

Landslide monitoring in the Three Gorges Region using InSAR time-series techniques



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2007/ 9/23

1) The Three Gorges

2) Data

3) Coherence

4) PS Density

5) Landslide Monitoring

6) Conclusions and Future Work

The Three Gorges



April 1987



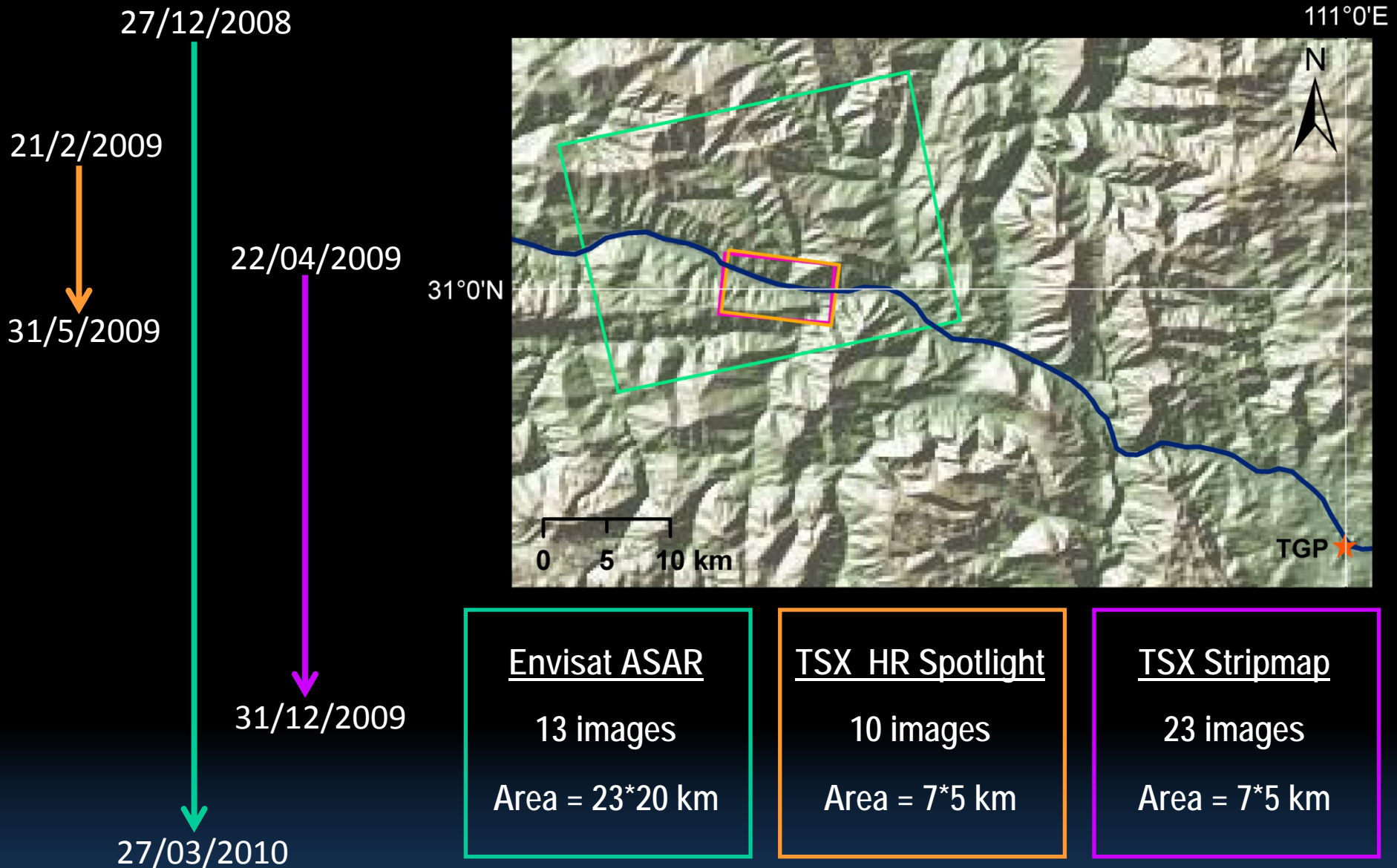


2002:

Dragon Gate
Bridge

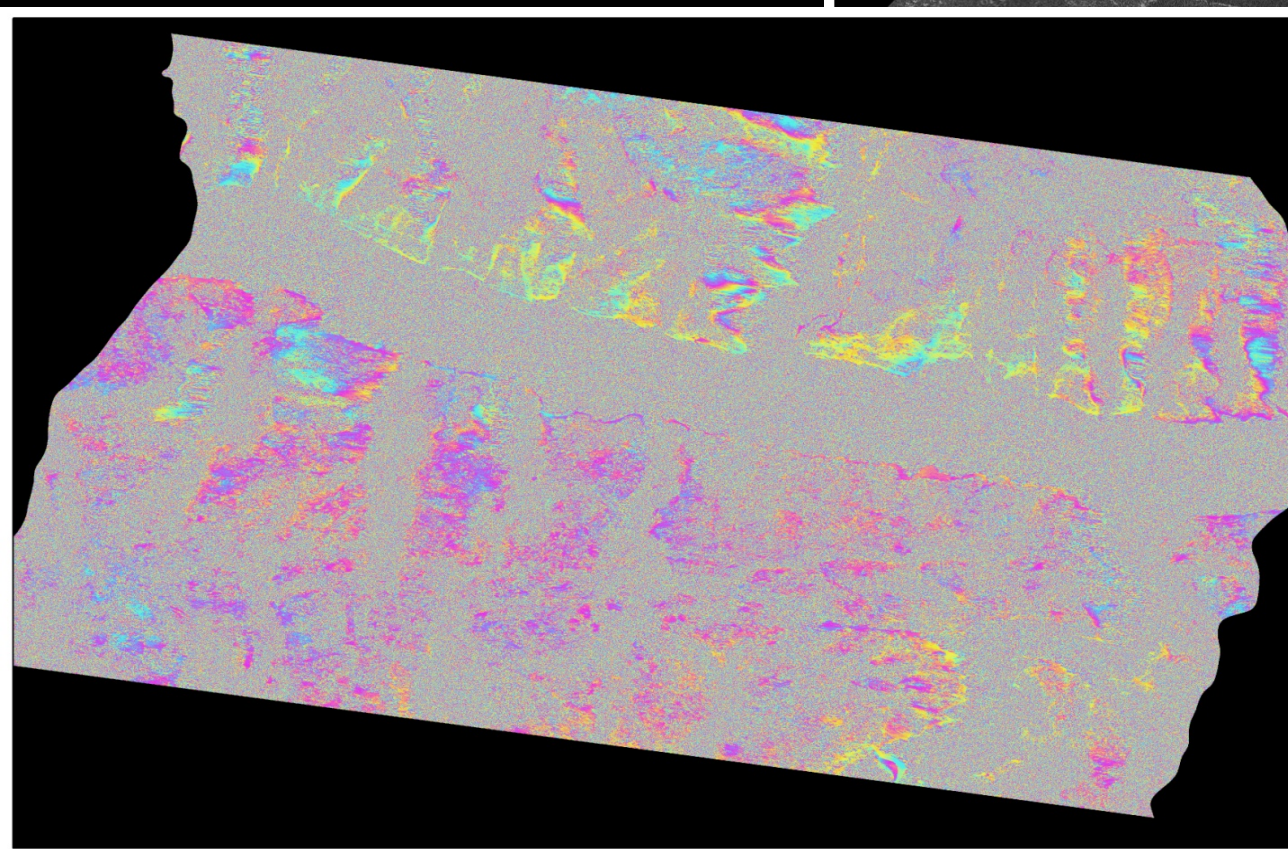
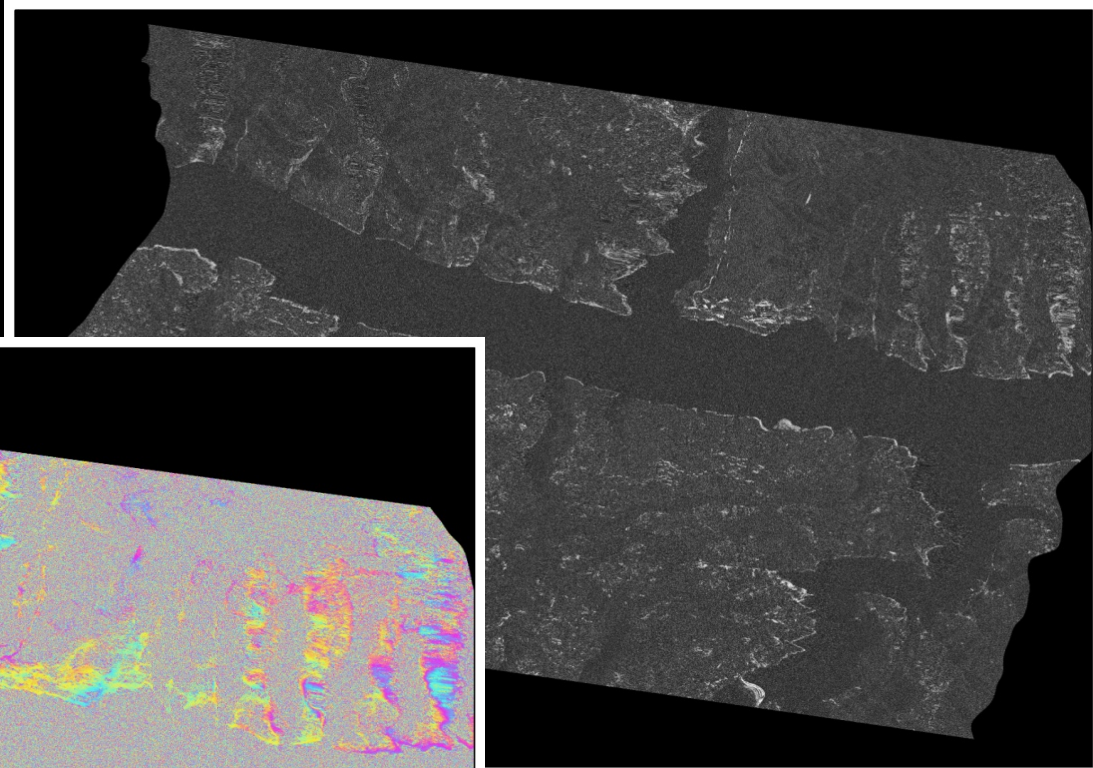


