

Subsidence



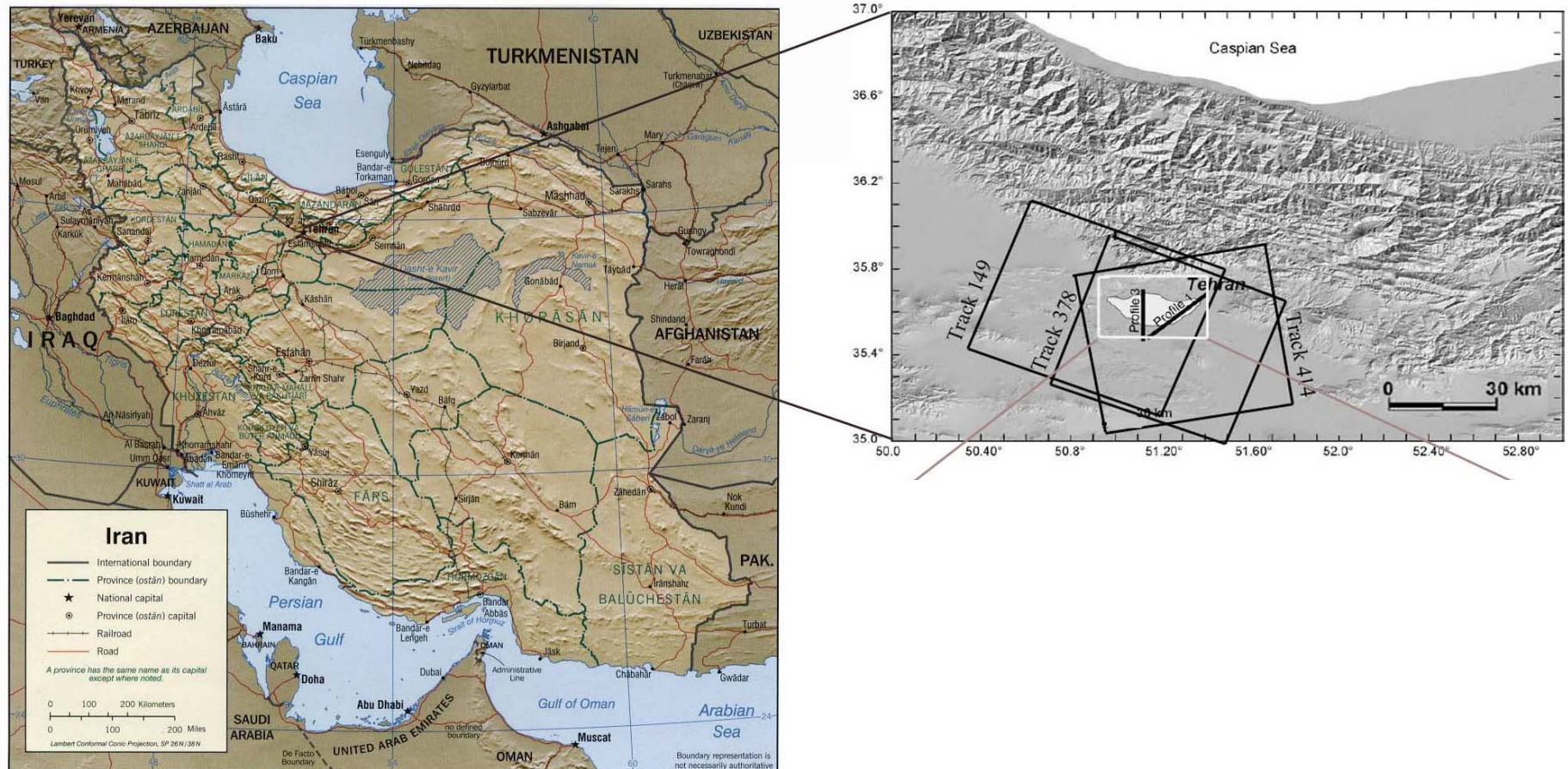
Andy Hooper
University of Leeds

**Synthetic Aperture Radar: A Global Solution for Monitoring
Geological Disasters, ICTP, 3 Sep 2013**

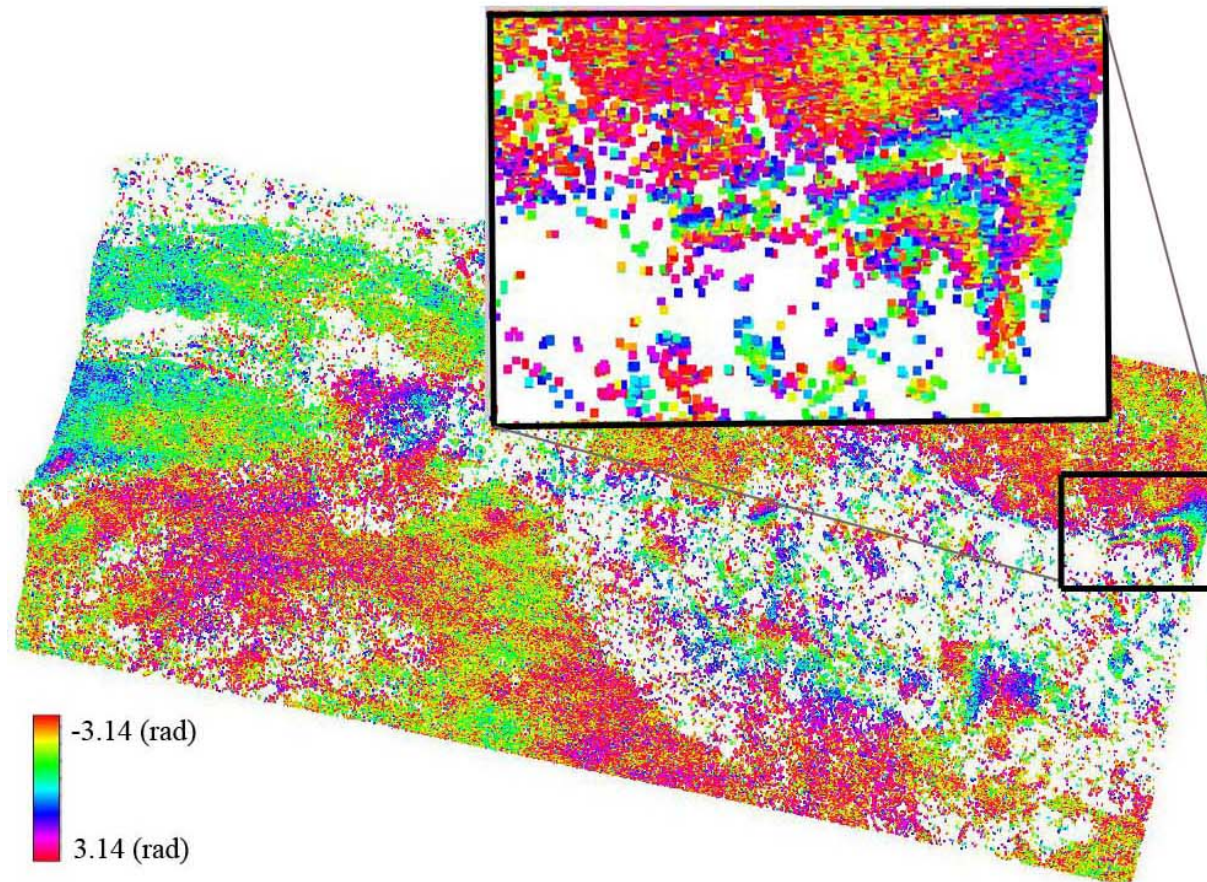


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Water extraction in Tehran Basin



