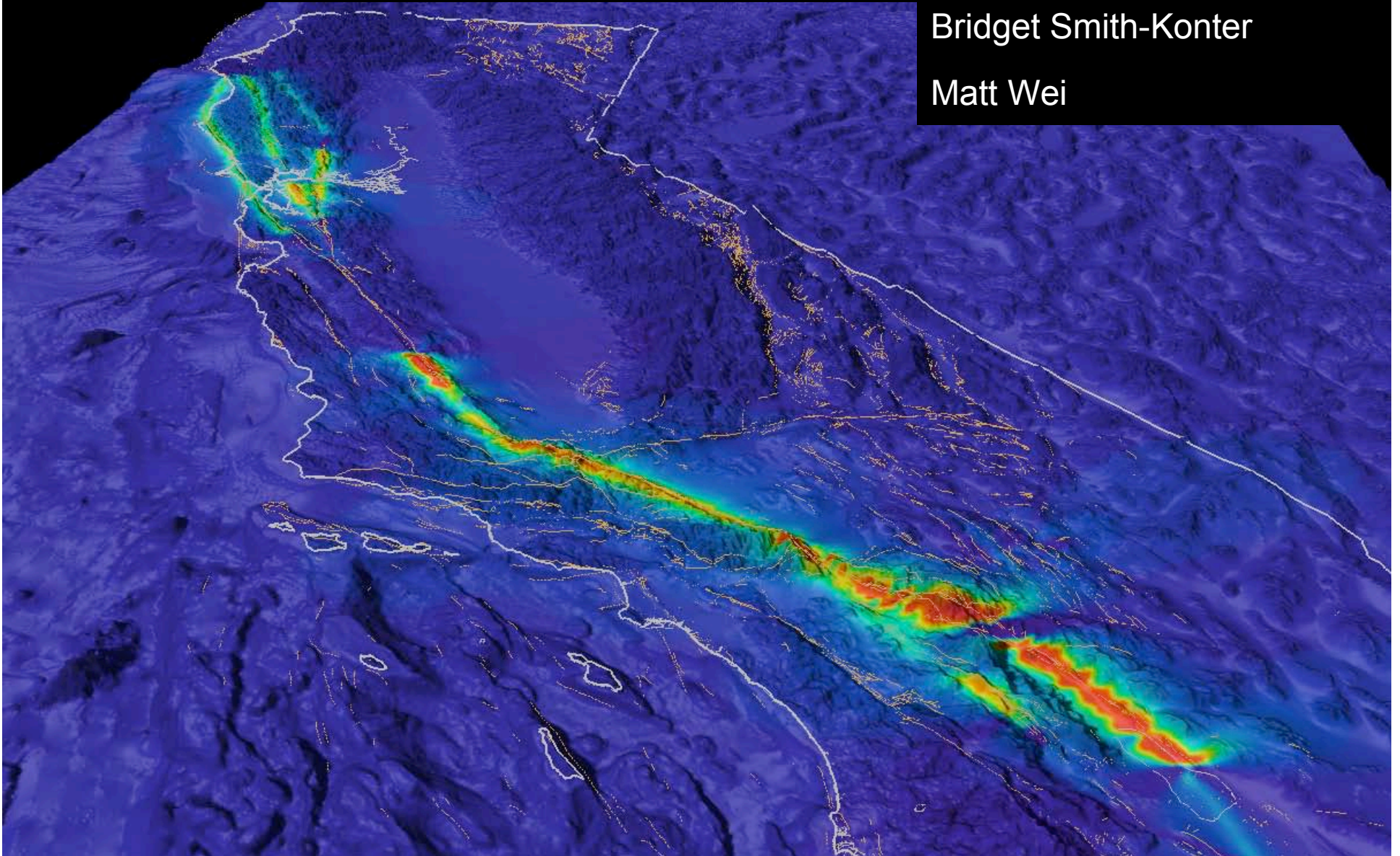


Imaging Crustal Deformation Along the San Andreas Fault System with ALOS InSAR and GPS

