

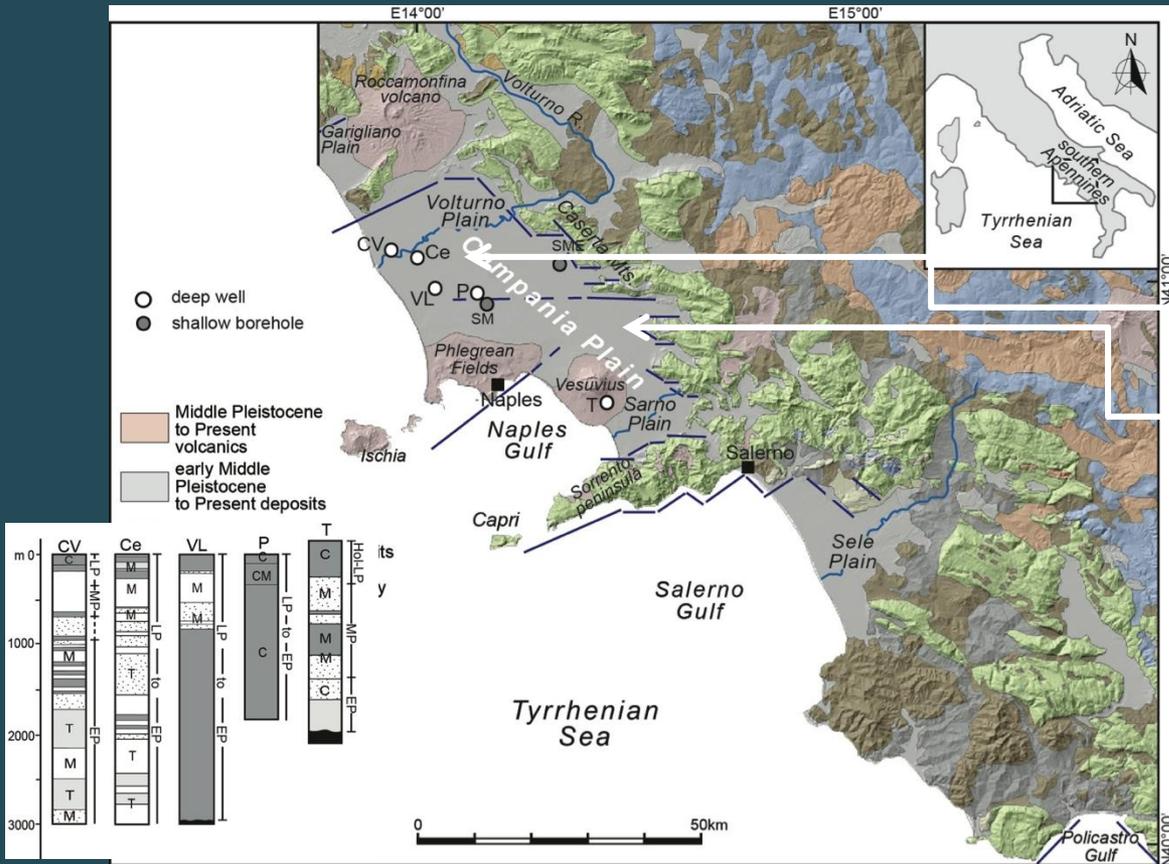
LONG TERM V_s . CURRENT VERTICAL MOTIONS IN THE NORTHERN CAMPANIA PLAIN AREA (SOUTHERN ITALY)

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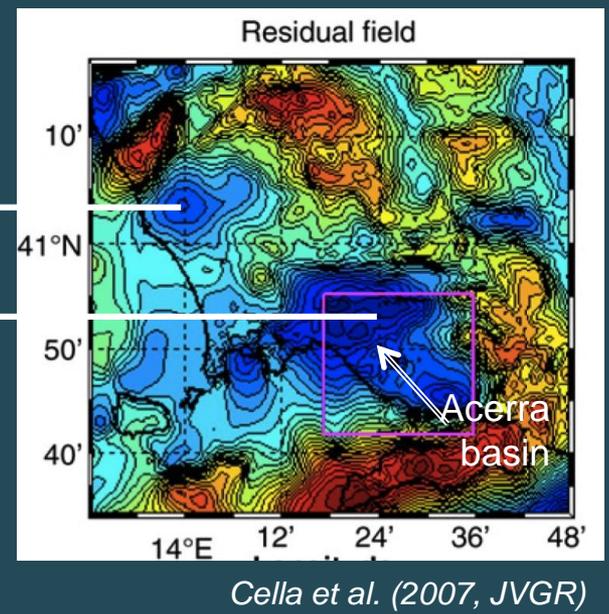
¹ Dipartimento di Scienze della Terra, dell'Ambiente e delle Risorse - DiSTAR, Università degli Studi di Napoli Federico II, Napoli

