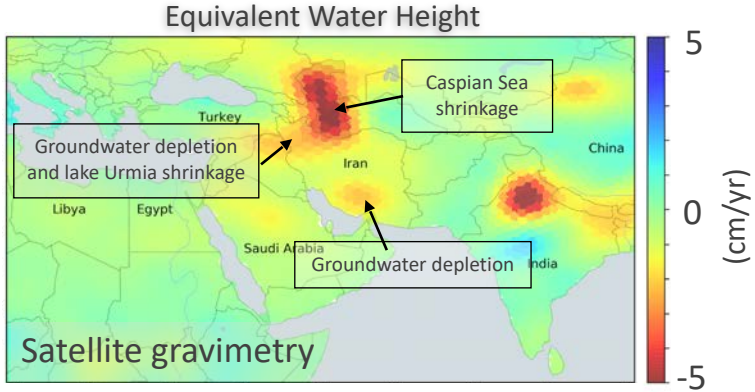
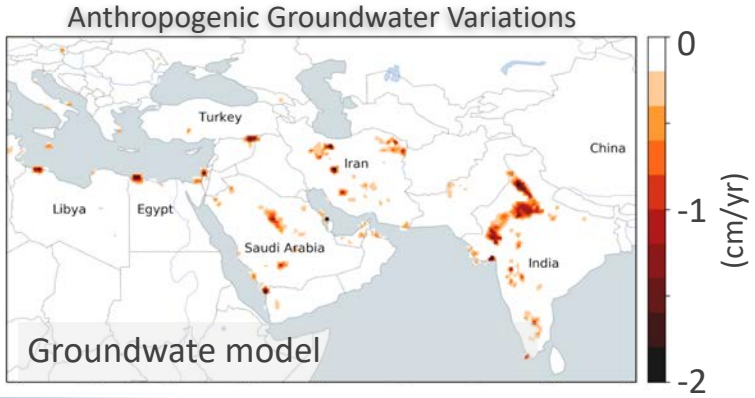
Geohazard Applications of InSAR Technology

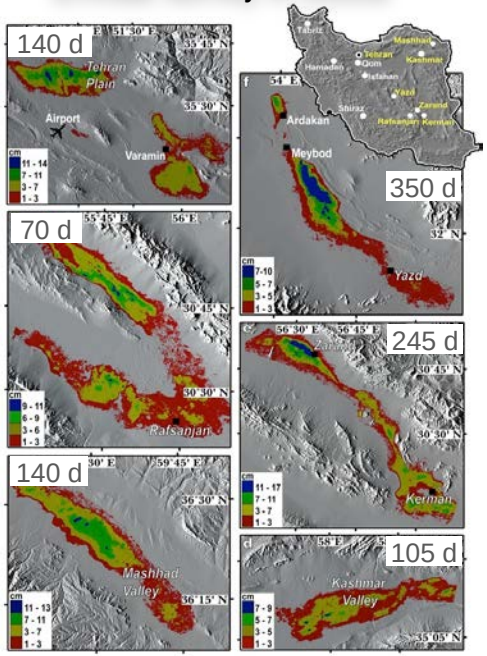




Danger of subsidence, natural gas pipeline leakage, and explosion.