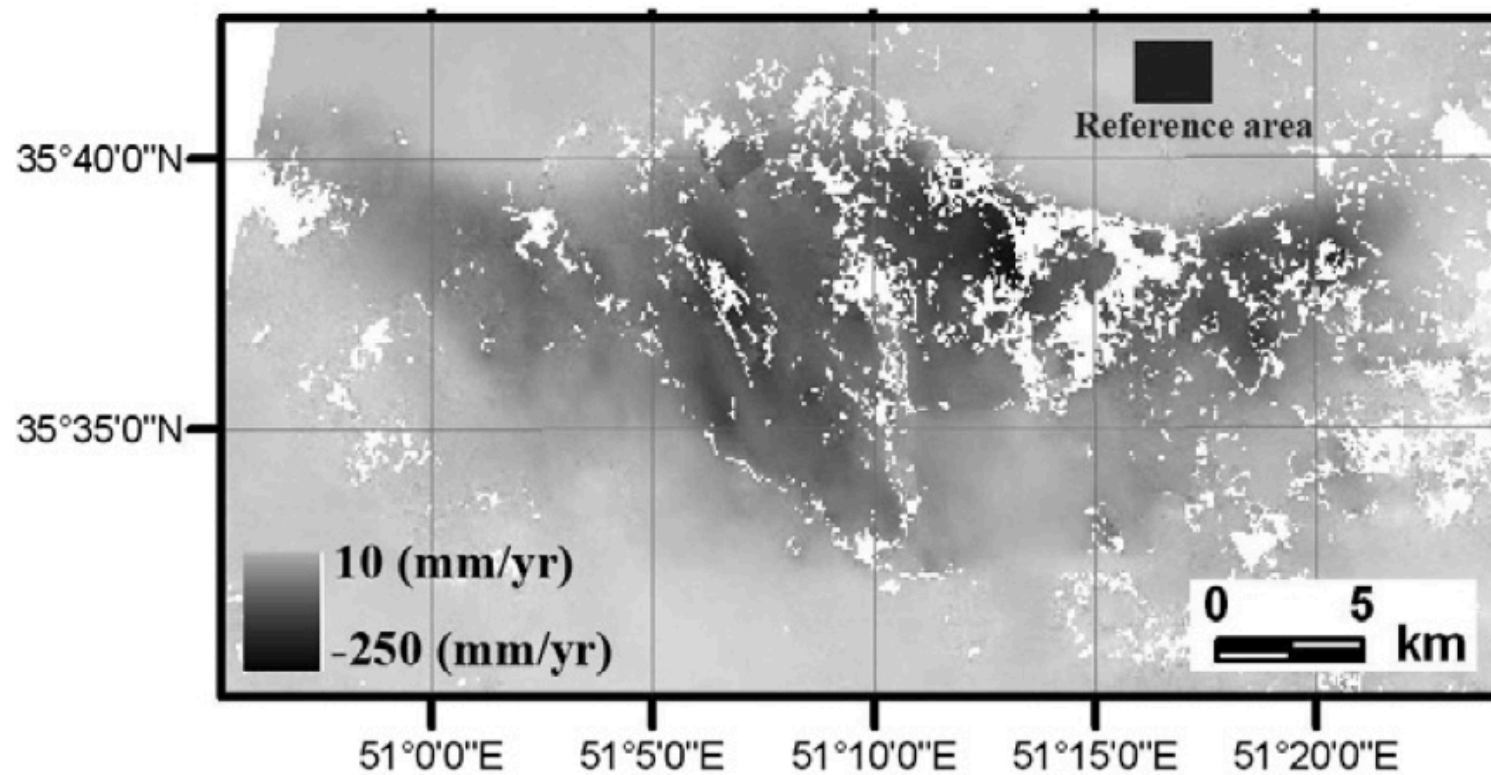
PS pixels in one interferogram



The deformation is not sampled enough (aliased)