² Dipartimento di Ingegneria Civile, Edile e Ambientale - DICEA, Università degli Studi di Napoli Federico II, Napoli

CAMPANA PLAIN: GEOLOGICAL AND STRUCTURAL SETTING

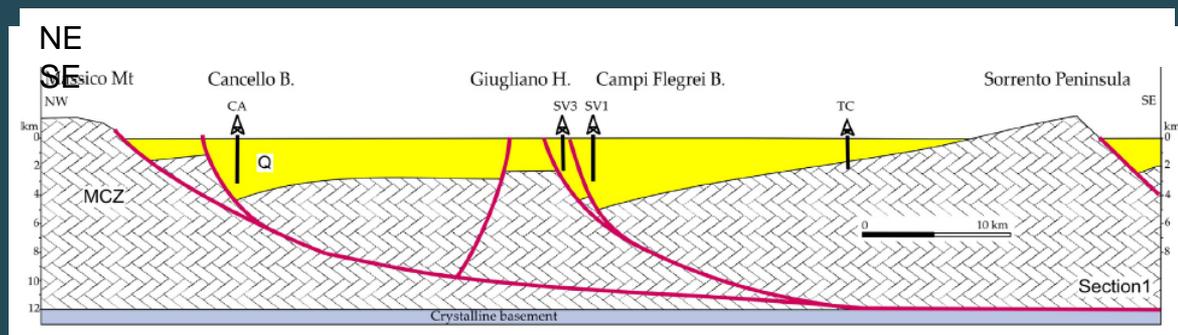


Gravimetric data



MAIN FEATURES:

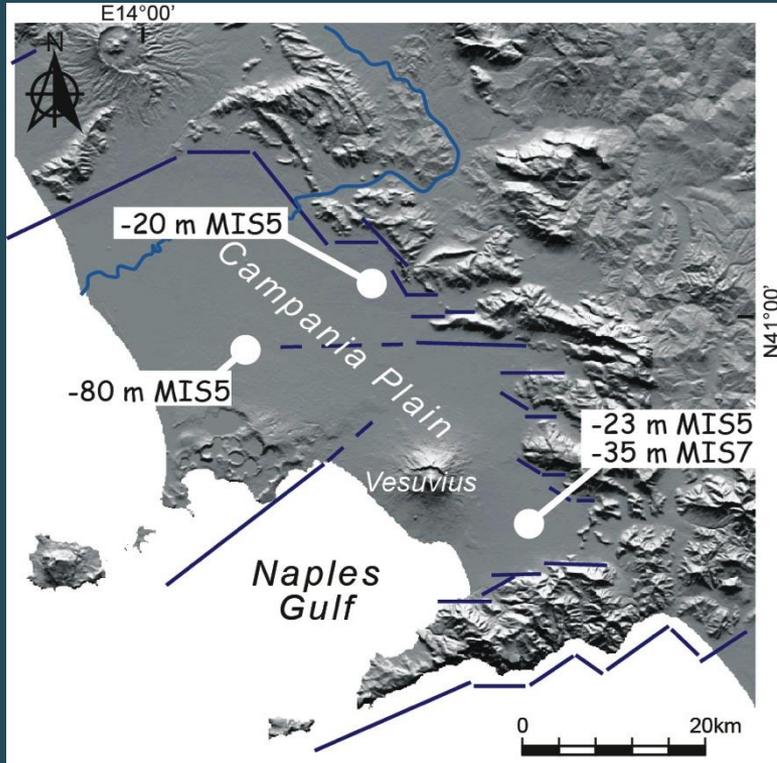
- Quaternary basin, locally >3000 m deep
- Volcanism active since Early Pleistocene
- Strong explosive volcanism in the last 300 ky