David Sandwell,

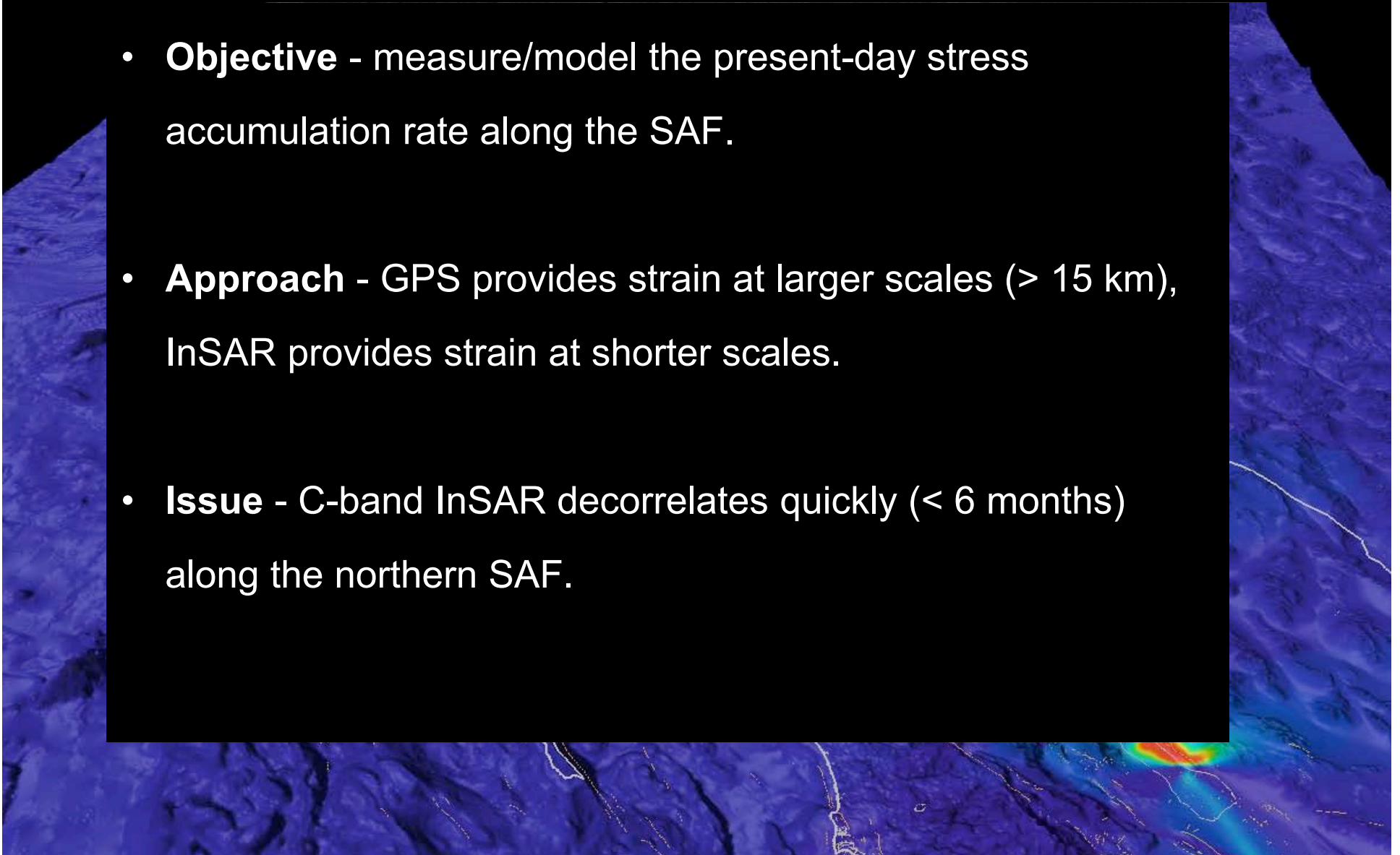
Bridget Smith-Konter

Matt Wei



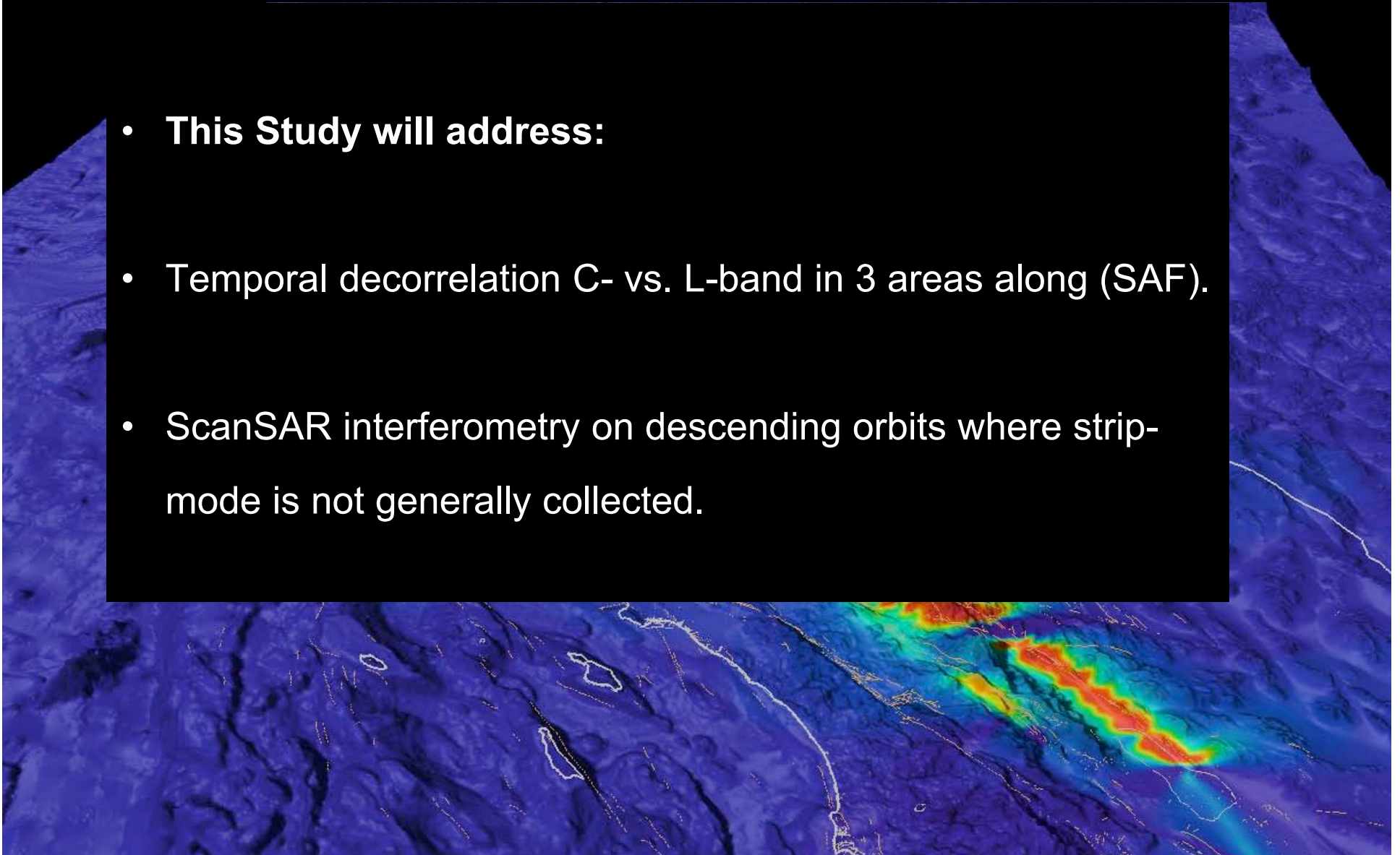
Imaging Crustal Deformation Along the San Andreas Fault System with ALOS InSAR and GPS

- **Objective** - measure/model the present-day stress accumulation rate along the SAF.
- **Approach** - GPS provides strain at larger scales (> 15 km), InSAR provides strain at shorter scales.
- **Issue** - C-band InSAR decorrelates quickly (< 6 months) along the northern SAF.

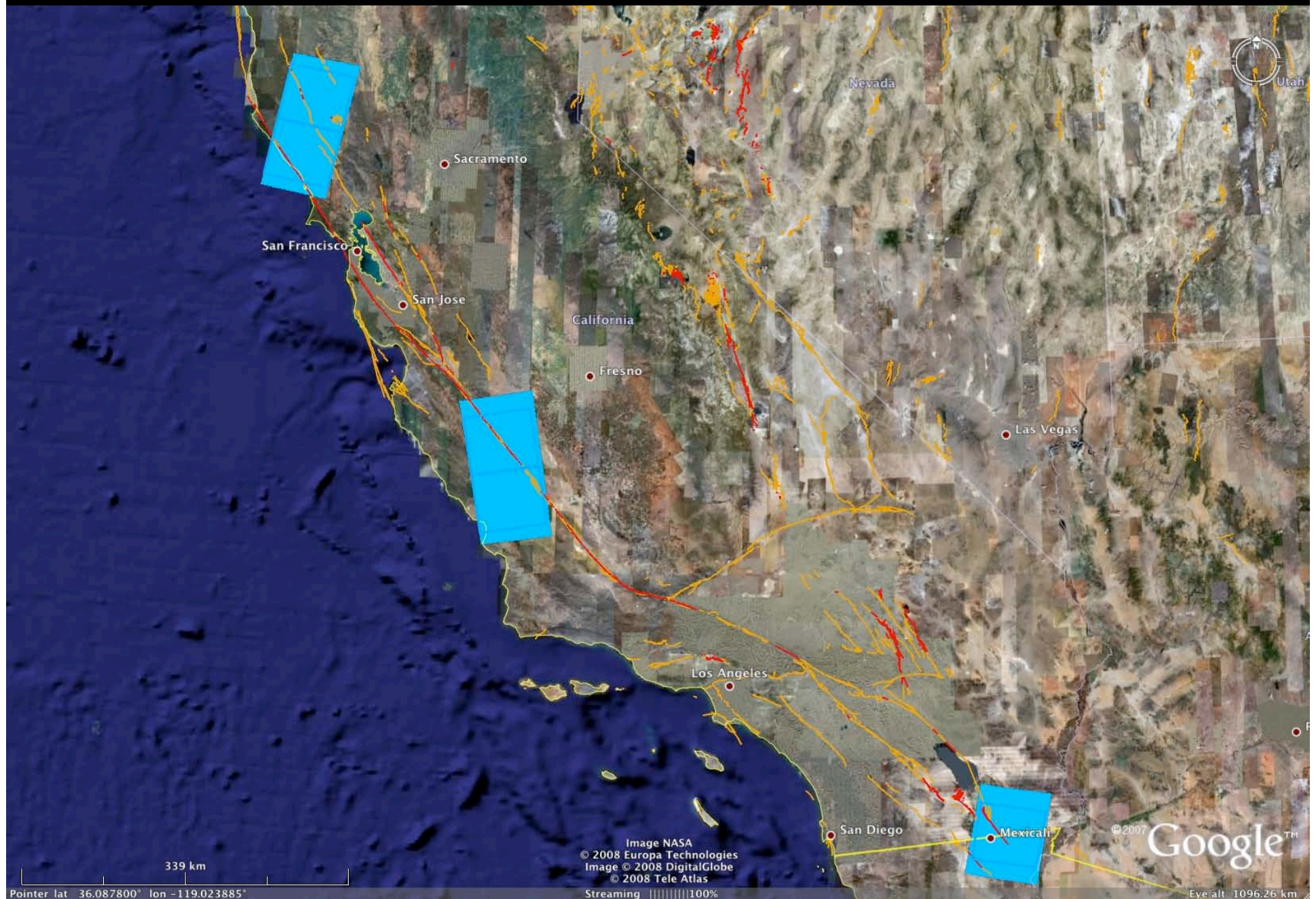


Imaging Crustal Deformation Along the San Andreas Fault System with ALOS InSAR and GPS

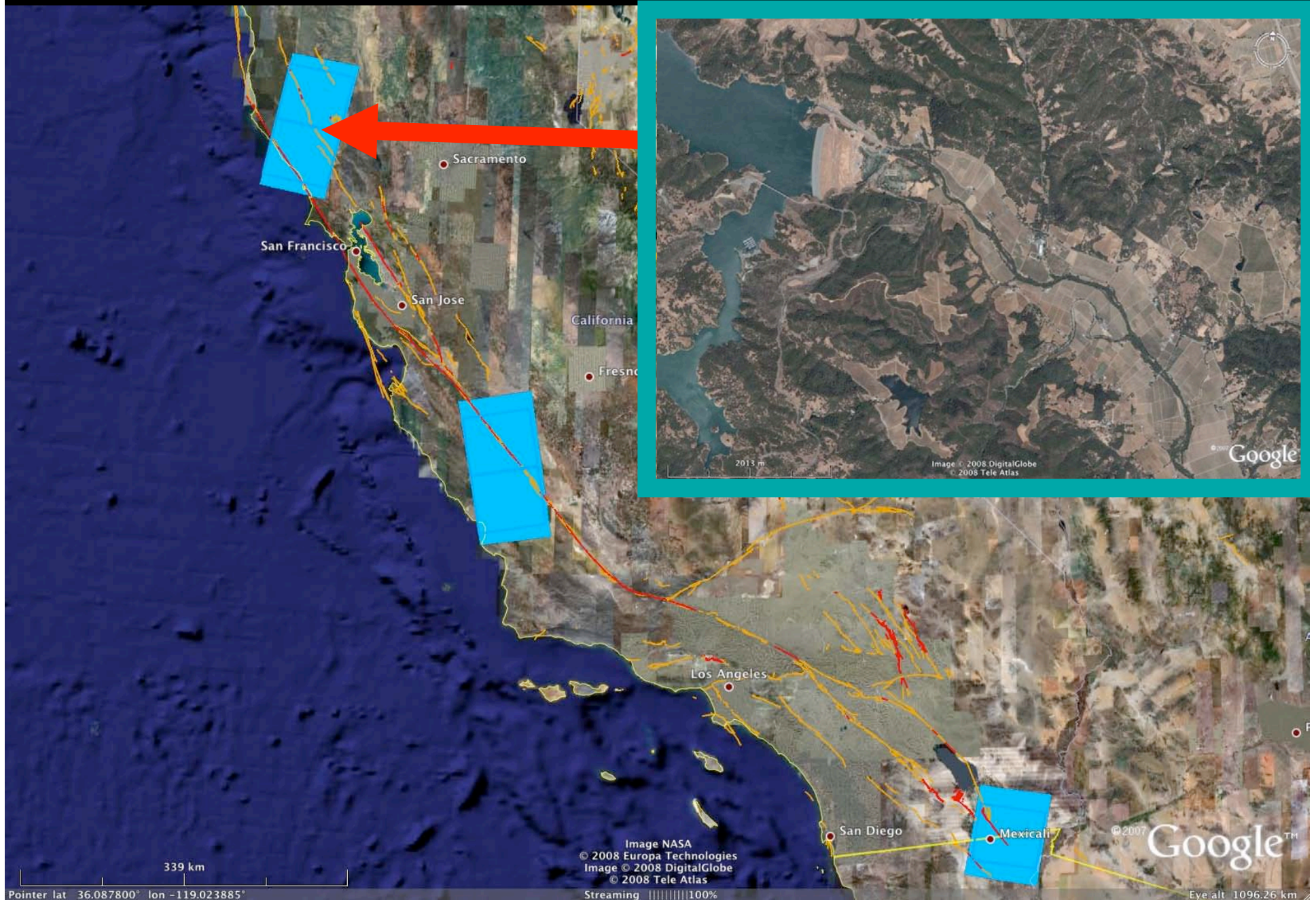
- **This Study will address:**
- Temporal decorrelation C- vs. L-band in 3 areas along (SAF).
- ScanSAR interferometry on descending orbits where strip-mode is not generally collected.



