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**DETECTION OF THE SECULAR
DEFORMATION ASSOCIATED WITH
THE SUBDUCTION OF THE
PHILIPPINE SEA PLATE WITH
ALOS/PALSAR**

Acknowledgments

- PALSAR level 1.0 data are shared among *PIXEL* (coordinator: Dr. Taku Ozawa), Earthquake WG (Geographical Survey Inst.) and provided from JAXA under cooperative research contract with ERI, Univ. Tokyo.
- The ownership of PALSAR data belongs to METI (Ministry of Economy, Trade and Industry) and JAXA.

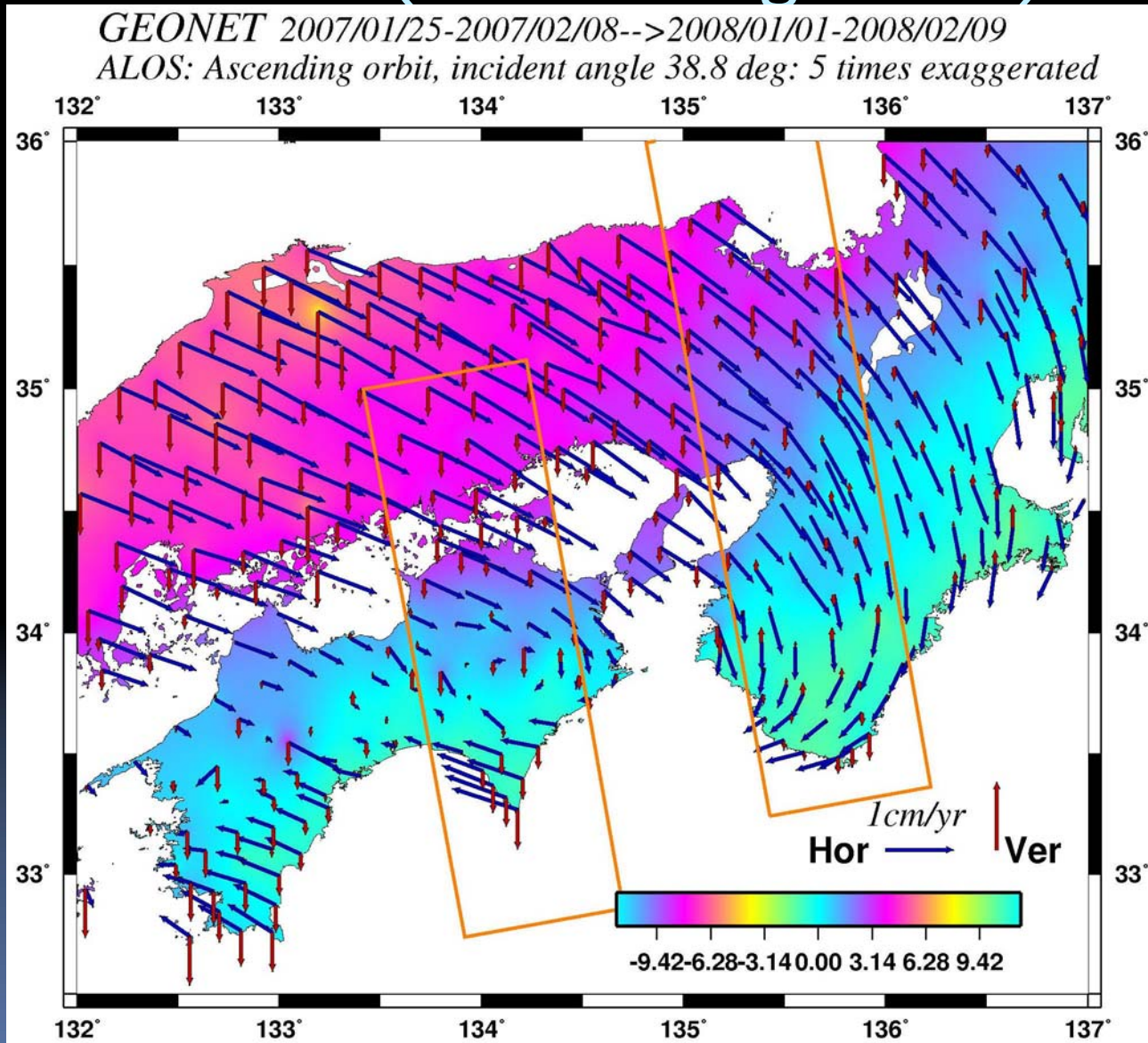
Motivation

- Examples of InSAR time series analyses
 - Ground subsidence
 - Creep along active faults
 - Volcanic deformation
- Frontier
 - Secular deformation in subduction zones
 - One example with ERS ← low spatial density
 - Long wave-length \sim orbital error
 - Small deformation