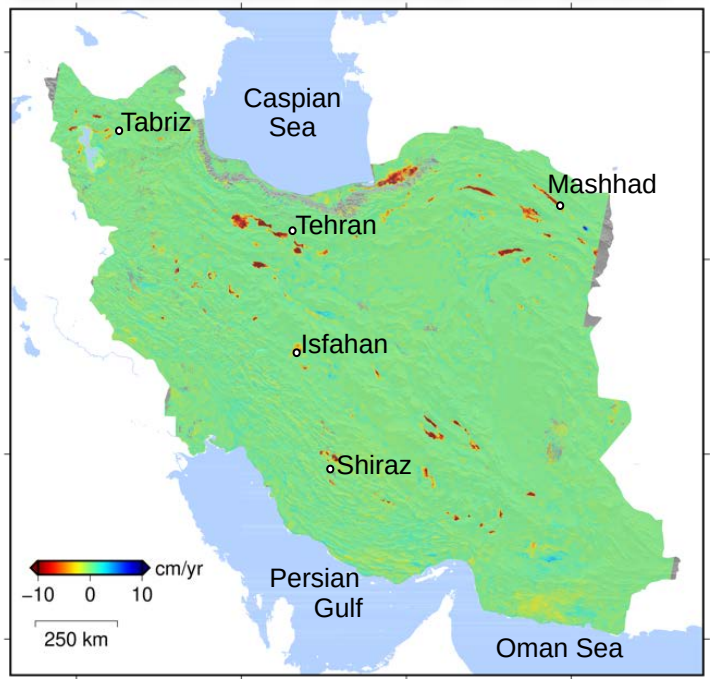
Scaling InSAR for Country-Wide Analysis

Envisat survey in 2000s

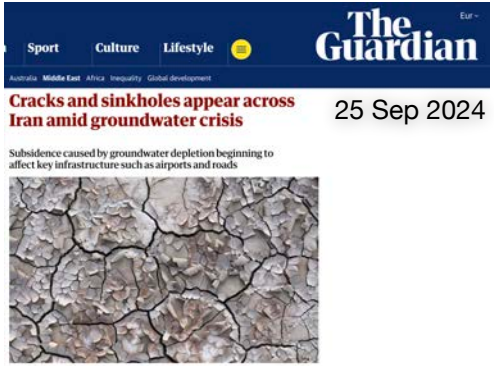


Motagh et al., 2008

Surface deformation across Iran from Sentinel-1



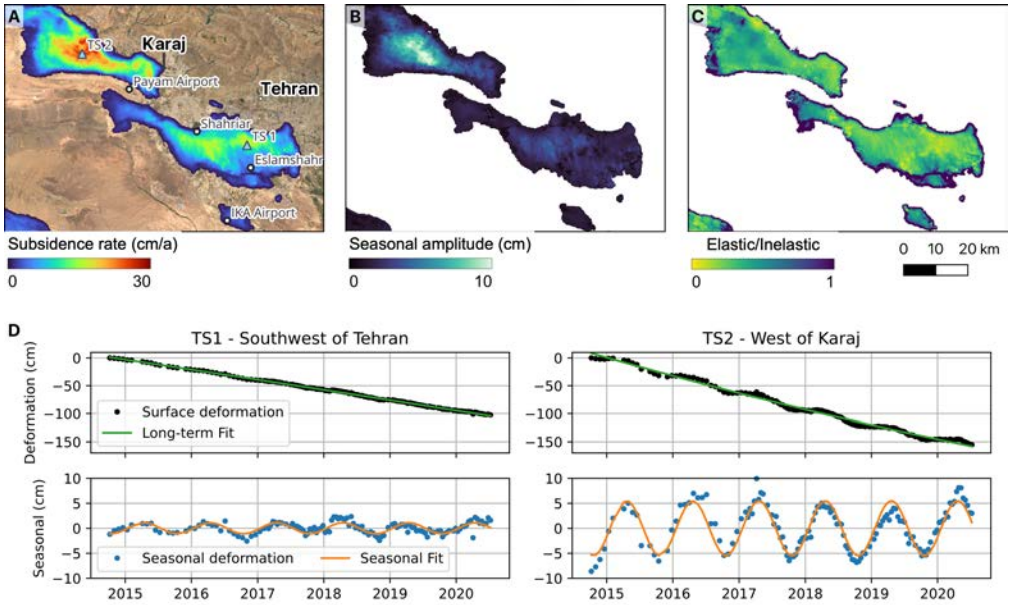
