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P. TEATINI AND R. ROSSELLI

Thematic and land subsidence maps of the Lagoon of Venice from ERS SAR interferometry

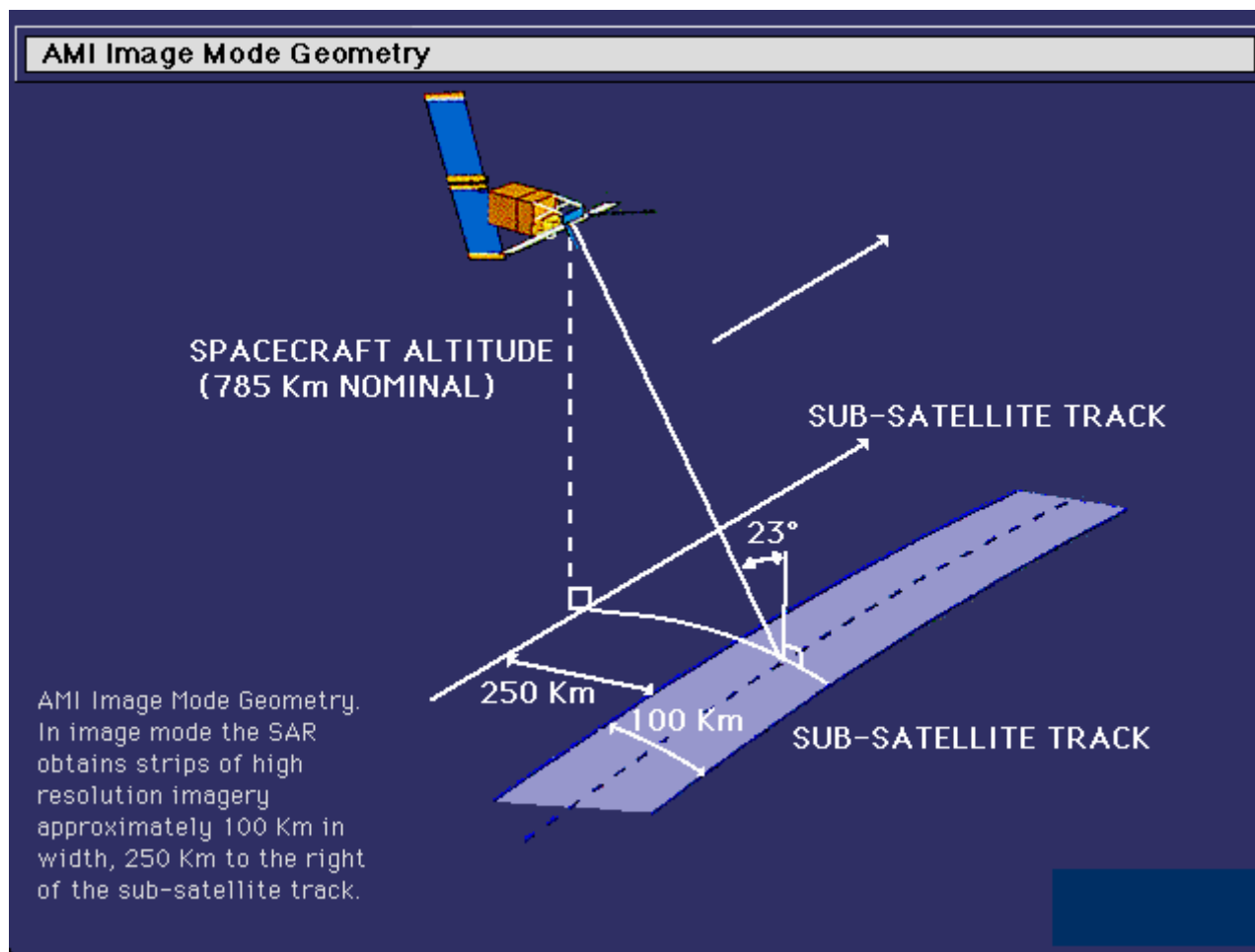
(Unit 3.2, "Morphology and Hydrodynamics
of the Venice Lagoon")

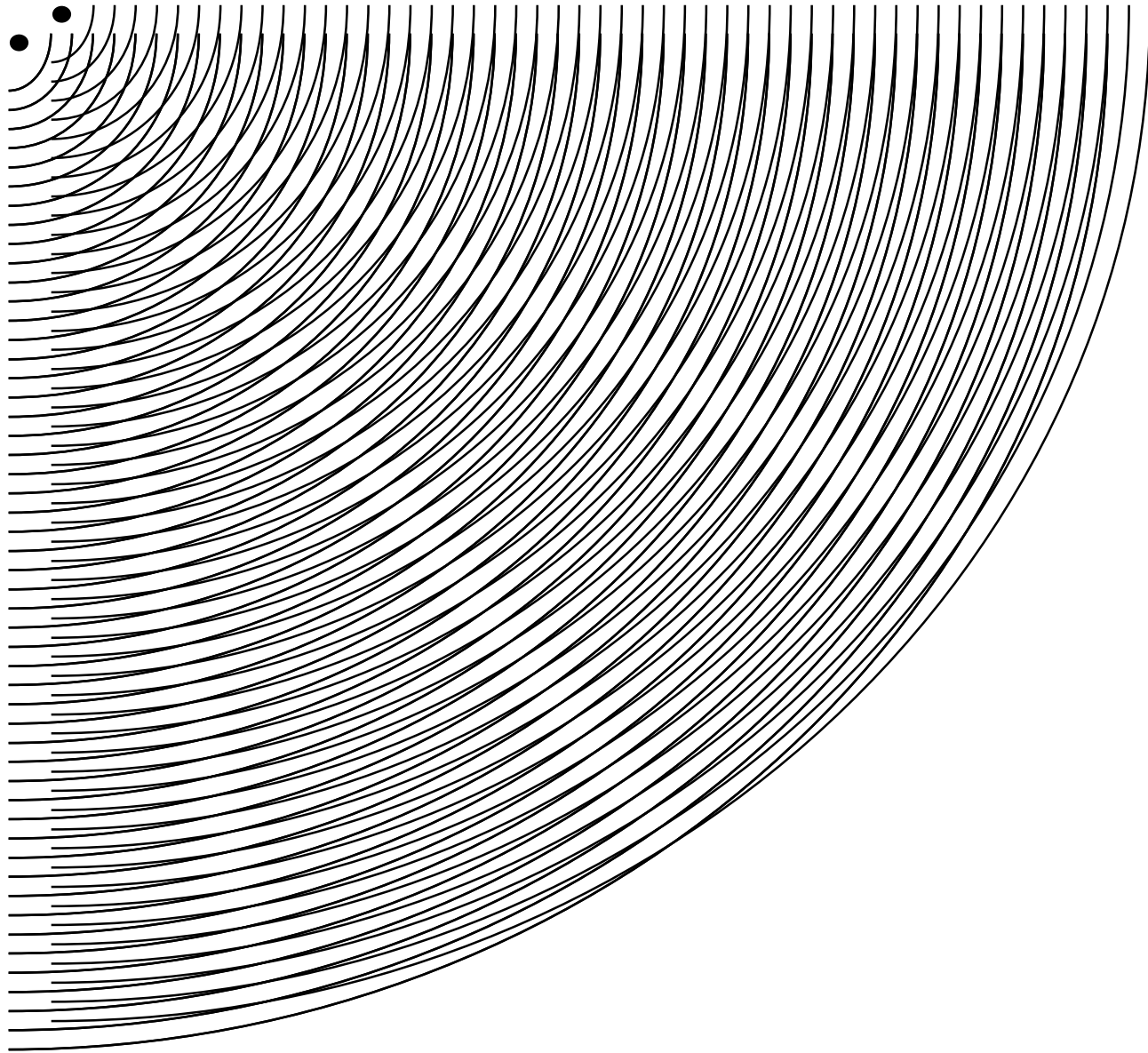
Aim of the work

Provide thematic and land subsidence maps of the Lagoon of Venice from ERS SAR interferometry

