LPS (May 12, 2016)

Interseismic crustal deformation in Taiwan revealed by InSAR

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Eileen Evans, Jyr-Ching Hu

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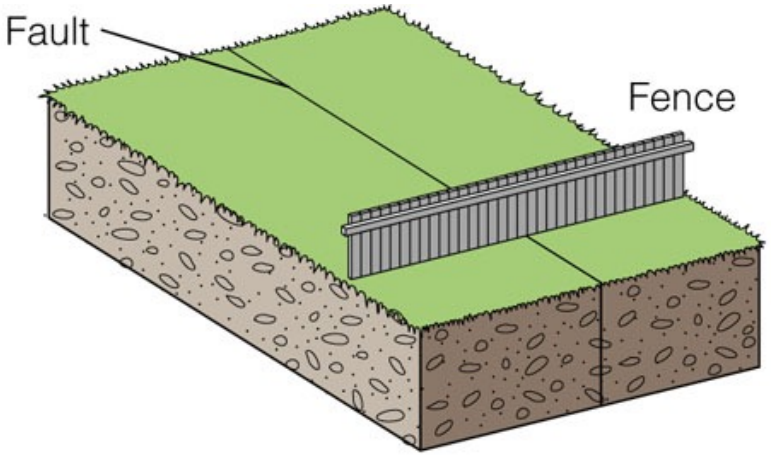
Earthquake cycles

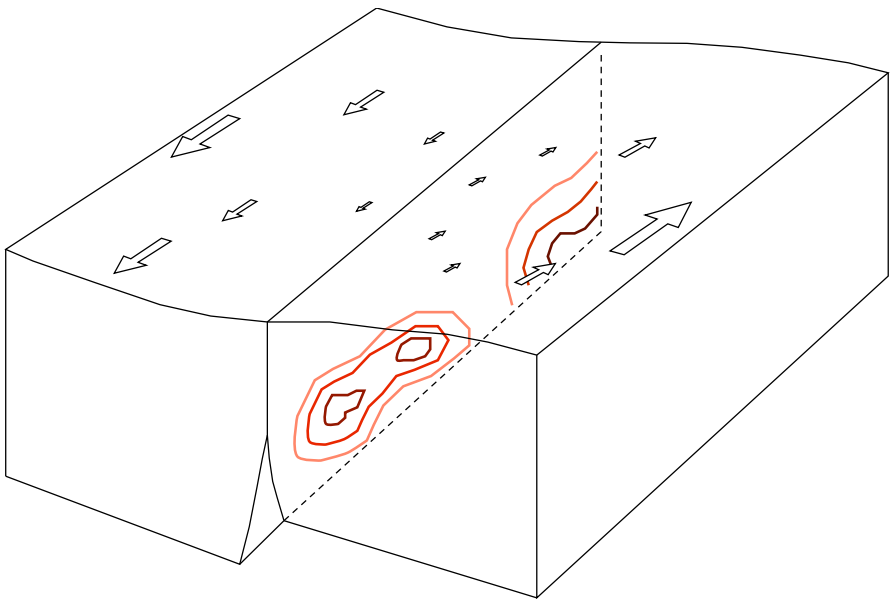


(a) Original position

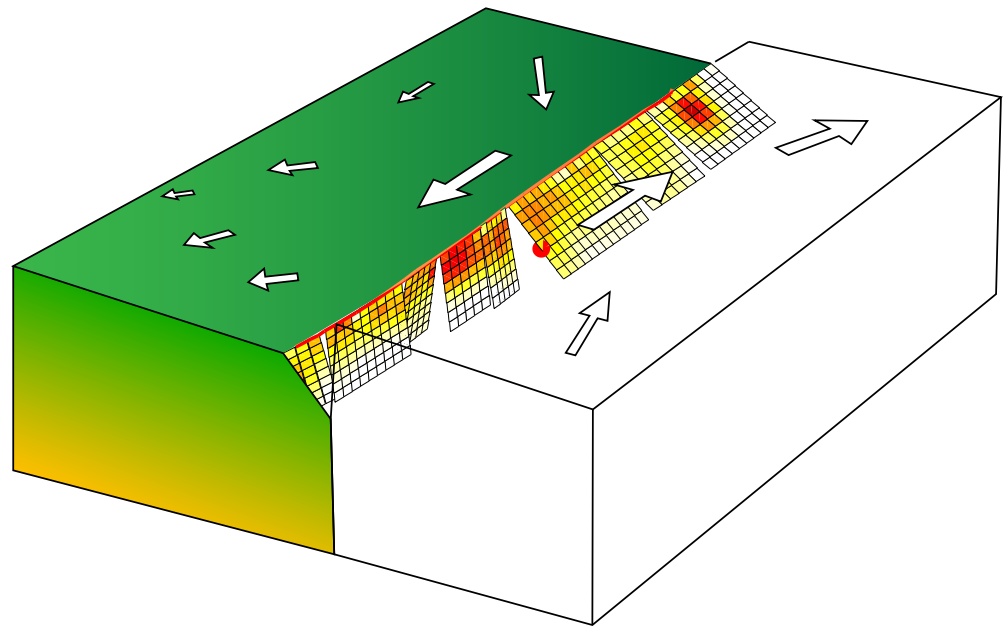
© 2006 Brooks/Cole - Thomson

What geodesy can tell us about faults and fault activities?