Haghighi and Motagh 2024

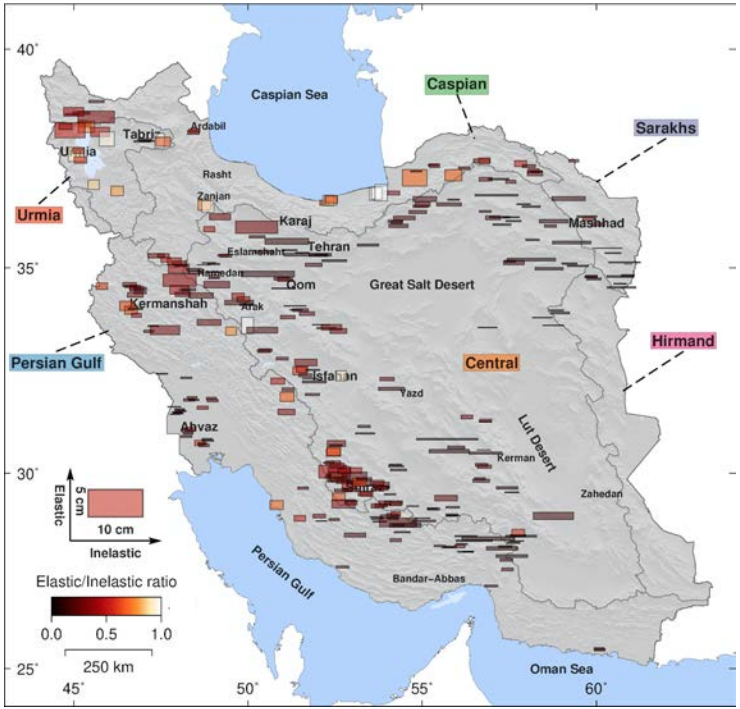


25 Sep 2024

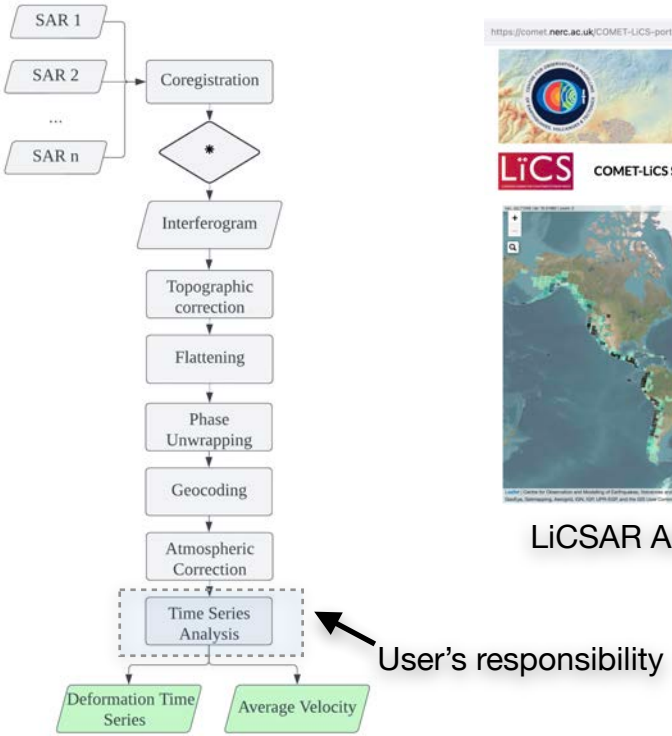
Using InSAR to Monitor Environmental Parameters

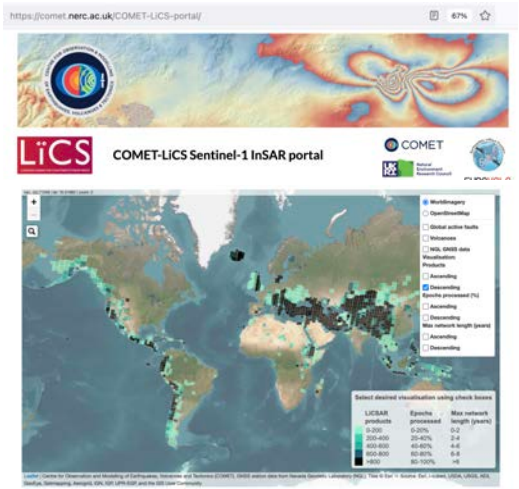
Recoverable vs. Irrecoverable groundwater depletion