The displacement data contributes to the control of the ground vertical movements as one of the possible components of the erosion and deposition processes

ERS-1/2 Satellites (1991 -)





The interferometric phase ϕ

$$\phi = \phi_{topo} + \phi_{disp} + \phi_{atmo} + \phi_{noise}$$

$$\phi = \frac{4\pi}{\lambda} B_{\parallel} + \frac{4\pi}{\lambda} r_{disp} + \frac{4\pi}{\lambda} r_{atmo} + \phi_{noise}$$

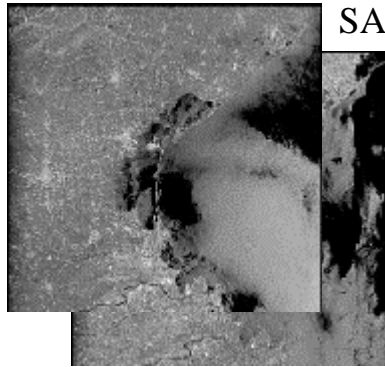
B_{\parallel} : component of the baseline parallel with the line-of-sight direction

r_{disp} : displacement of the scatterer in the line-of-sight direction

r_{atmo} : path length changes due to different atmospheric conditions during the acquisitions of the two SAR images

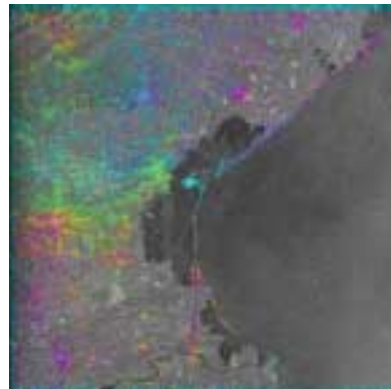
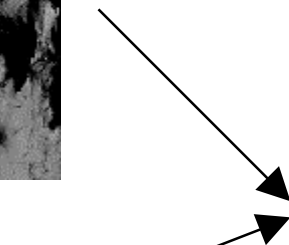
Differential Interferometry

WP 2.2.1



SAR image 23 April 1997

SAR image 24 March 1999

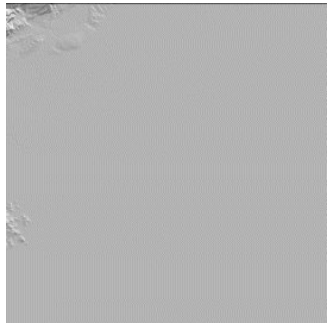


DiffINSAR pair: 23 April
1997 - 24 March 1999
complex differential
interferogram

Unwrapped
interferogram



DEM
shaded relief

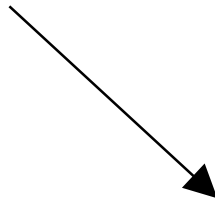


Differential Interferometry

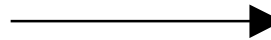
WP 2.2.2

Stacking (atmosphere reduction)

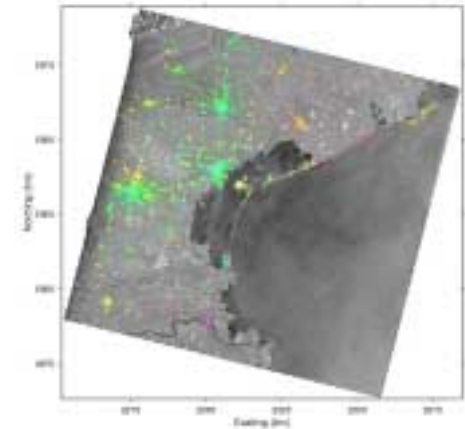
Orbit	Date	Perpendicular baseline	Acq. time interval
07782_00477	10.01.93_24.05.95	3 m	864 giorni
00477_10497	24.05.95_23.04.97	7 m	700 giorni
10497_20517	23.04.97_24.03.99	-21 m	700 giorni
11289_05487	12.09.93_08.05.96	-17 m	969 giorni
25160_18012	07.05.96_30.09.98	-11 m	876 giorni
18012_26529	30.09.98_17.05.00	-49 m	595 giorni



Geocoding

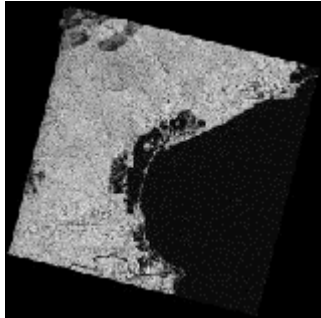


Date presentation and interpretation

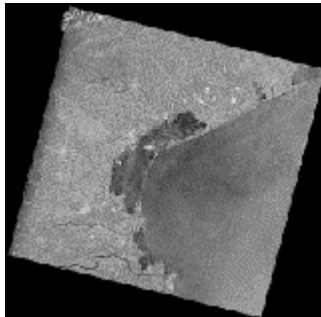


Geocoded (30 m) landuse map of the Lagoon of Venice from satellite radar interferometry (ERS-1/2)

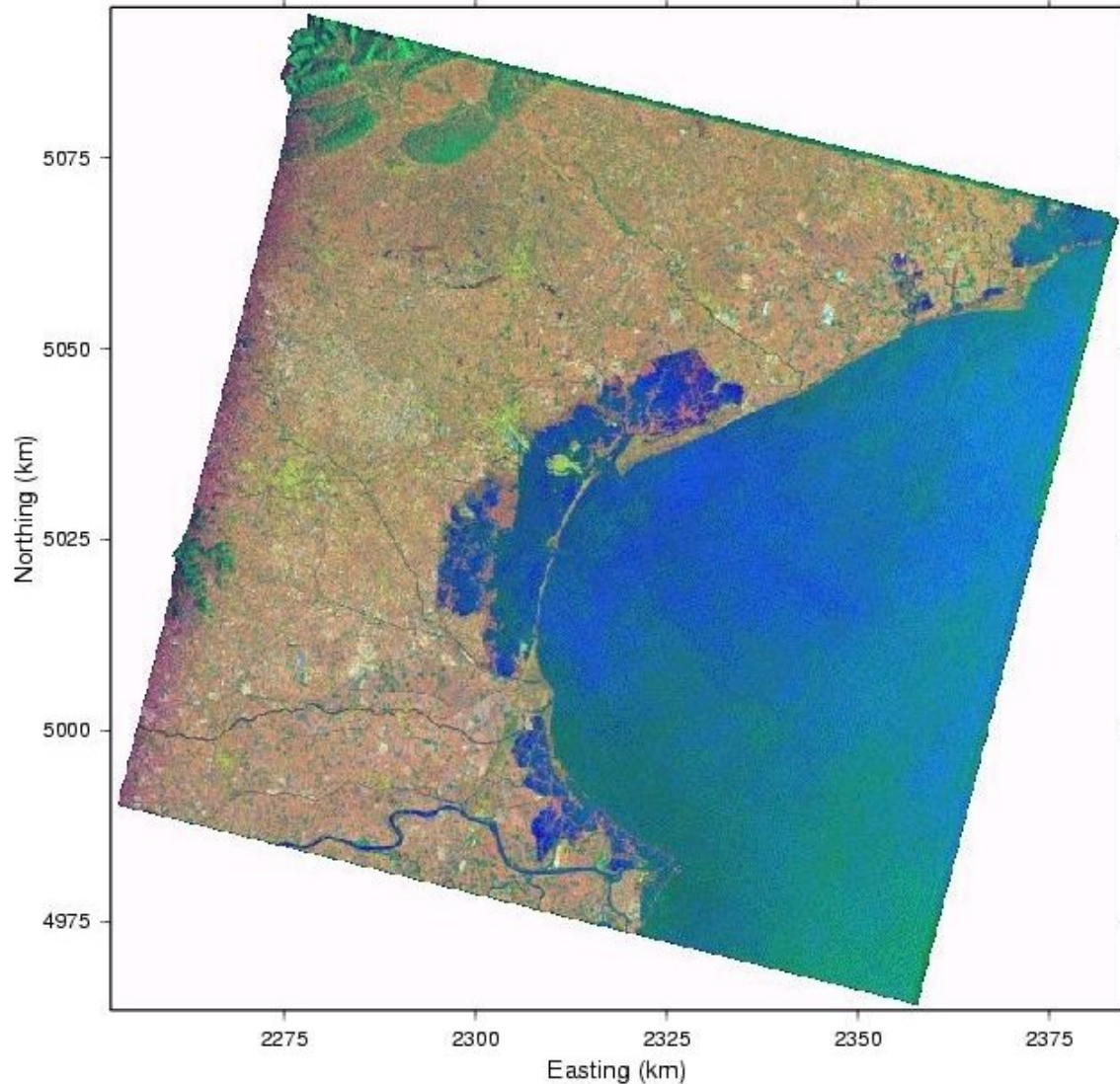
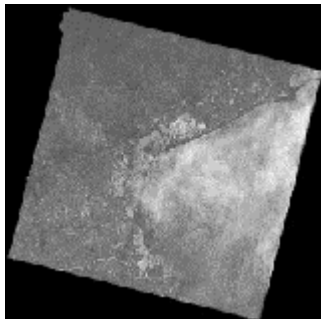
Tandem
coherence (red)