coherence in 3 problem areas



Northern SAF



Northern SAF PALSAR FBS-FBS

$\Delta T = 46$ days

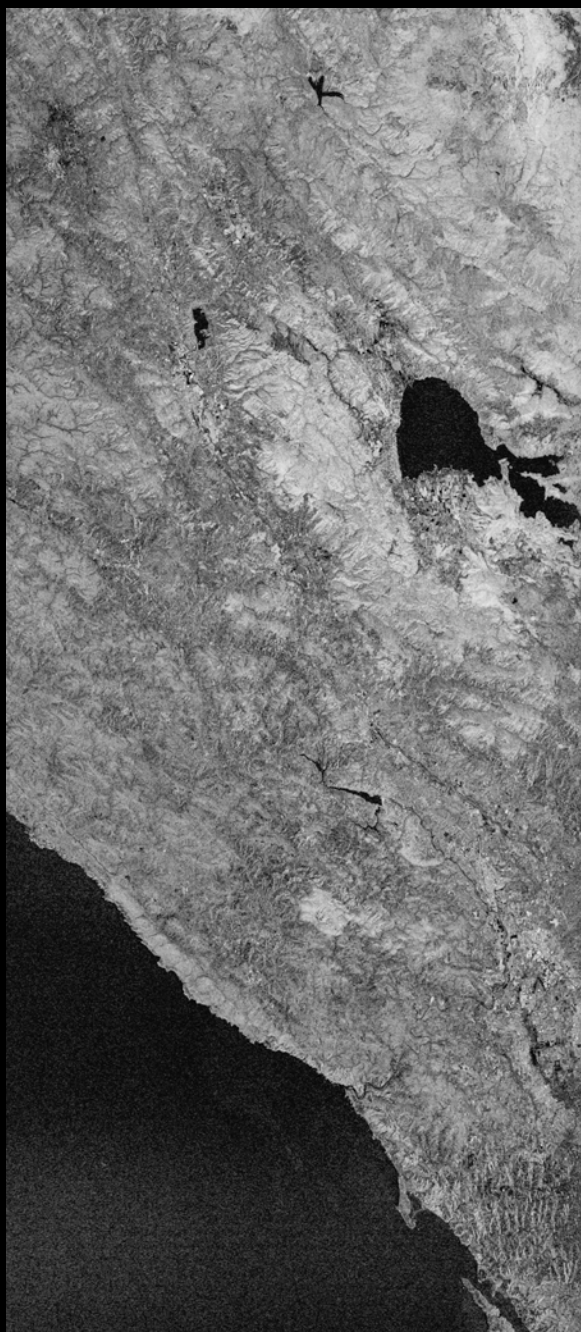
OCT 7, 2007

NOV 21, 2007

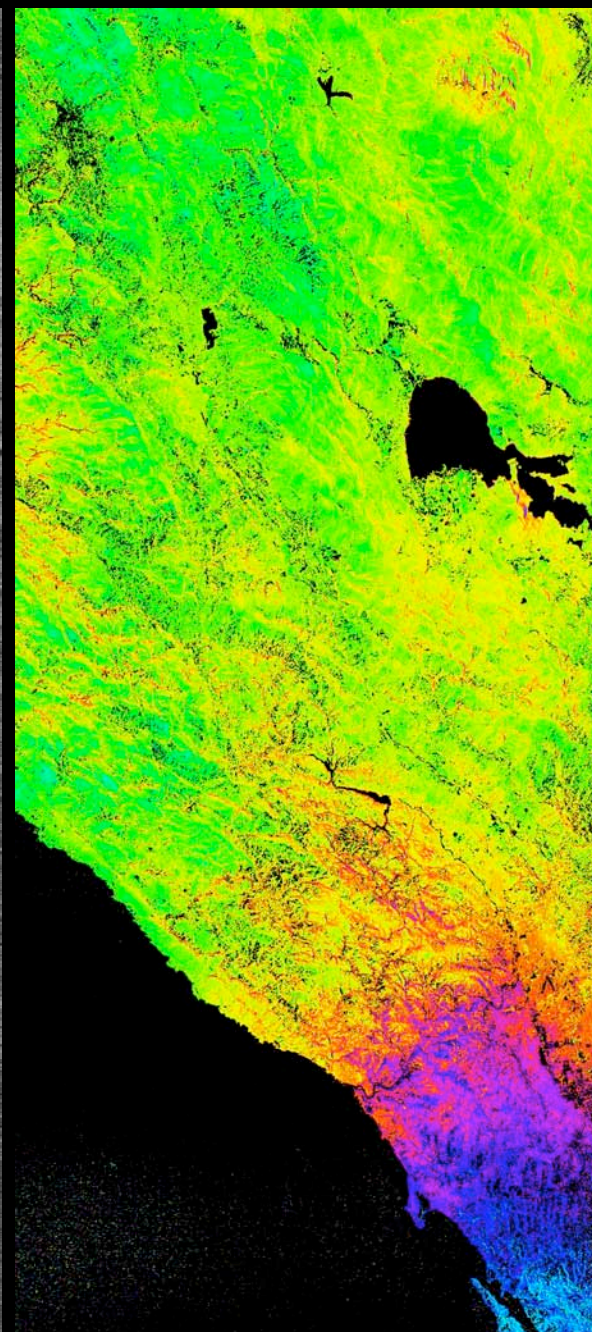
$B_{\text{perp}} = 248$ m

mean coherence
= 0.41

coherence



phase



Northern SAF
PALSAR FBS-FBS

$\Delta T = 138$ days

AUG 21, 2007

JAN 6, 2008

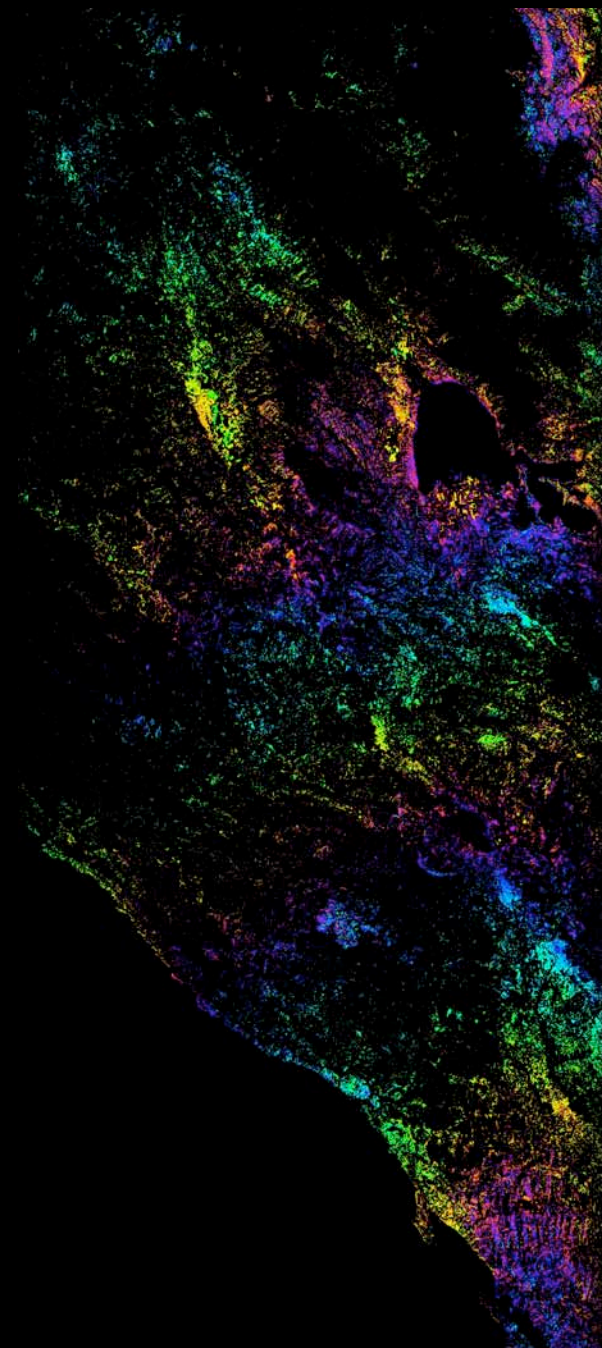
$B_{\text{perp}} = 1132$ m