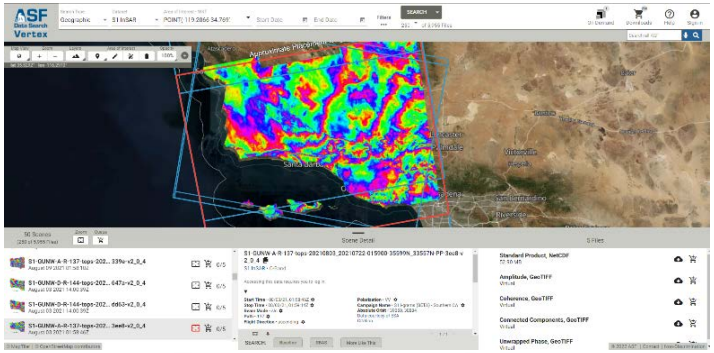


Compromising Resolution for Simplicity





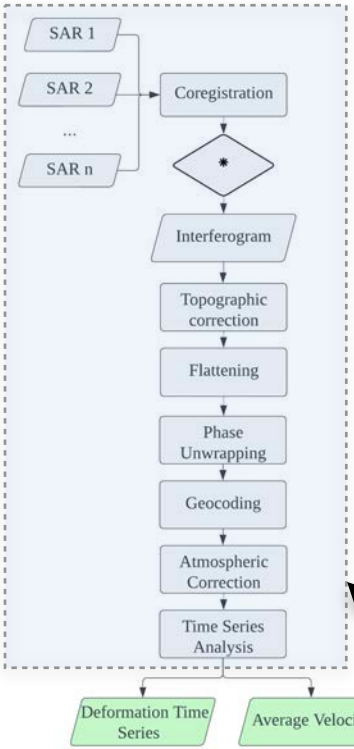
LiCSAR Analysis Ready Data



ARIA Analysis Ready Data

Hyp3 on-demand processing

InSAR End Products: Improved Accessibility for Users



Too complicated for many end-users

InSAR Norway

Ground Motion Service Germany

European Ground Motion Service

Limitations of Current InSAR End Products


taz

THEMEN POLITIK ÖKO GESELLSCHAFT KULTUR SPORT BERLIN NORD WAHRHEIT

Carolabrücke in Dresden als Symbolbild

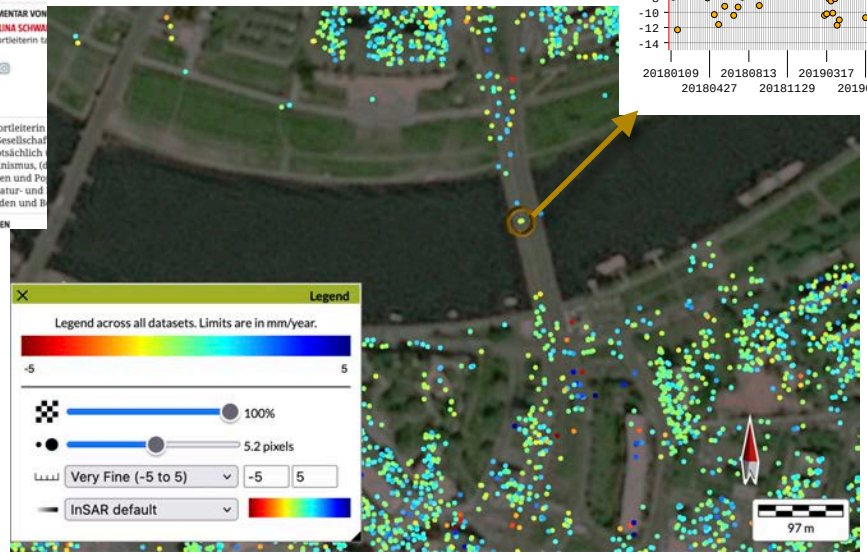
Brüche überall

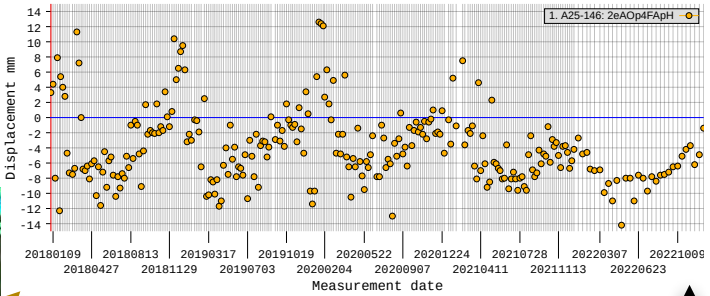
12 Sep 2024

Die Carolabrücke ist ein Symbol für ein marodes Deutschland. Statt sich um zentrale Probleme zu kümmern, diskutiert die Politik nur über Migration.