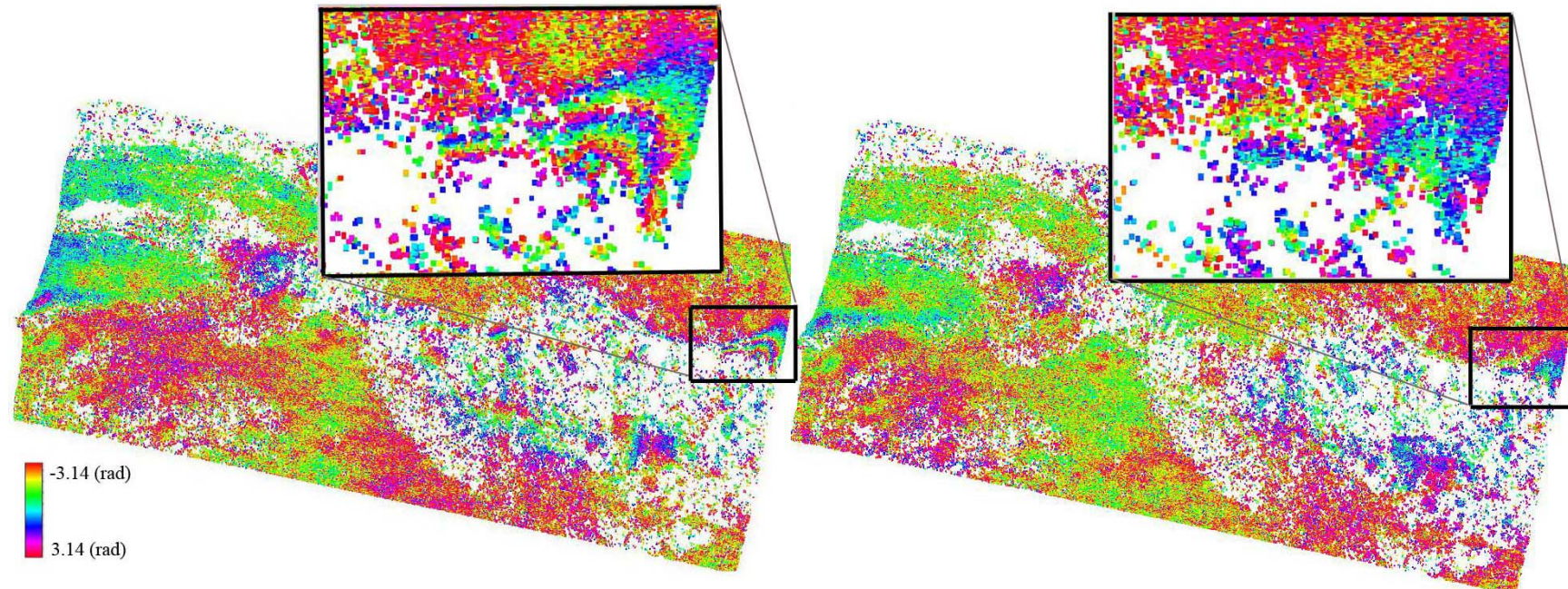
Initial Mean Velocity



- Estimated from a few interferograms spanning small time intervals



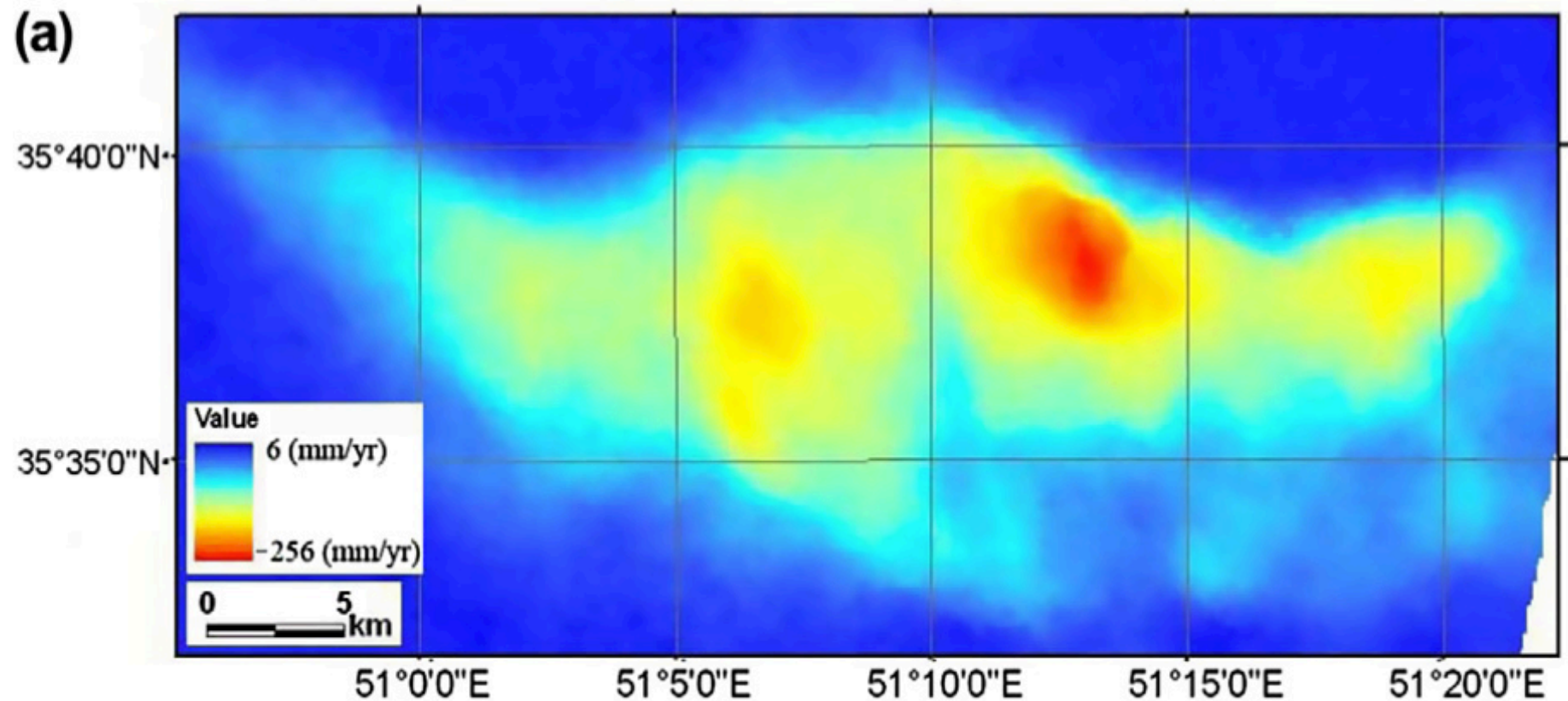
Fringe reduction



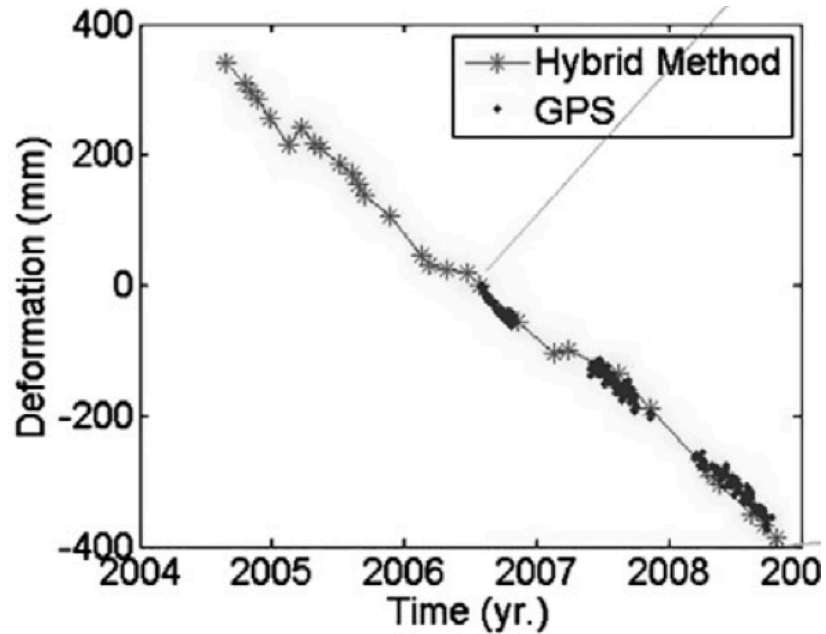
- Displacement estimated from initial mean velocity is subtracted from each PS interferogram
- Phase unwrapping is then possible