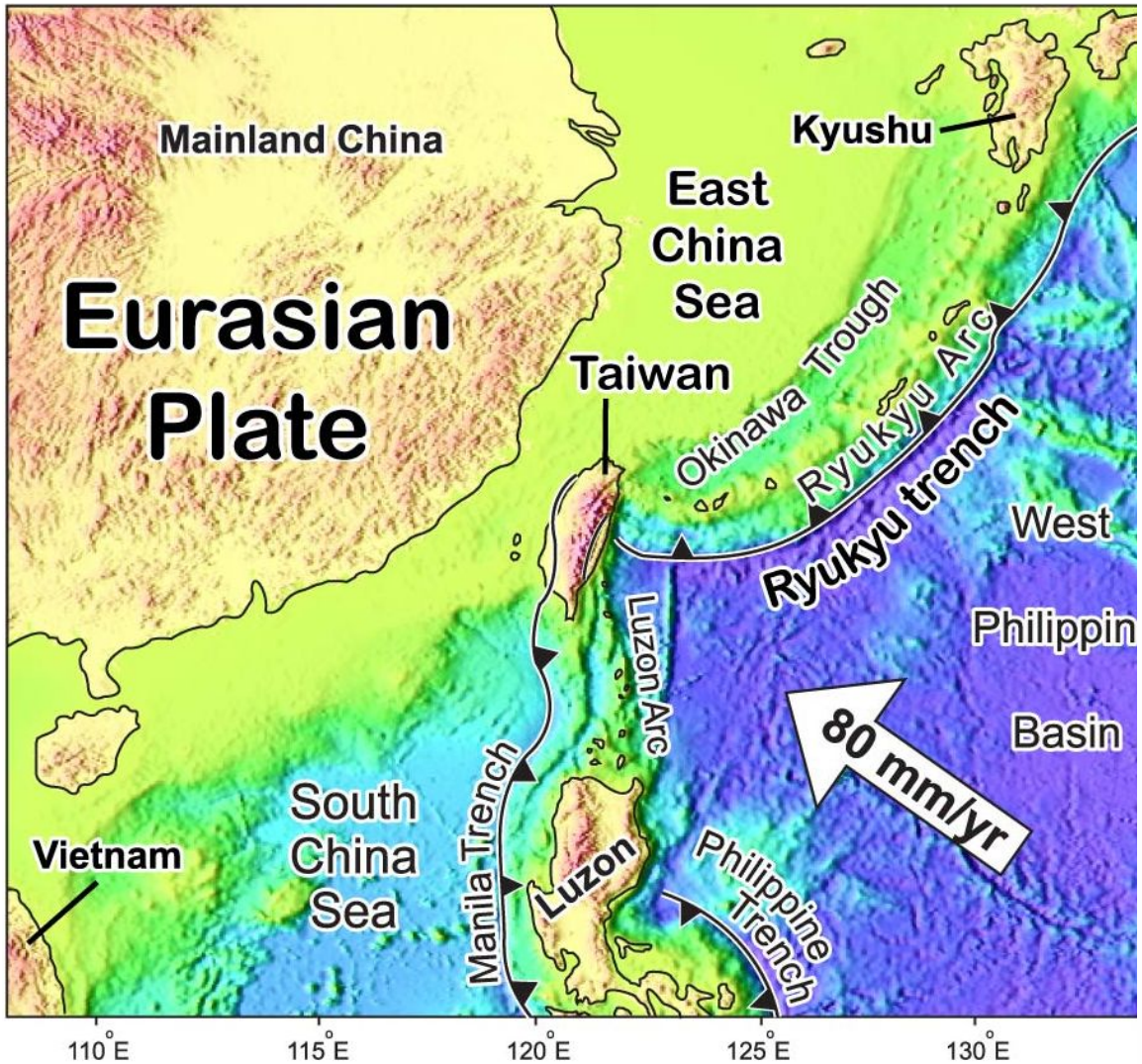
Interseismic



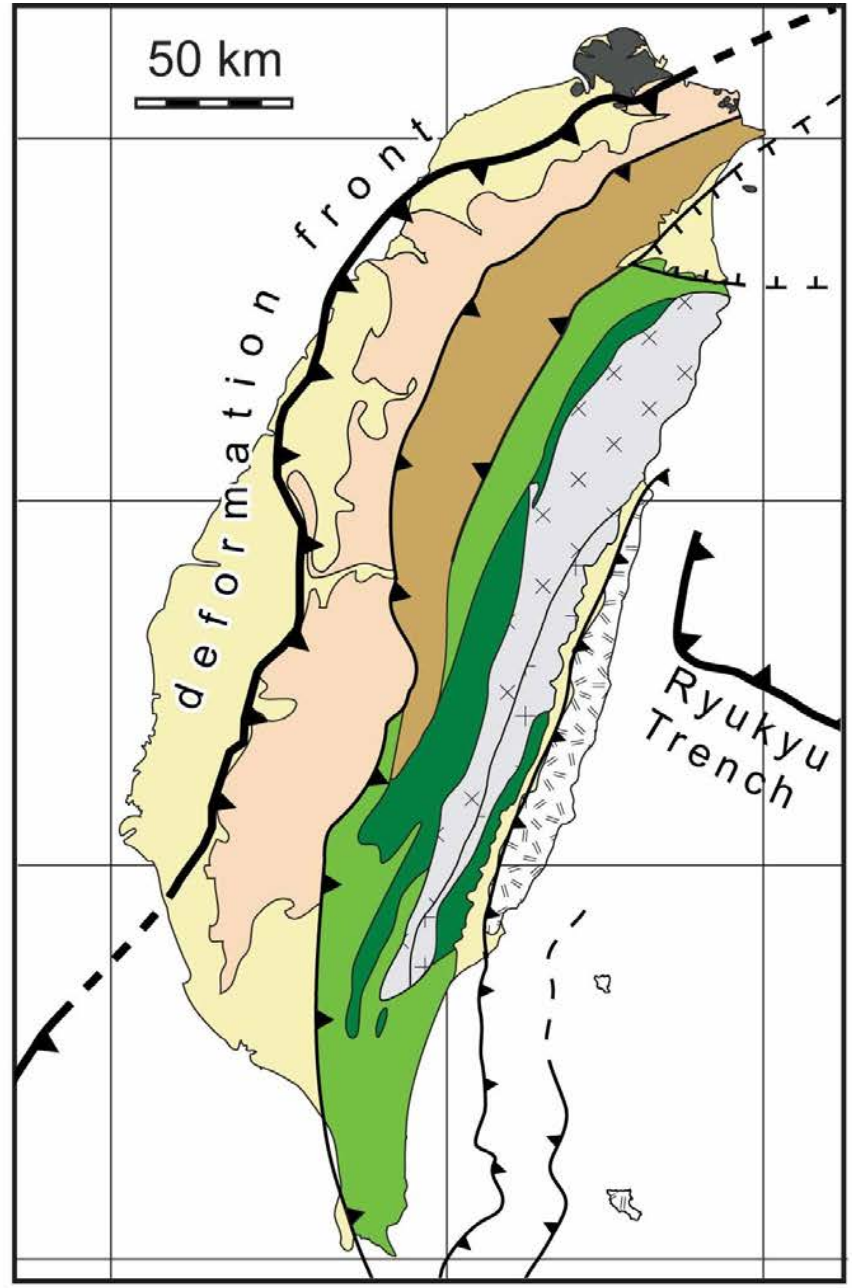
Coseismic



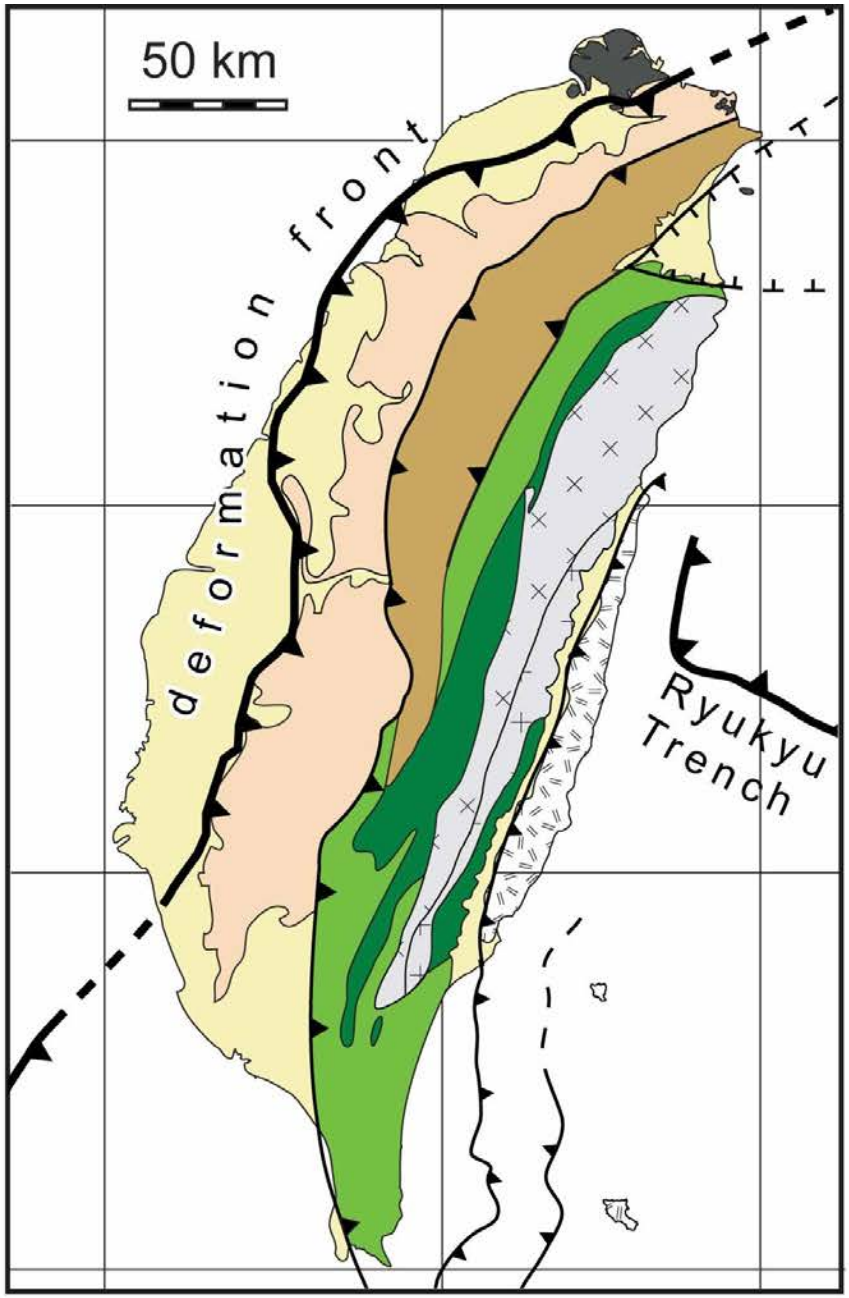
Geologic setting



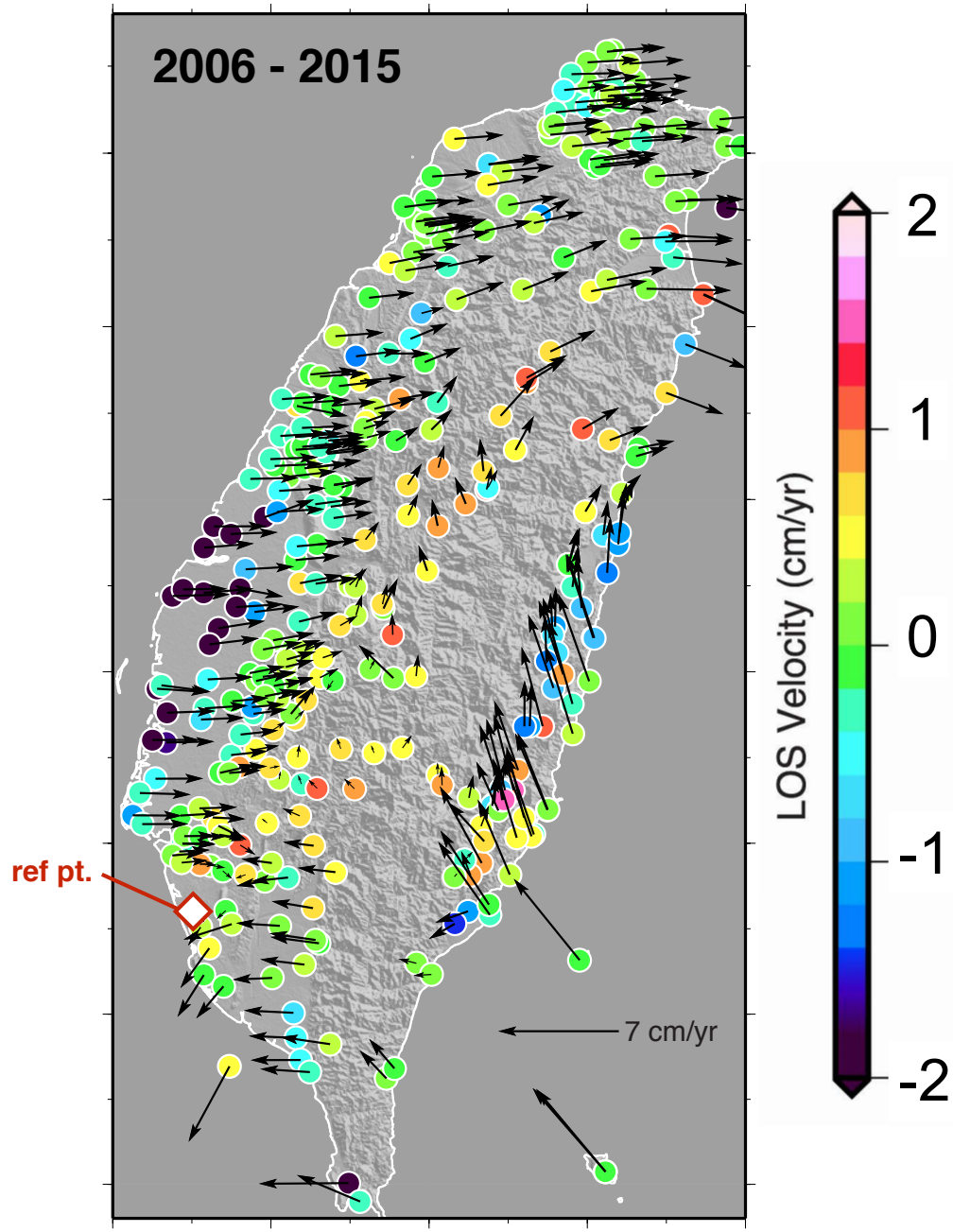
courtesy of K. Ustaszewski



Geology

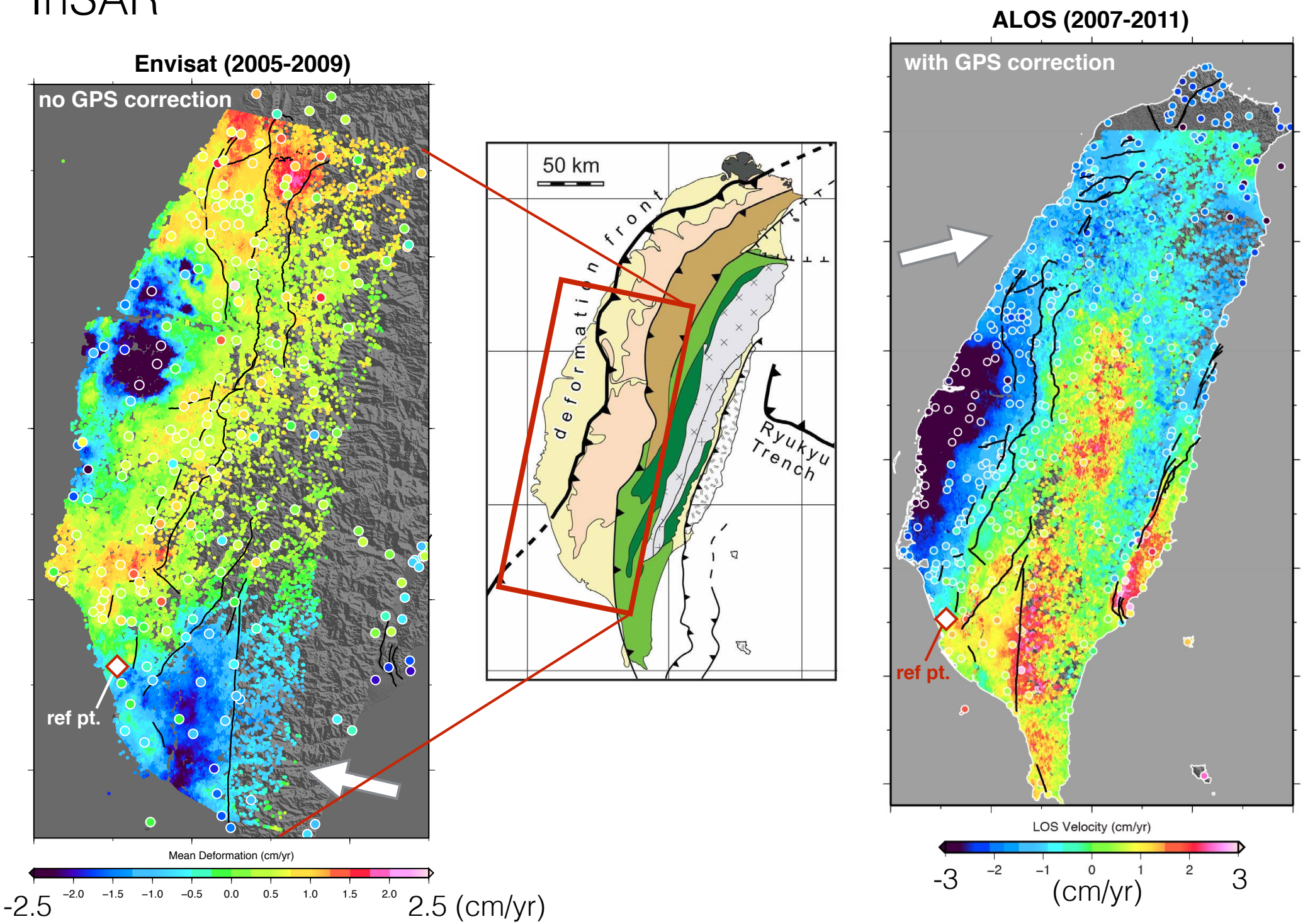


CGPS based crustal deformation (Data from IES, Sinica)