9 Minuten vor dem Teileinsturz fuhr noch eine Straßenbahn über die Carolabrücke

Foto: Sylvio Dittrich/imago

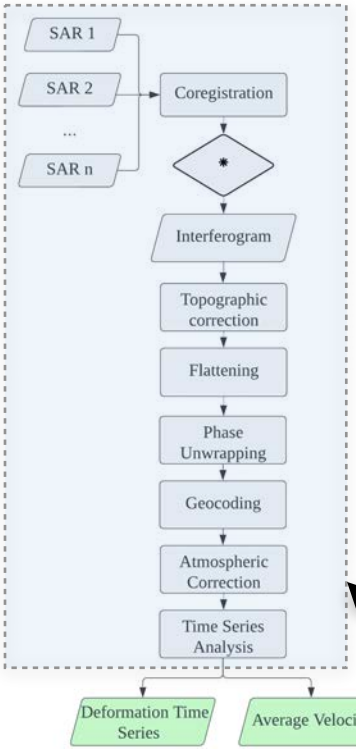




Latest update in 2022

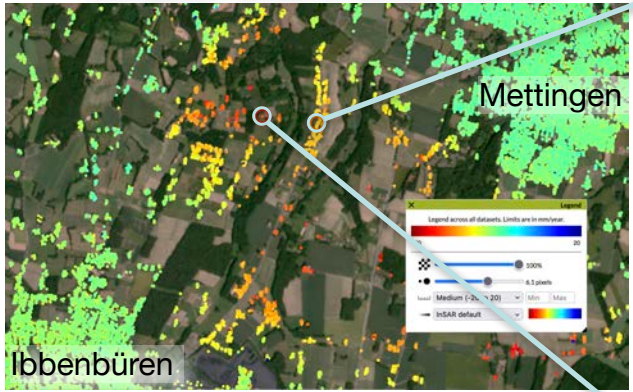
European Ground Motion Service

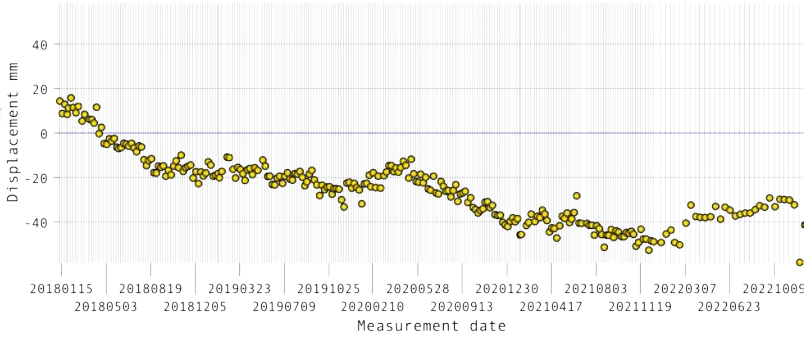
InSAR End Products Are Very Helpful, But Not Always Reliable