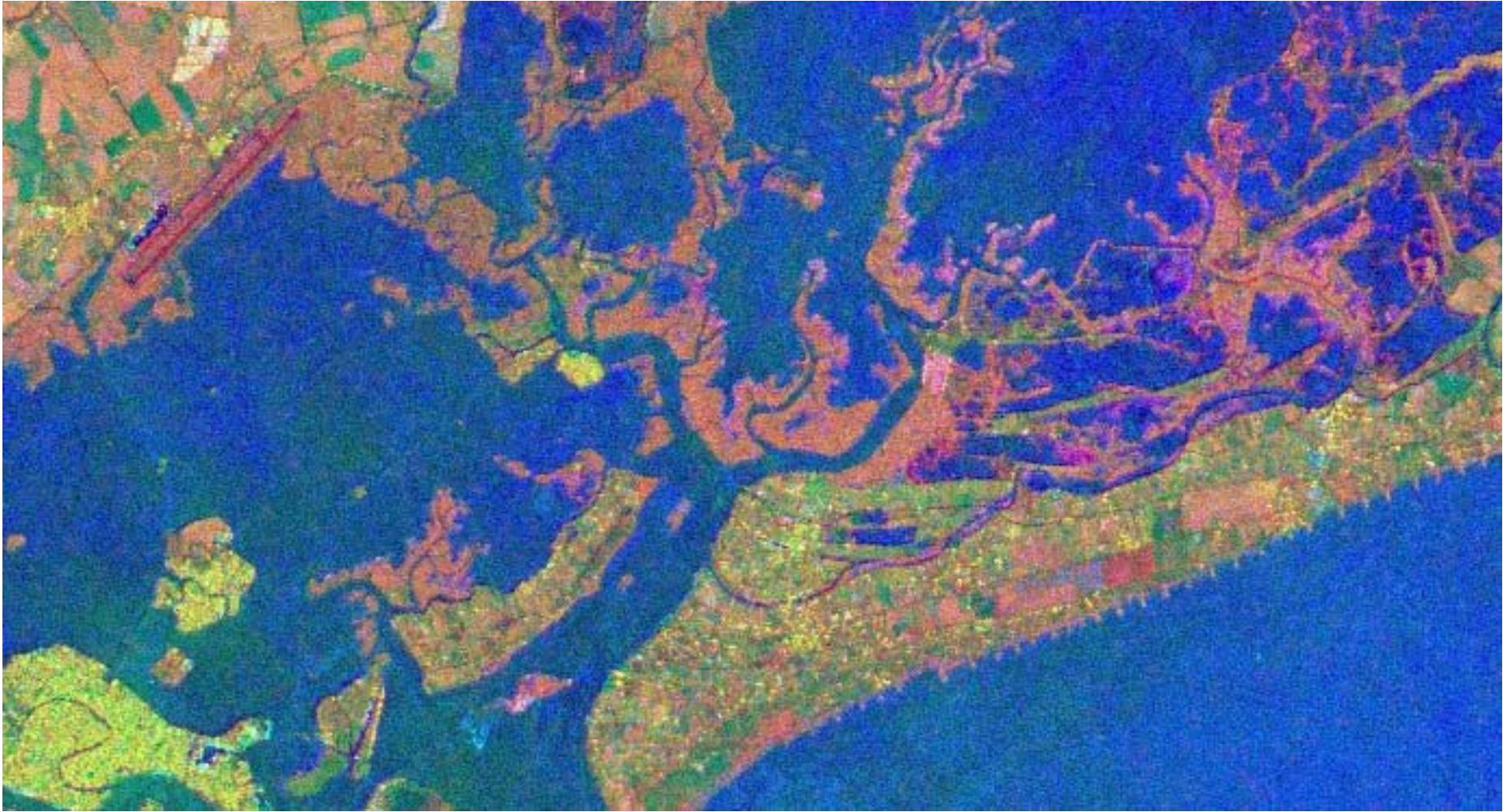
Backscattering
intensity (green)