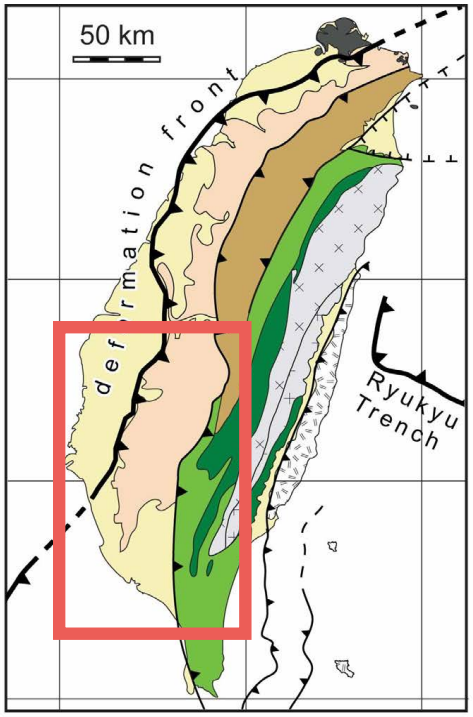


Crustal deformation between 2005 and 2010

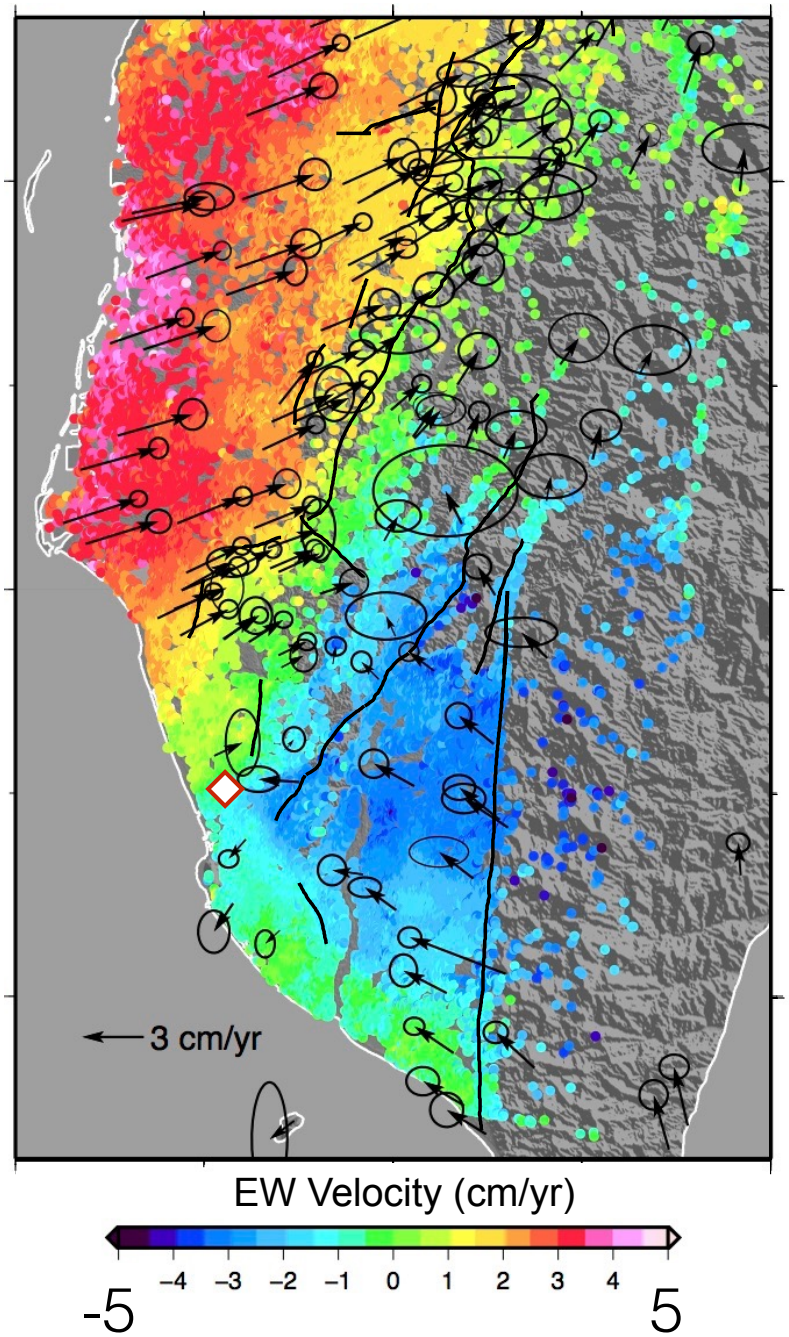
InSAR


Envisat (2005-2009)
no GPS correction
ref pt.
Mean Deformation (cm/yr)
-2.5
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
2.0
2.5 (cm/yr)
50 km
deformation front
Ryukyu Trench
ALOS (2007-2011)
with GPS correction
ref pt.
LOS Velocity (cm/yr)
-3
−2
−1
0
1
2
3
(cm/yr)