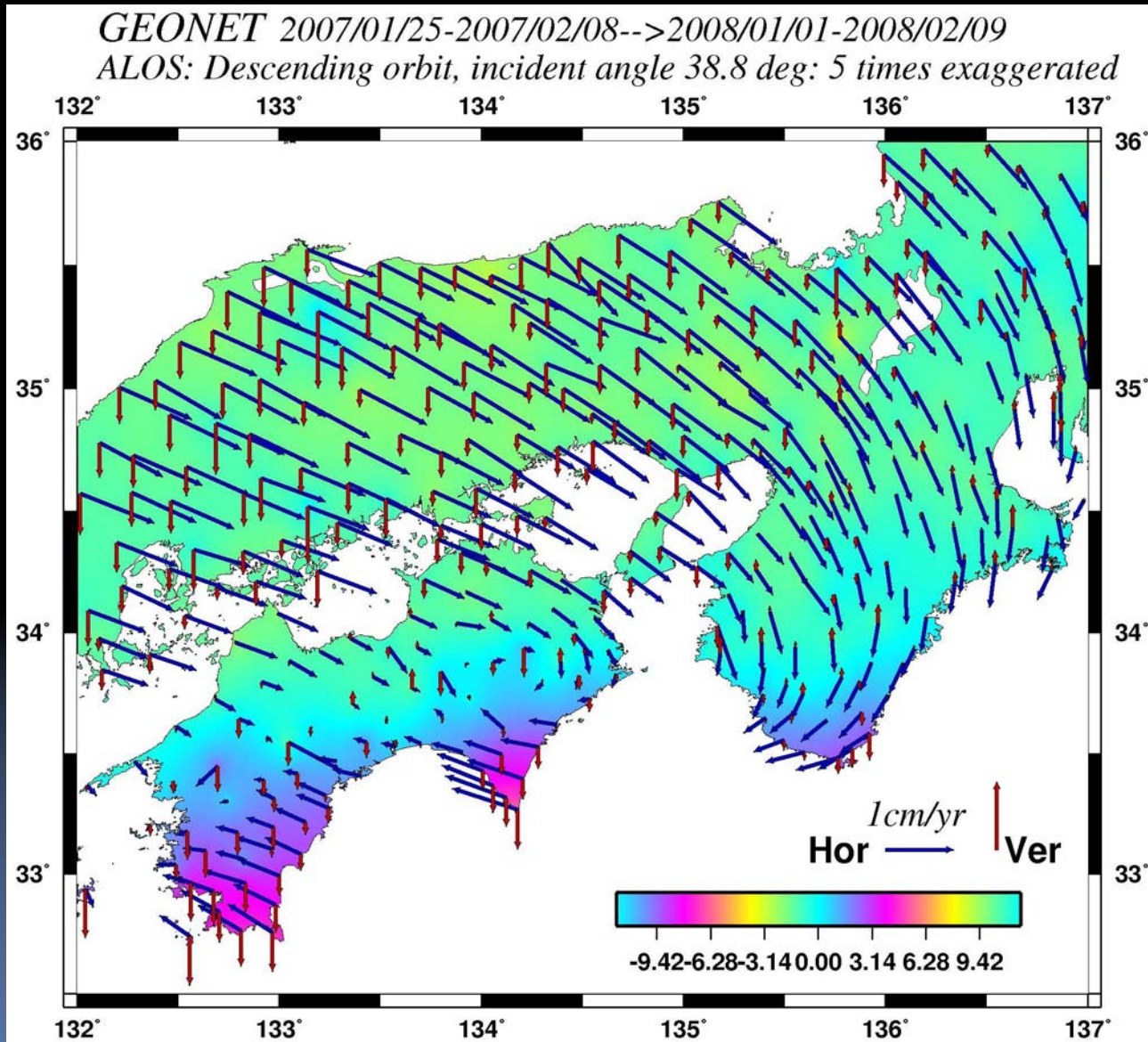
InSAR Analyses of ALOS/PALSAR Data in Kii Peninsula and Shikoku

- Large deformation due to the subduction of the PHL plate
- Strike of island arc perpendicular to path of ALOS
 - Gradient of deformation is parallel to the path
- InSAR and stacking of data from May, 2006 to July, 2008

Synthetic Interferogram from GEONET Velocities (Ascending Path)




Synthetic Interferogram from GEONET Velocities (Descending Path)