2008:



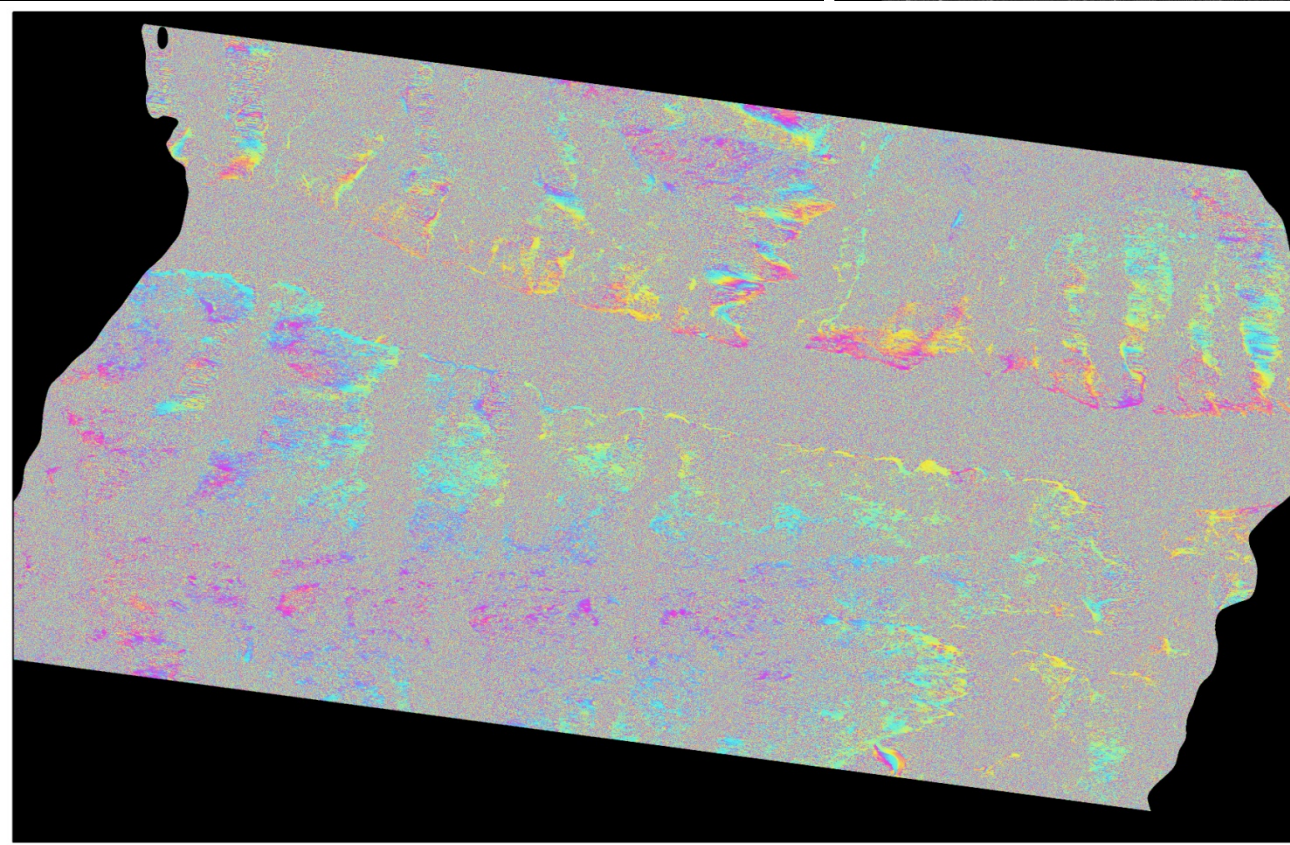
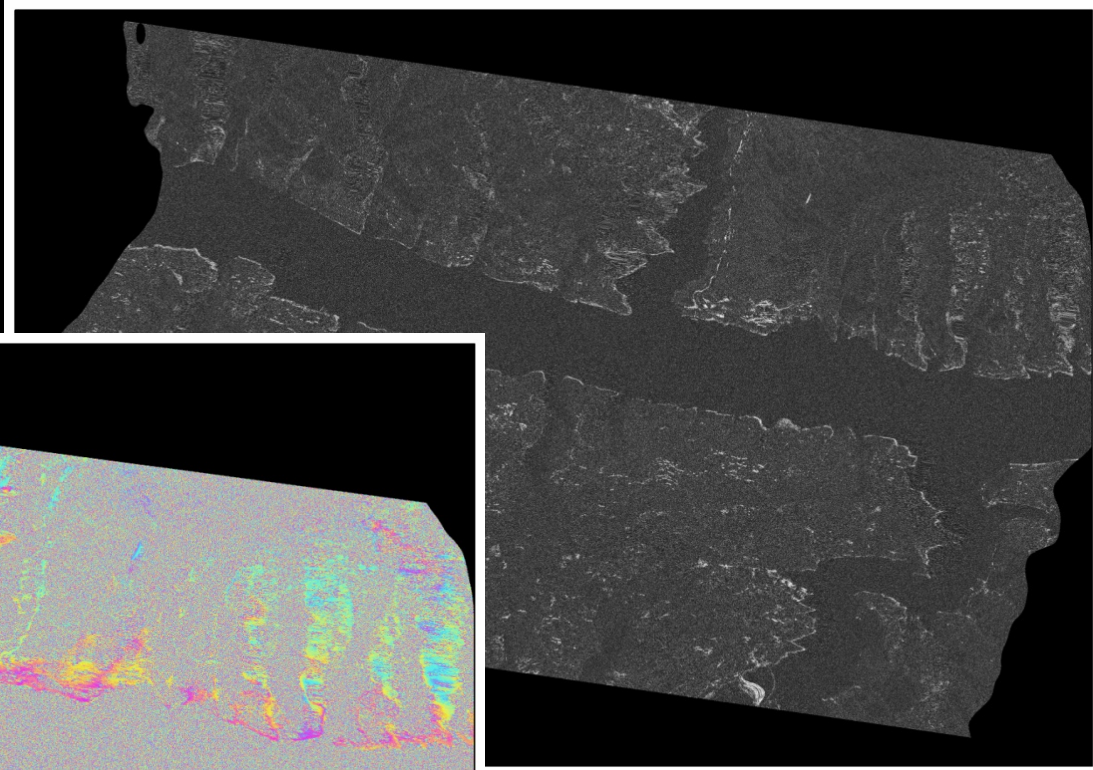
11 days