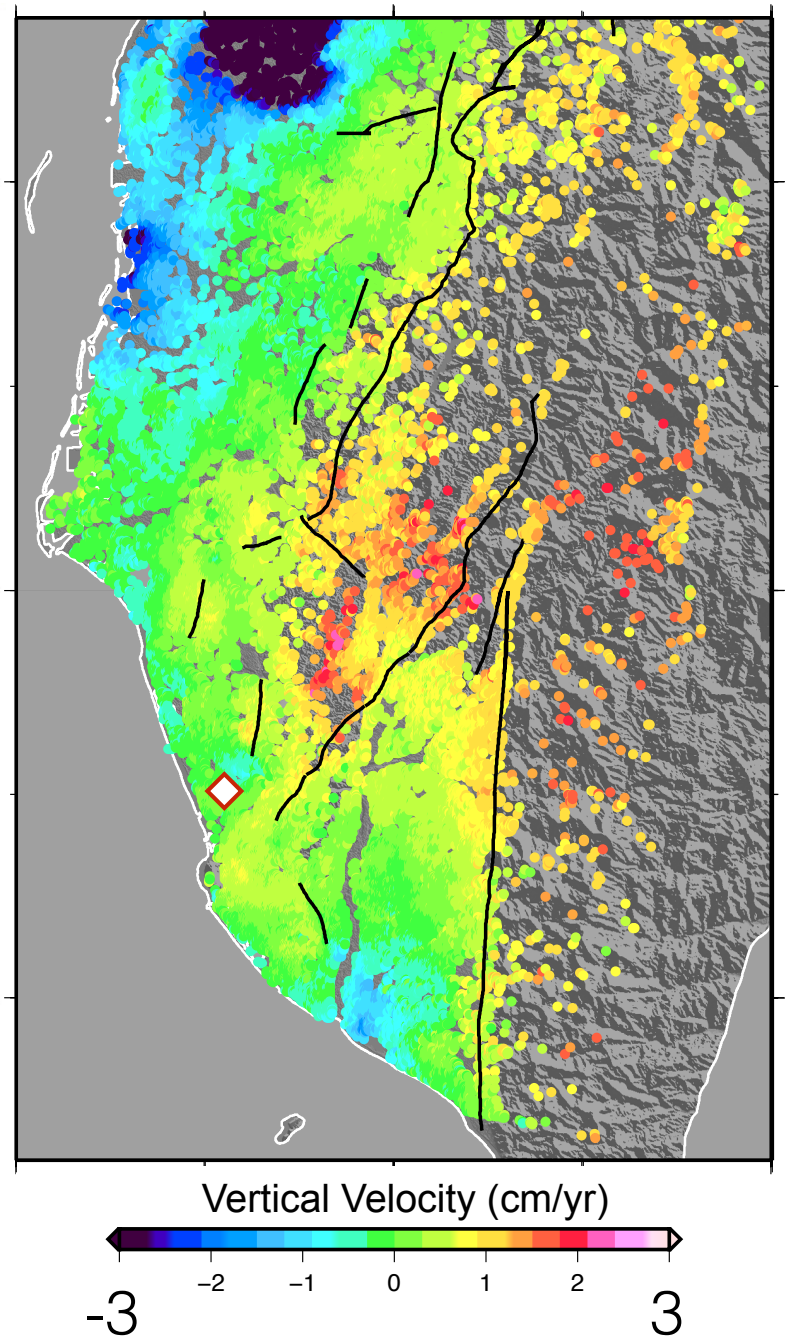
Interseismic Deformation



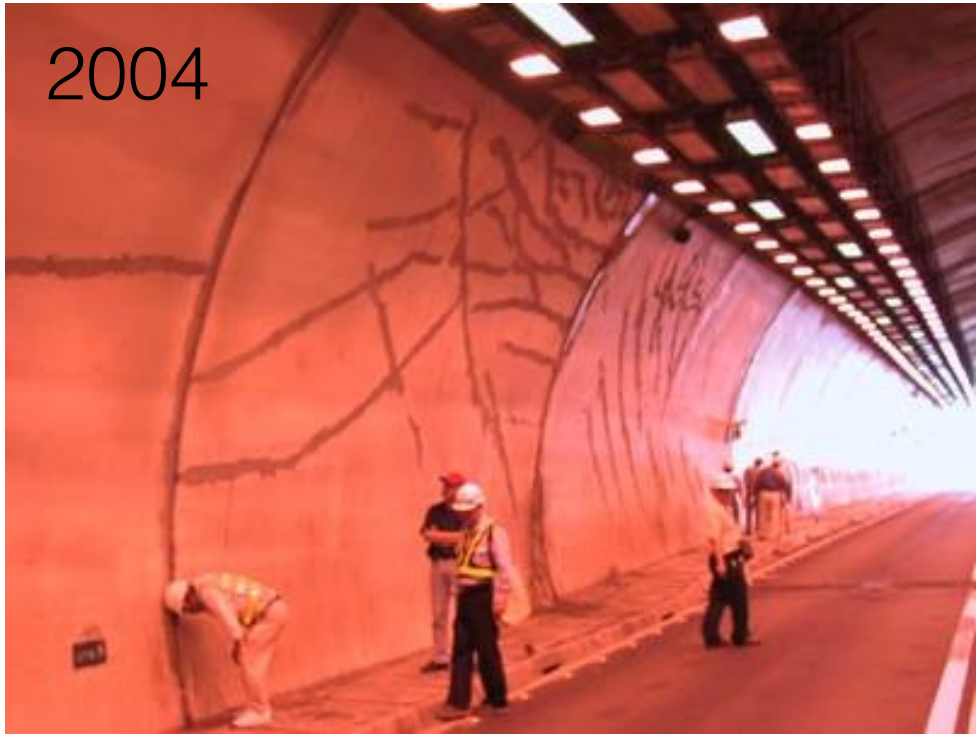
East-West deformation



Vertical deformation



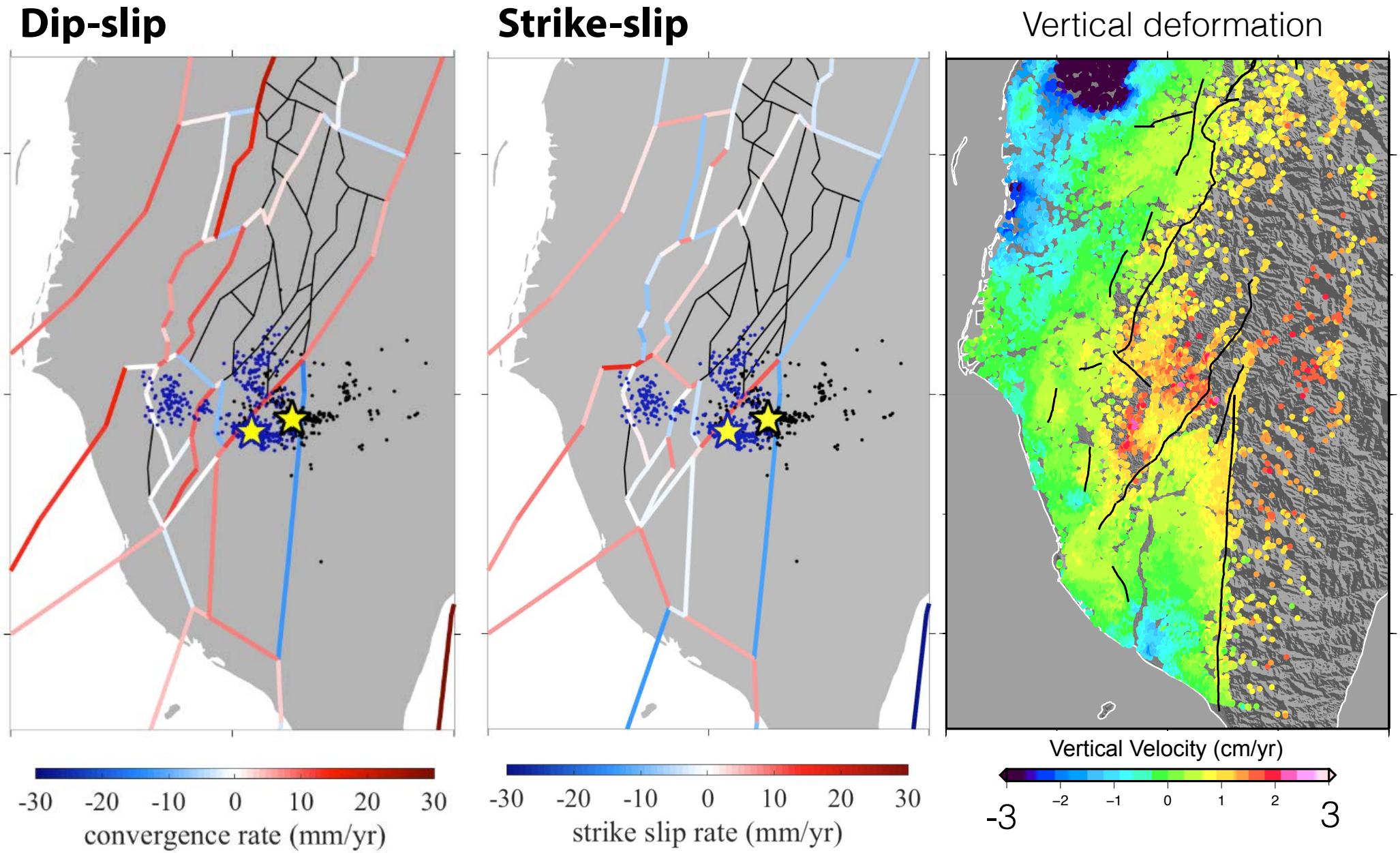
Huang et al., in prep.


2004

2012

2004

2014


Dip-slip
Strike-slip
Vertical deformation
-30 -20 -10 0 10 20 30
convergence rate (mm/yr)
-30 -20 -10 0 10 20 30
strike slip rate (mm/yr)
Vertical Velocity (cm/yr)
-3
-2 -1 0 1 2
3

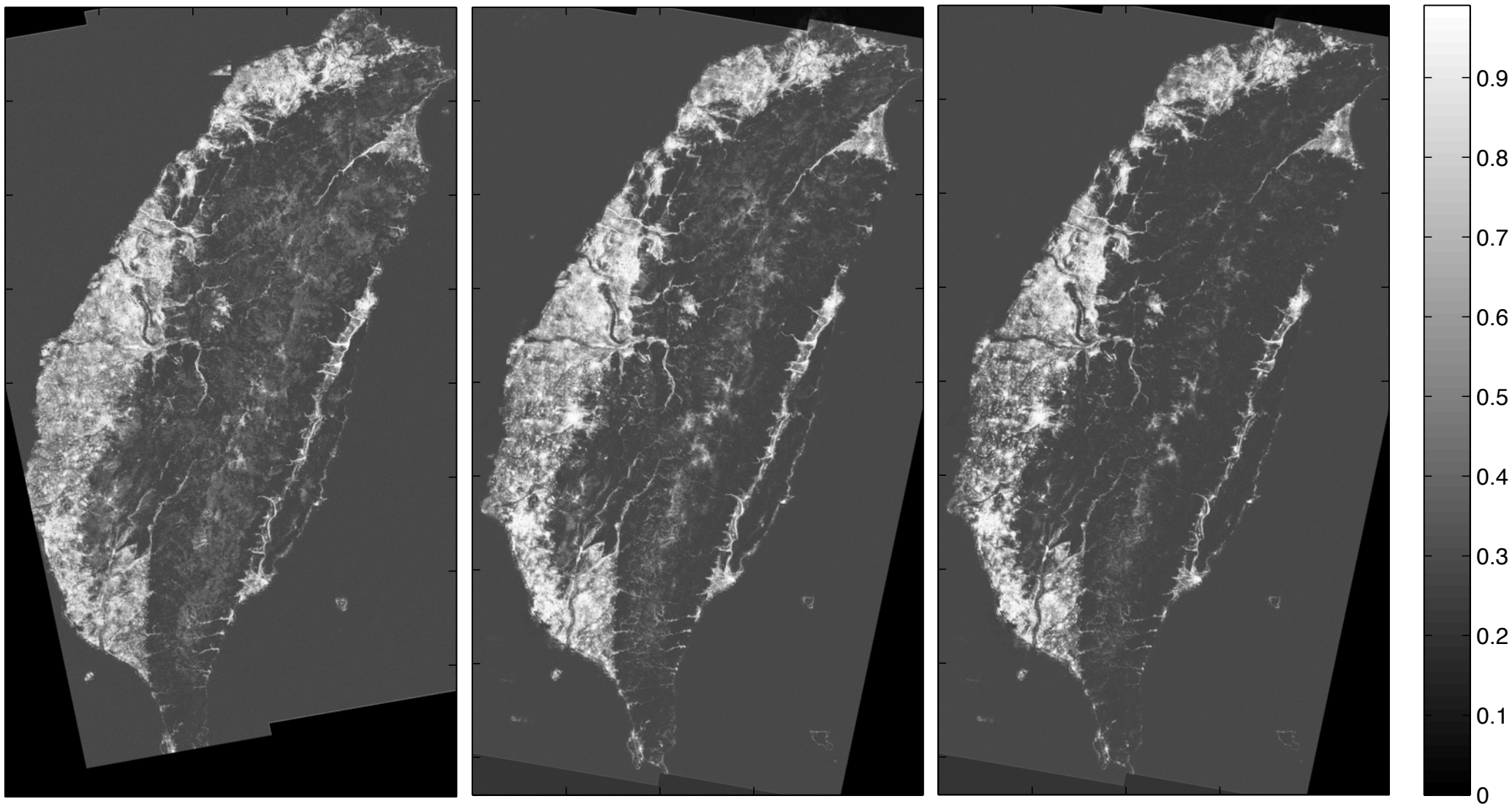
Crustal deformation since 2015

Crustal deformation since 2015

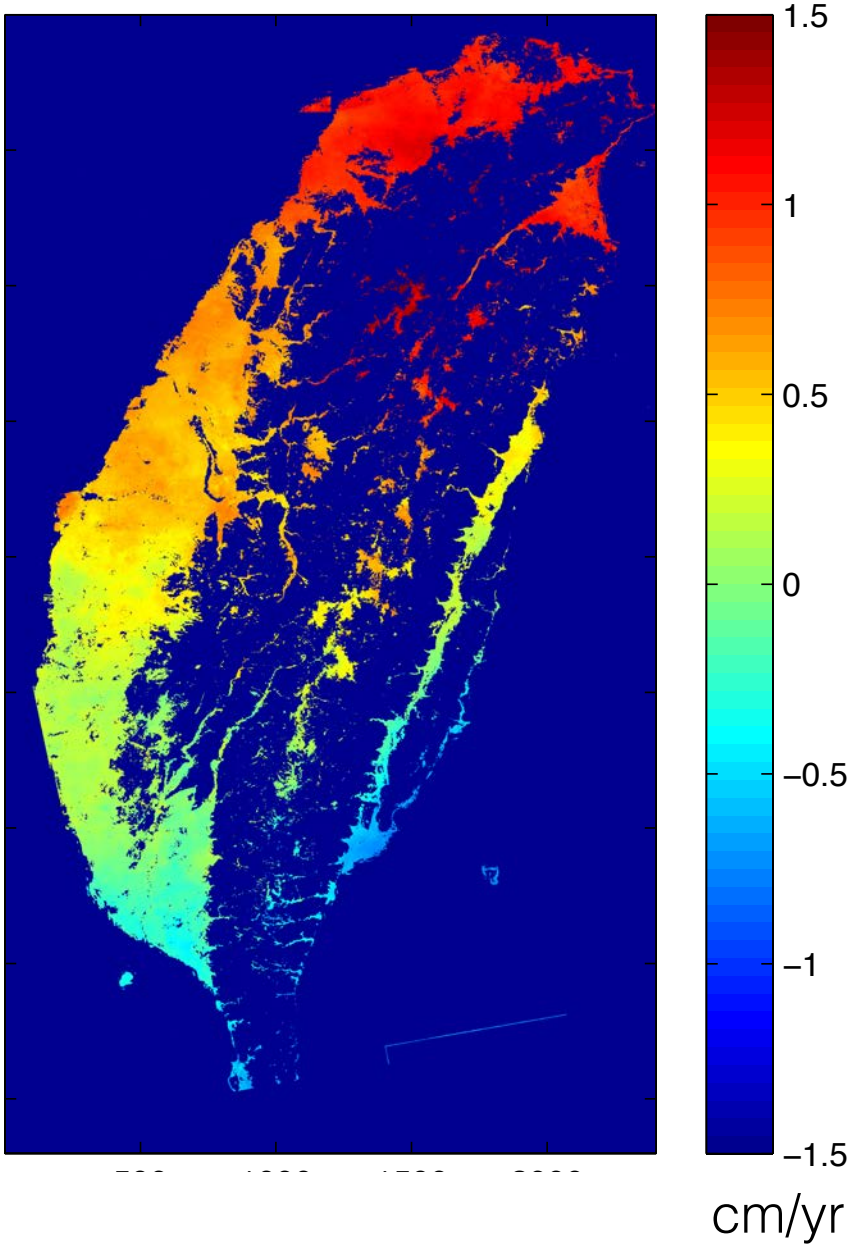
Ascending
(12 days)