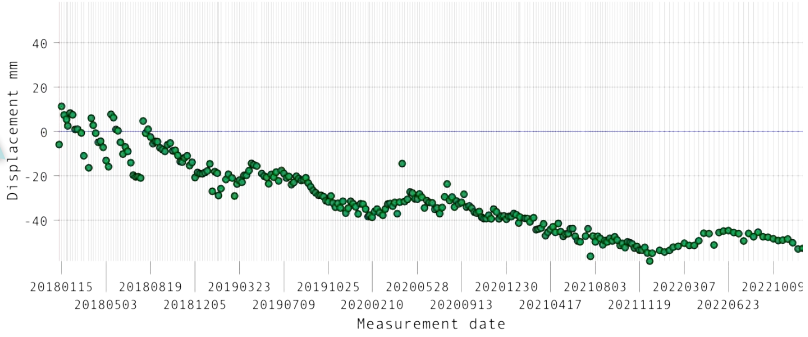


Too complex for a one-size-fits-all solution

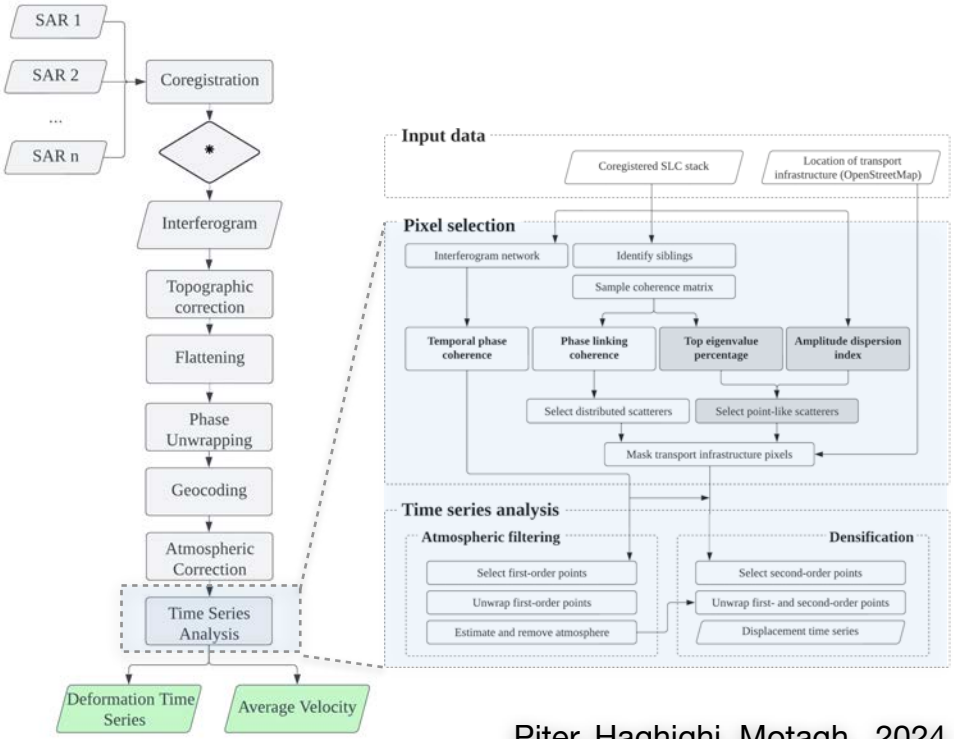
European Ground Motion Service

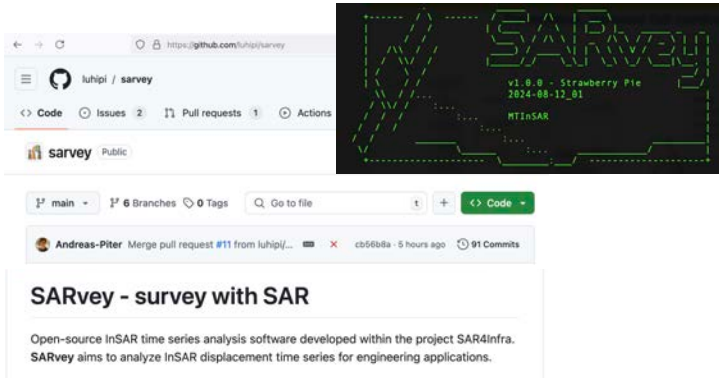


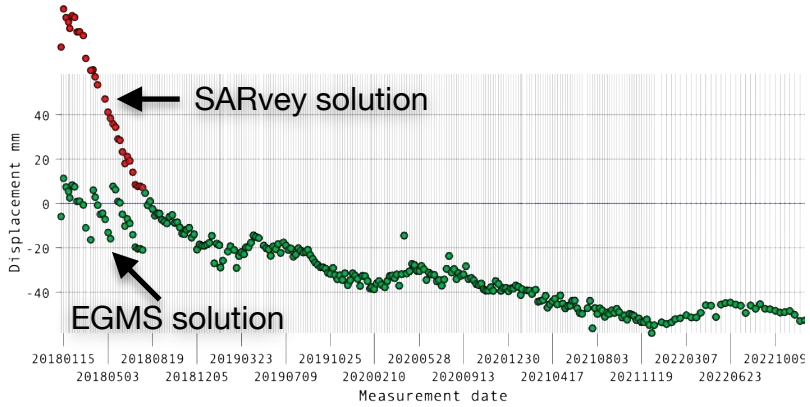




The Need for Full Control in InSAR Processing

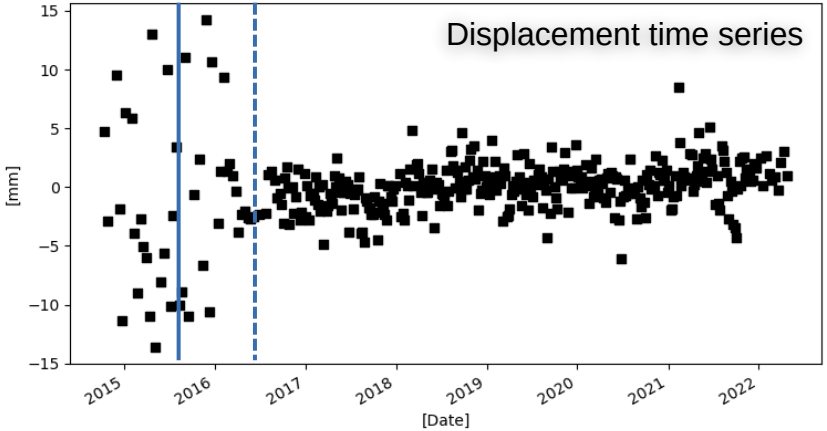


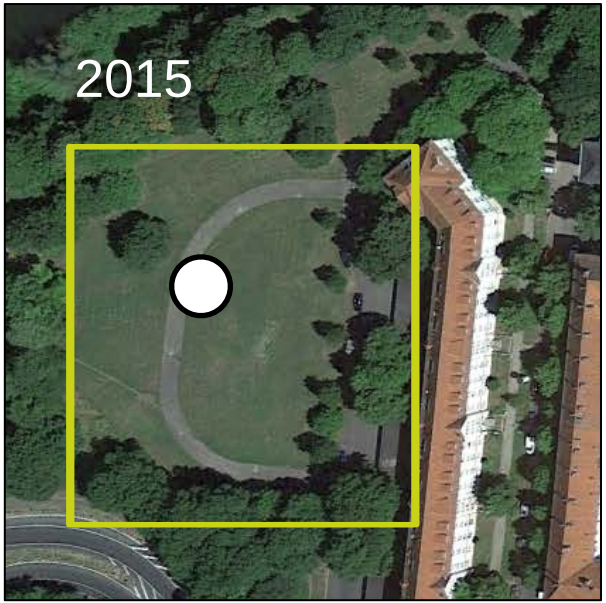


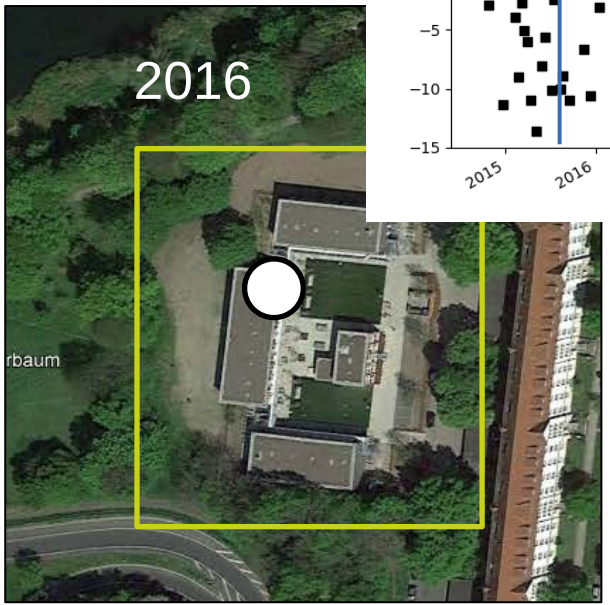


Piter, Haghighi, Motagh, 2024