⊥ 40 m



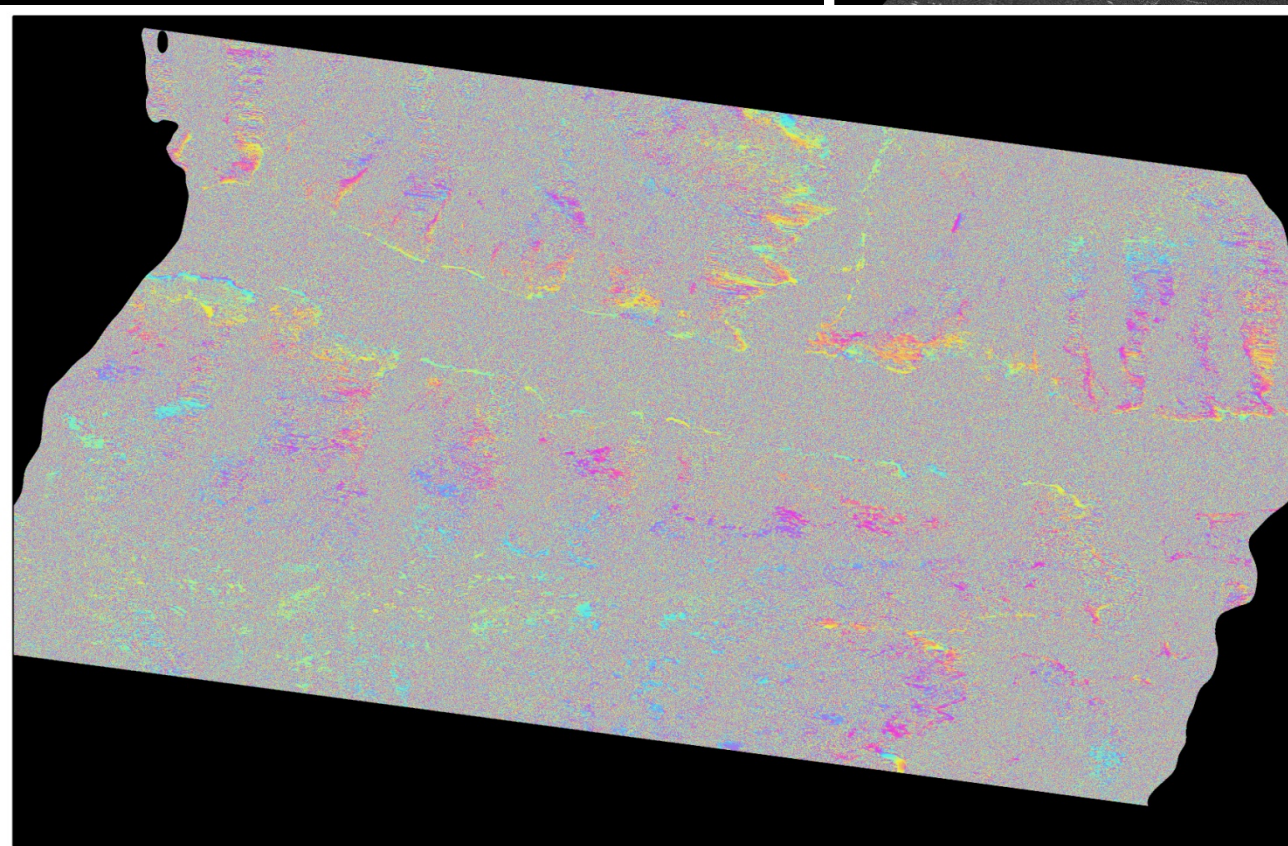
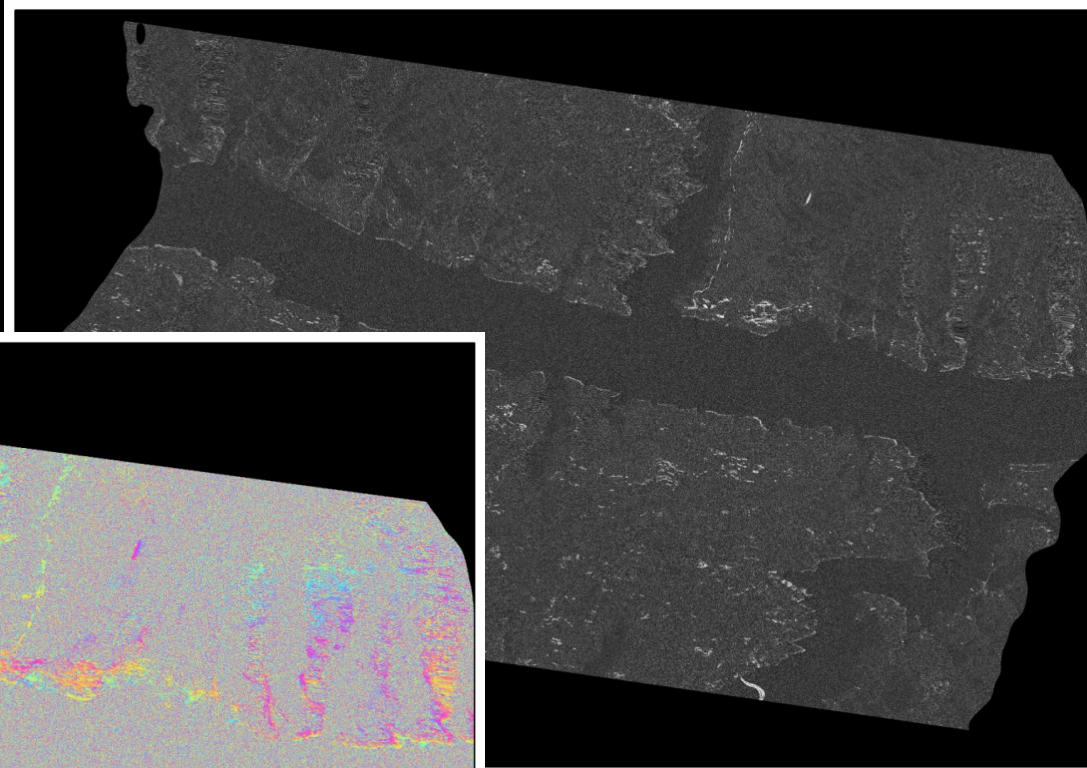
22 days