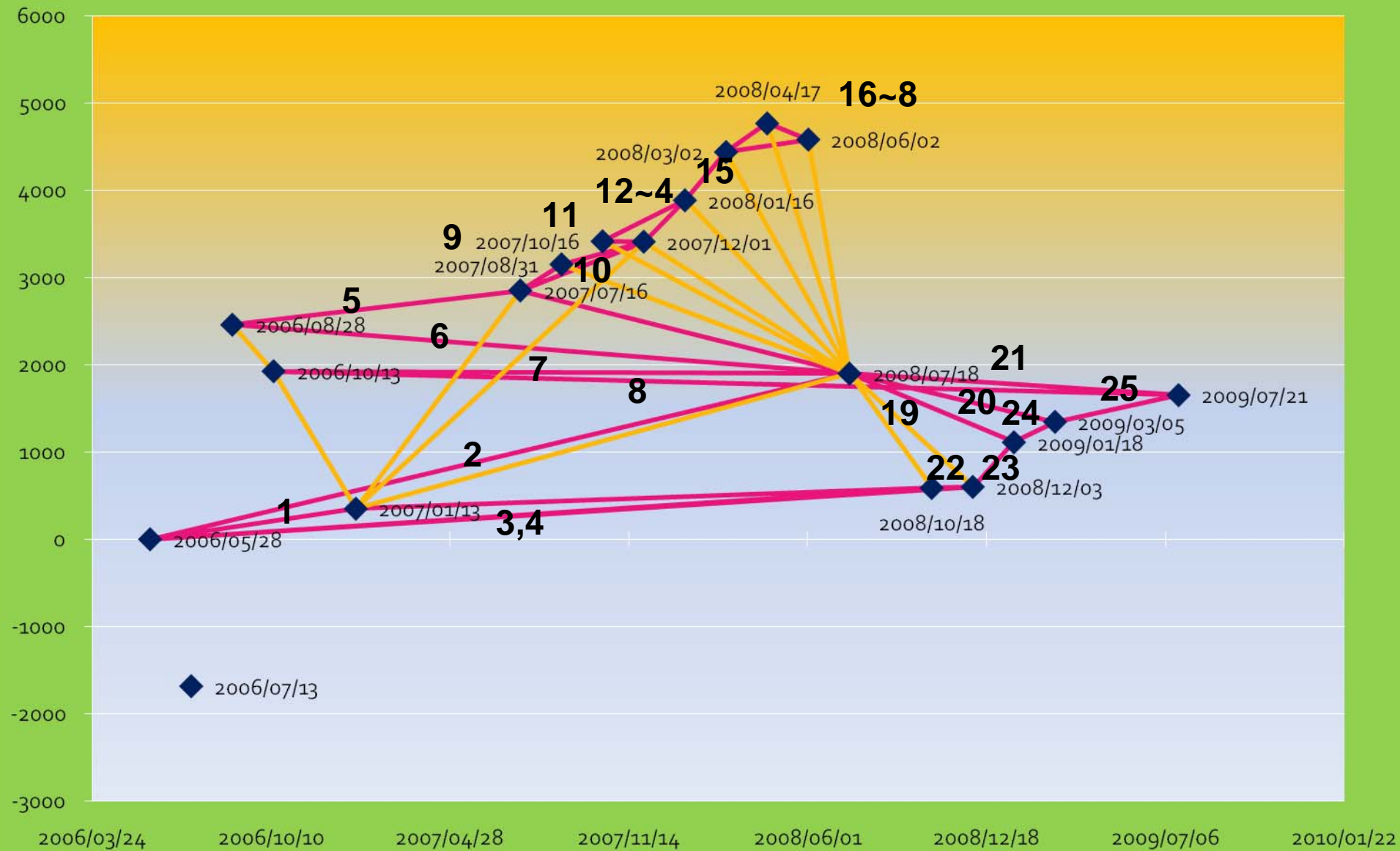


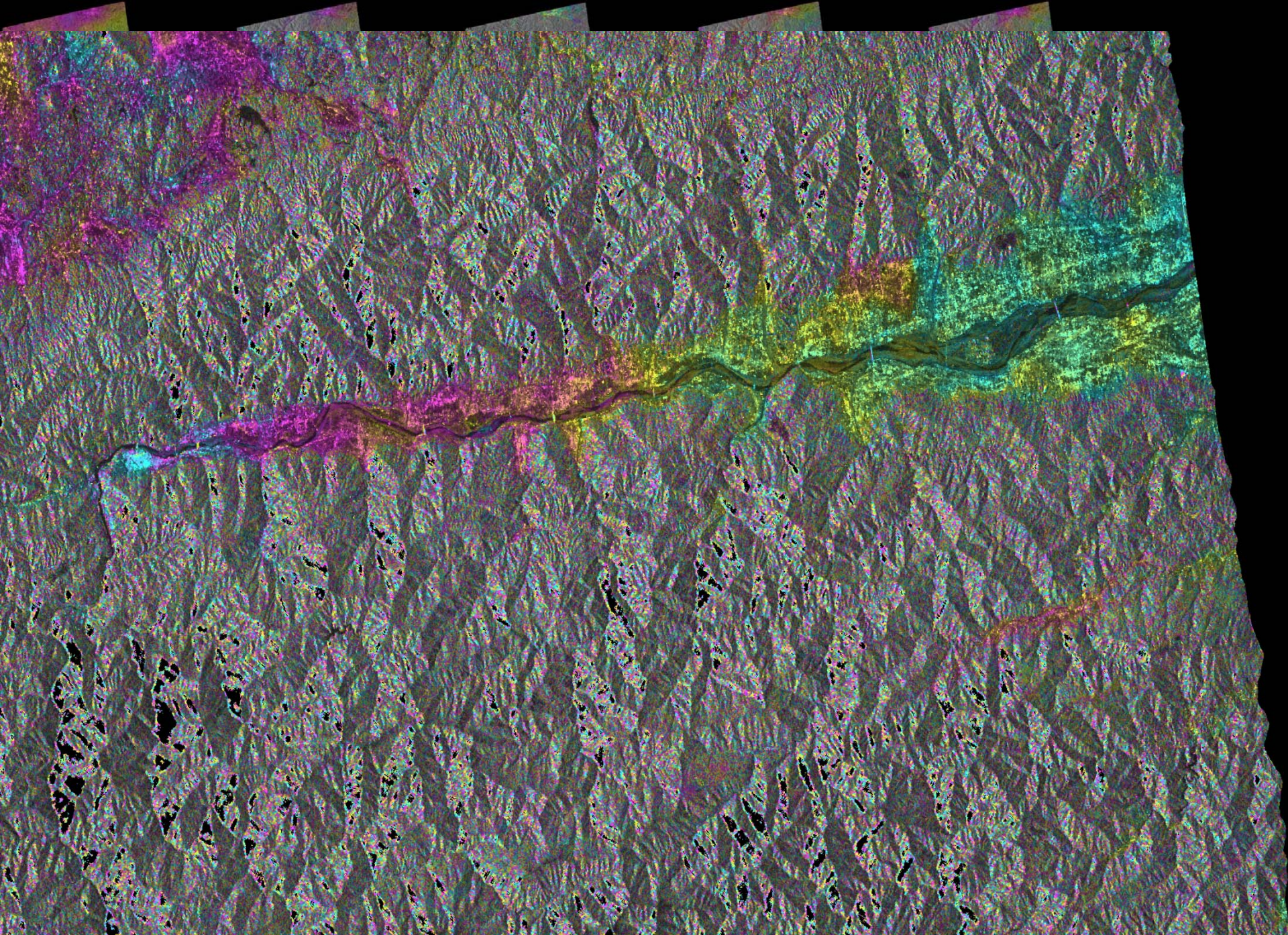