mean coherence
= .15

coherence



phase



Northern SAF

ERS-1 to ERS-2

$\Delta T = 174$ days

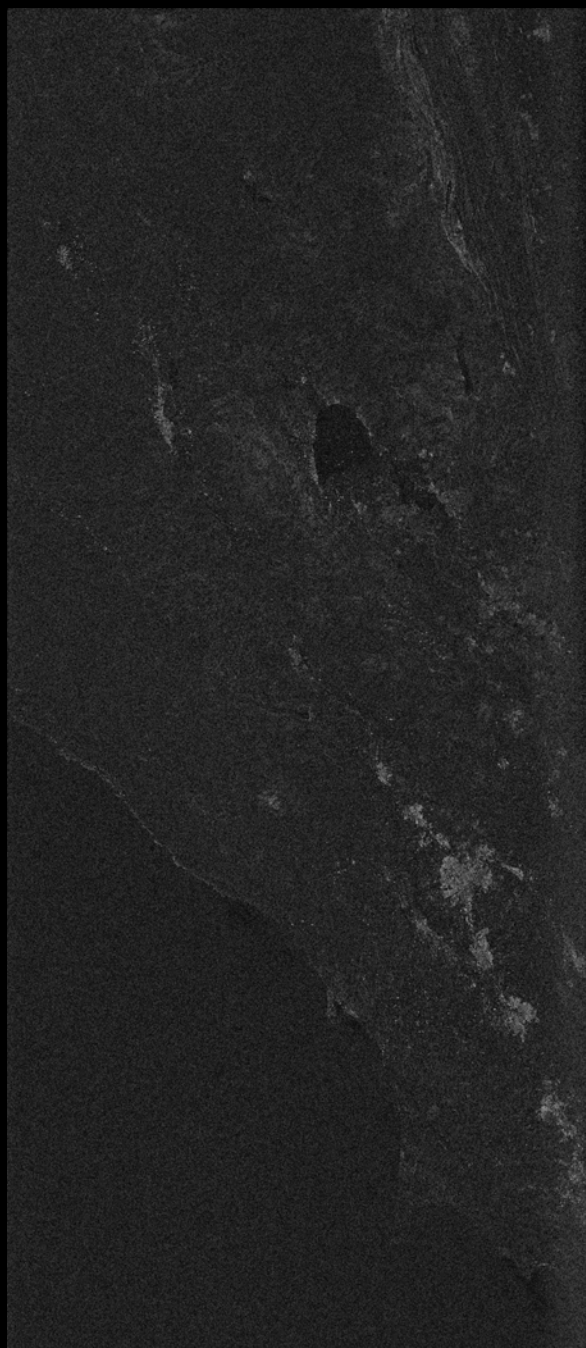
AUG 20, 1996

FEB 11, 1997

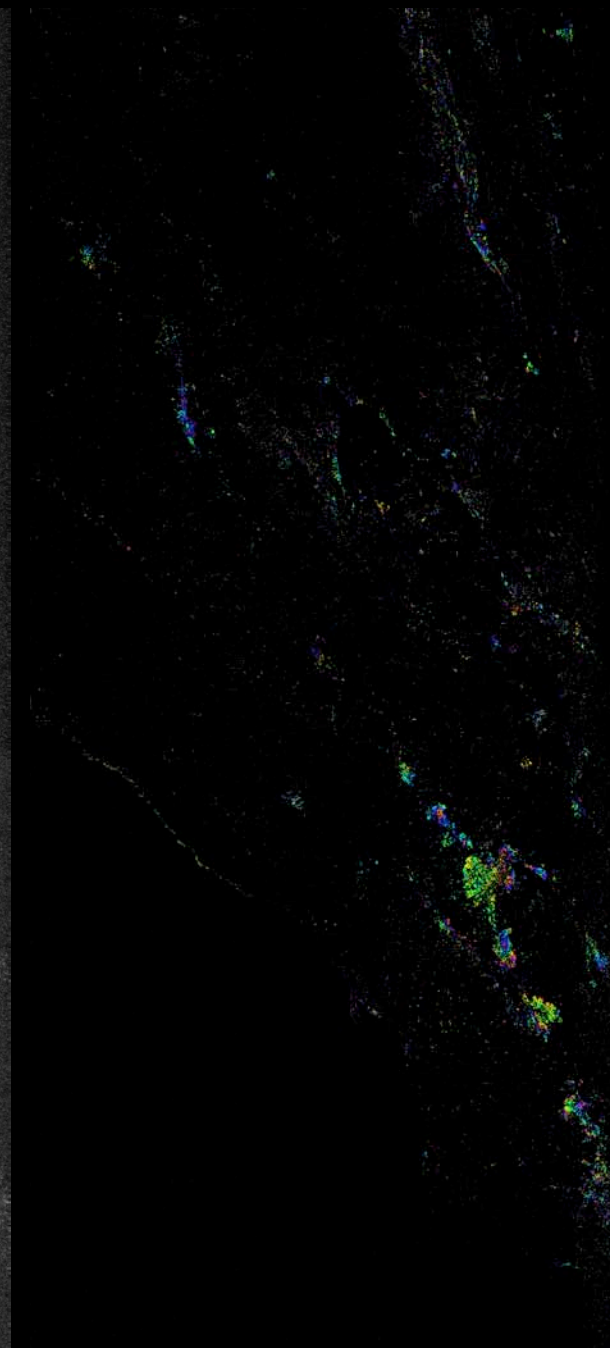
$B_{\text{perp}} = 190$ m

mean coherence
= 0.14

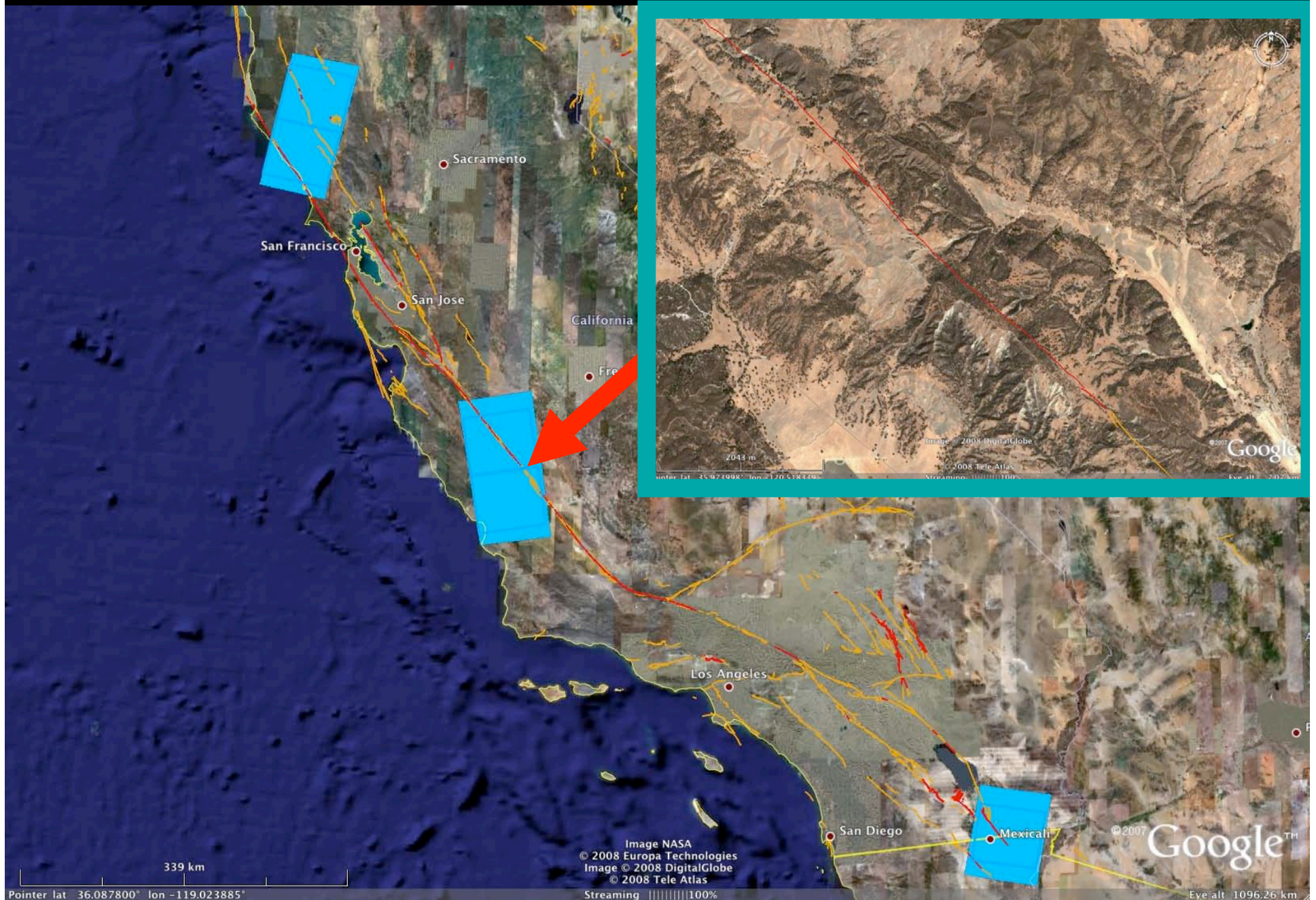
coherence



phase



Central SAF - Parkfield



Central SAF

Parkfield

PALSAR FBS-FBD

$\Delta T = 92$ days