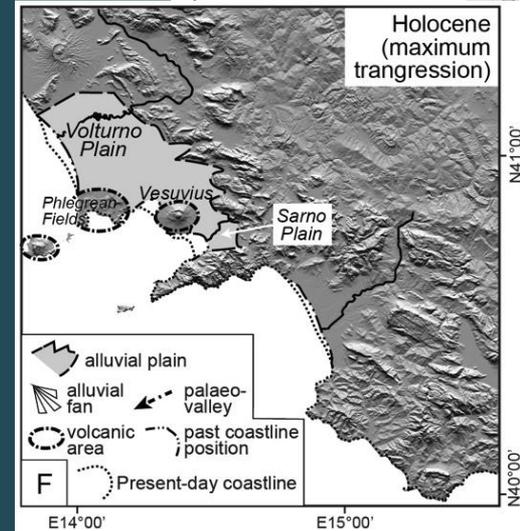
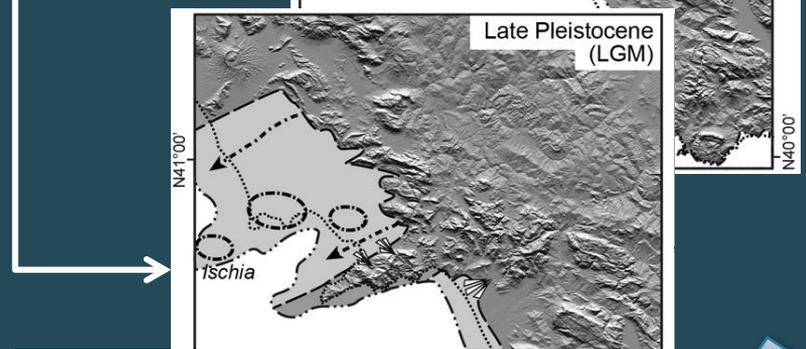
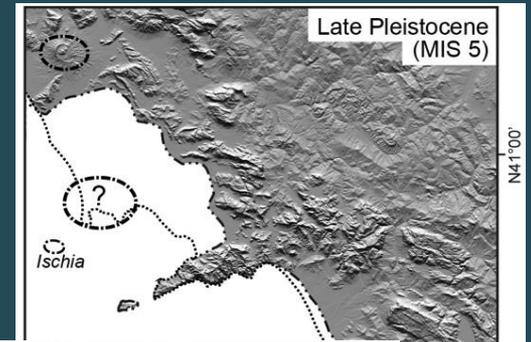
Milia & Torrente (2015, J Geodynamics)

CAMPANIA PLAIN

Post-MIS5 subsidence and Late Pleistocene - Holocene coastal progradation



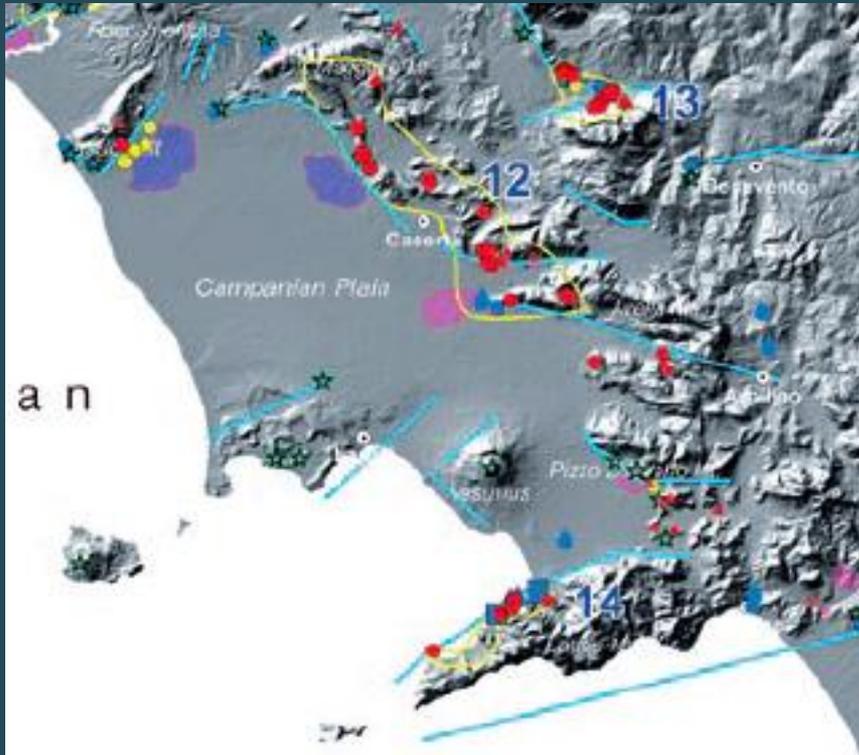
strong volcanic inputs
e.g. Campanian
Ignimbrite at 40 ky