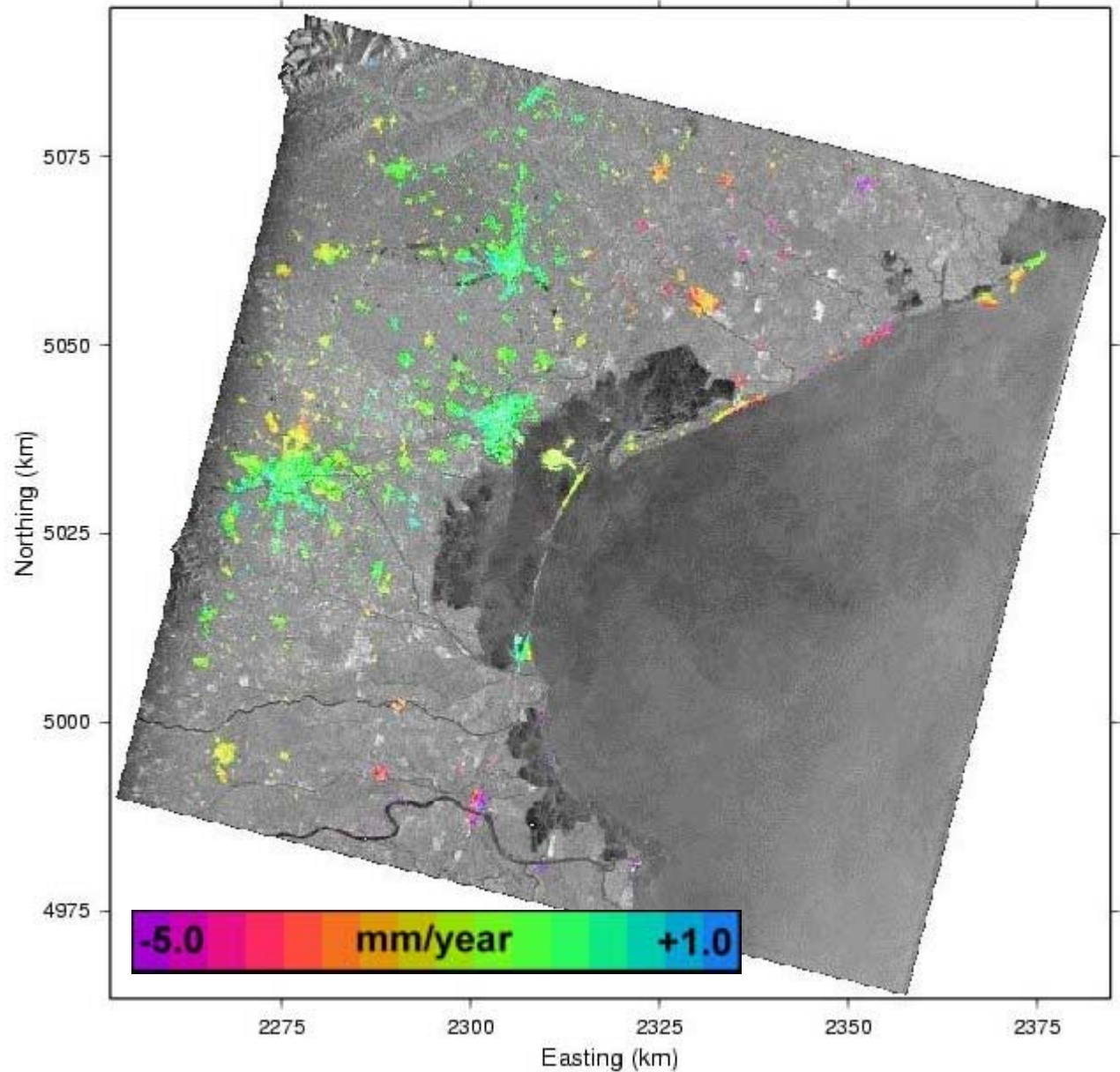
Backscattering
intensity change
(blue)



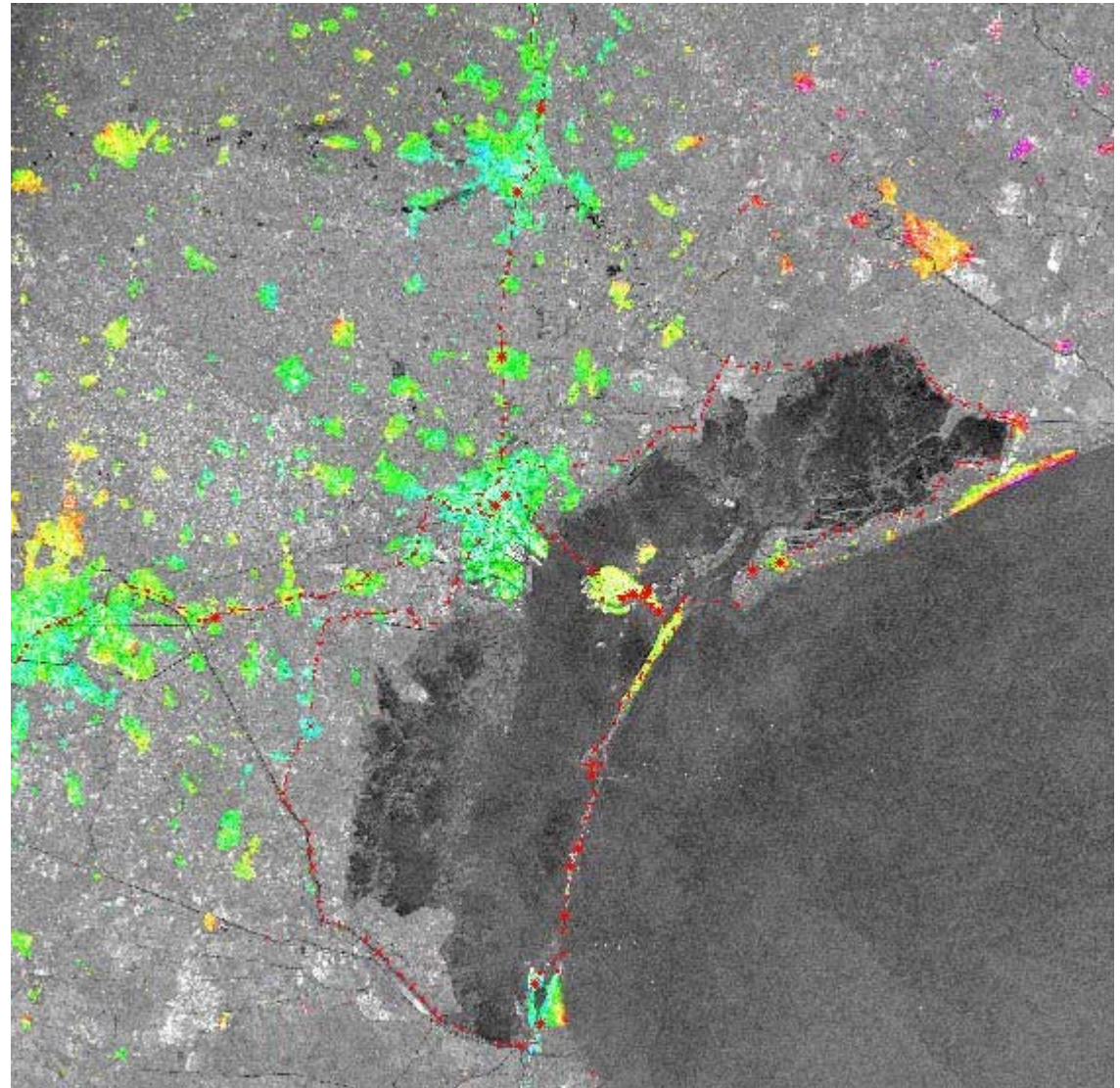
Geocoded (30 m) landuse map of the Lagoon of Venice from satellite radar interferometry (ERS-1/2)