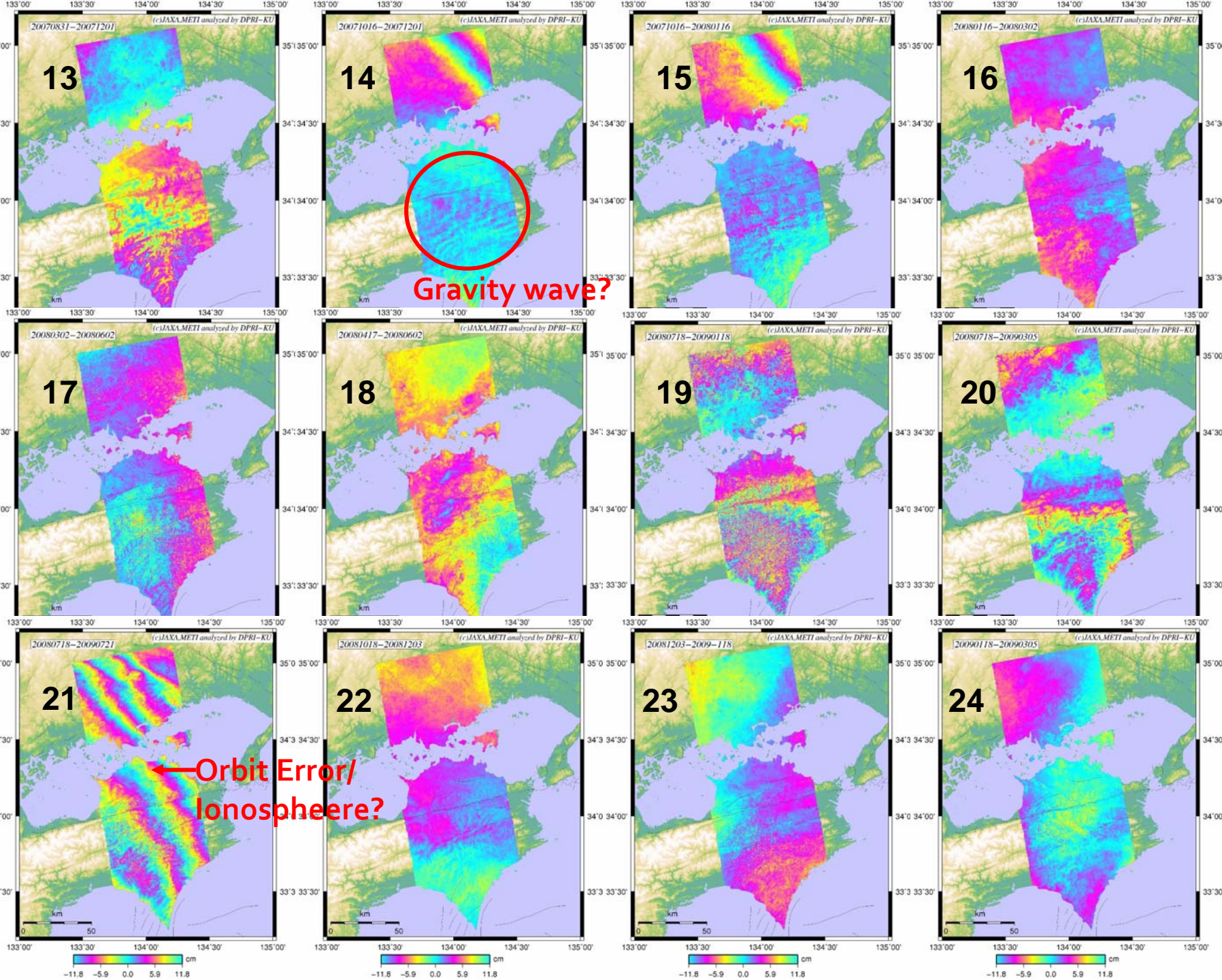
Shikoku Area (Path 417)