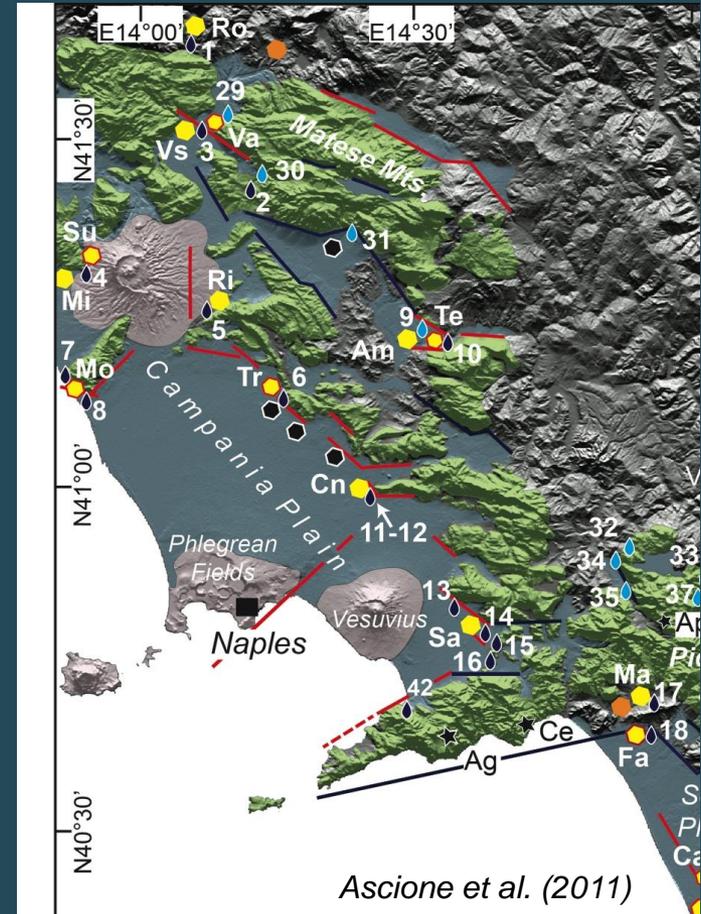
Data from (e.g.):

- Bellucci et al. (1990)
- Romano et al. (1991)
- Scandone et al. (1991)
- Barra et al. (1994)
- Aprile & Toccaceli (2002)
- Cinque & Irollo (2004)
- Santangelo et al. (2010)
- Amorosi et al. (2012)

- Mineral springs
- Travertine/tufa deposits, bearing a “crustal” signature
- Sinkholes