┆ 35 m



33 days

┌ 10 m



Coherence Comparison

Envisat ASAR

11/04/09 – 16/05/09
(35 days)

182 m

Mean: 0.17

(35 days)

19.1 m

Mean: 0.13

TSX HR Spotlight

04/03/09 – 06/04/09
(33 days)

10 m

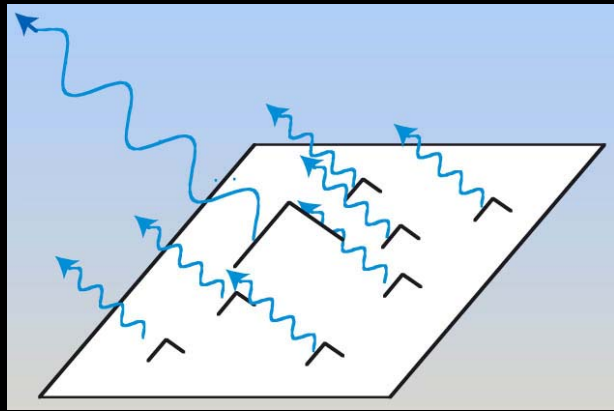
Mean: 0.246

TSX Stripmap

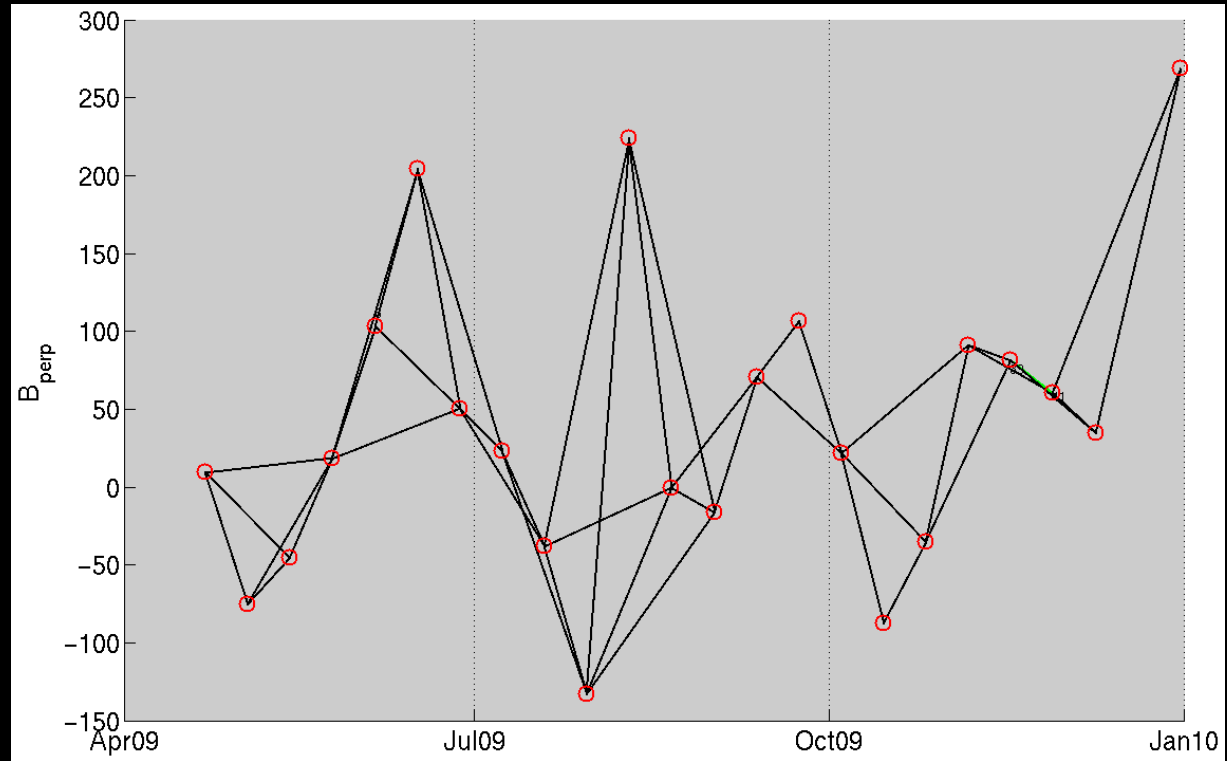
03/05/09 – 06/06/09
(33 days)