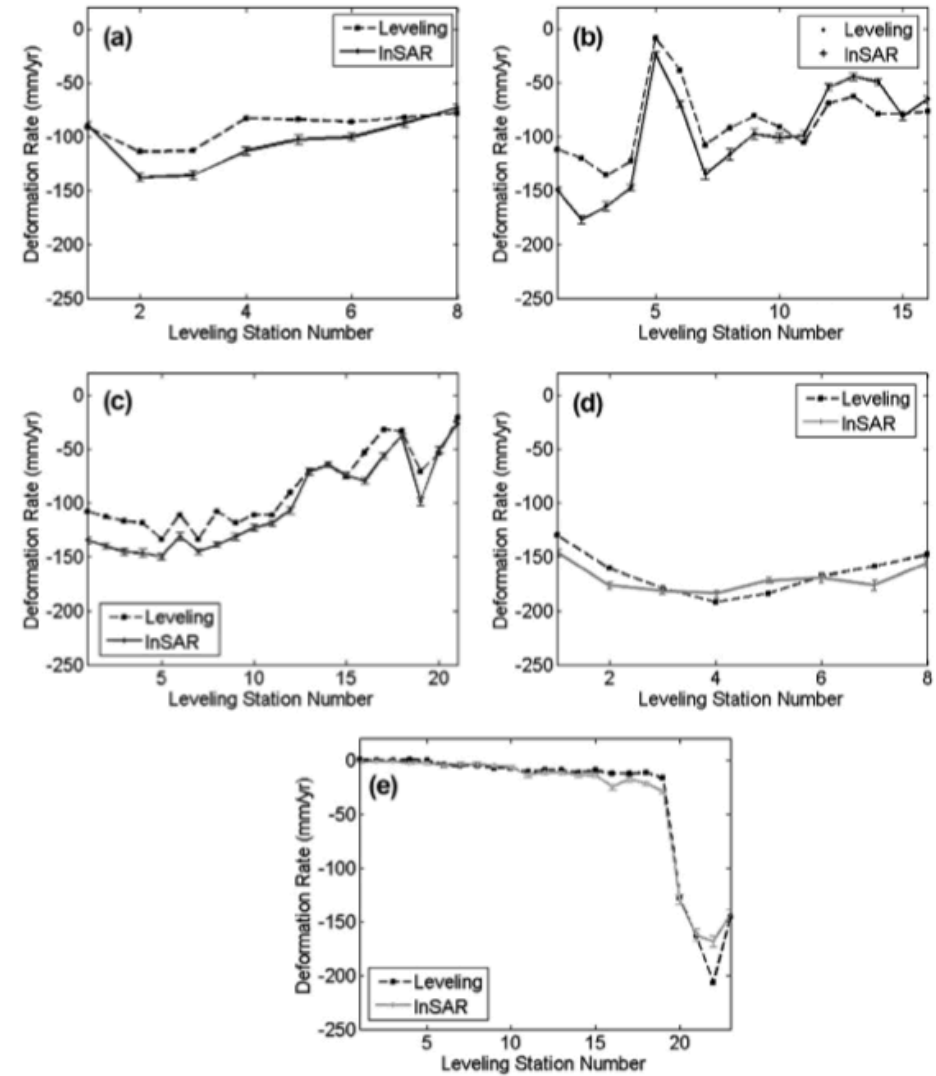
Final mean subsidence rates from PS



Validation



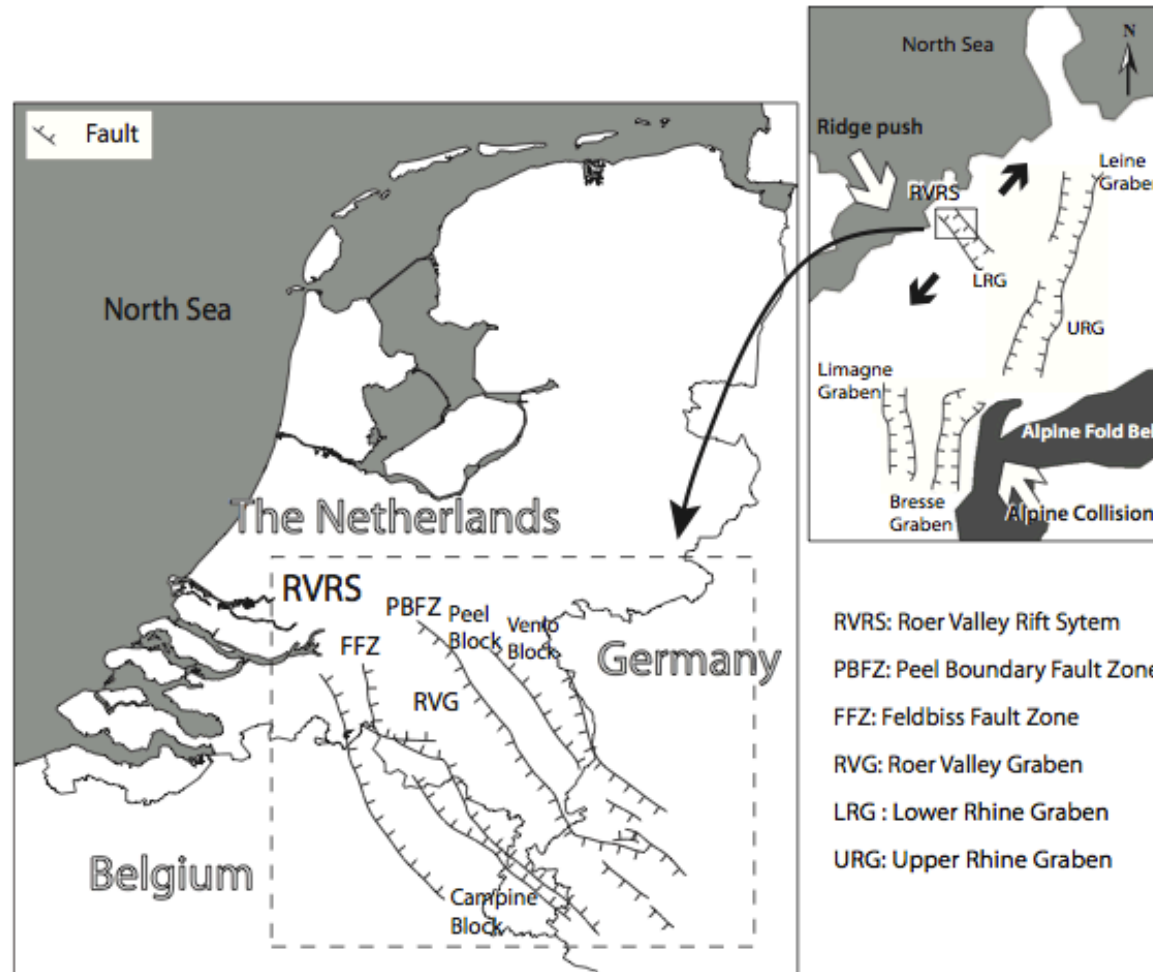
GPS vertical time series