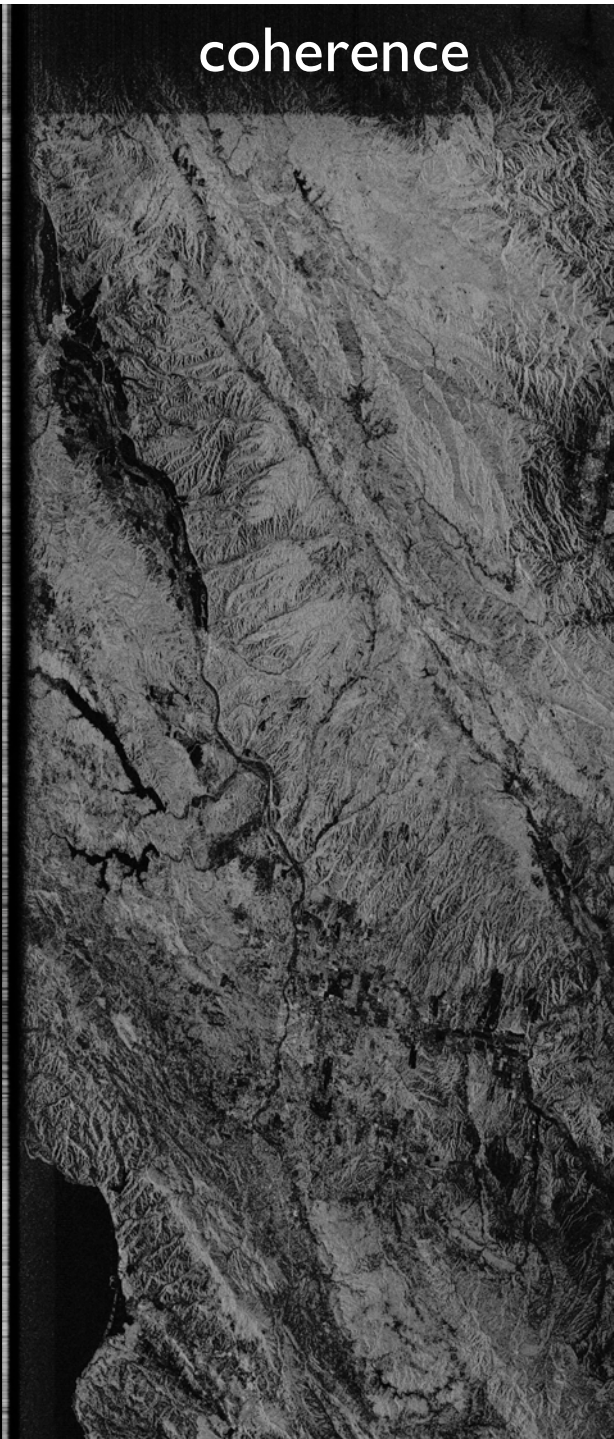
MAR 9, 2007

JUN 9, 2007

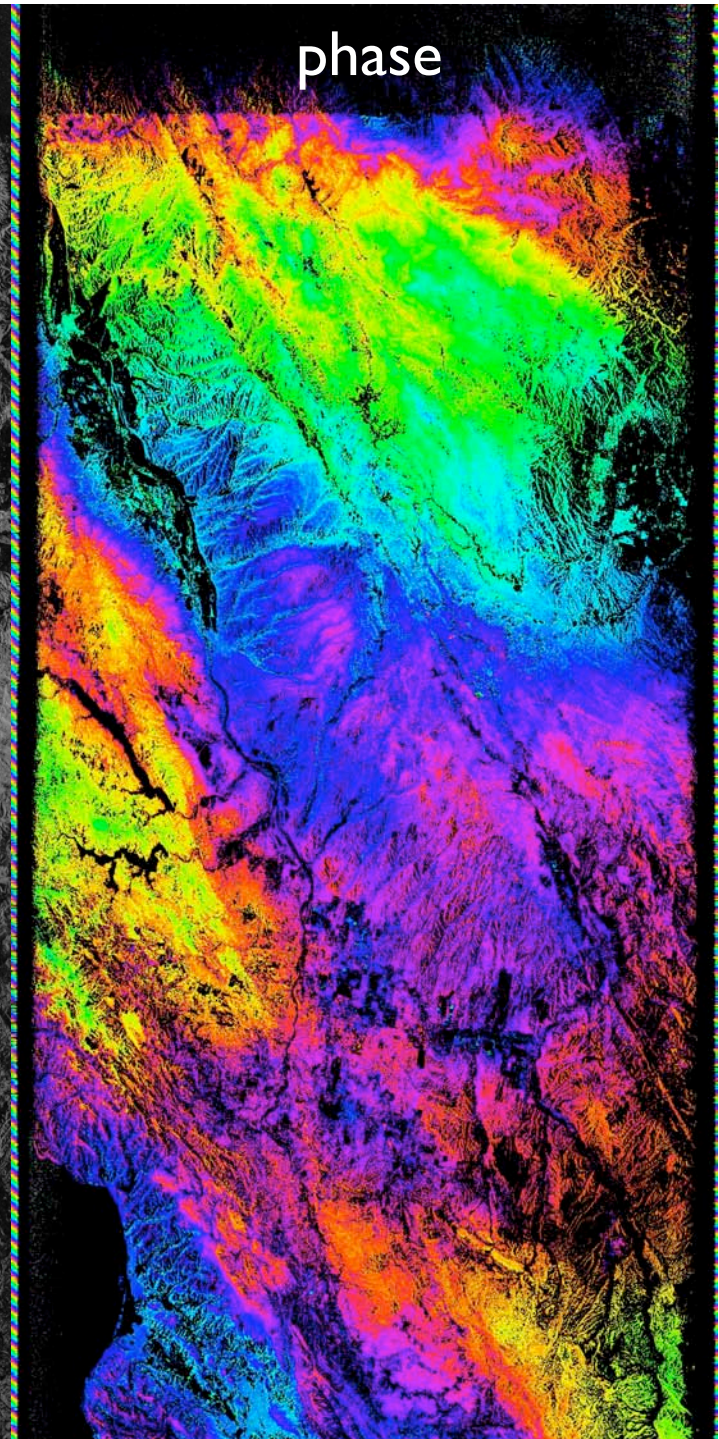
$B_{\text{perp}} = 28$ m

mean coherence
= 0.29

coherence



phase



Central SAF

Parkfield

ERS-2 to ERS-2

$\Delta T = 105$ days

FEB 21, 1996

JUN 6, 1997

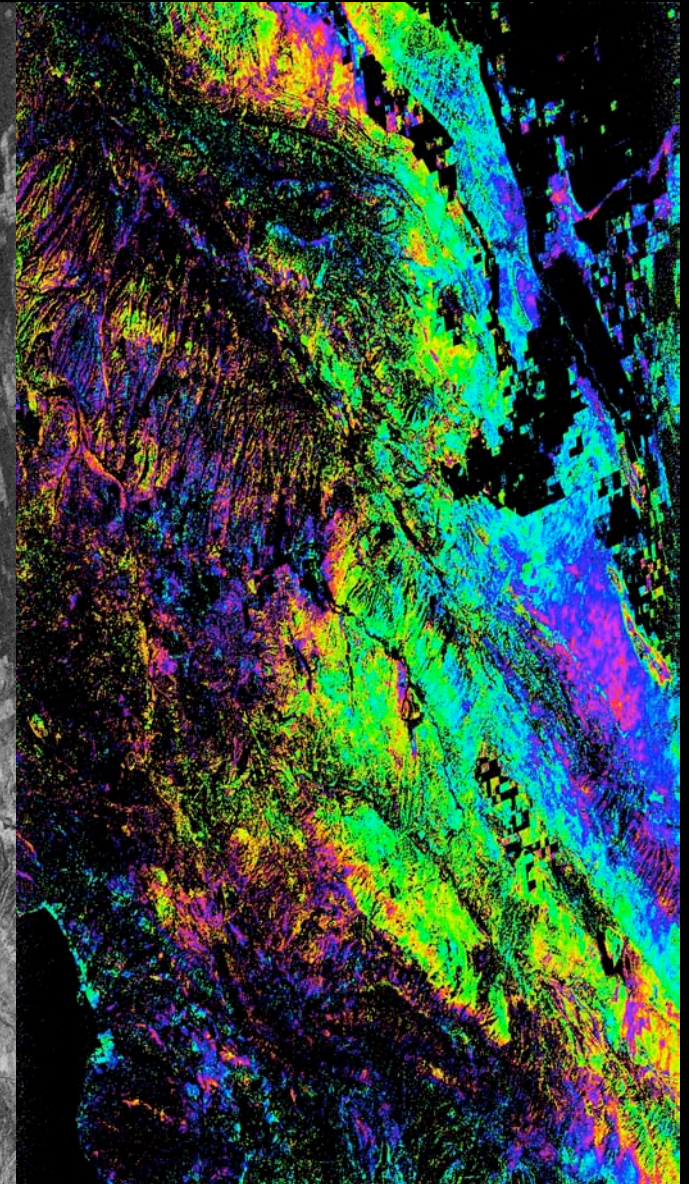
$B_{\text{perp}} = 7$ m

mean coherence
= 0.27

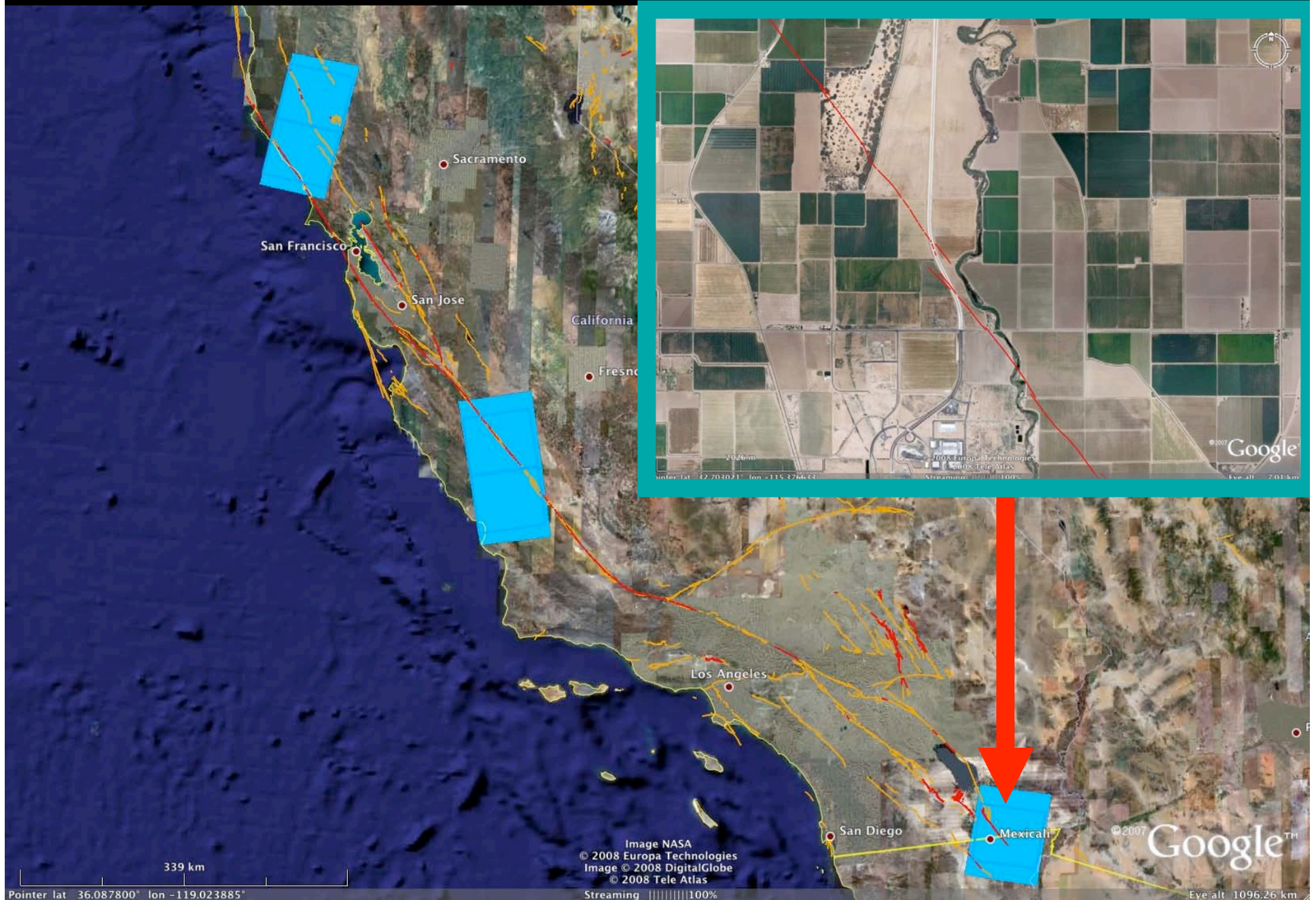
coherence



phase