Long Time Series Are Not Always Coherent



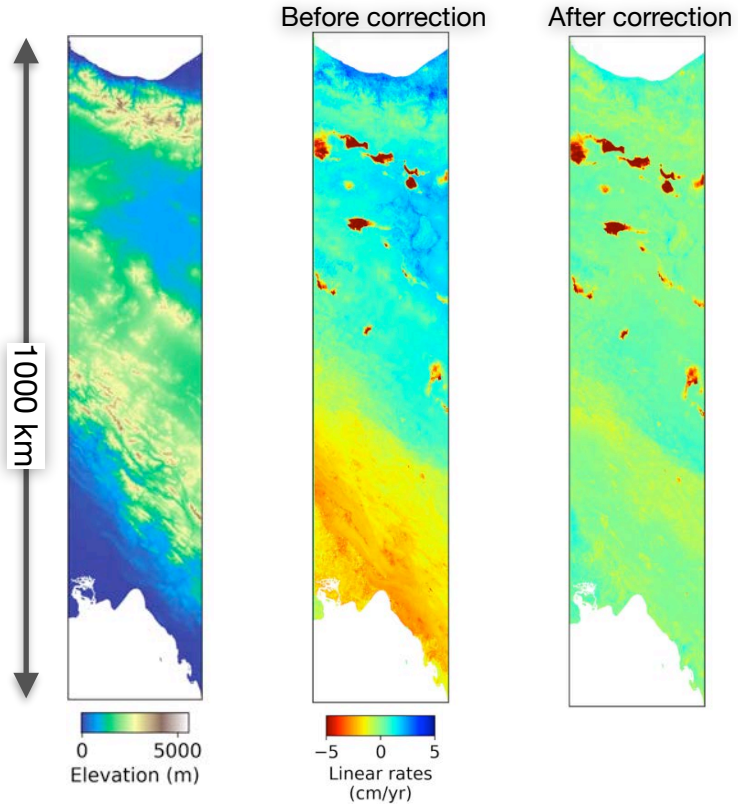


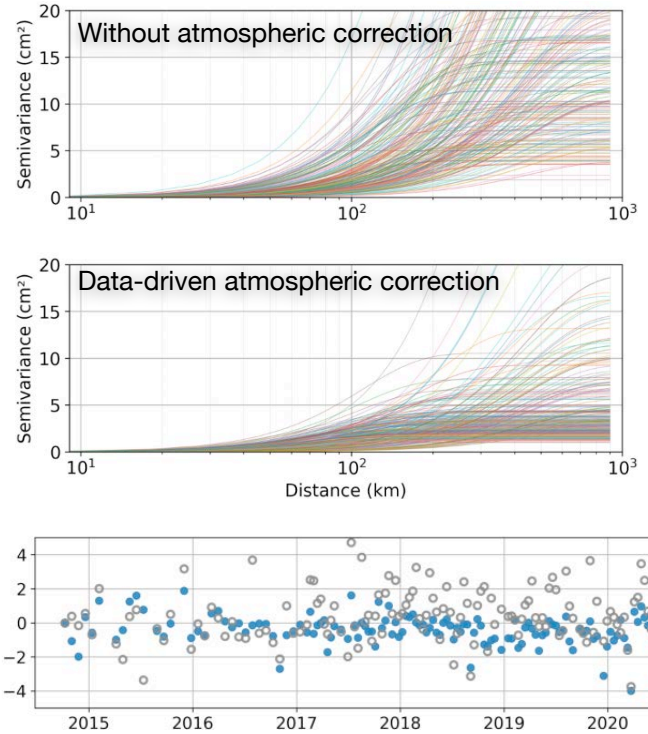


Background image: © Google

Andreas Piter, 2024

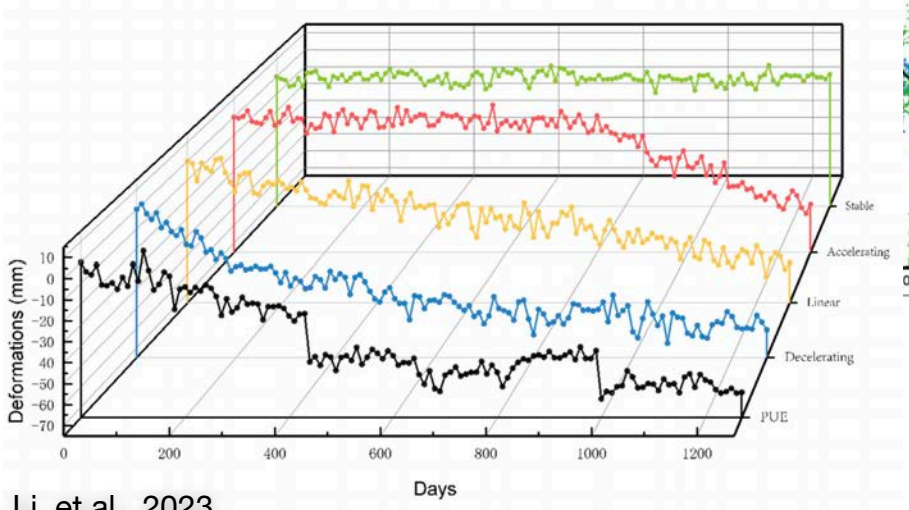
Leveraging Long-Term Data for Data-Driven Solutions



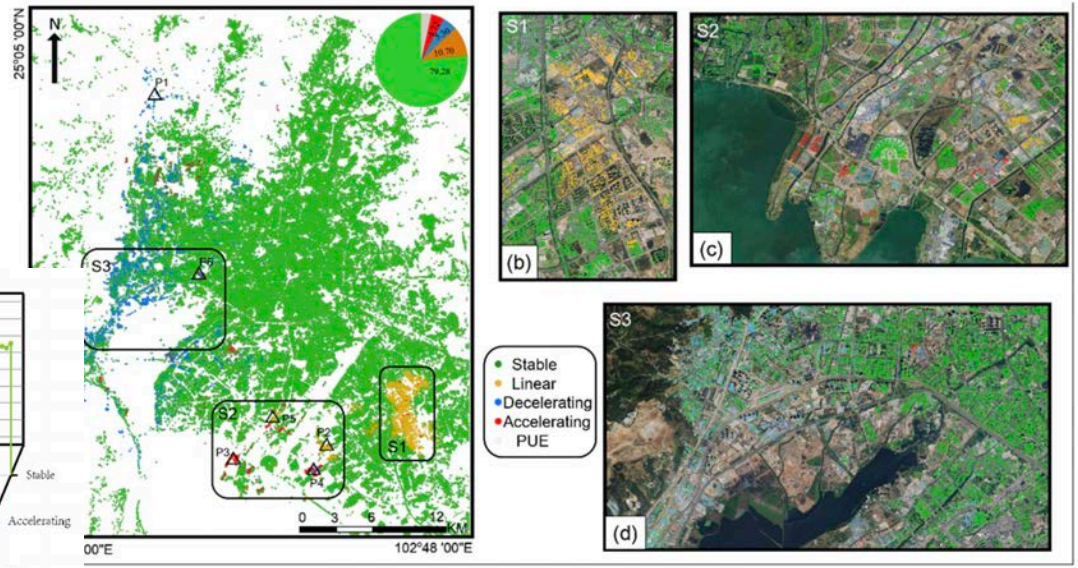


Haghighi and Motagh 2024

AI-Driven Insights from InSAR Data



Li, et al., 2023



Conclusion

- InSAR technology has experienced rapid growth.
- A diverse range of end users has access to a wide array of products.
- Various processing approaches cater to different expectations.
- But there is no universal, one-size-fits-all solution.
- Long-term time series is available for billions of time series.
- It is now time for AI to step in and extract meaningful patterns and insights from the data.

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