Subsidence rates from levelling



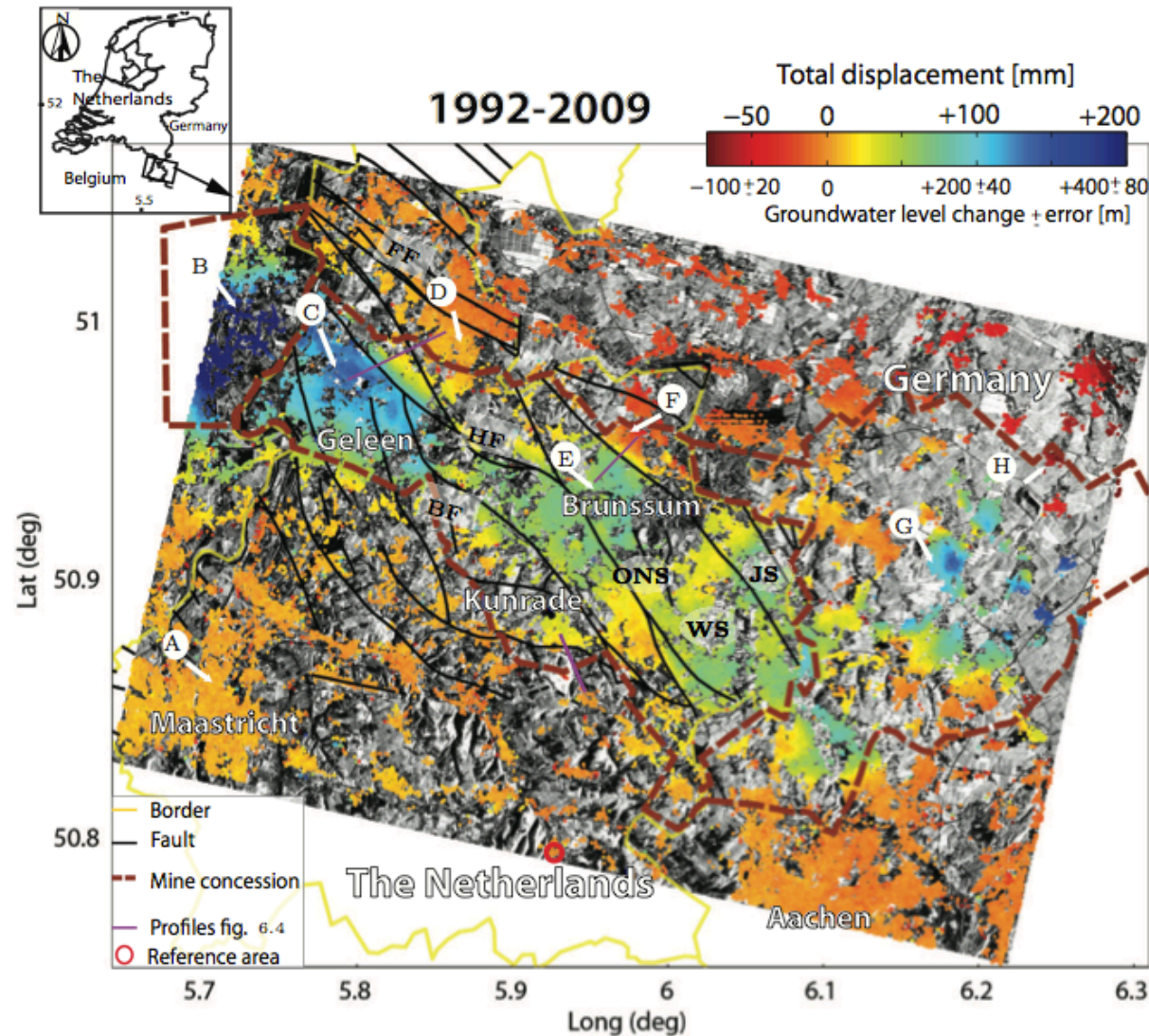
Roer Valley Graben



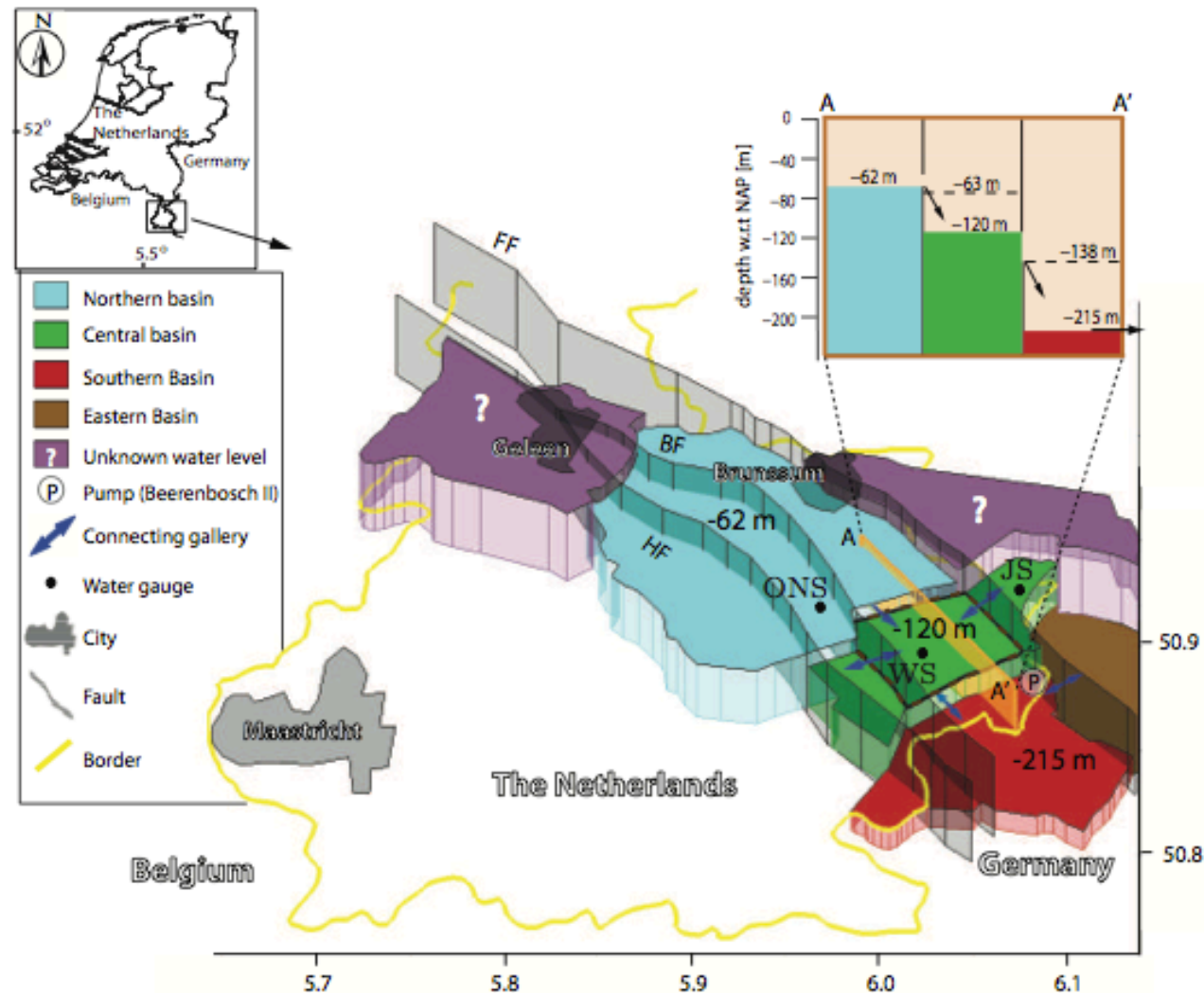
Tectonic
movement
at present?