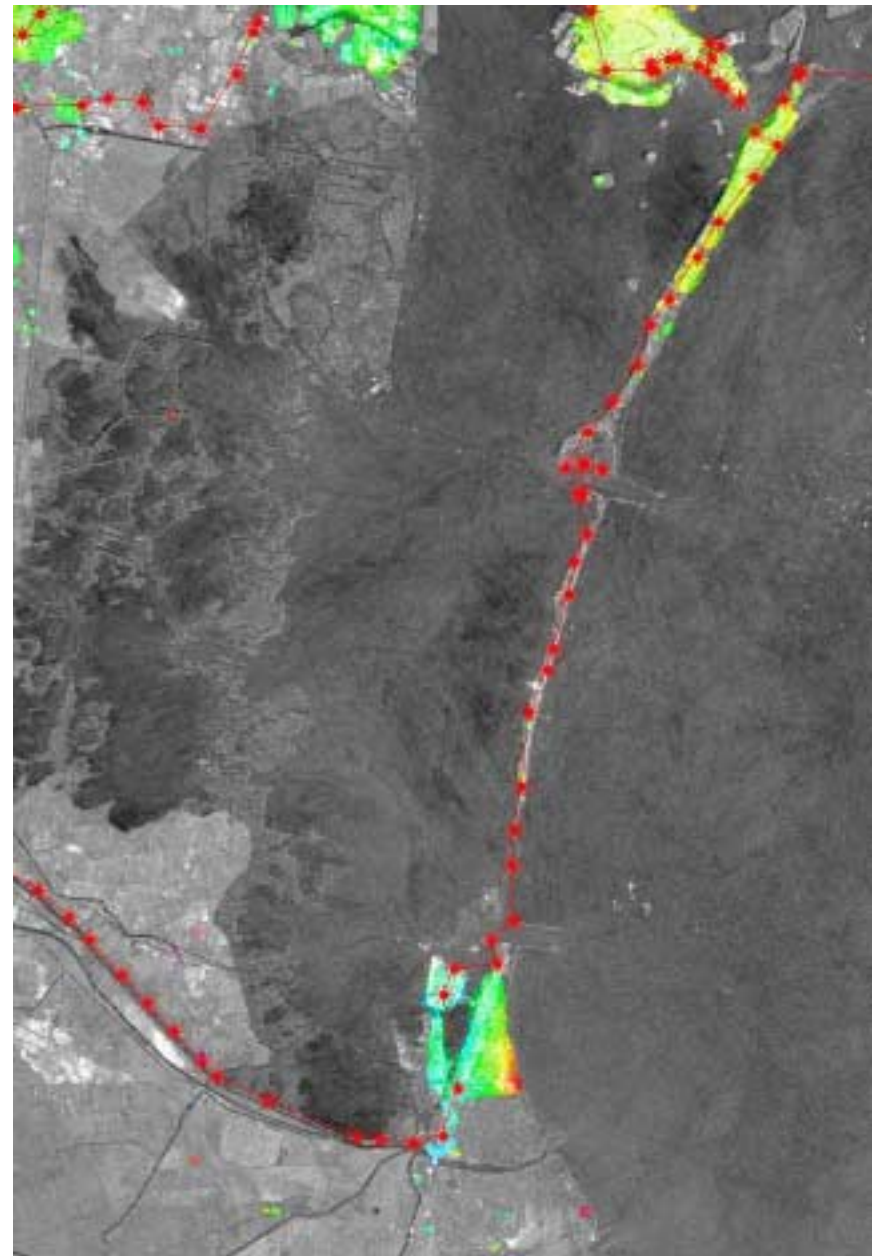
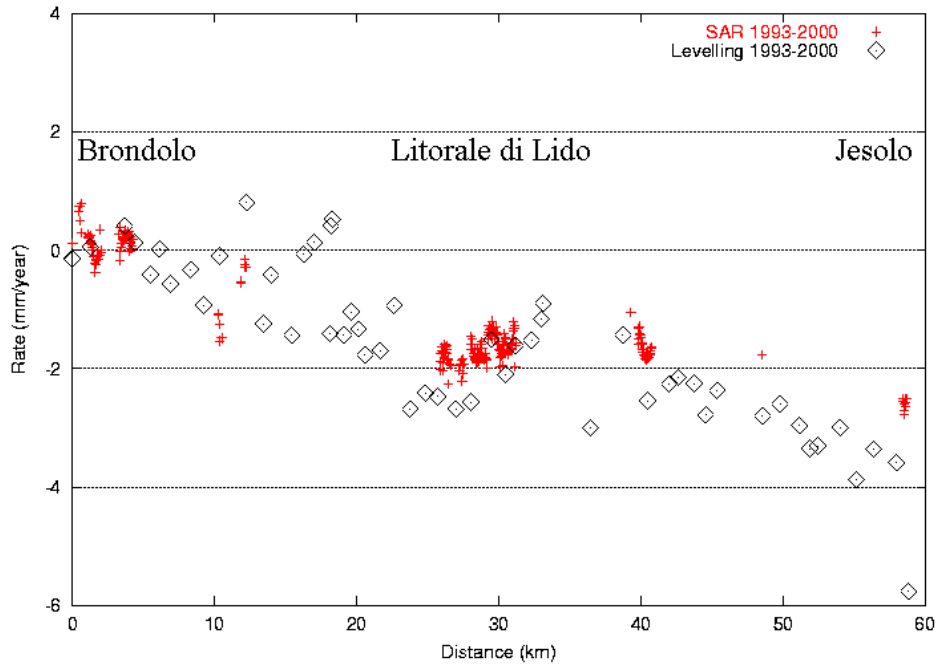
Land subsidence
map from SAR
interferometry
1993 - 2000