8.9 m

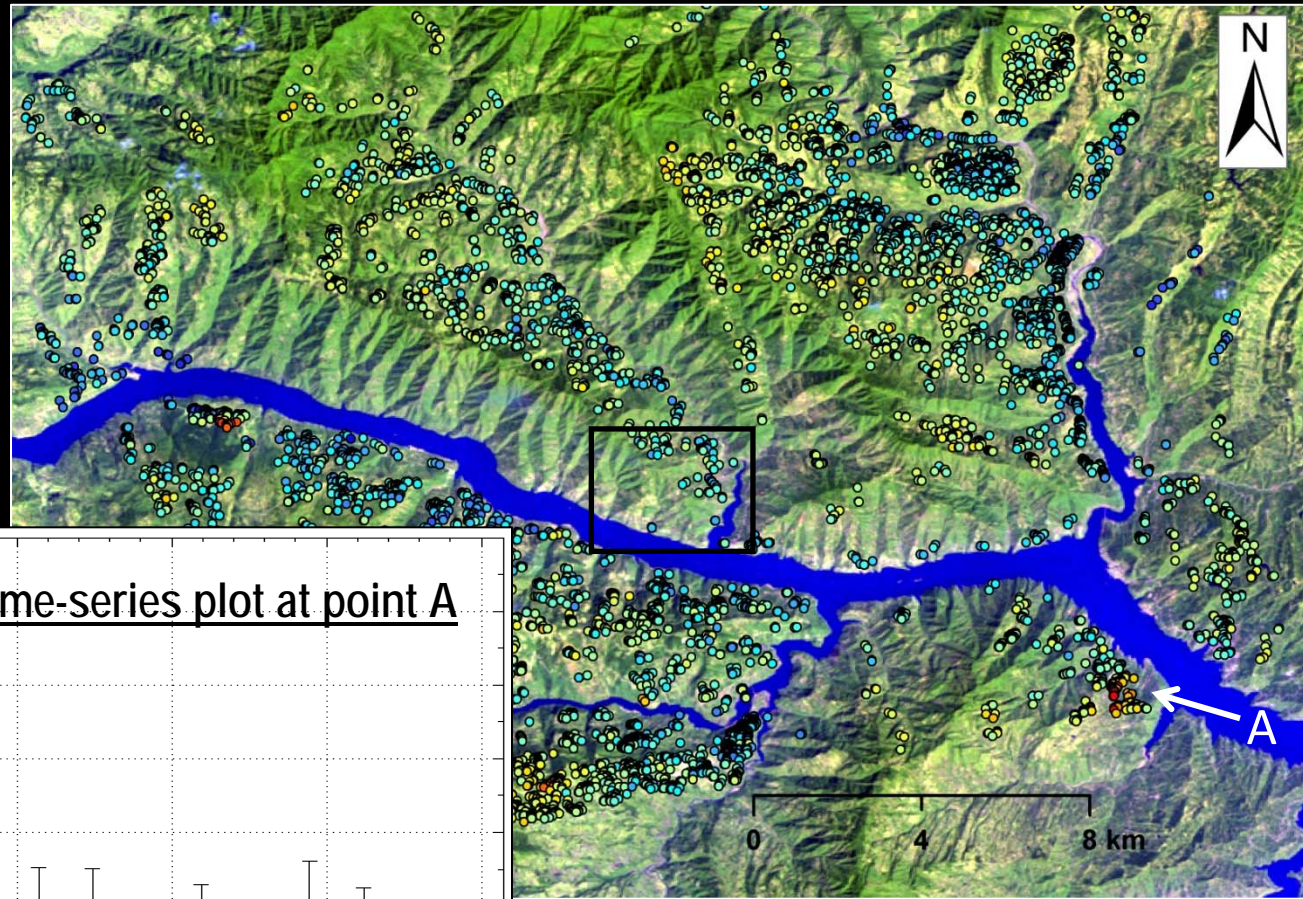
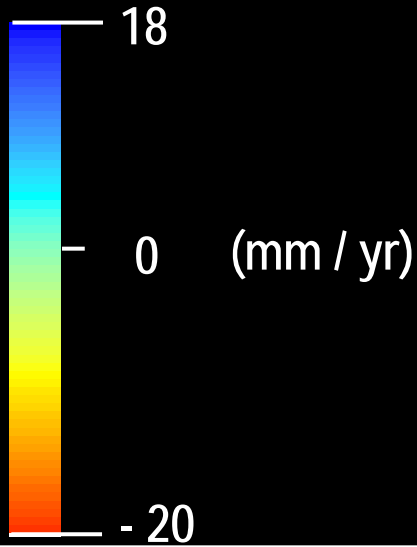
Mean: 0.26