Southern SAF - Imperial



Southern SAF

Imperial

PALSAR FBS-FBS

$\Delta T = 92$ days

NOV 9, 2007

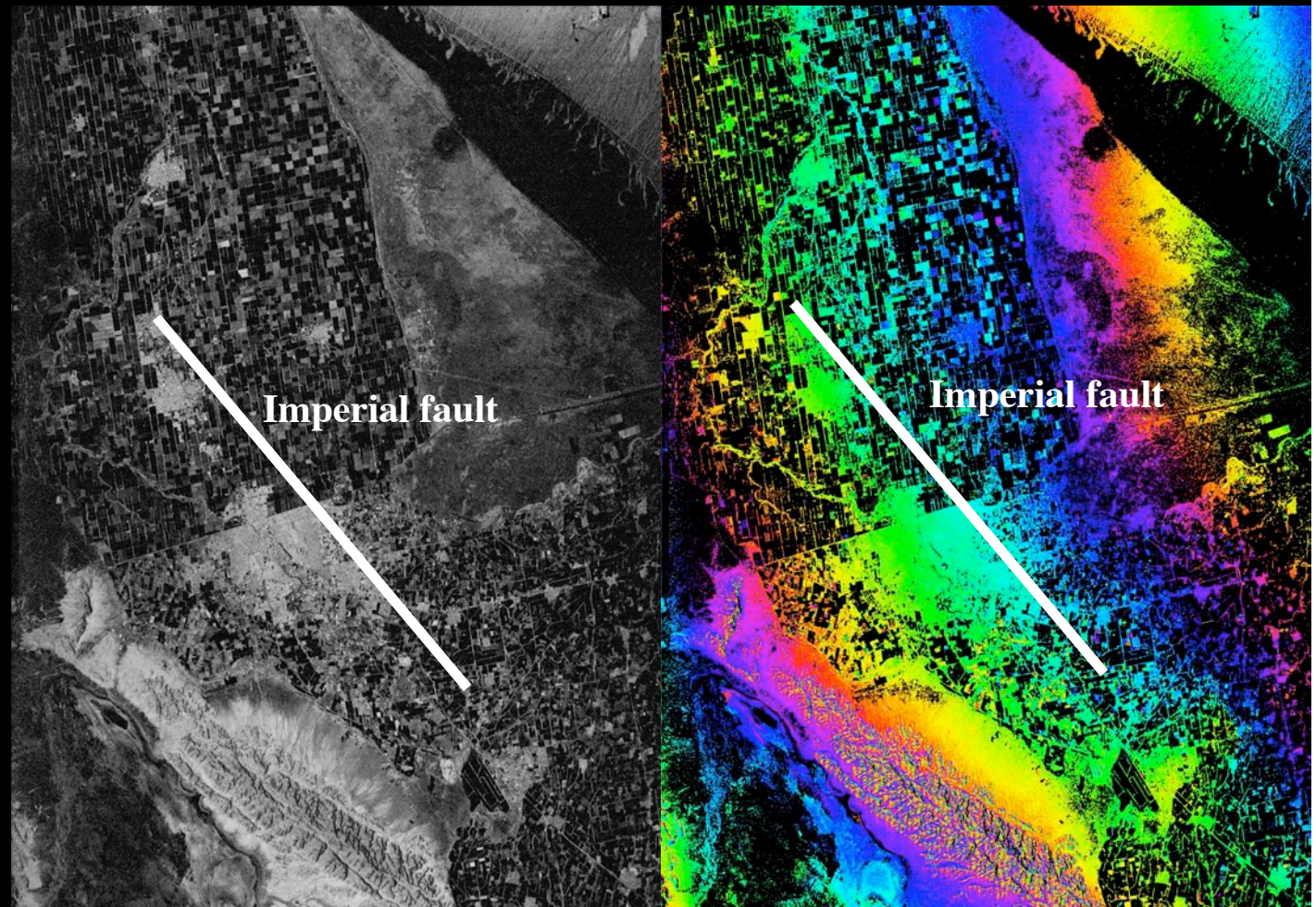
FEB 8, 2008

$B_{\text{perp}} = 946$ m
(topophase removed)

mean coherence
= 0.26

coherence

phase



Southern SAF

Imperial

ERS-2 to ERS-2

$\Delta T = 105$ days

SEP 7, 1997

DEC 21, 1997

$B_{\text{perp}} = 223$ m

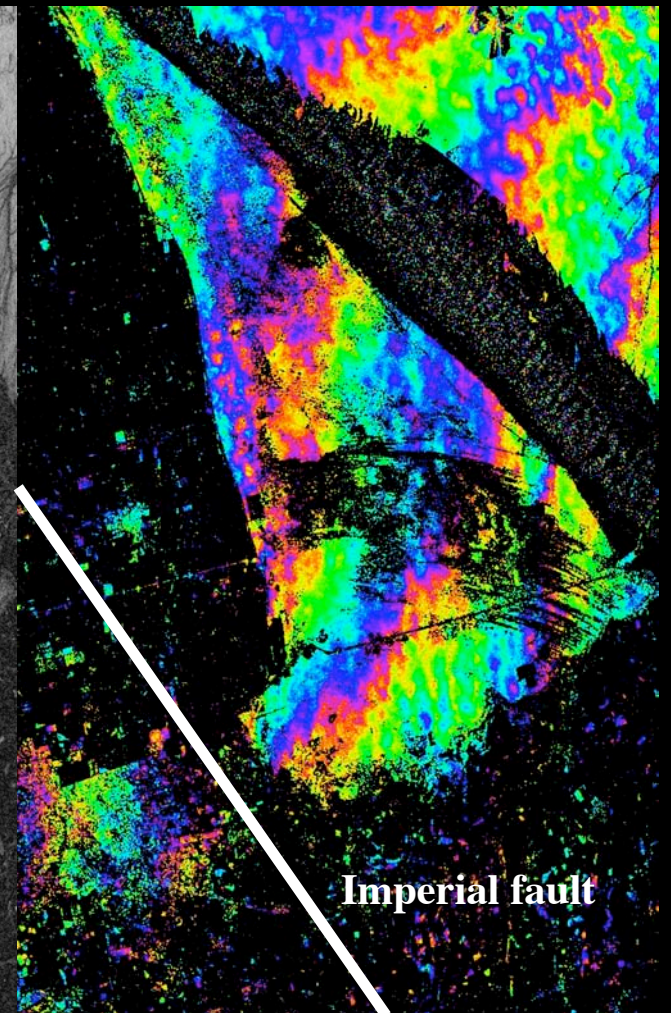
(topophase not removed)