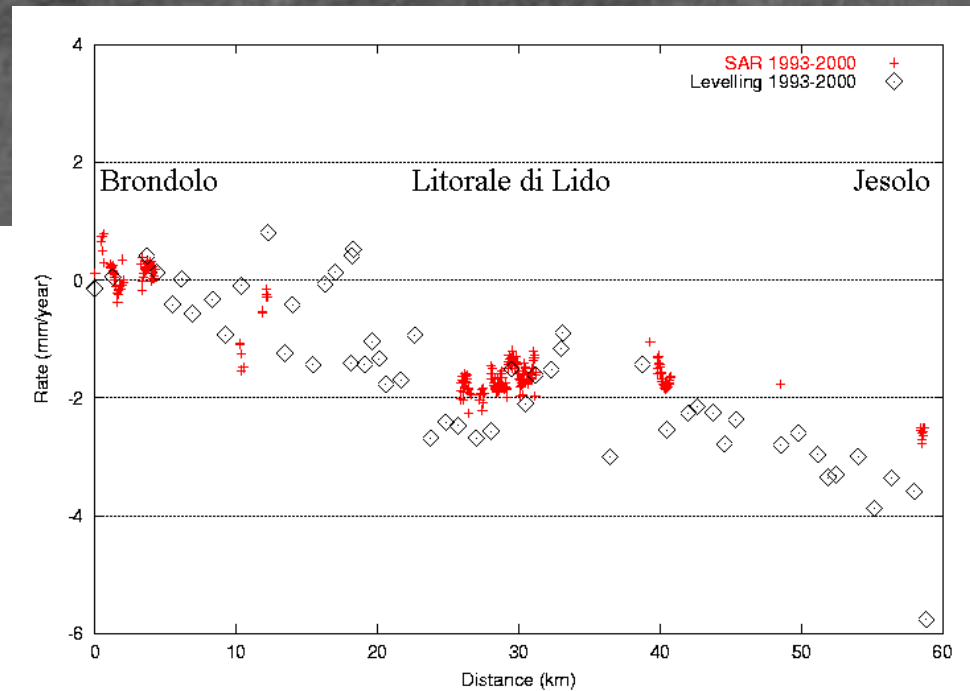
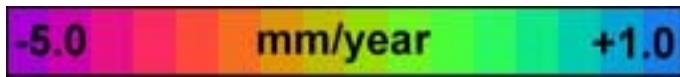
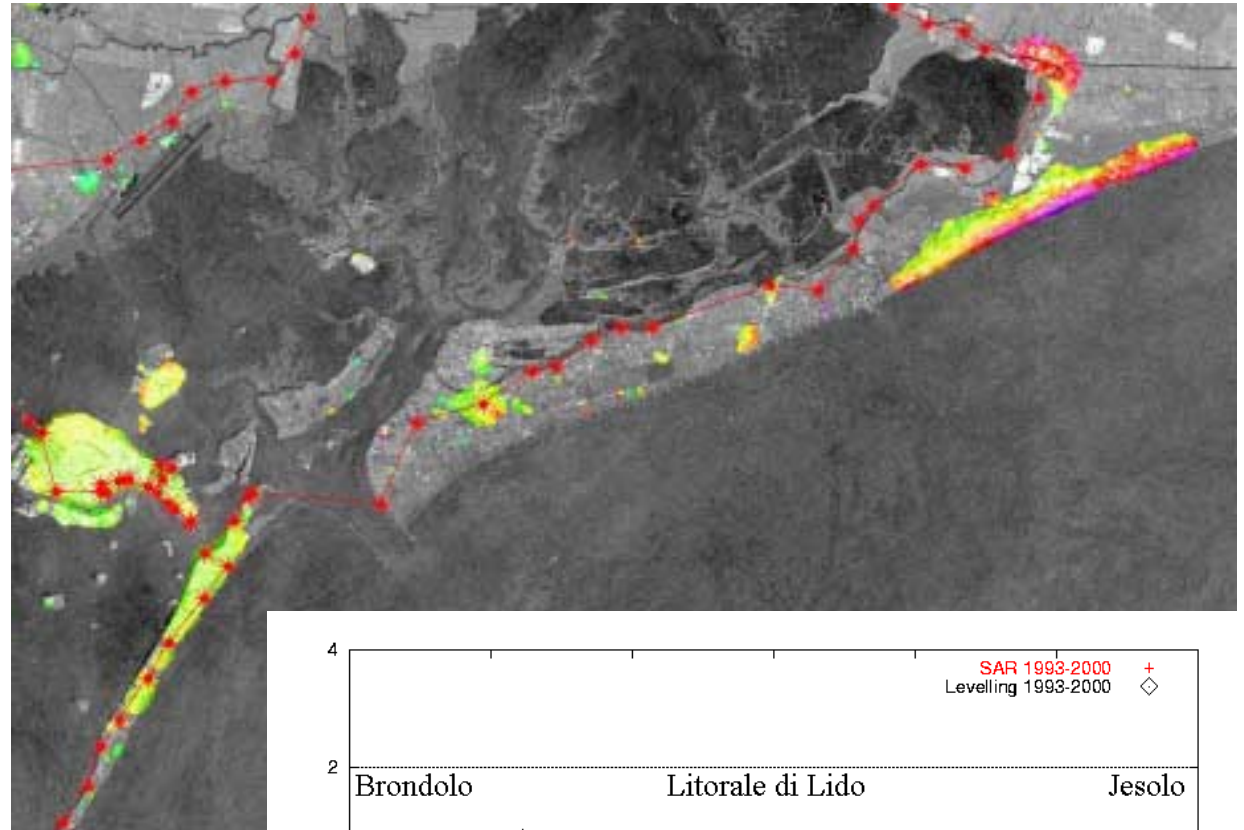
Land subsidence
map from SAR
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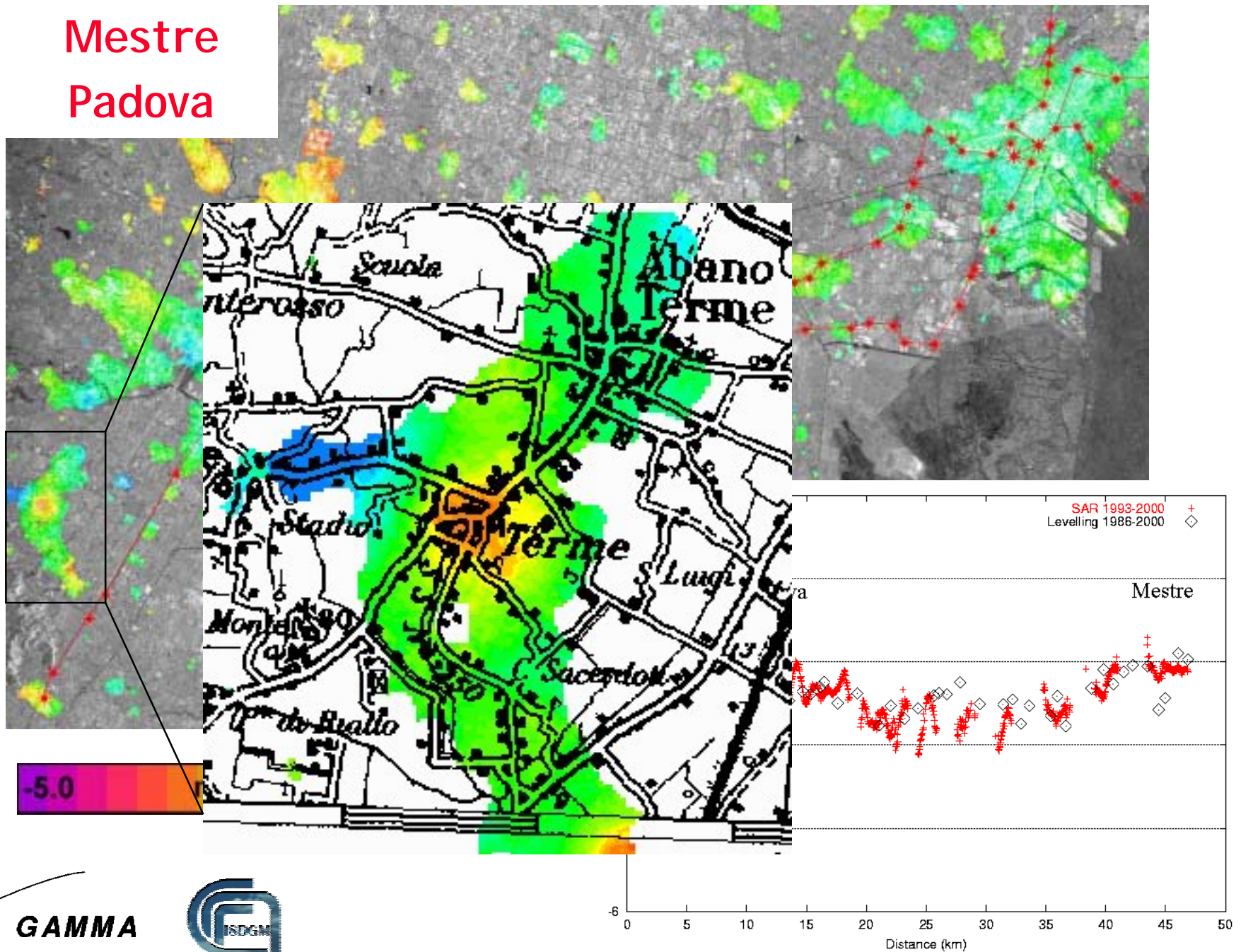
Chioggia Litorale di Lido