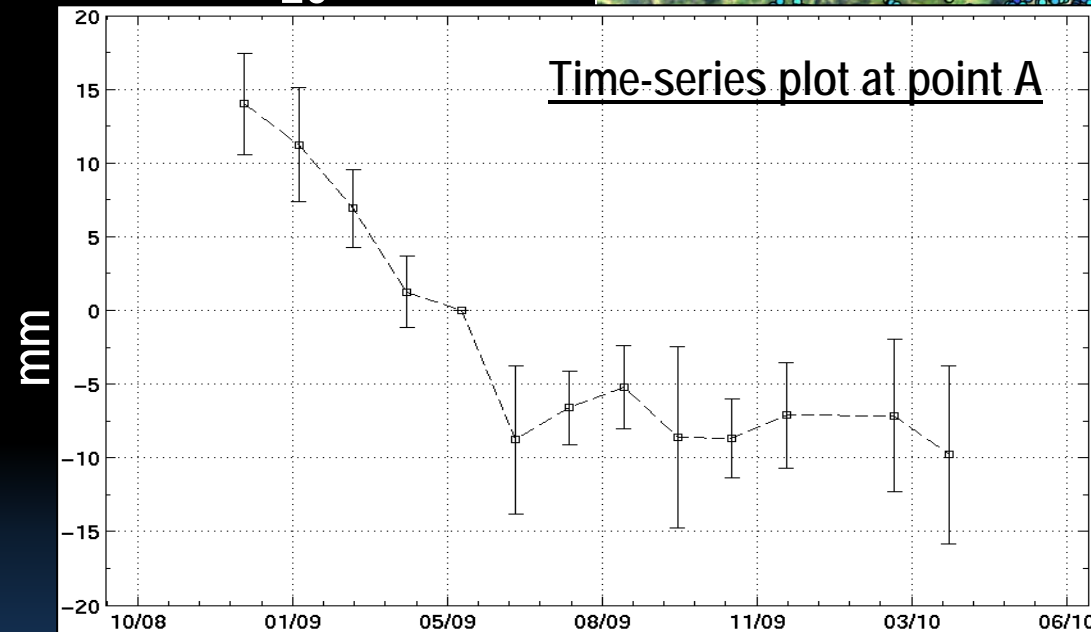
Small Baseline InSAR



Envisat	TSX Spotlight	TSX Stripmap
8 per sq km	182 per sq km	450 per sq km

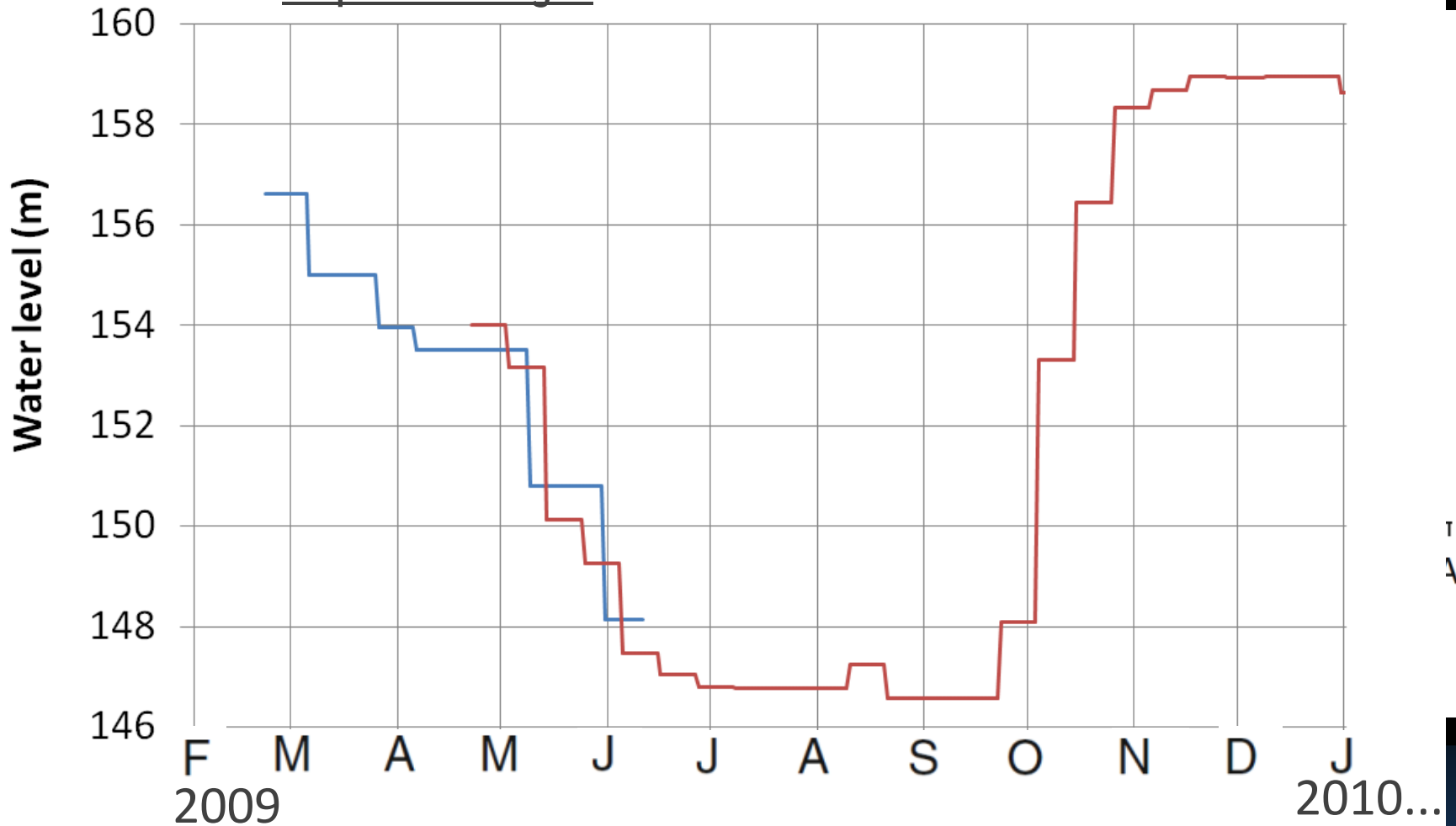


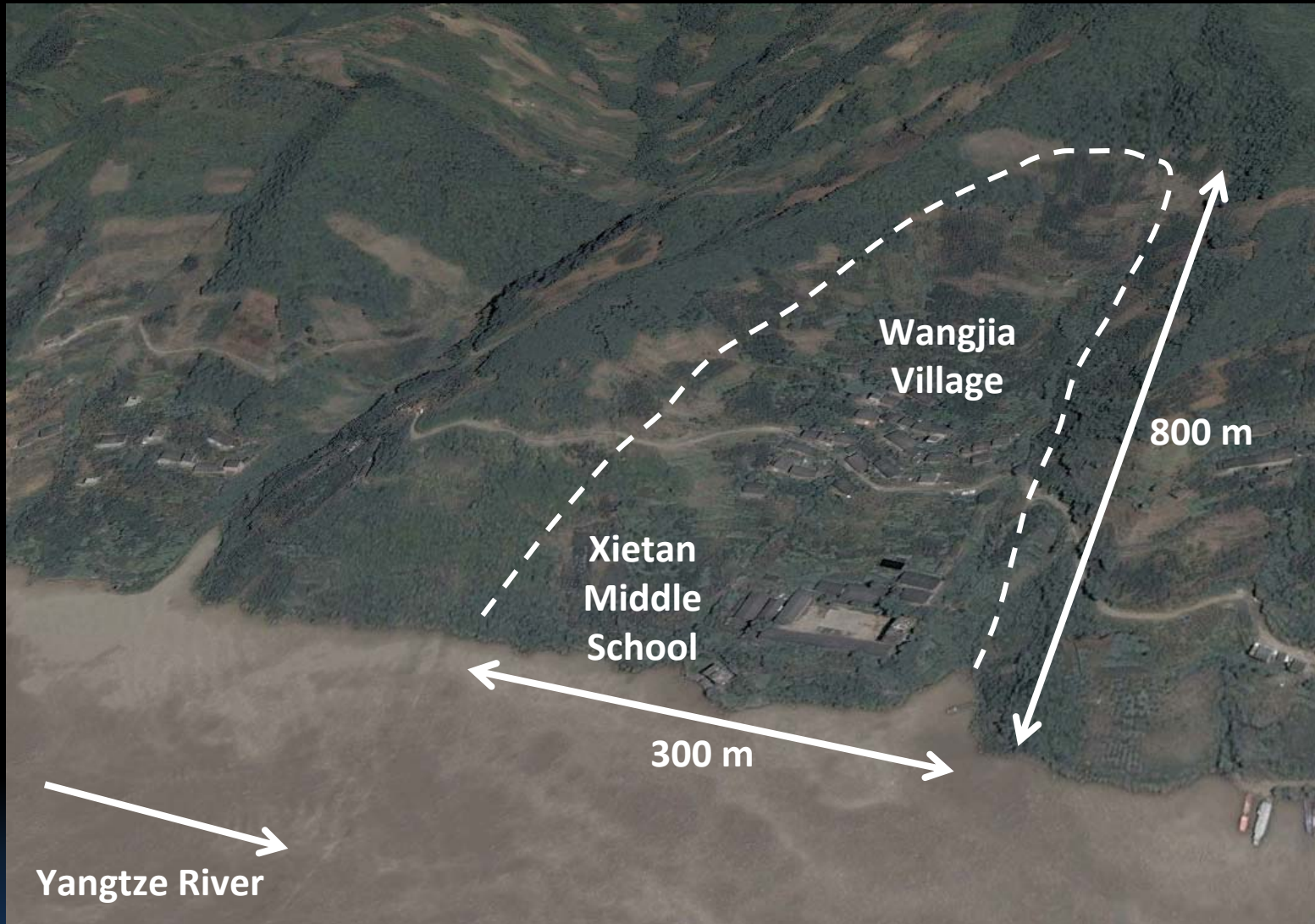
Time-series plot at point A