- 19 acquisitions during 2006~2008
 - Pt. Muroto ~ Okayama
- 

Shikoku: Bperp

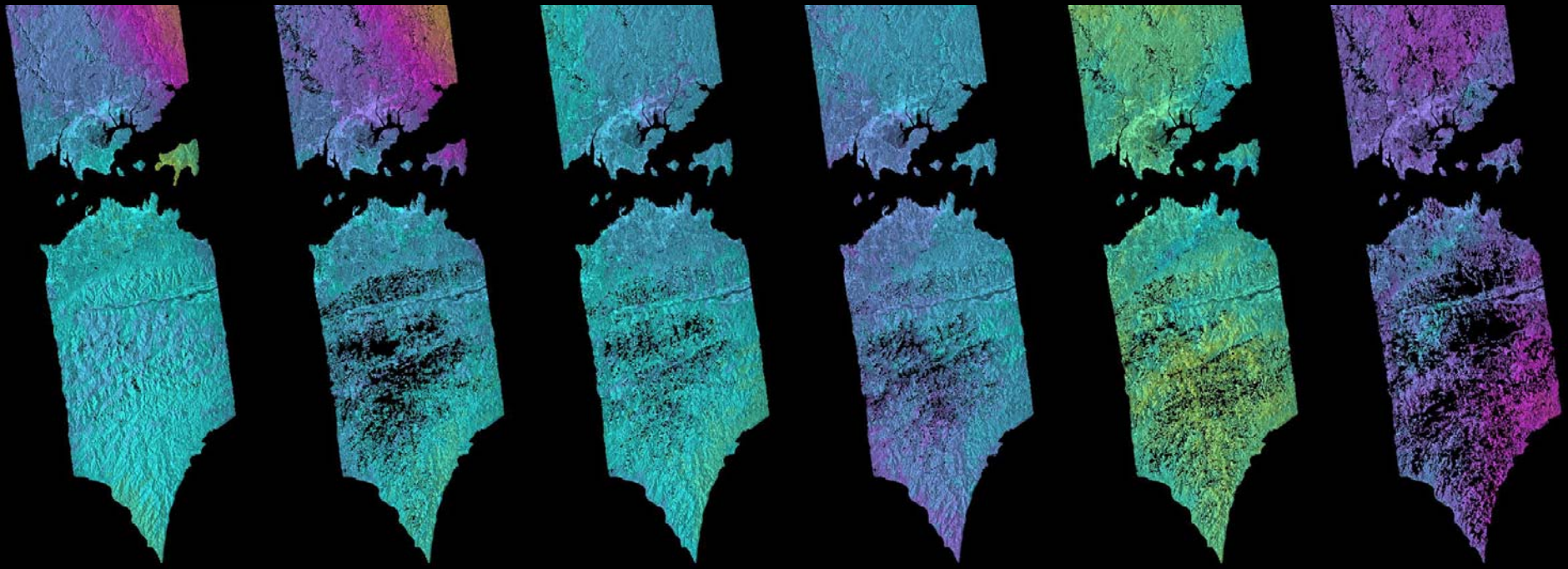


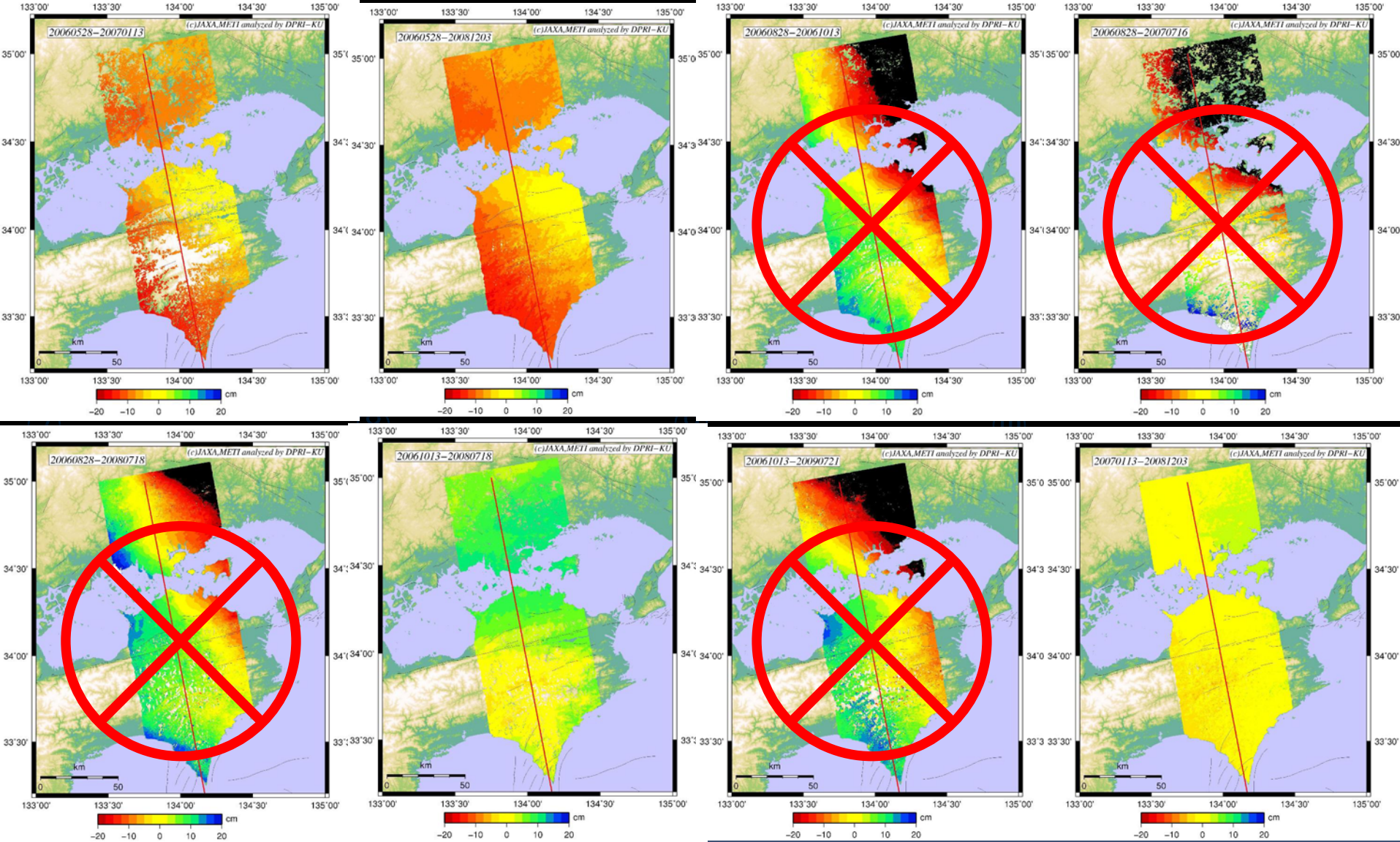




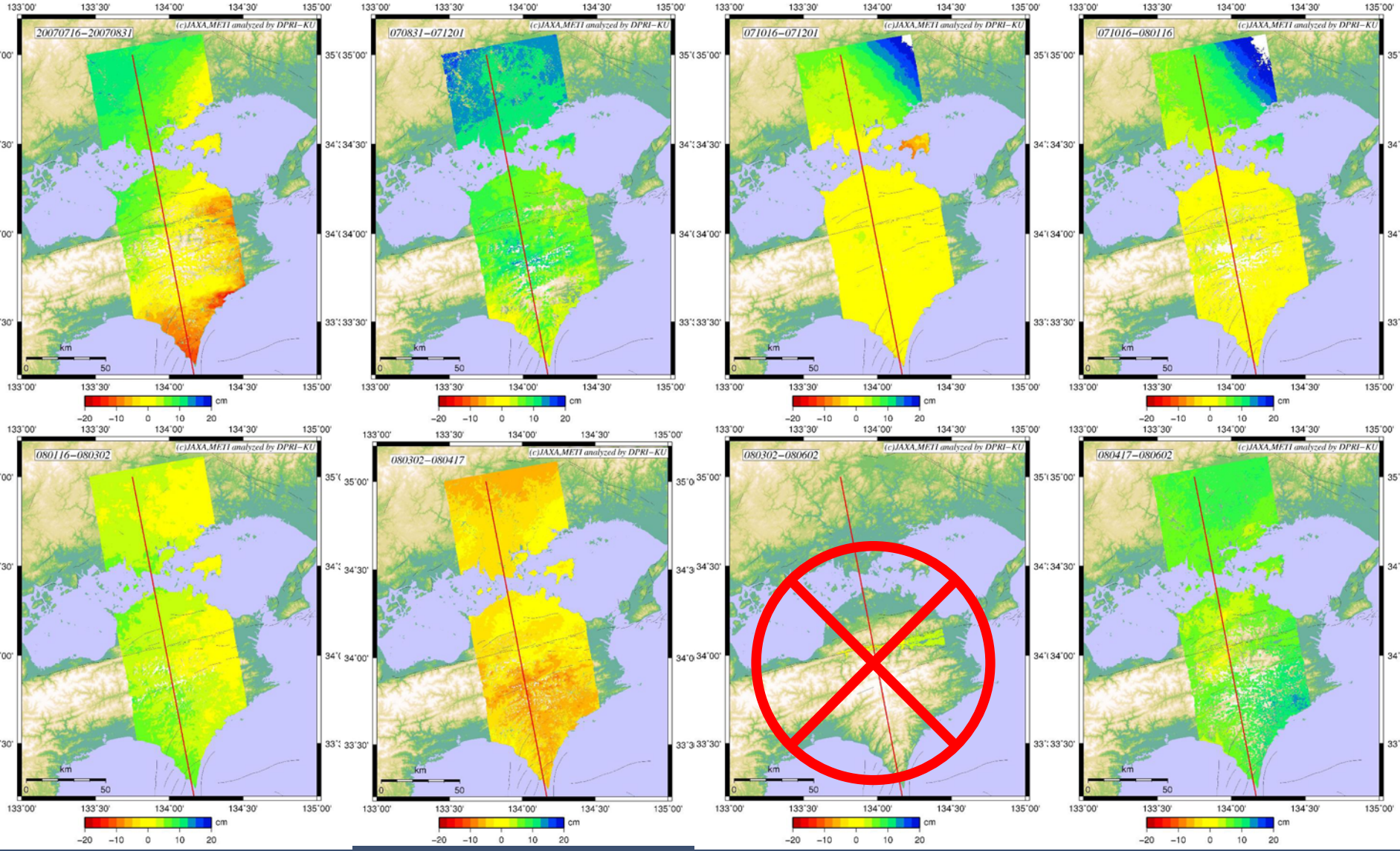