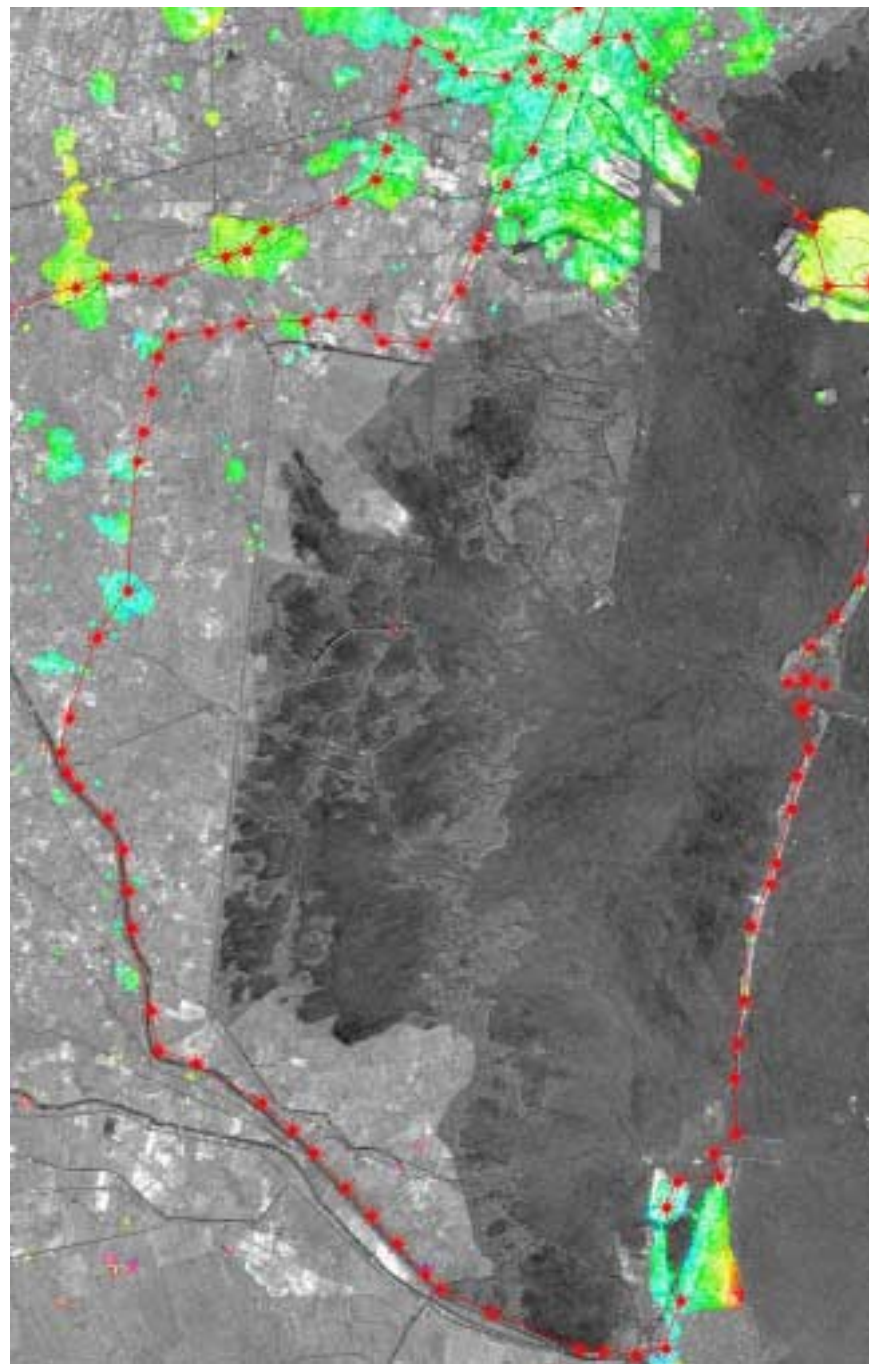
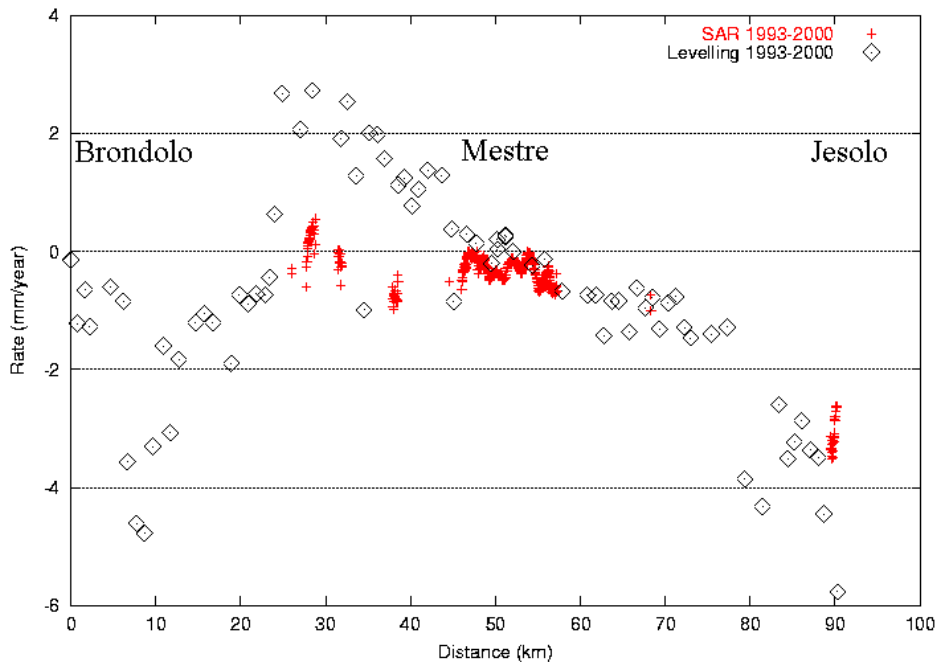
Litorale di Lido Jesolo



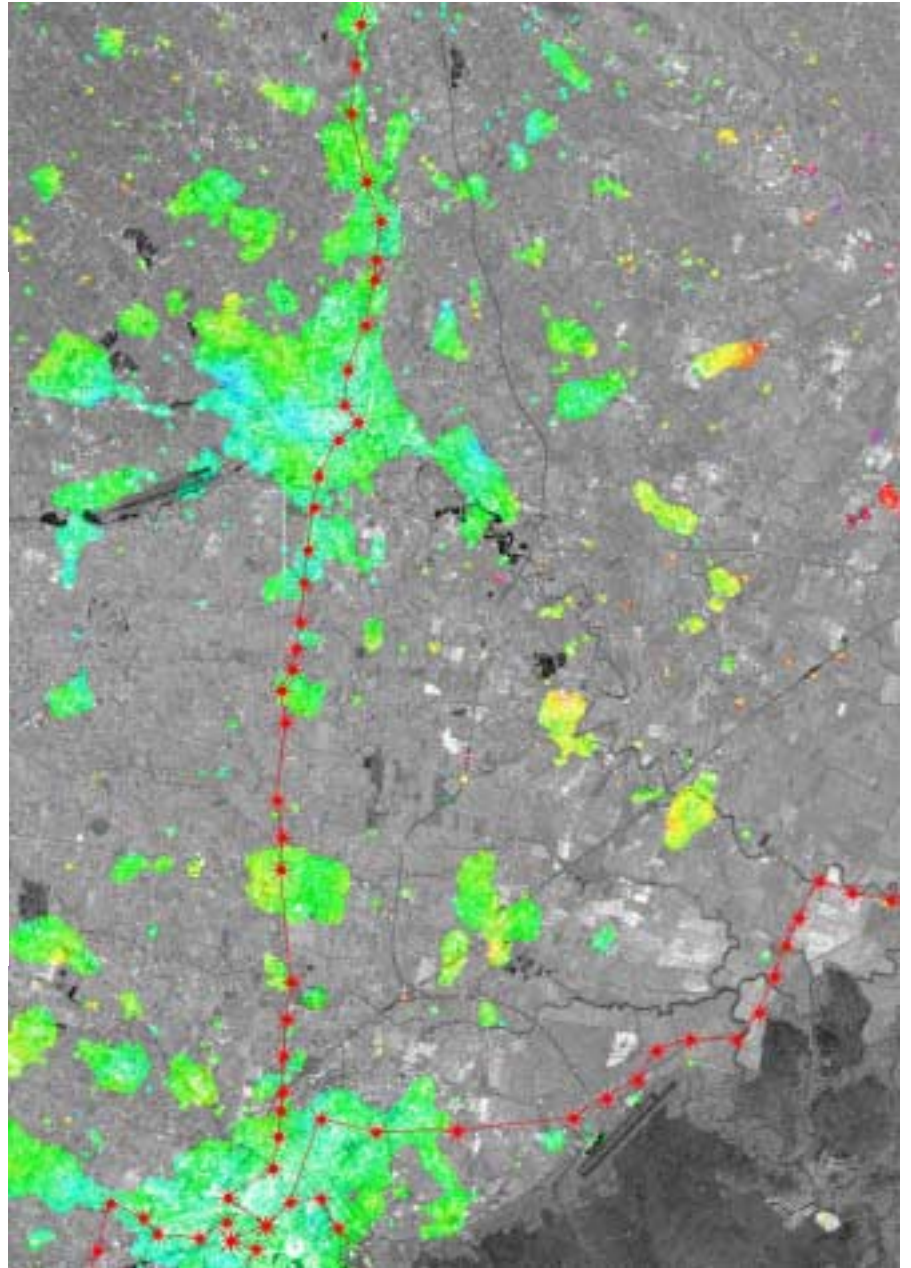
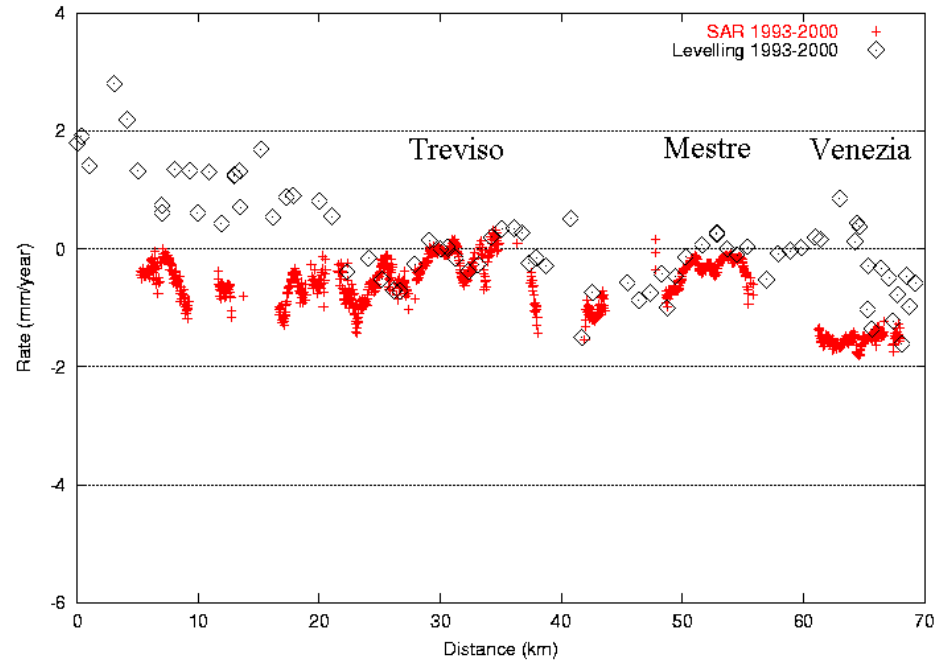
Mestre Padova