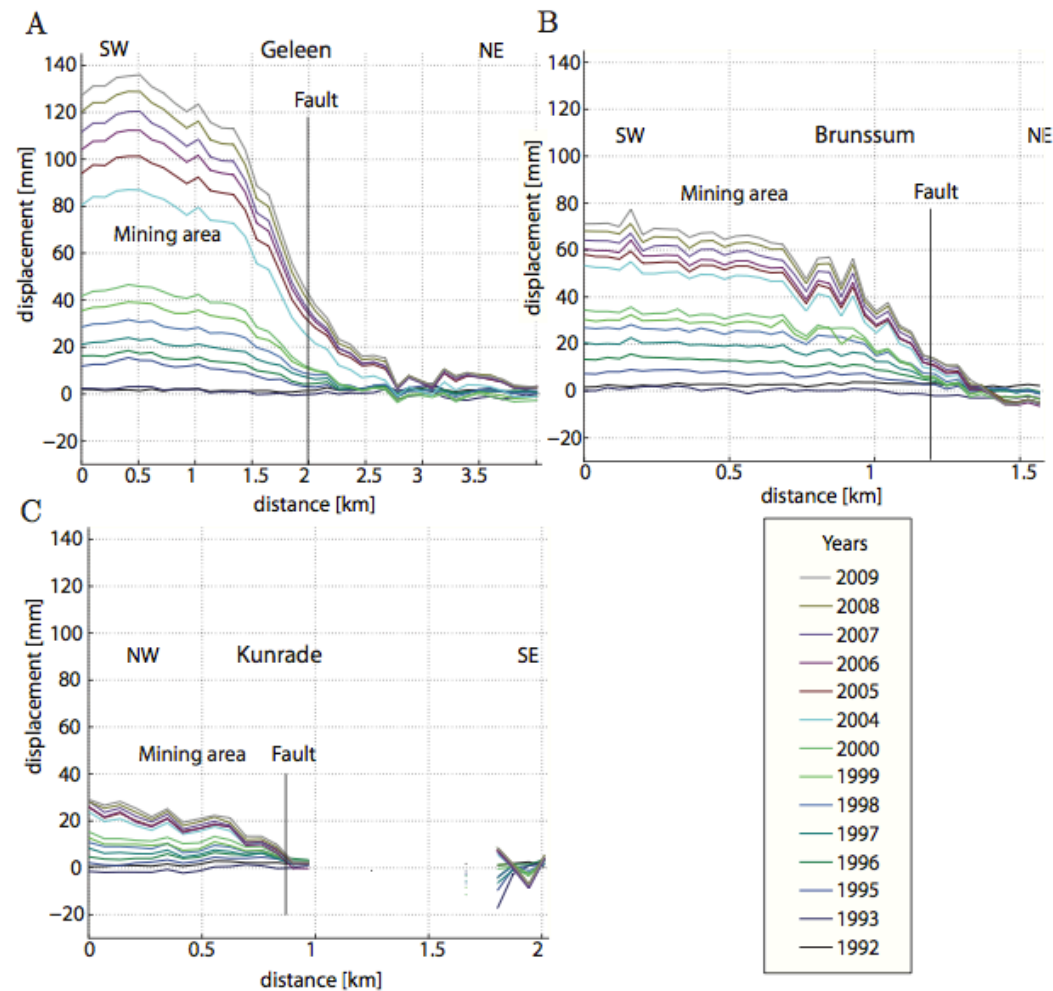
Line-of-sight displacement rates



1994 Coal mine water levels



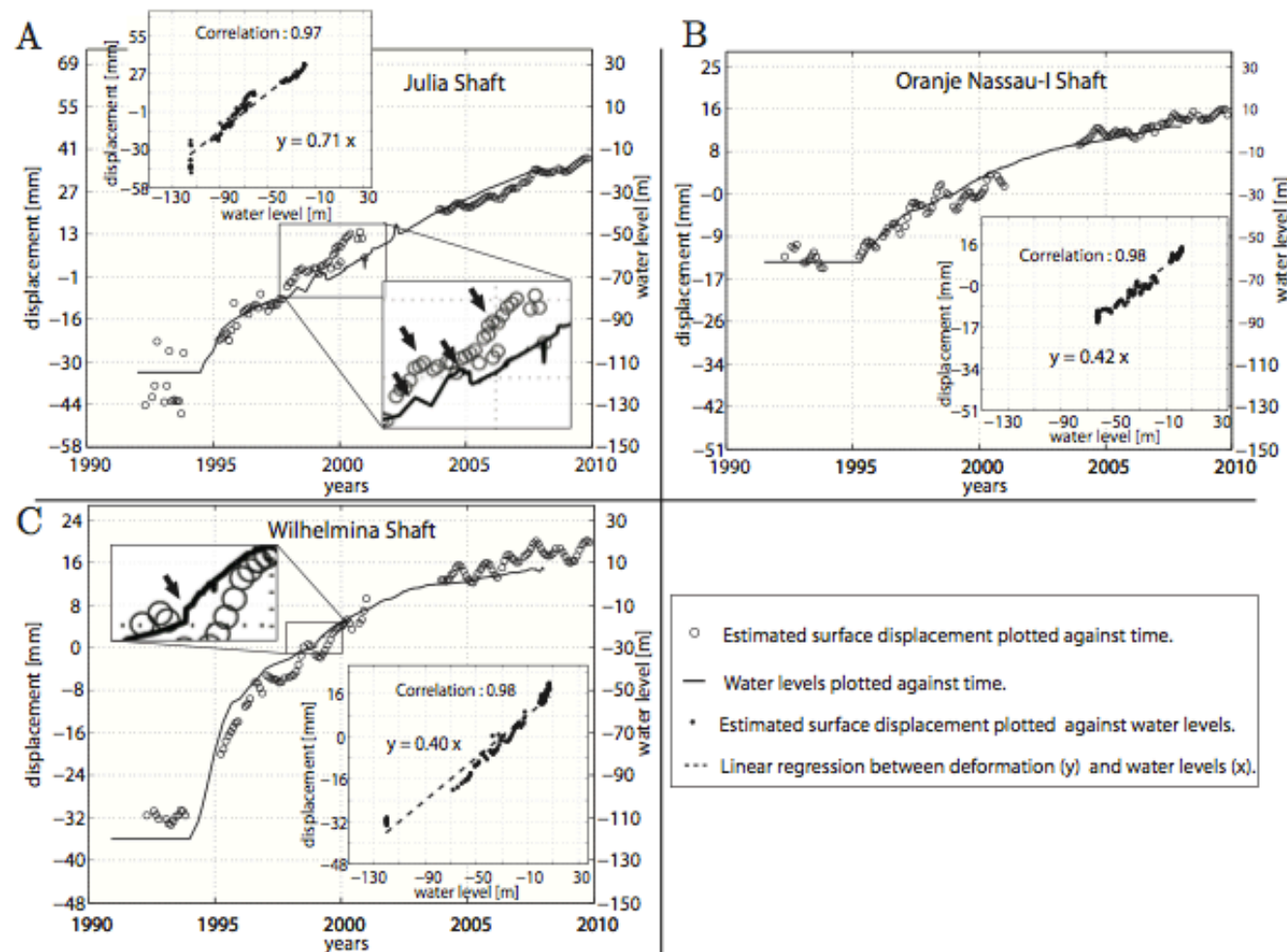
Profiles across faults



Tectonic or barrier
to water flow?