Unwrapped Interferograms

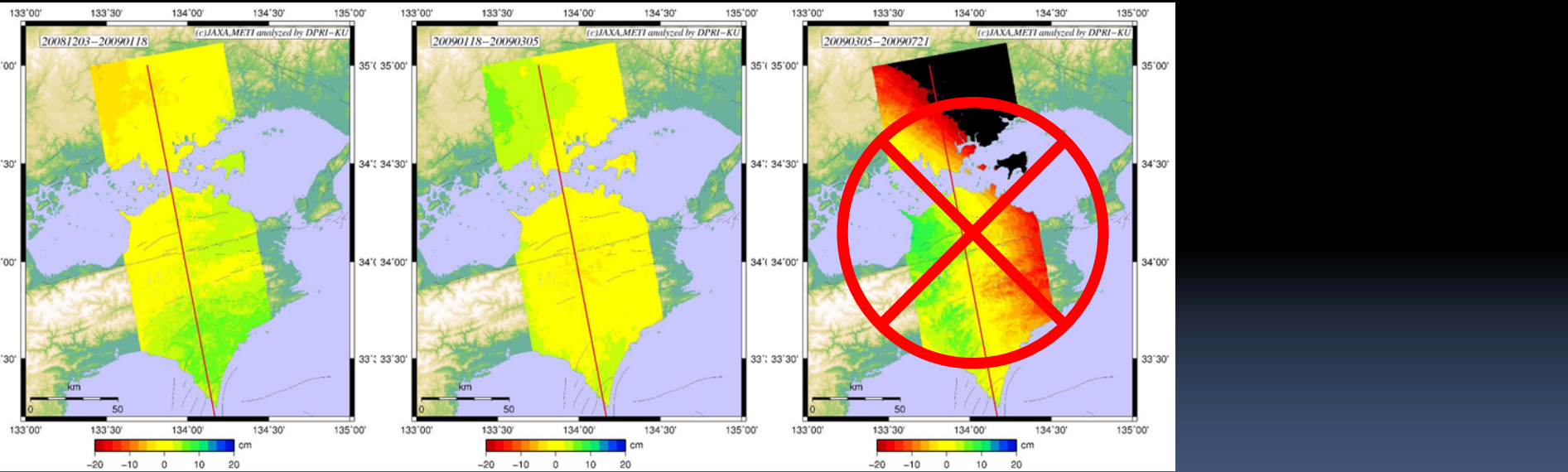
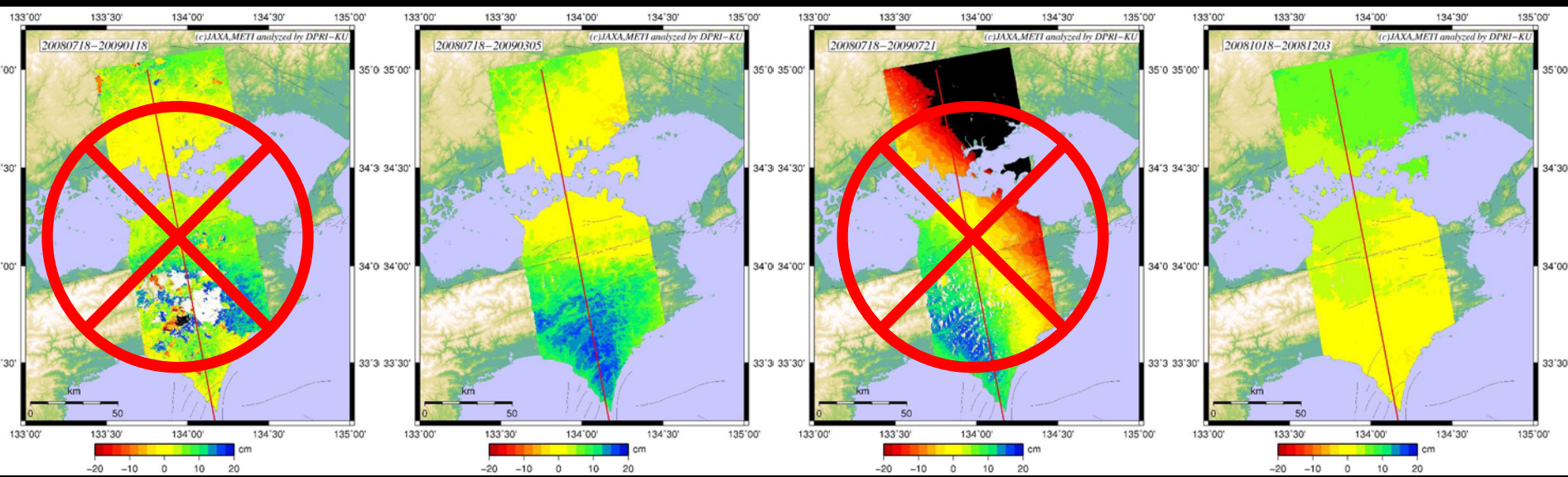
- Branch-cut
- Deformation profile using `grdtrack` in GMT