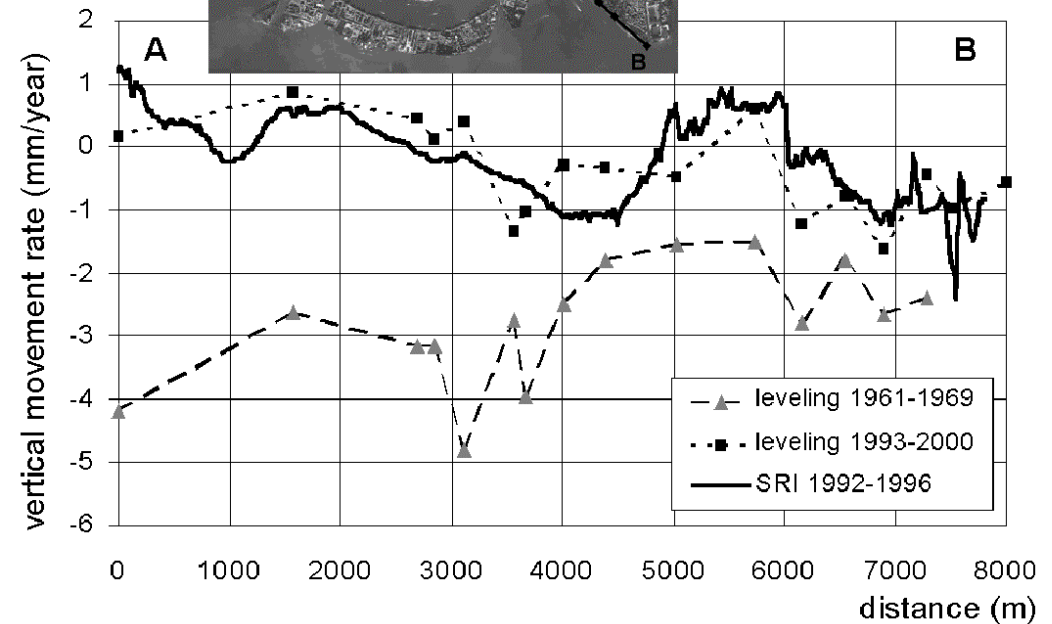
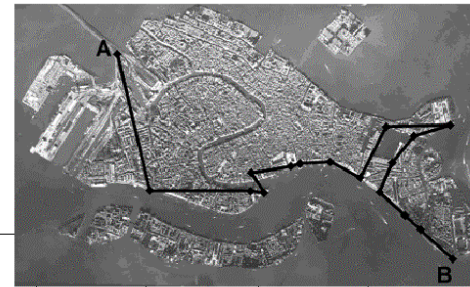
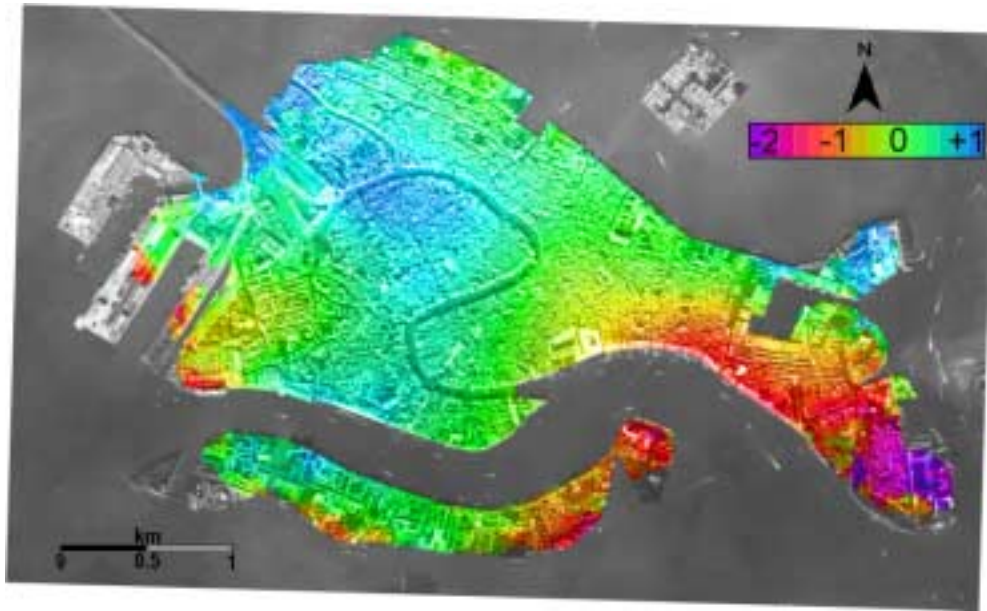
Mestre Brondolo



Mestre Treviso



Venezia



Outlook

Interpretation

Interferometric
Point Target
Analysis