Descending
(24 days)

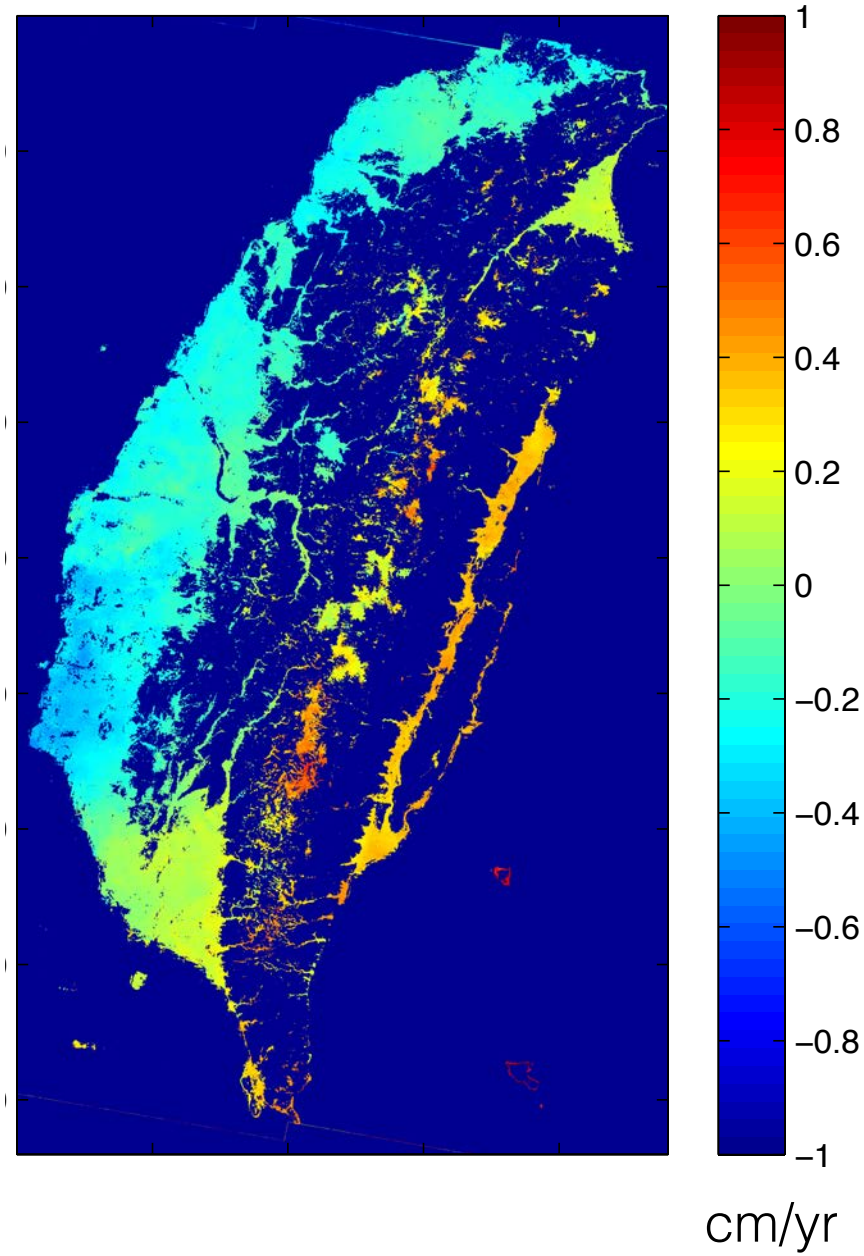
Descending
(48 days)