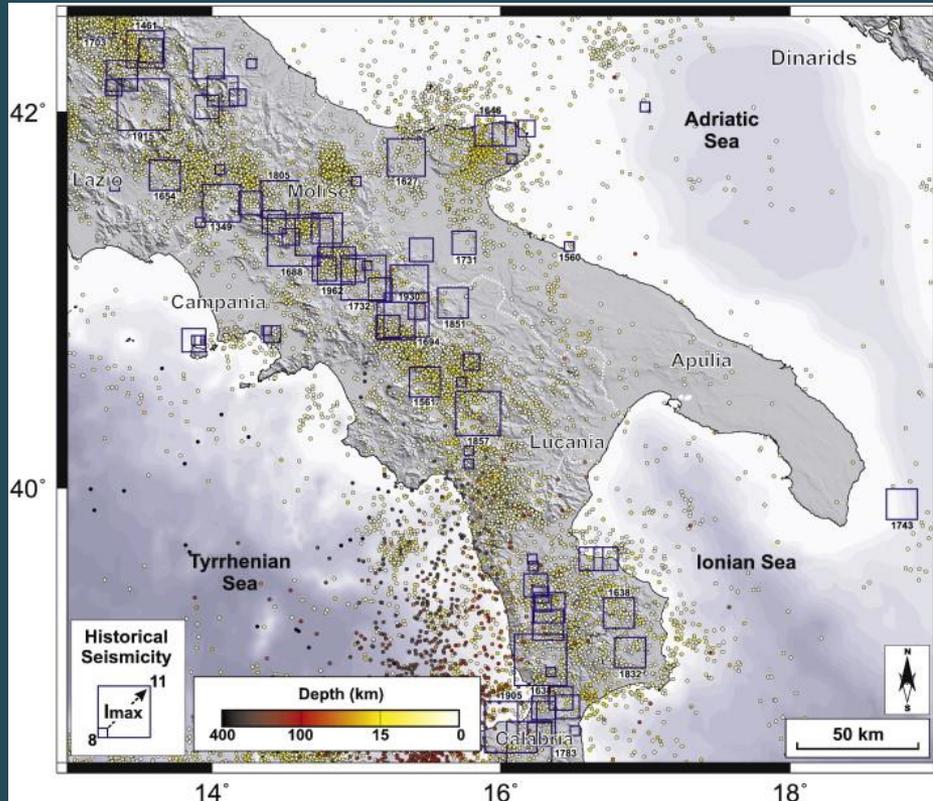


Santo et al. (2011)



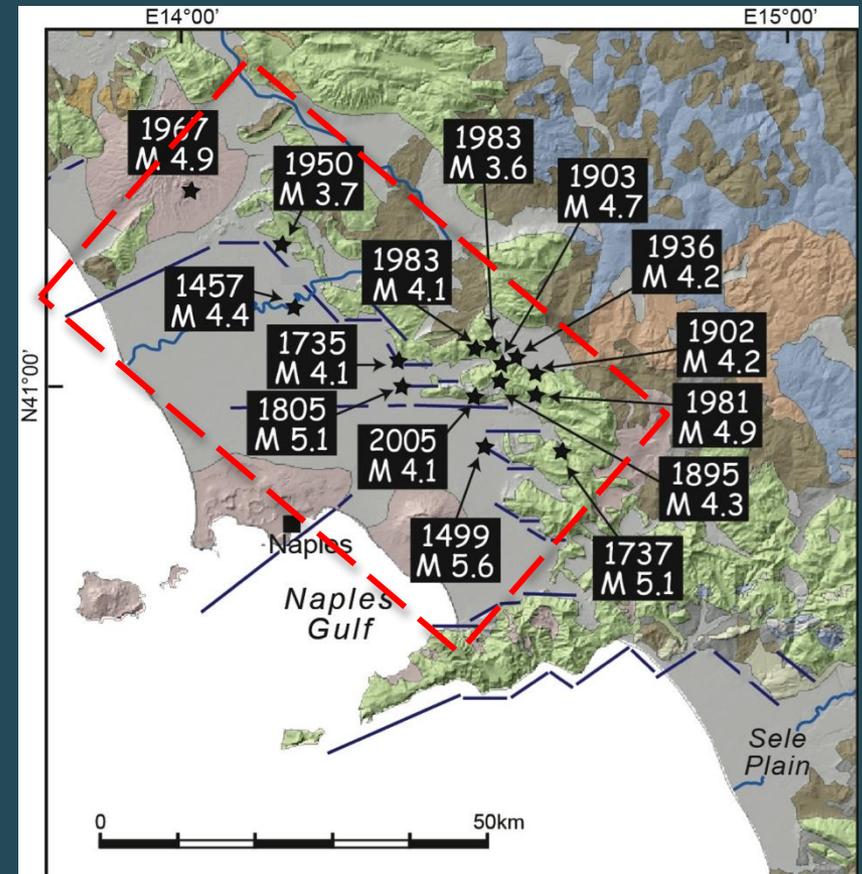
Ascione et al. (2011)

HISTORICAL SEISMICITY



Ferranti et al. (2014, *Tectonophysics*)