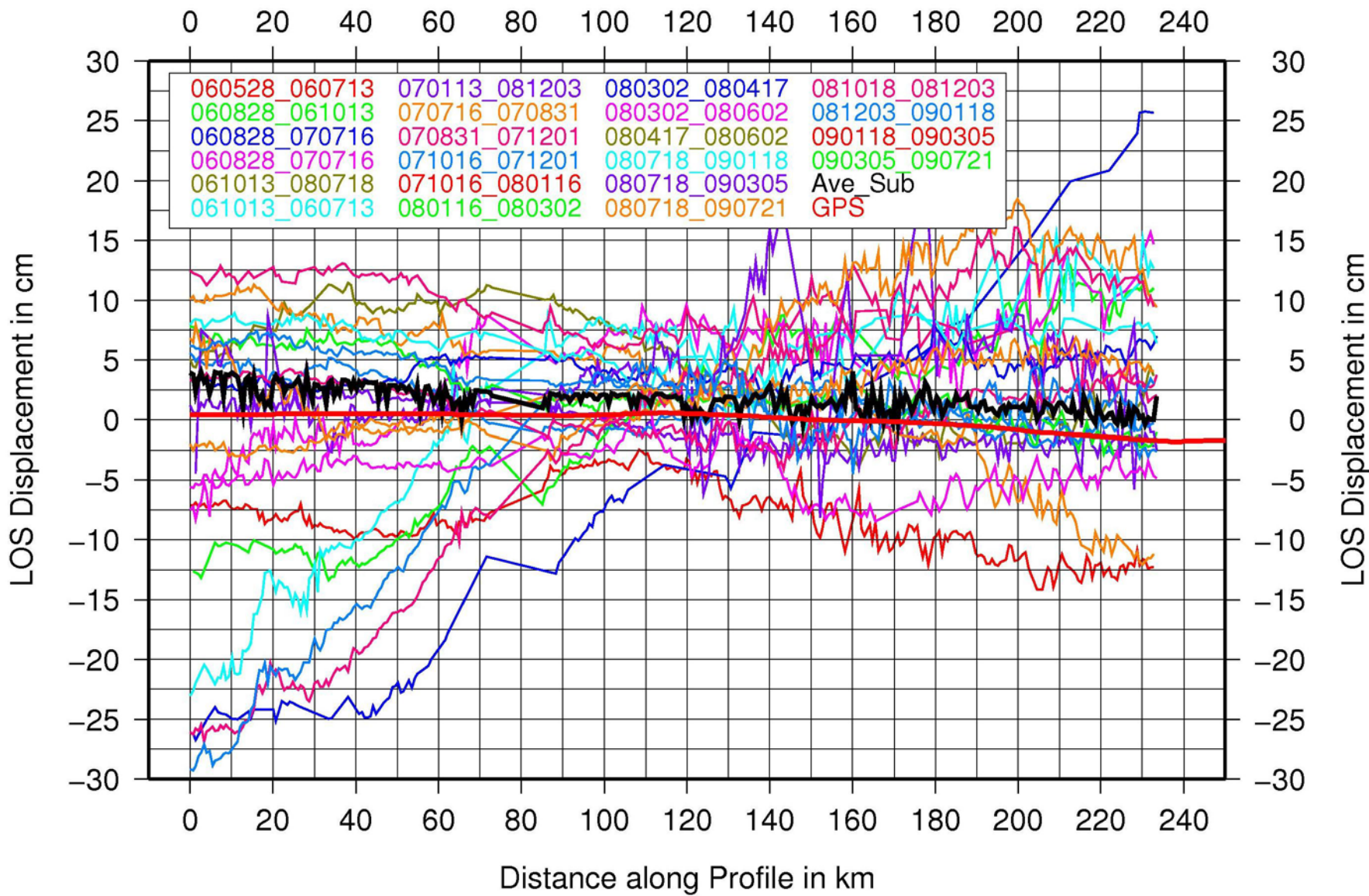


Processed with Branch-cut
Red line indicates the
sampling line .