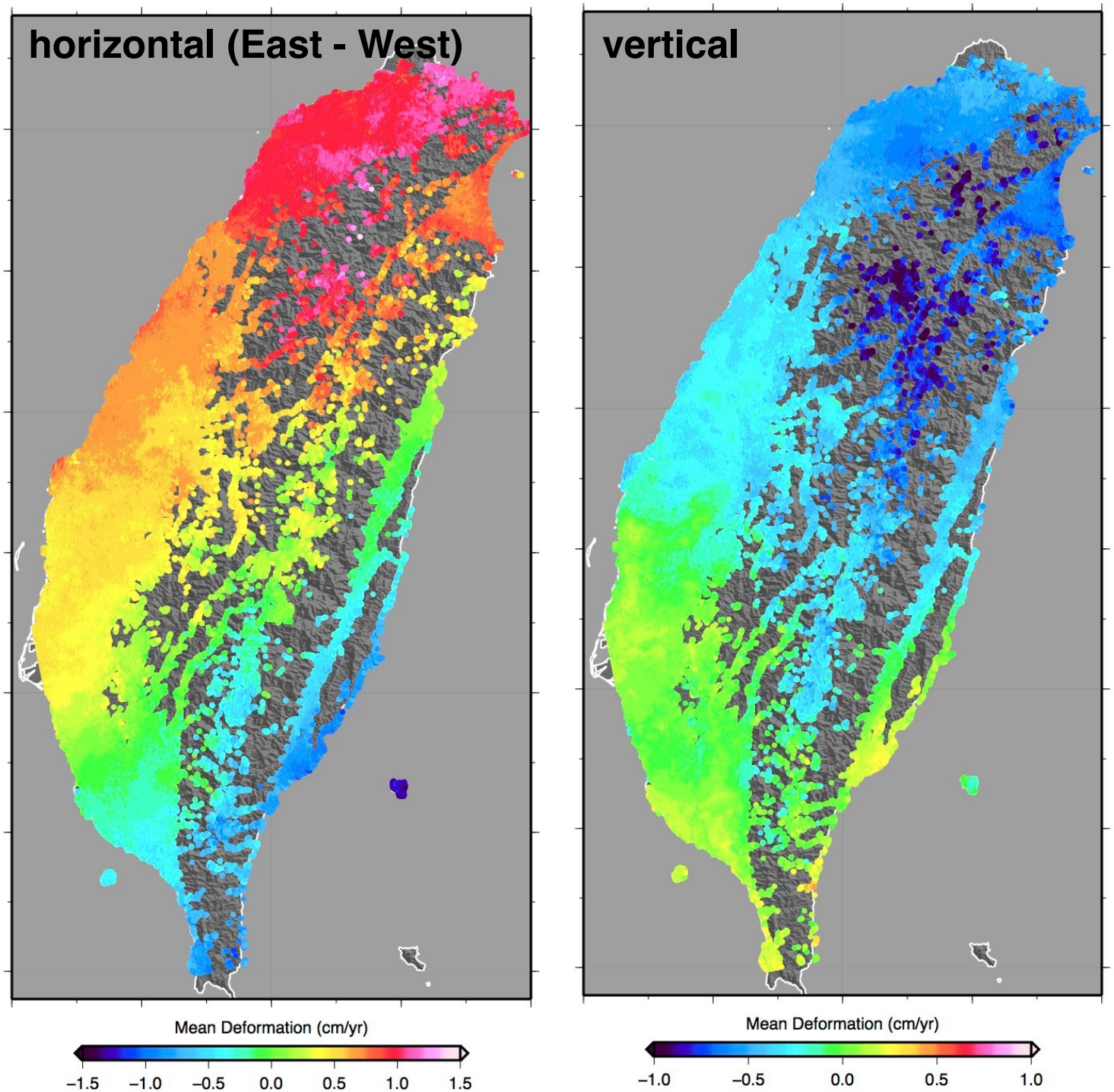
Mean ascending
LOS velocity



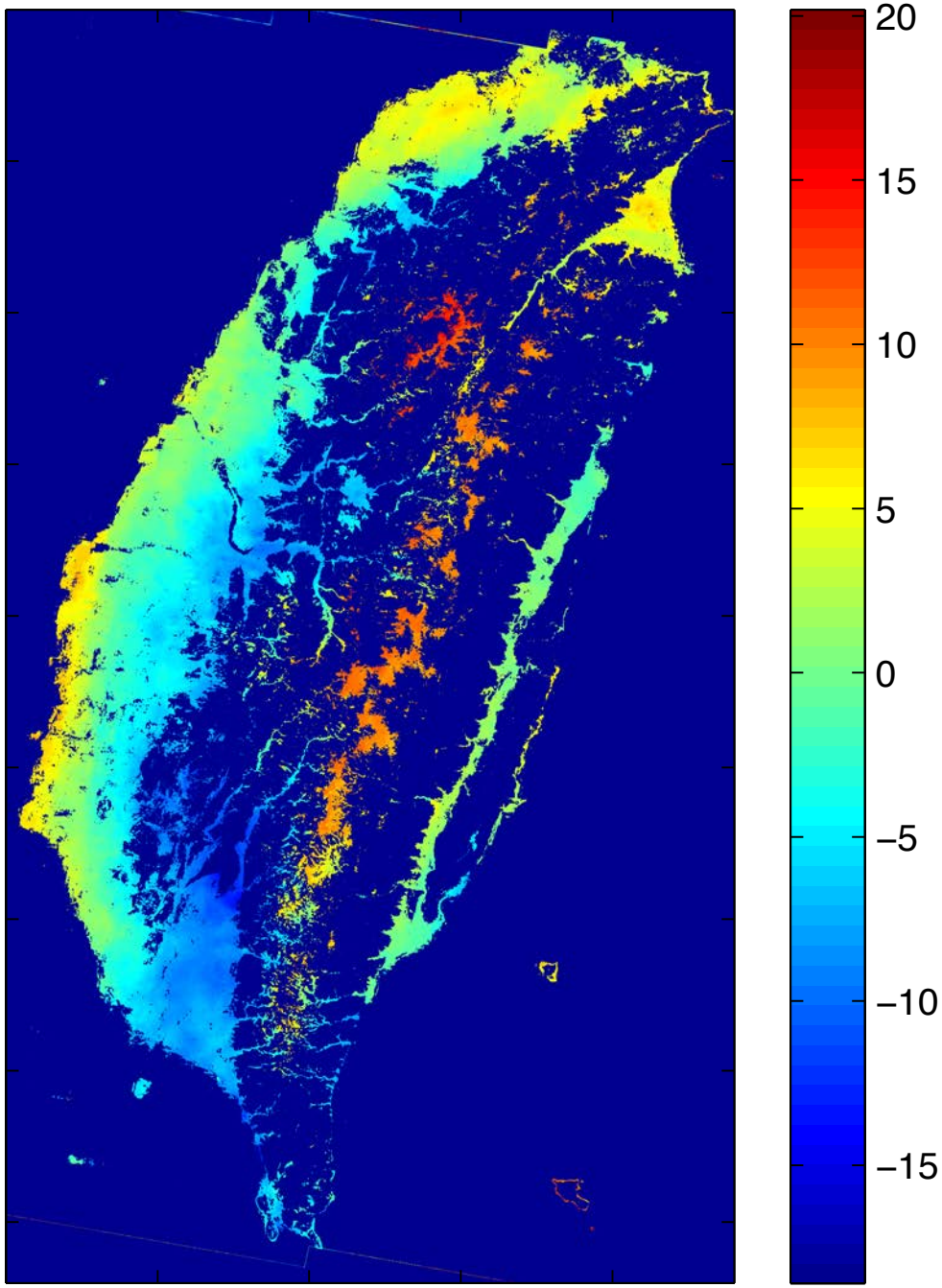
Mean descending
LOS velocity



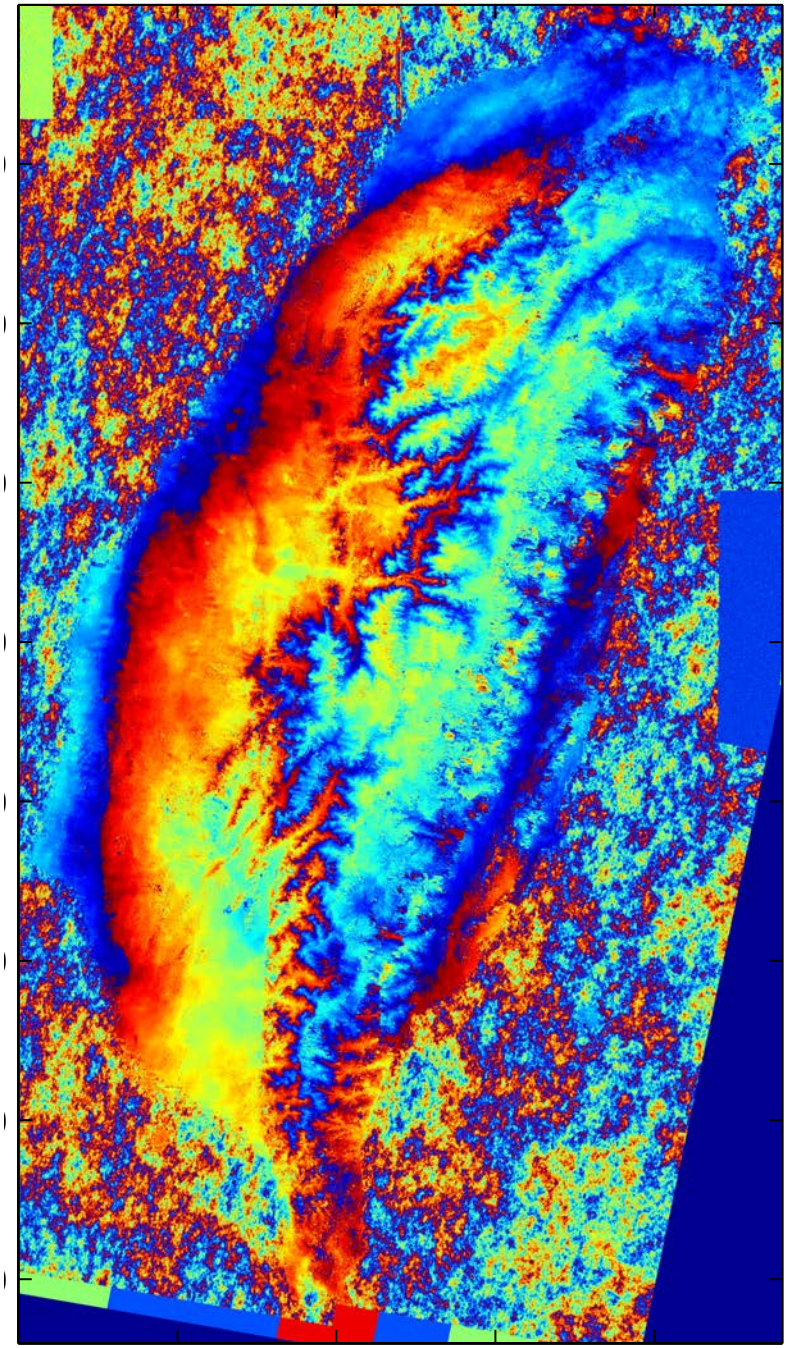
Crustal deformation between Apr. 2015 and Jan. 2016 (Sentinel-1A)



Unwrapping error



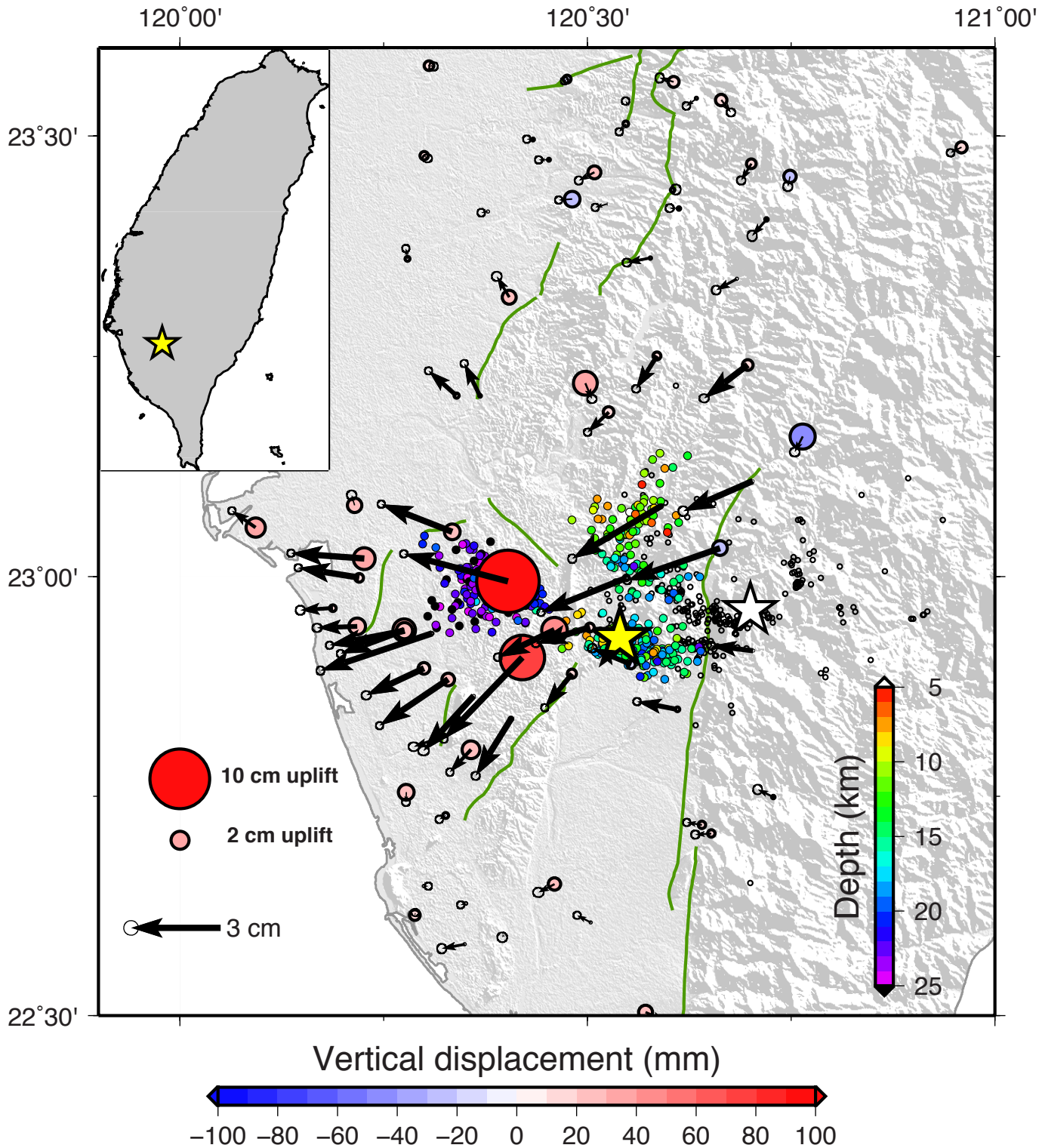
Atmospheric noise
(2015/11/24 - 2015/12/18)