coherence

phase

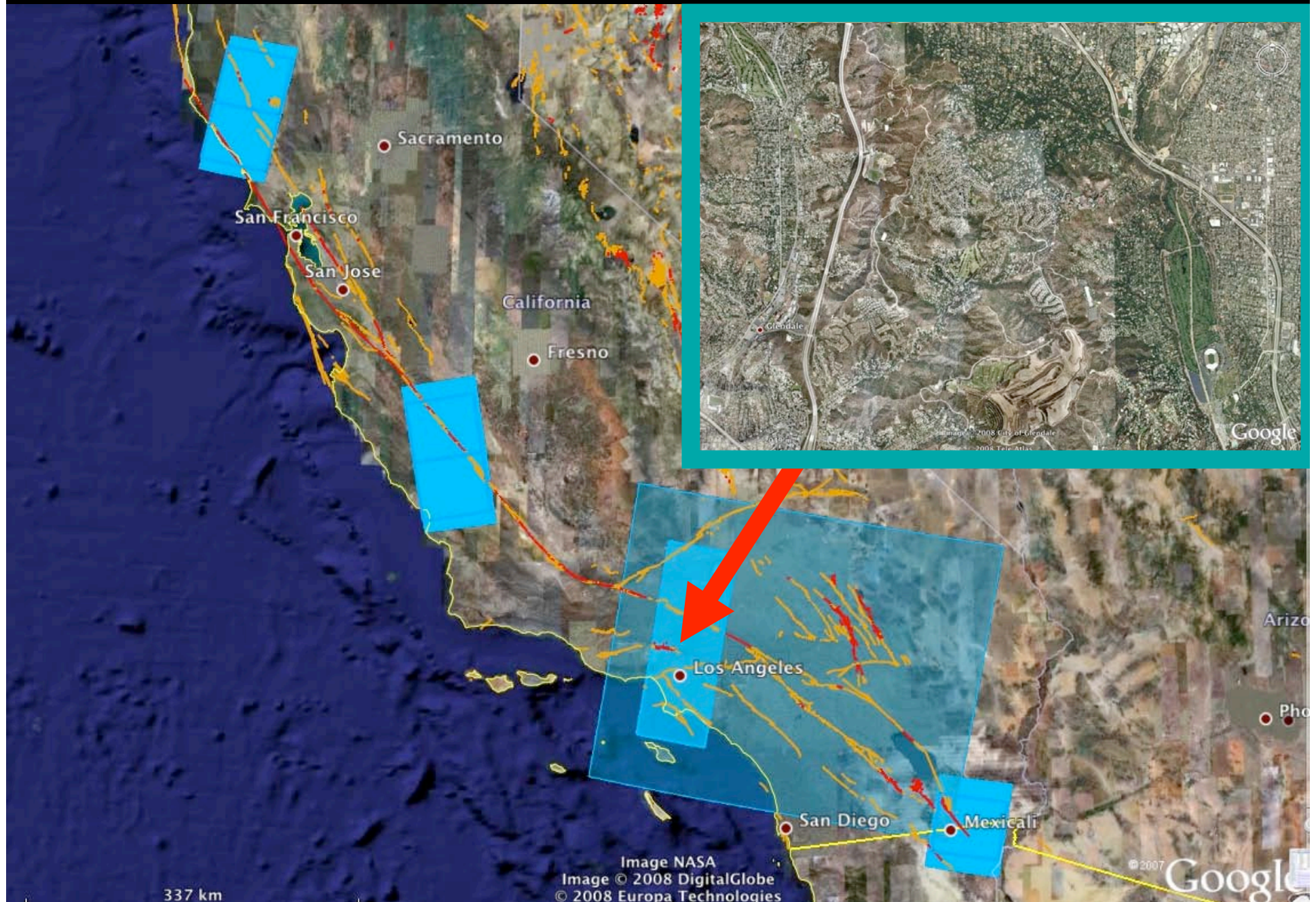


Imperial fault



Imperial fault

Los Angeles - ScanSAR



Los Angeles

PALSAR

FBD-FBD

$\Delta T = 46$ days

JUL 3, 2007

AUG 18, 2007

$B_{\text{perp}} = 10$ m

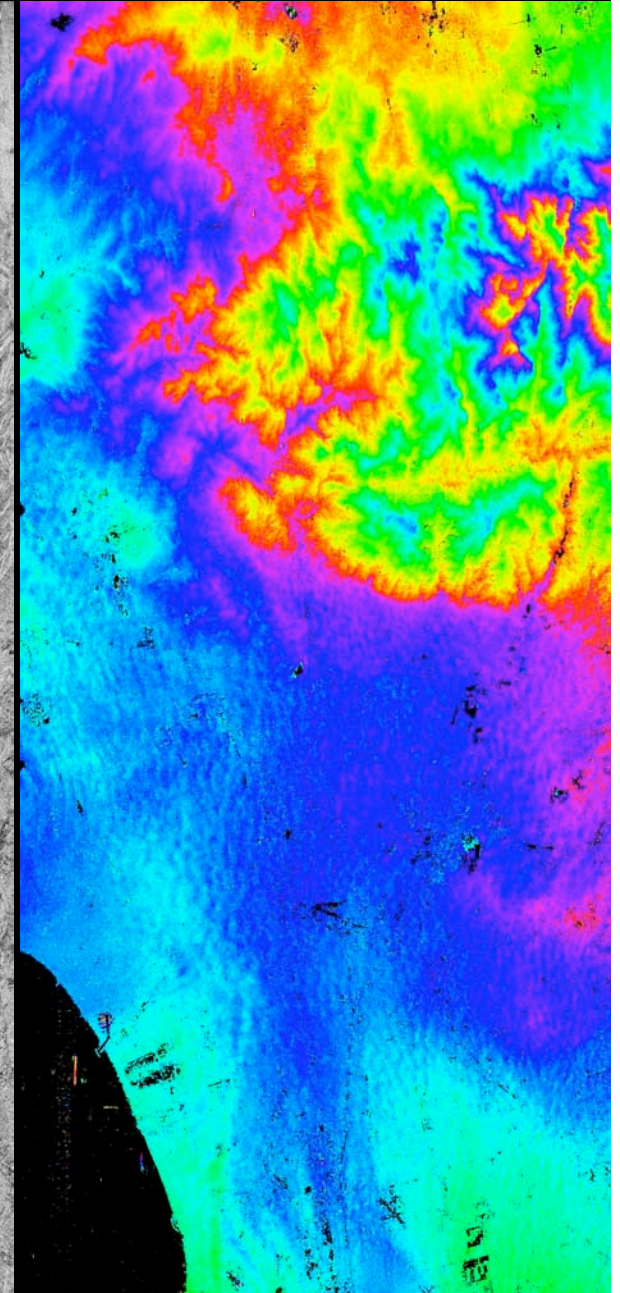
(topophase not removed)

mean coherence
= 0.67

coherence



phase



Los Angeles

PALSAR

FBD-ScanSAR

$\Delta T = 184$ days

DEC 31, 2006

JUL 3, 2007

$B_{\text{perp}} = 121$ m

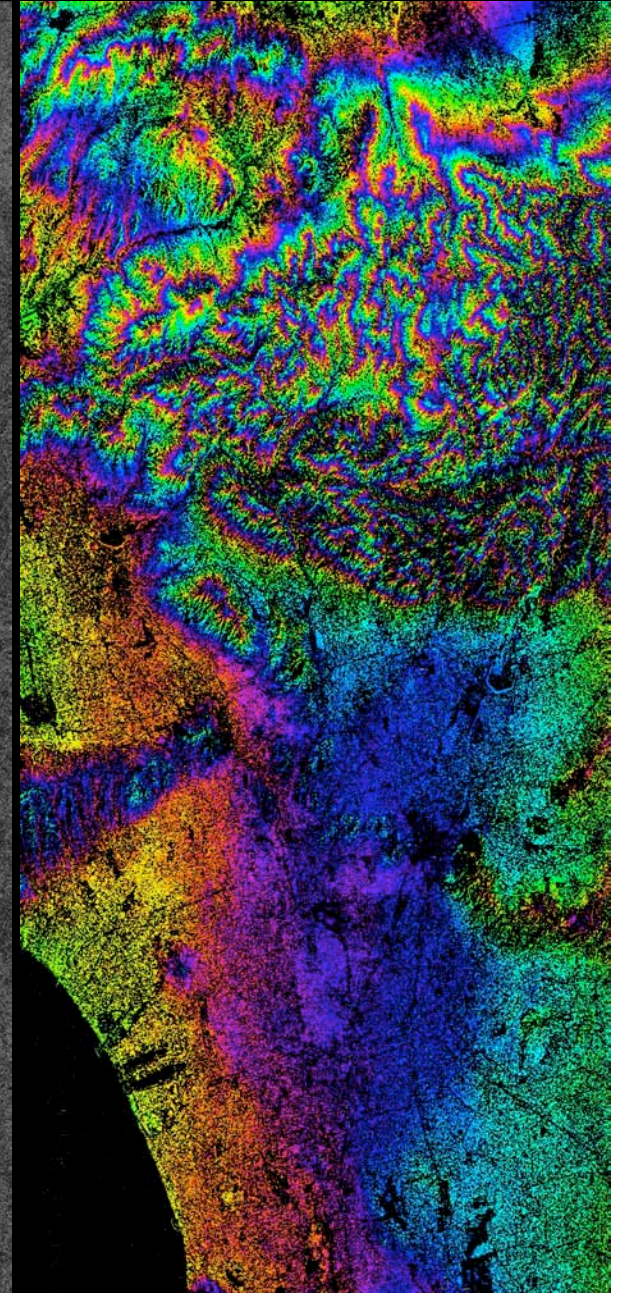
(topophase not removed)

mean coherence
= 0.24

coherence



phase



Los Angeles

PALSAR

ScanSAR-ScanSAR

$\Delta T = 92$ days

DEC 31, 2006

APR 1, 2007

$B_{\text{perp}} = 445$ m
(topophase not removed)