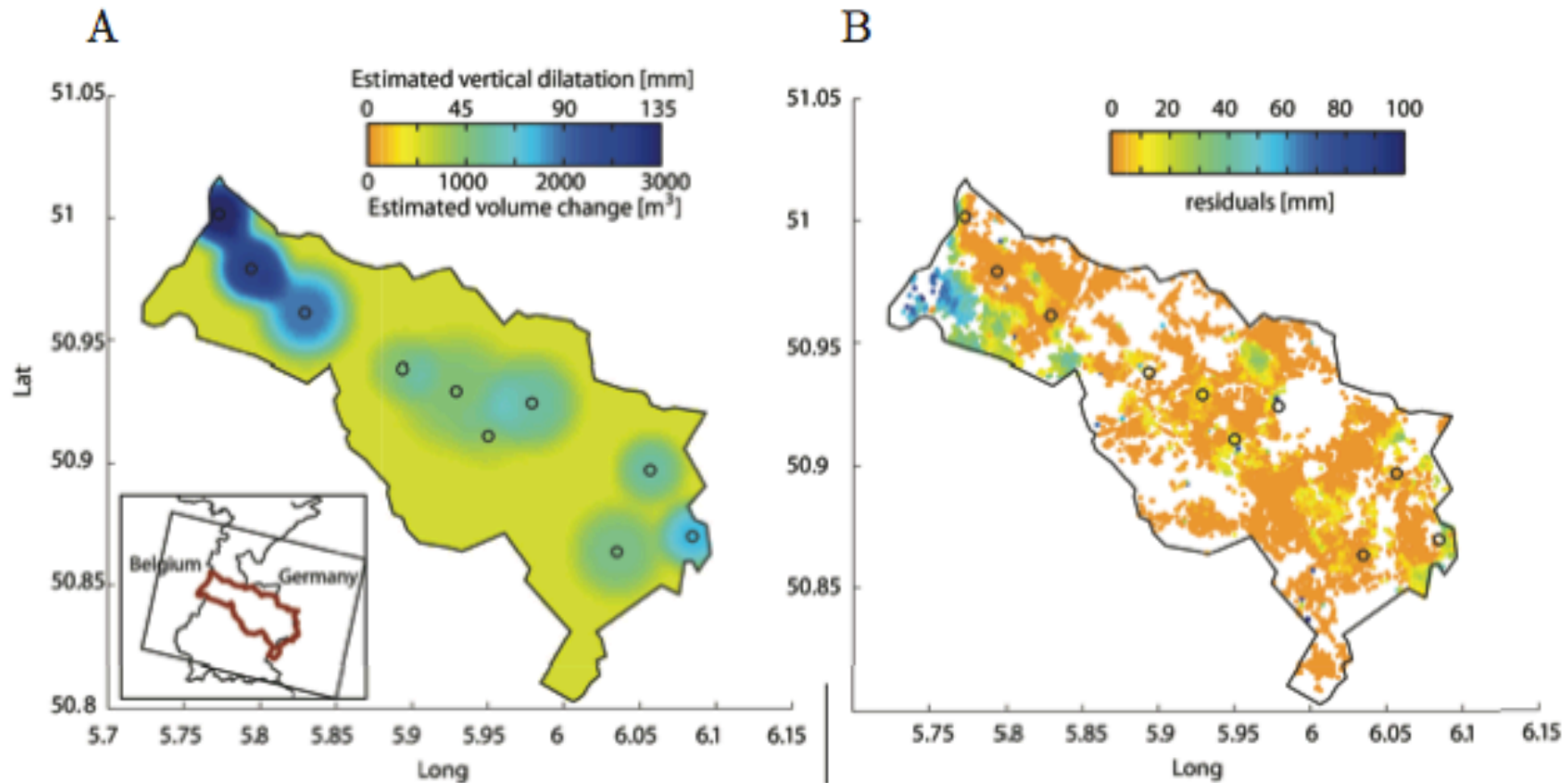
Water levels in mine shafts



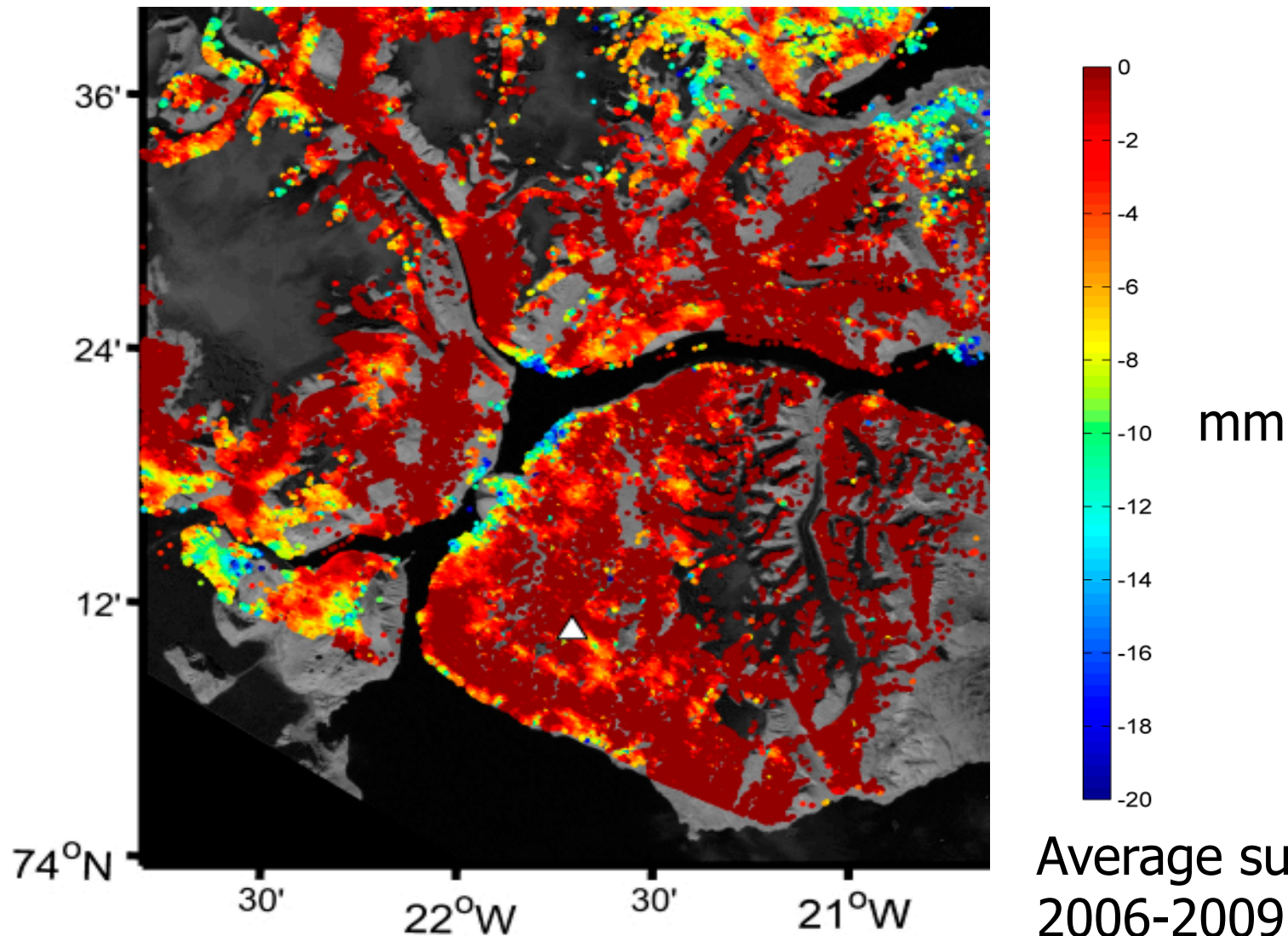
- High correlation between water levels and deformation



Model of pore pressure change