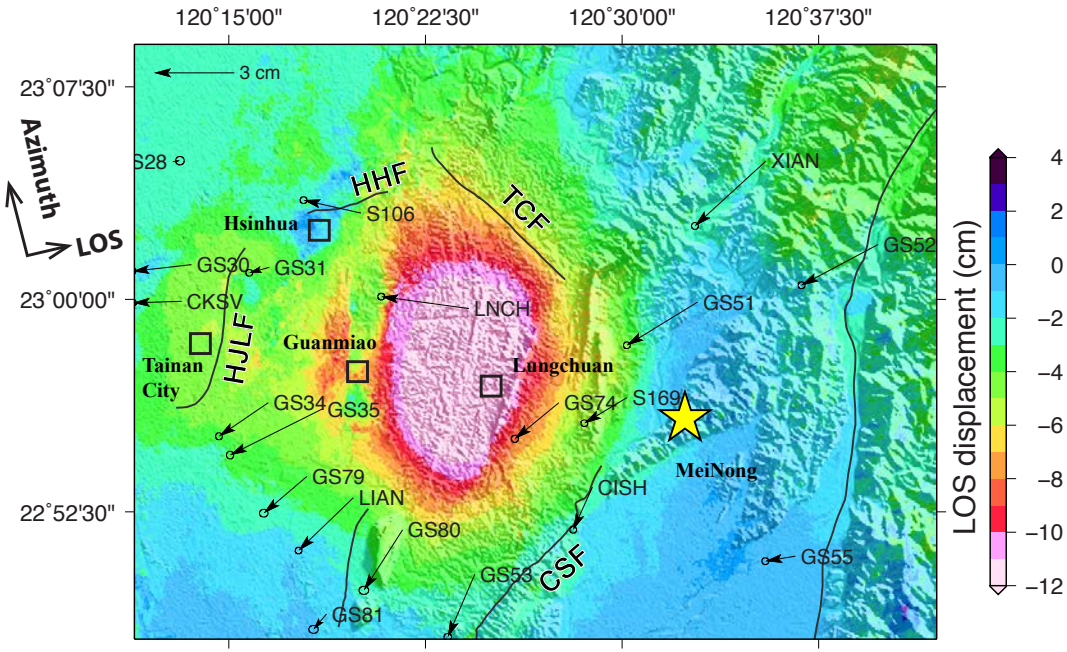
The M_w 6.4 MeiNong earthquake

February 5, 2016

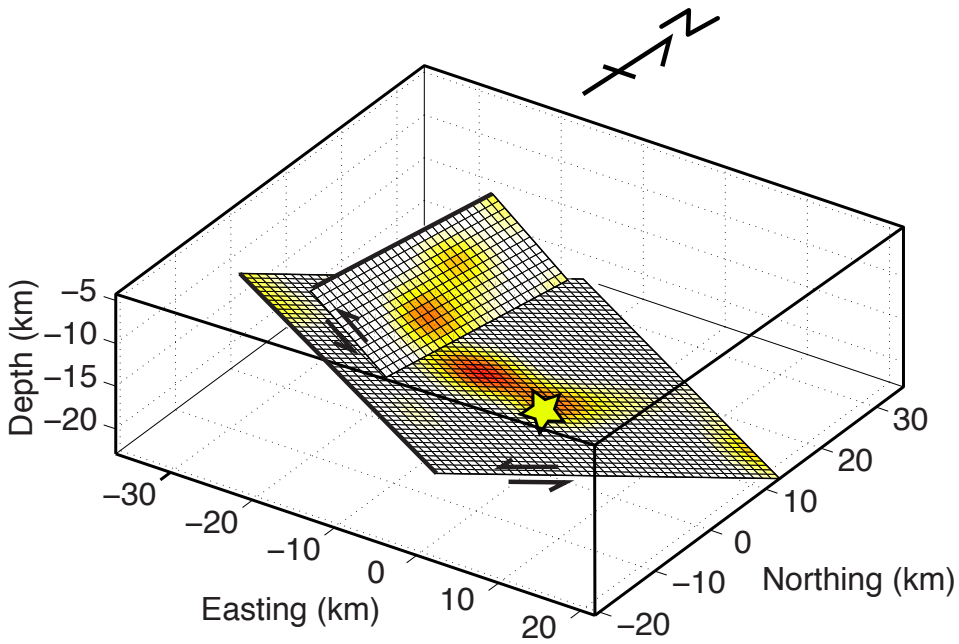
Coseismic Displacement

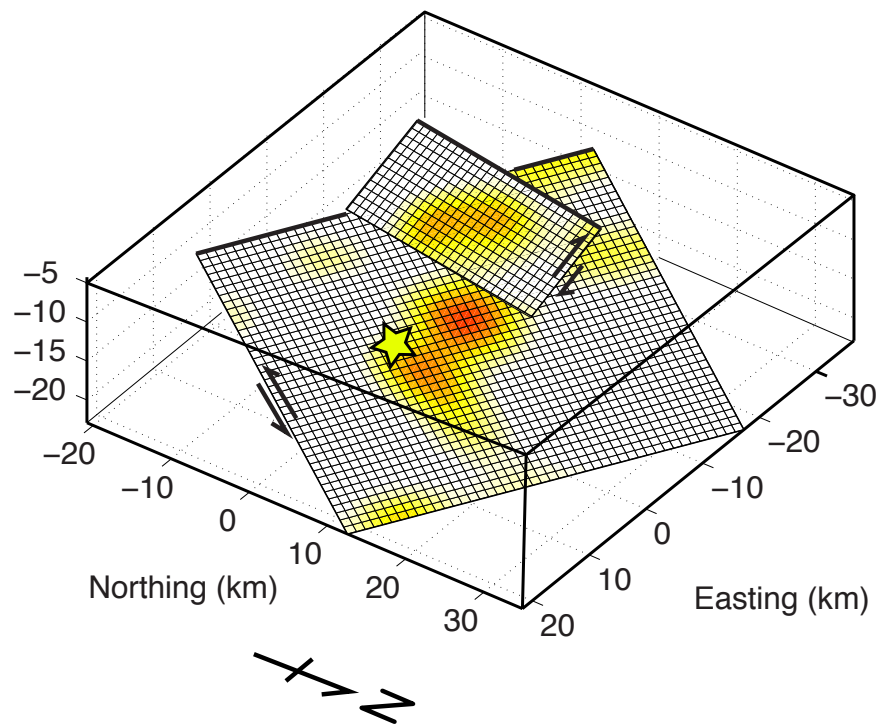


c **Sentinel-1A (2016/02/02 - 2016/02/14)**



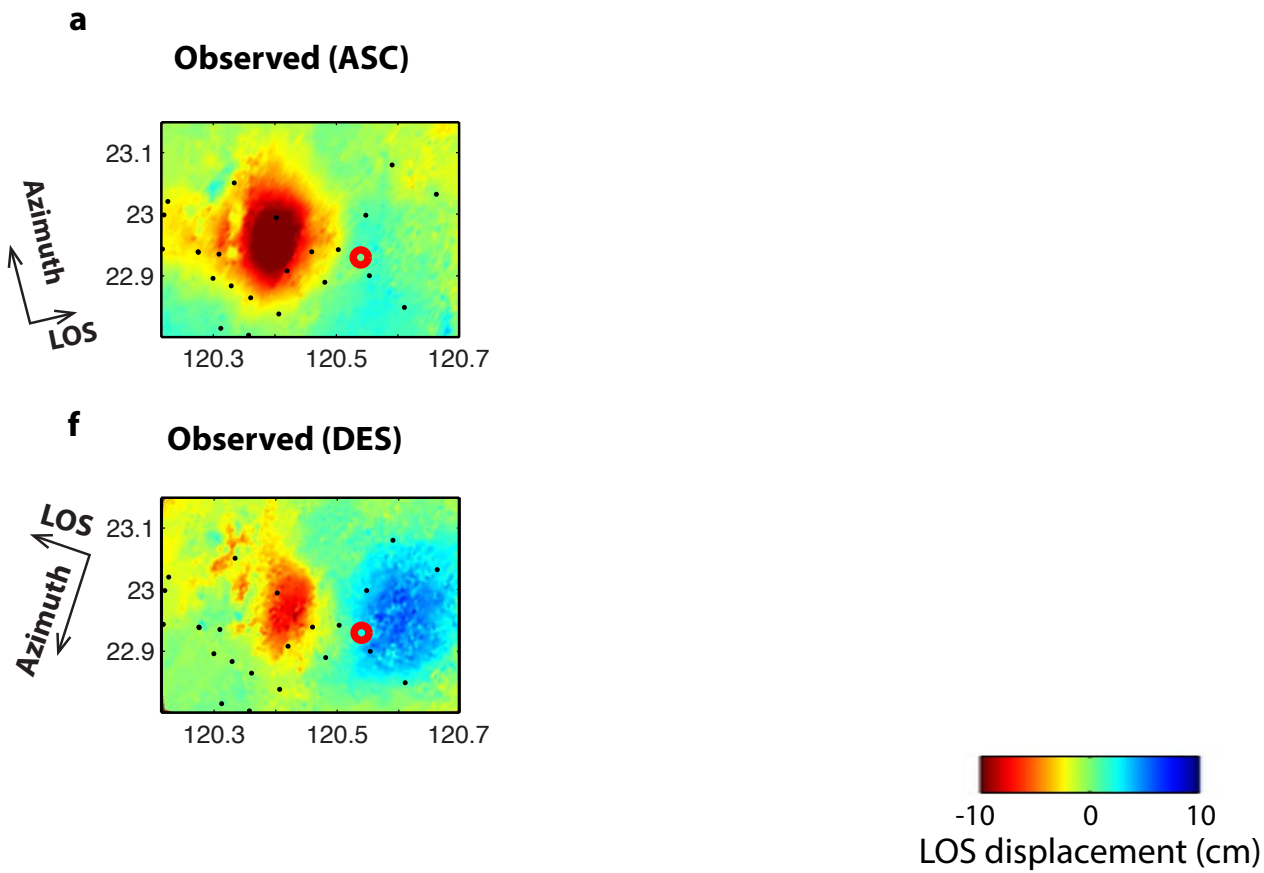
deep + shallower faults



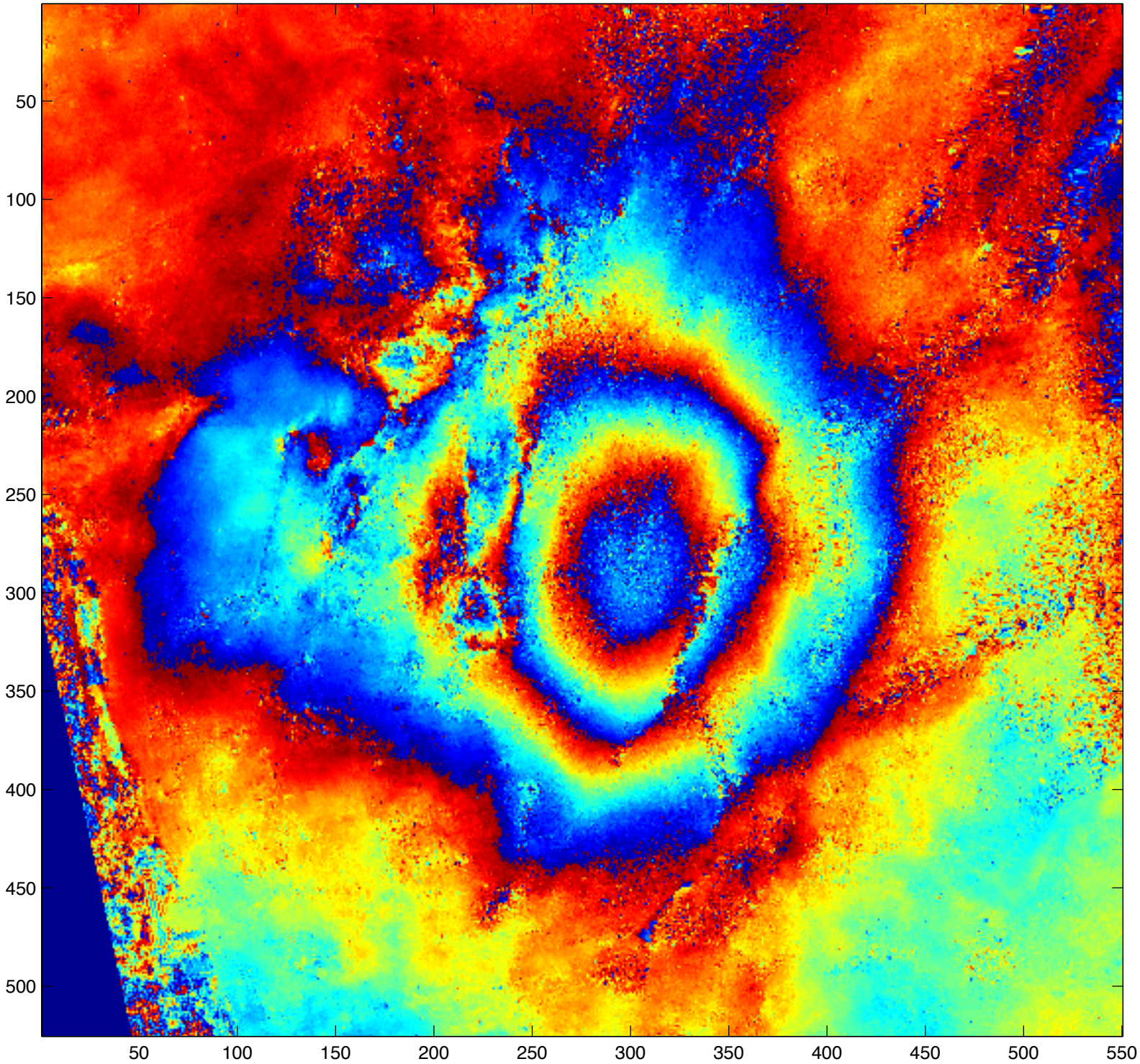


Huang et al., in review

Deformation contributed from different layers of fault



Huang et al., in review


50
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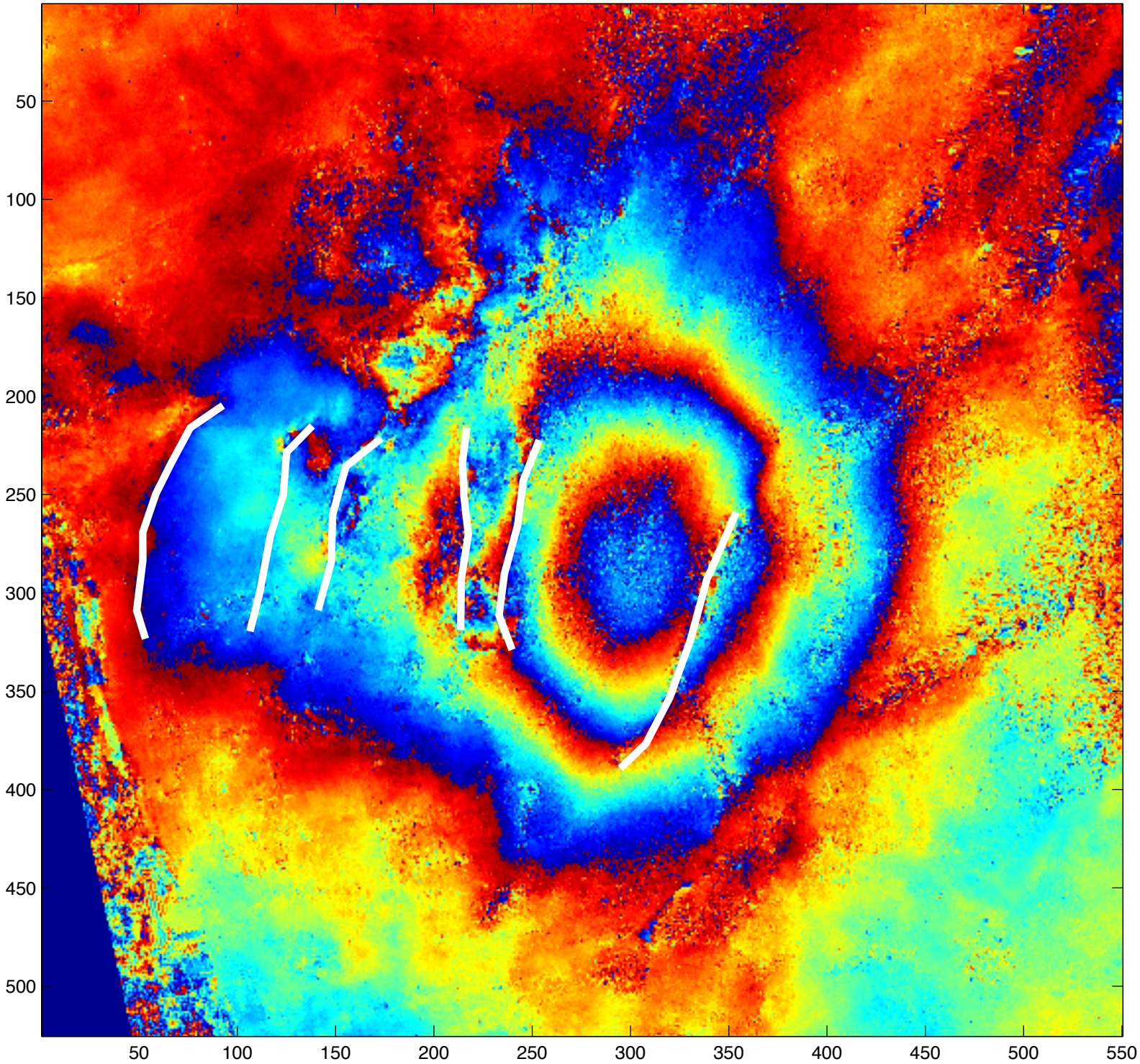
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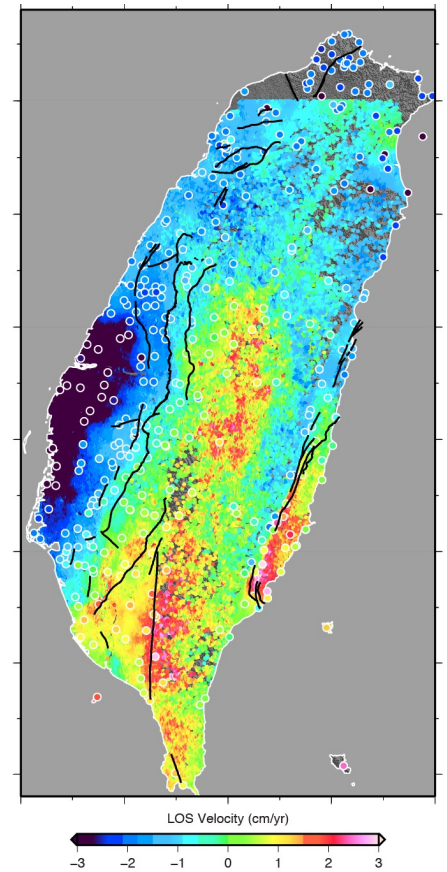