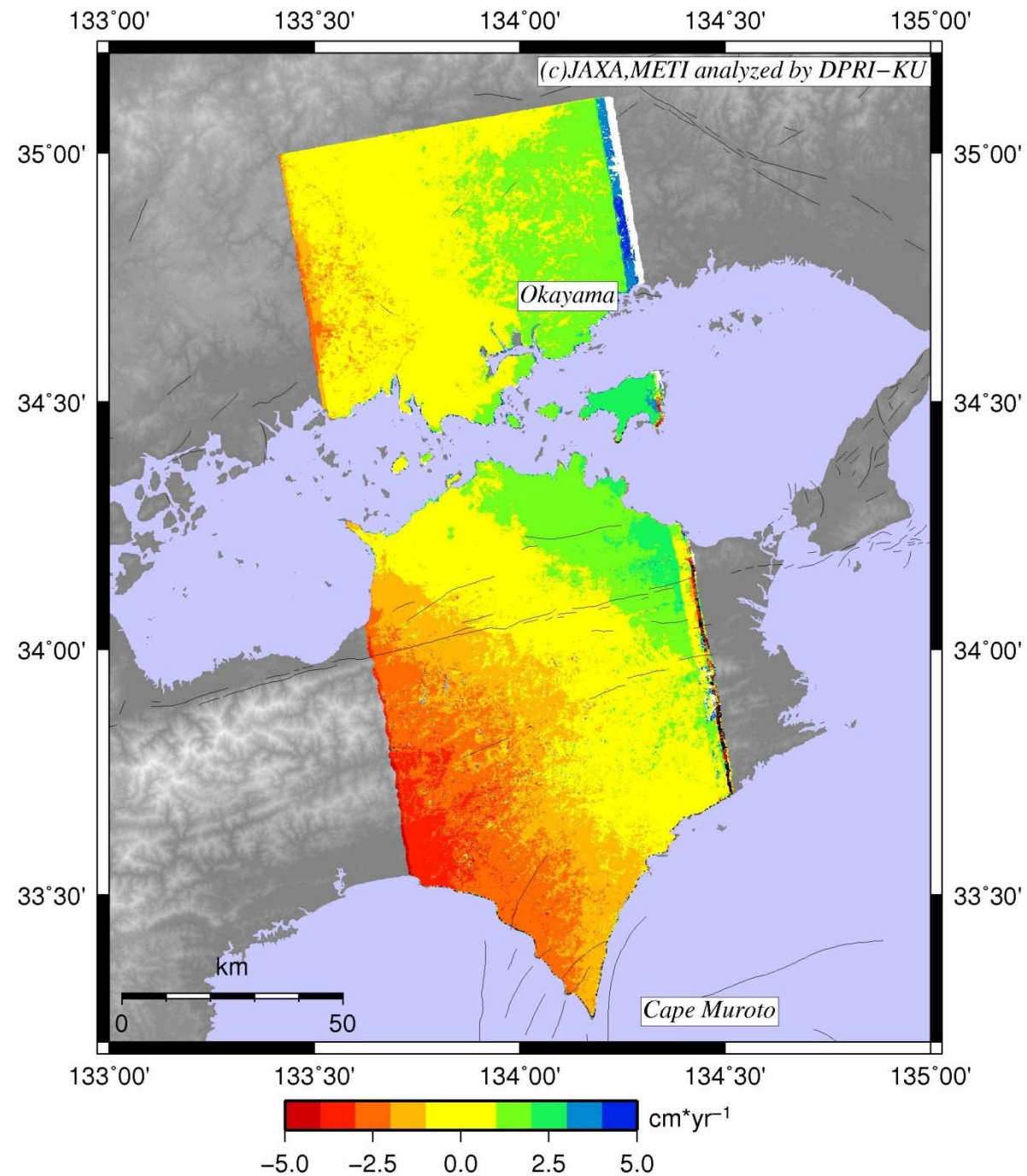


Distance along Profile in km

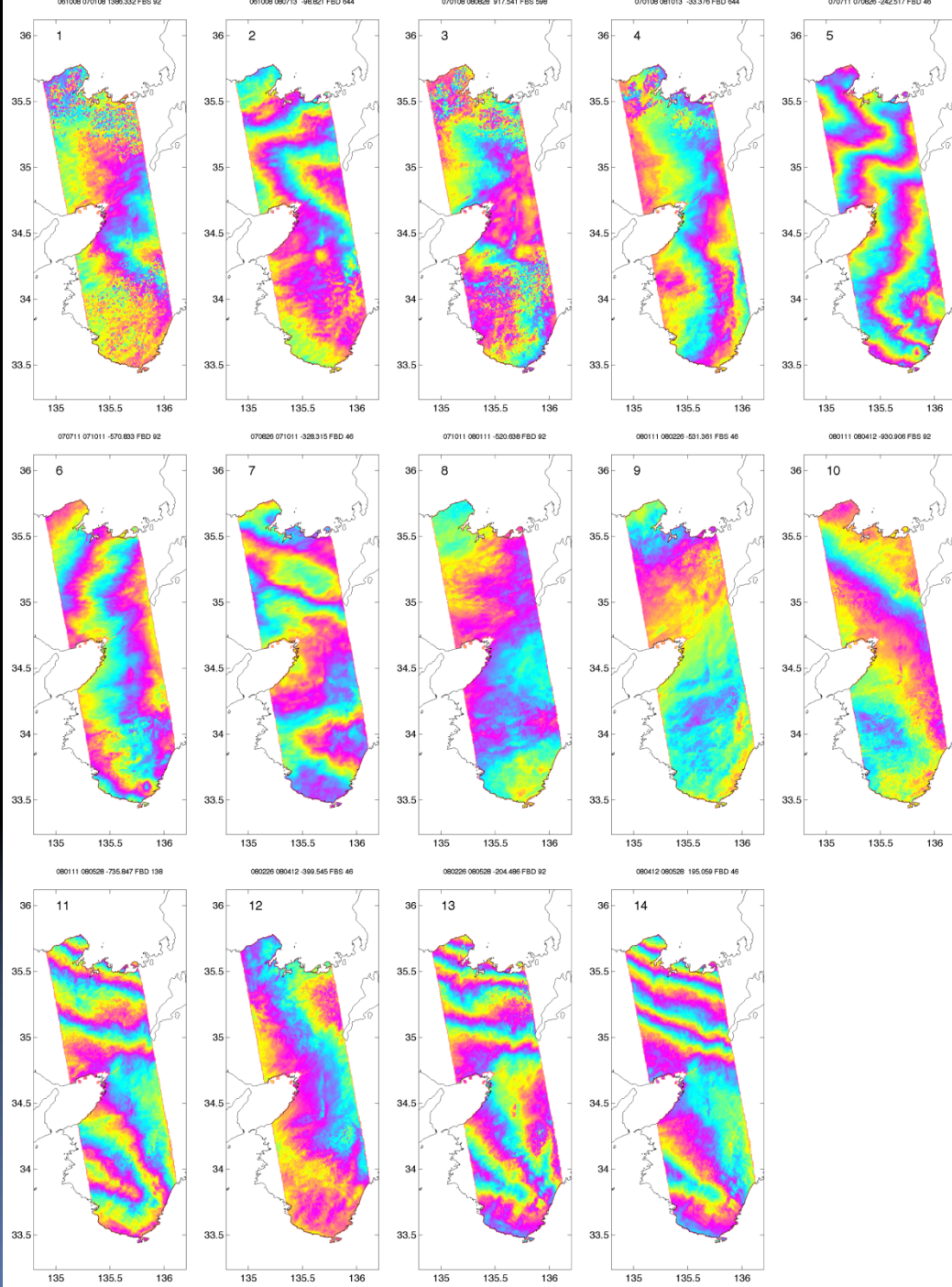


Stacked Interferograms

- With Stacking in Gamma
- Stacking of 15 interferograms
- More than 5 obs. at each pixel
- Larger than GPS



Interferograms along path 414



Summary

- $B_{\text{perp}} < 500\text{m}$ is necessary
 - $< 300\text{m}$ is good for mountains
 - $> 300\text{m}$ causes unwrapping problems
 - Fraction of residue $< 1\%$ for smooth unwrapping
 - $> 500\text{m}$ is no use in mountains
- Disturbances in interferograms with small B_{perp}
 - Bad orbits or large ionospheric effect on 2006/08/28 and 2009/07/21 acquisition
- Short spatial baseline with long temporal baseline
- Spatial pattern of stacked interferogram
 - Fair(?) agreement with GPS
 - A bit larger than GPS

Can Time Series Analyses Be Applied to ALOS/PALSAR Data?

- So far it is not easy!
- Problems
 - Accuracy of orbit
 - Fringes due to orbit error
 - Difficulty in unwrapping
 - Irregular Recurrence
 - Accumulation of interferograms with long B_{temp}
 - Tropospheric/ionospheric disturbances
 - Fringe proportional to topography
 - Irregular fringes