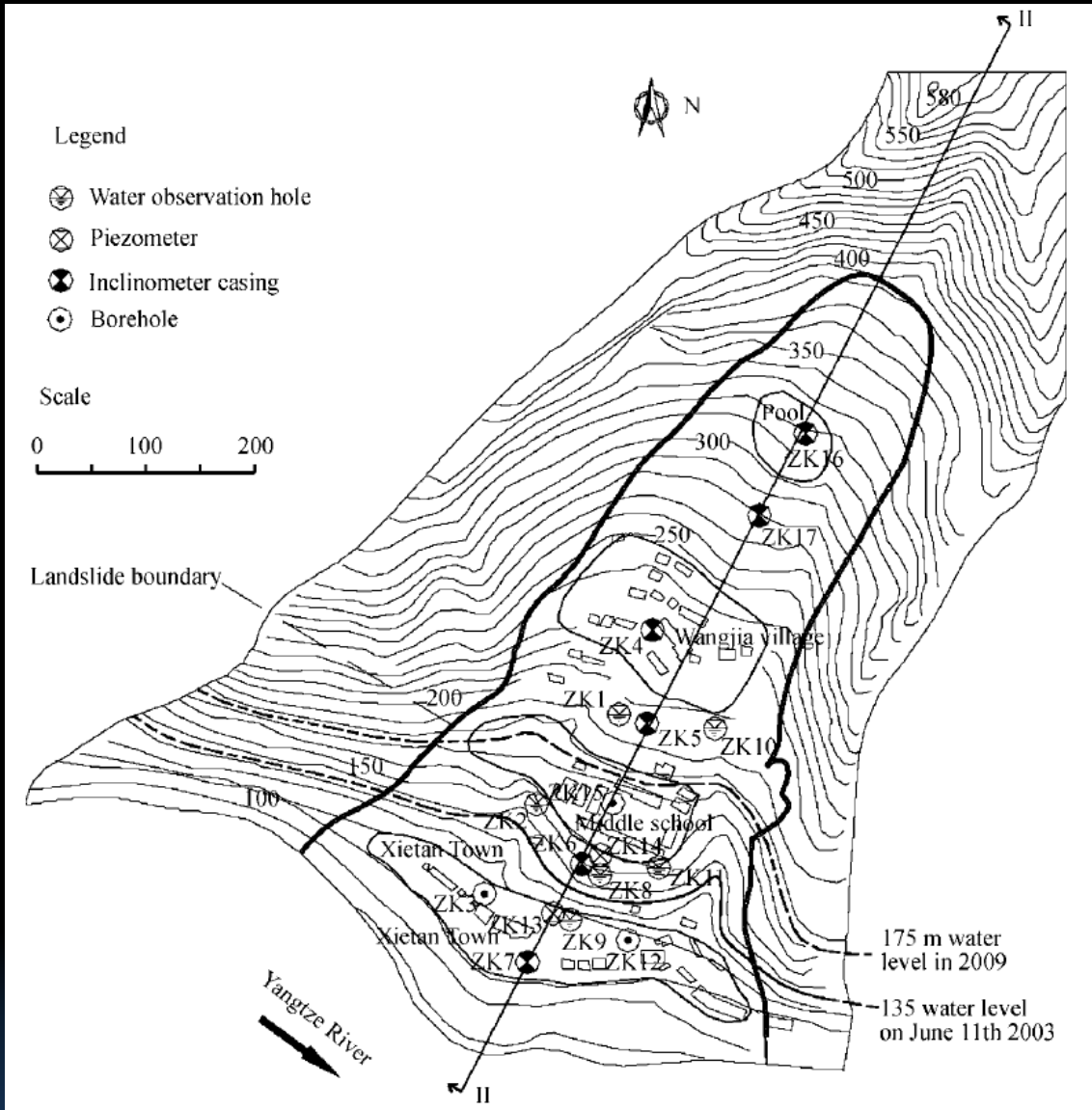


Water level mapped from
amplitude images

— TSX High Res — TSX Stripmap

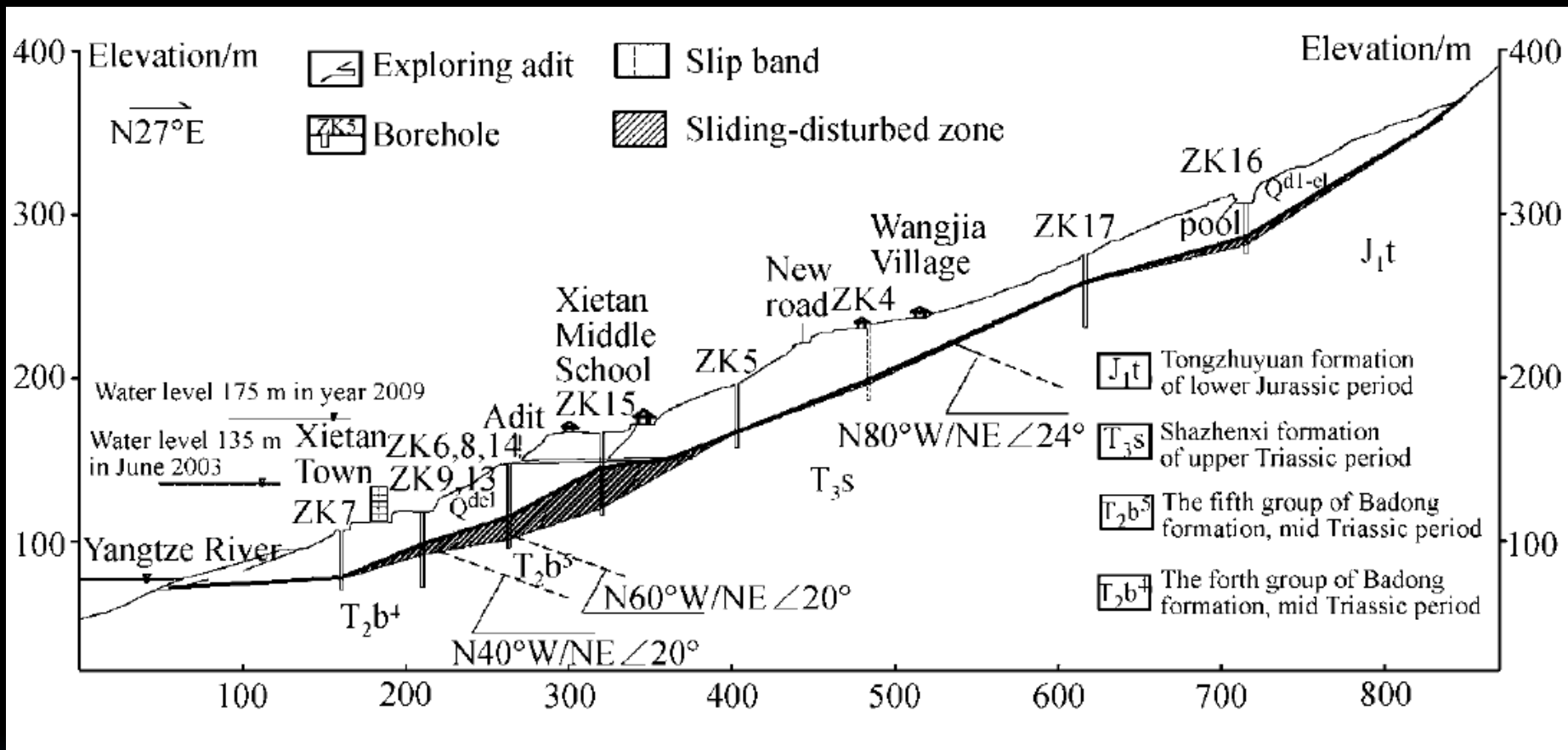




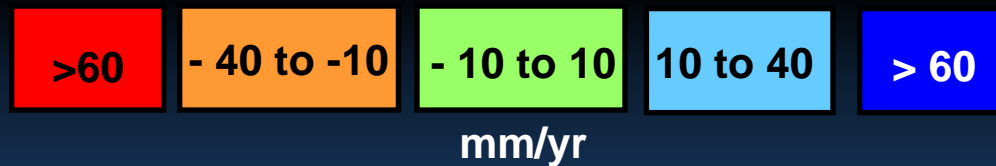
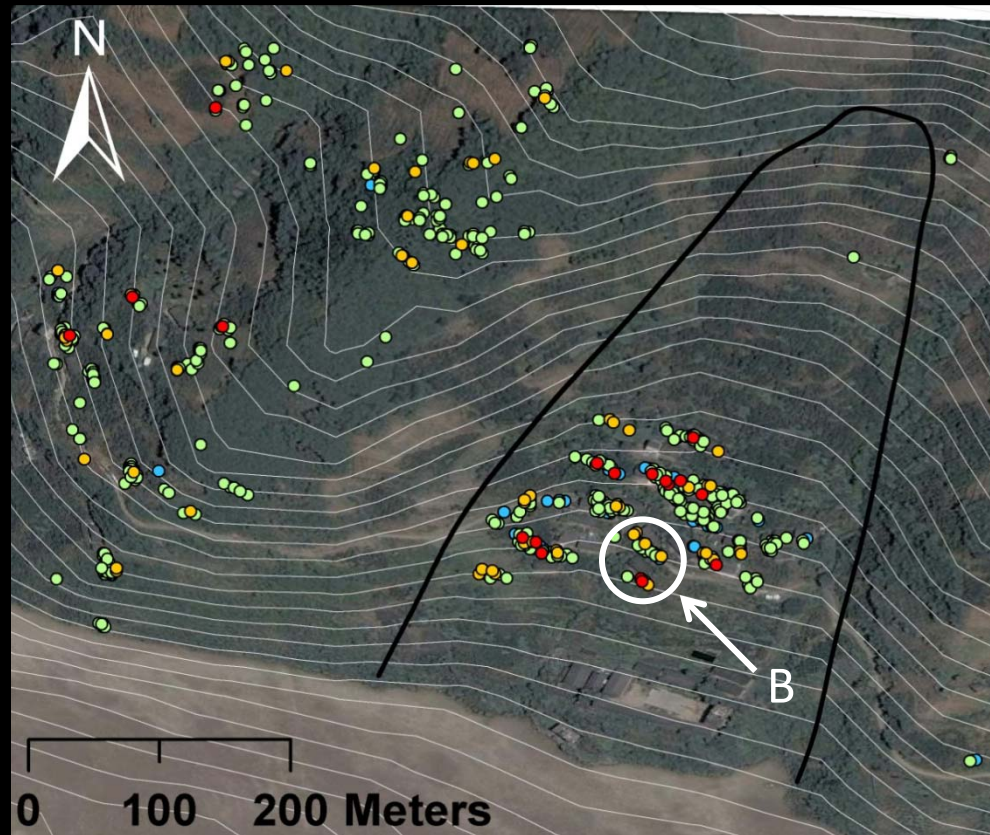