Very shallow ruptures through the Tainan city

Summery

Interseismic deformation

- InSAR can provide high resolution surface displacement

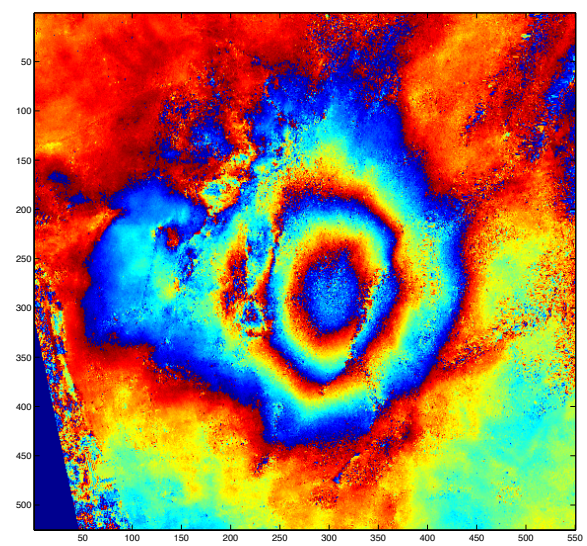
- The margins of the Western Foothills accommodate most of the interseismic deformation



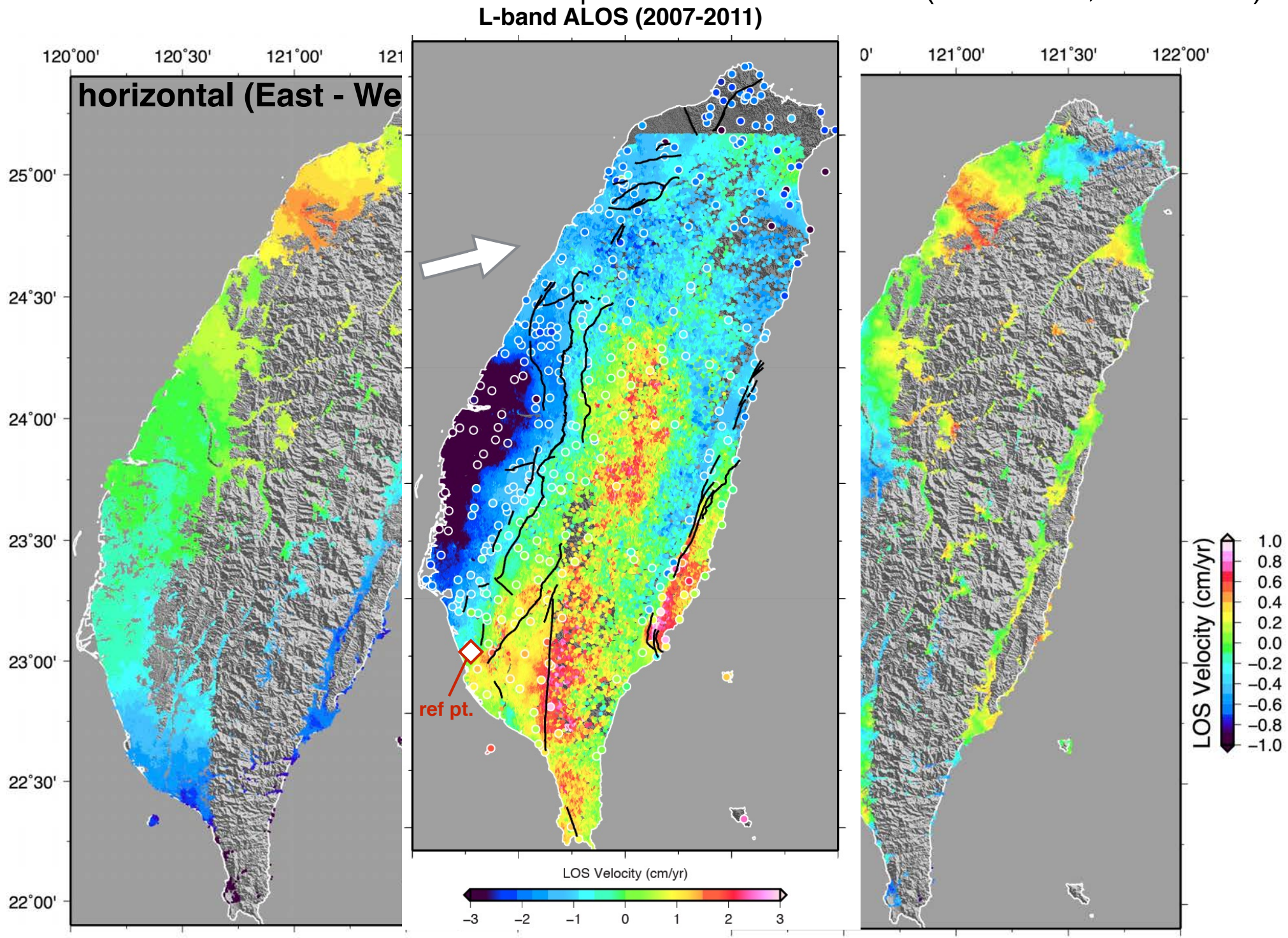
Coseismic deformation

- Slip in multiple faults at different depths

- High resolution InSAR reveals very shallow ruptures



Crustal deformation between Apr. and Nov. 2015 (Sentinel, C-band)



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Thank You