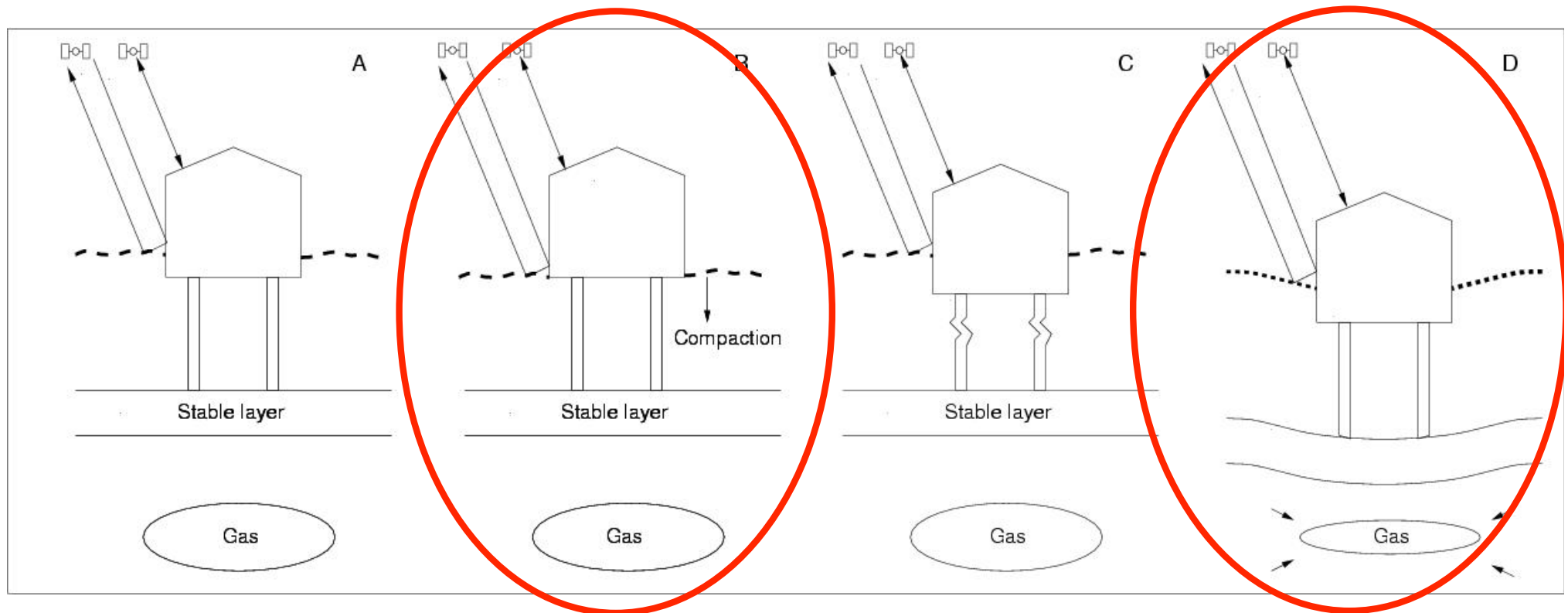


Permafrost thawing in Greenland



Interpretation of PS observations

Consider what is actually moving



Sometimes this...

Usual assumption



Examples from Delft



Extreme examples from Bangkok