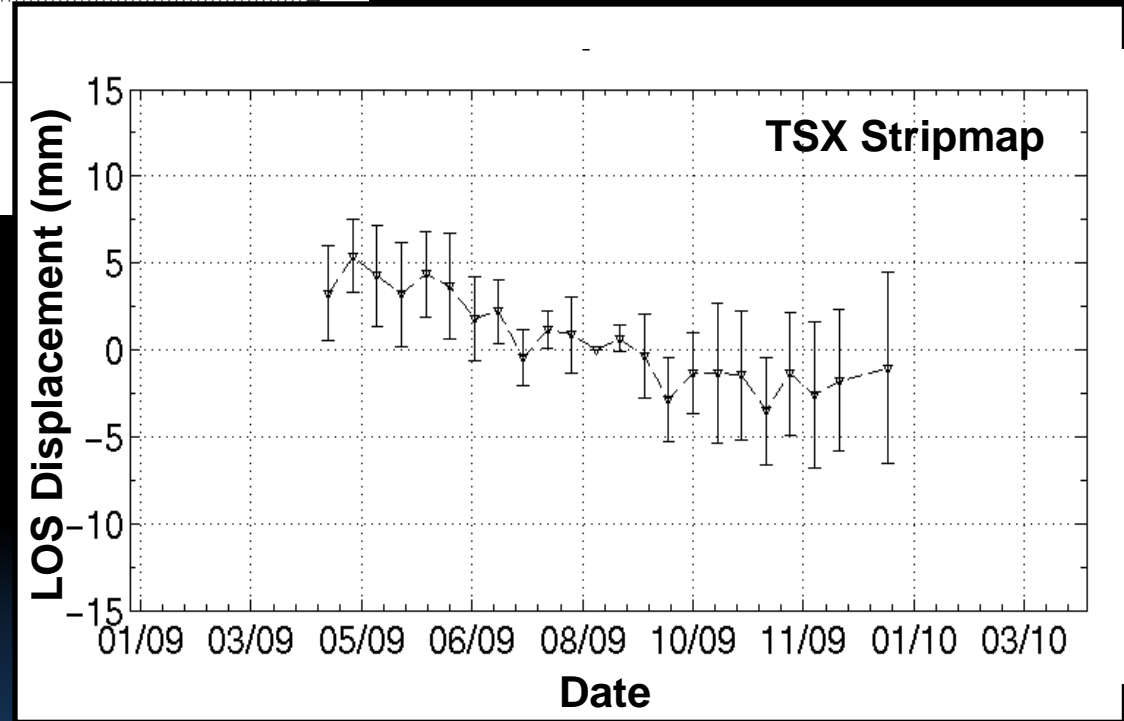
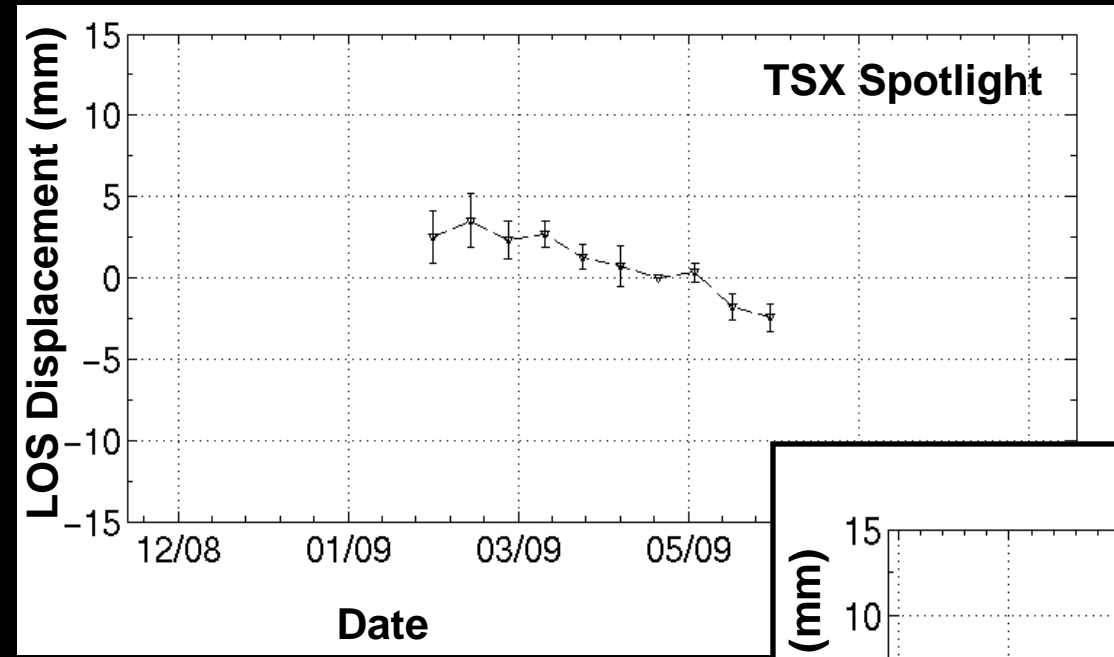
Deng *et al.*, 2005

*Science in China:
Engineering and Materials
Science 48*



Mean LOS Velocity Map from TSX Stripmap





- 1) Spatial resolution and the time interval between acquisitions greatly affects the coherence & quality of results.
- 2) TerraSAR-X is very suitable for monitoring slope stability (even in areas with steep slopes, e.g. Three Gorges).

Future Work:

- Refine the deformation signals
- Modelling with a focus on reservoir water level
- Fieldwork validation

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China acknowledges Three Gorges dam 'problems'

By Michael Bristow
BBC News, Beijing



AP

“ One problem appears to have been caused by fluctuations in the water level of the vast reservoir, which stretches for 660km (360 miles). This causes frequent landslides ”



TSX Data: TSX AO project (ID: LAN0112)

Envisat Data: ESA-MOST Dragon 2 Cooperation Program (ID: 5343)

Thank You