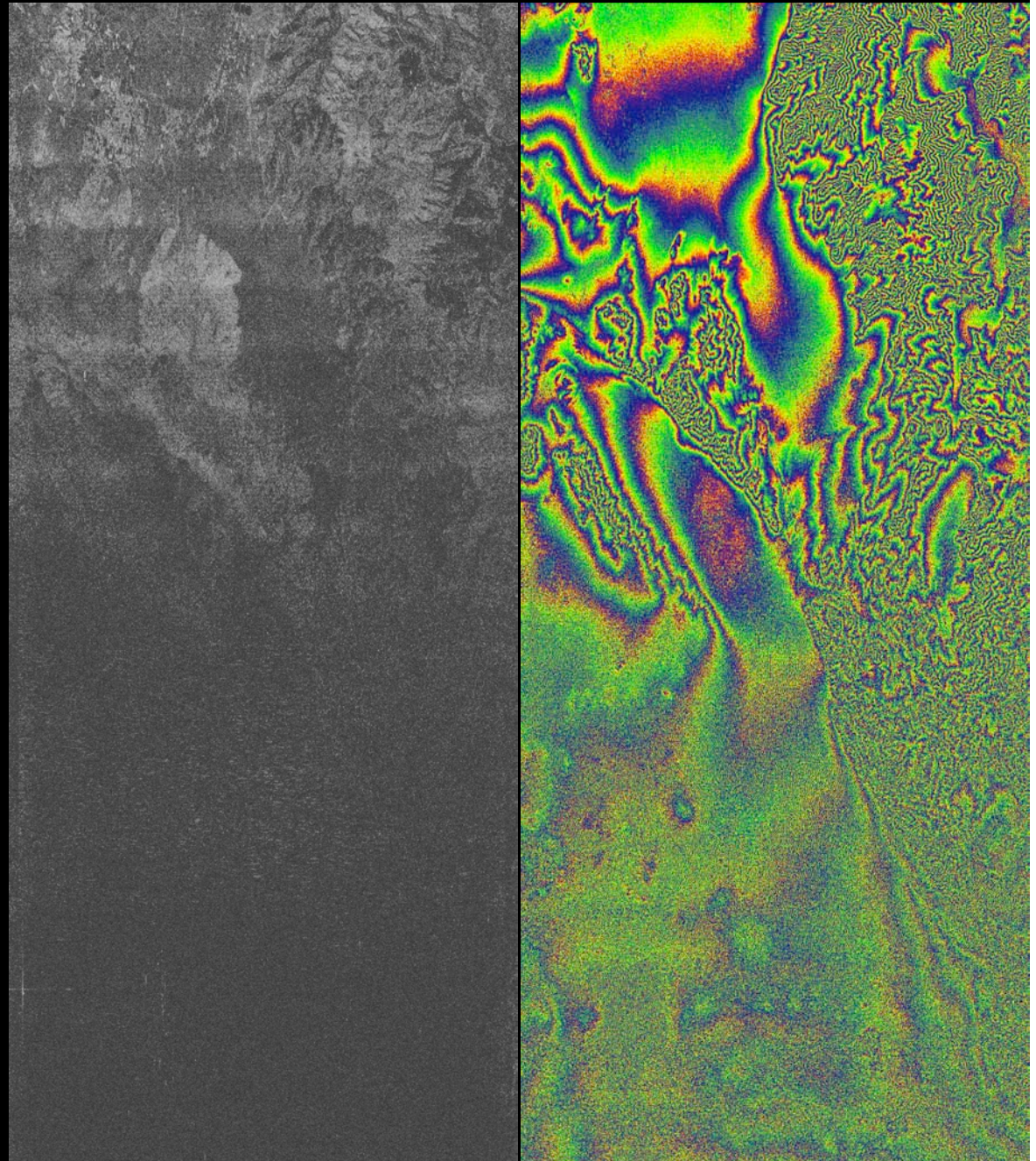
Burst alignment decreases
because the reference and
repeat images have different PRF.

decreasing burst overlap

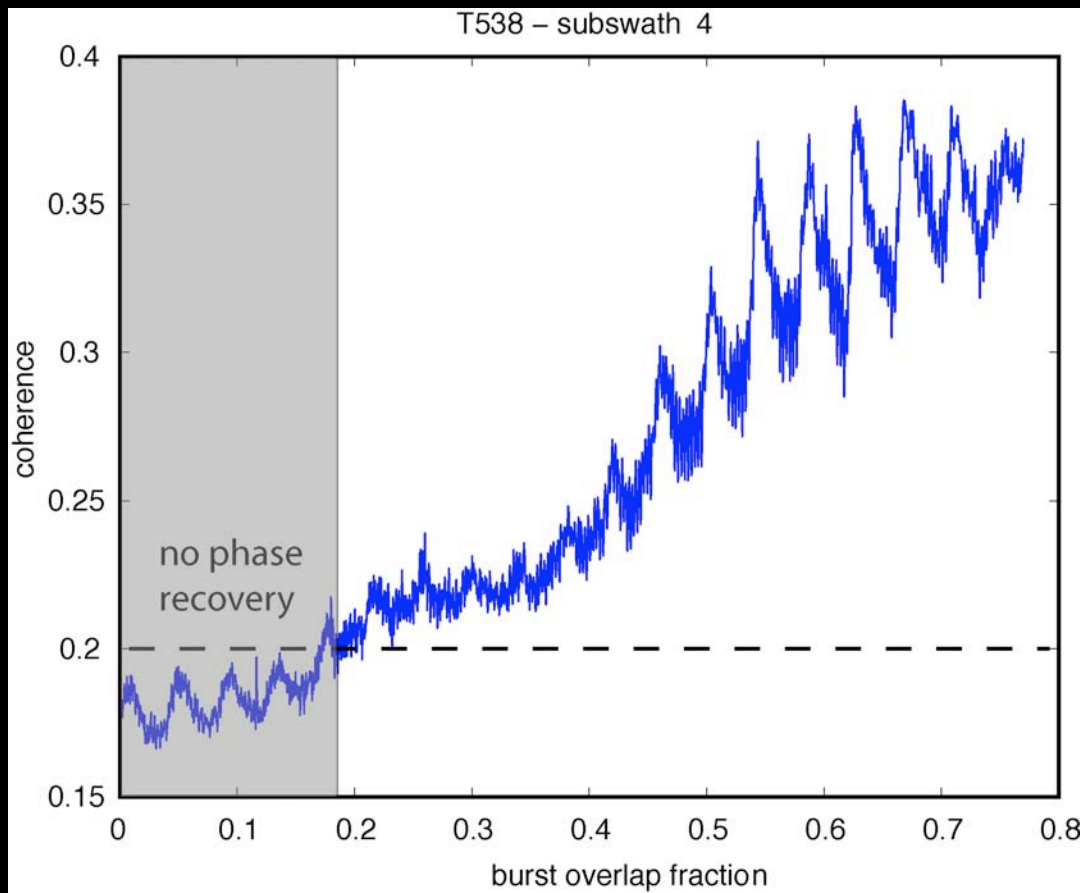


coherence

phase



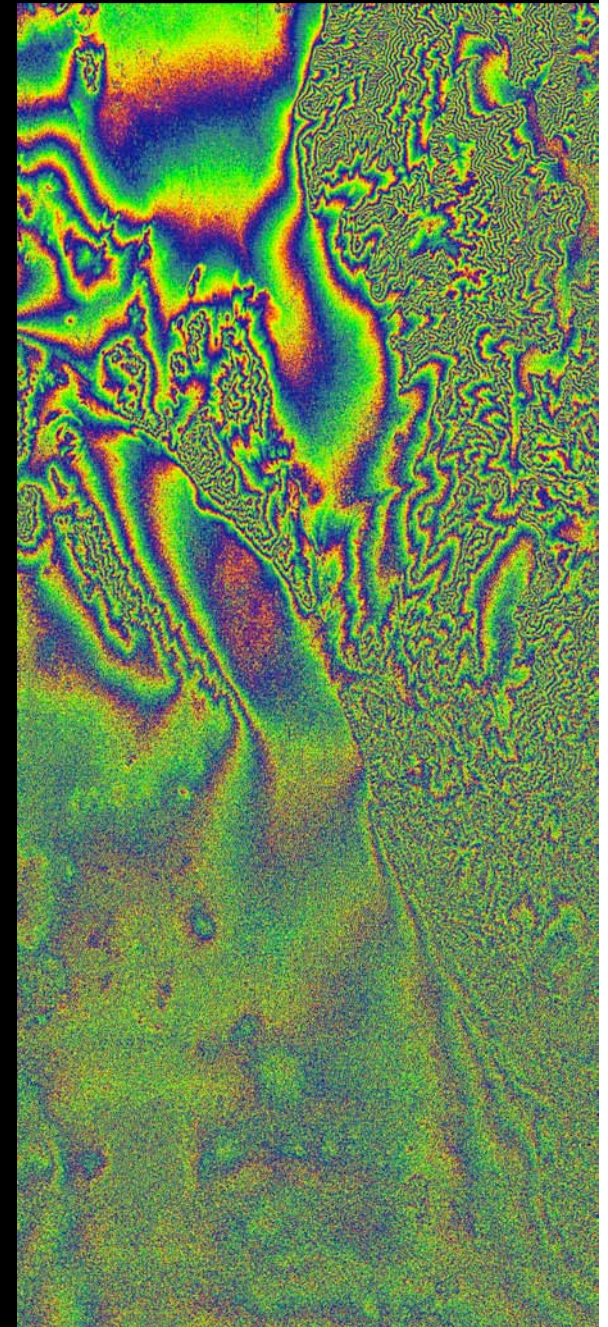
**Need > 0.2 burst overlap
to recover phase form
ScanSAR to ScanSAR
interferometry.**



decreasing burst overlap



phase



Conclusions

- L-Band provides some improvement in coherence with respect to C-band in vegetated areas along the SAF.
- Summer to summer will probably be best but shorter baseline, one-year interferograms are not yet available.
- ScanSAR to strip-mode interferometry will be routine and provide improved coverage on descending tracks.
- ScanSAR to ScanSAR interferometry has good coherence when burst overlap exceeds 0.35.