NON-VOLCANIC SEISMICITY

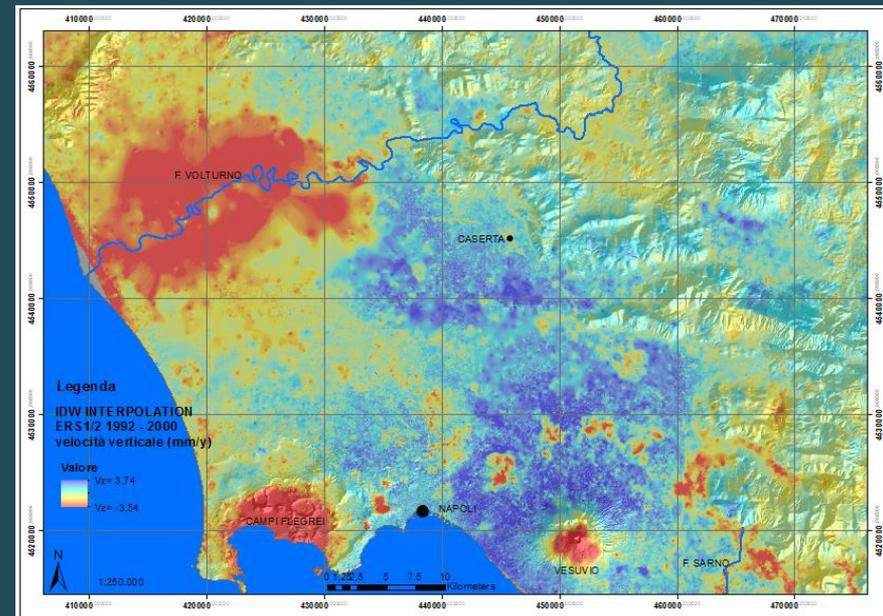
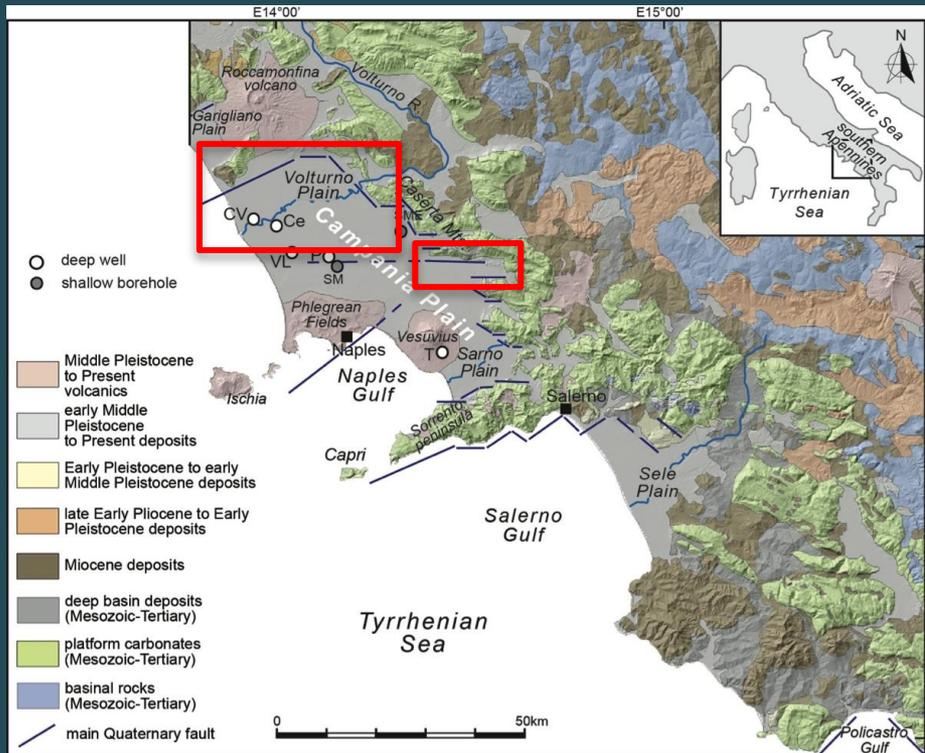


Dati da CPT15 (Rovida et al., 2016)

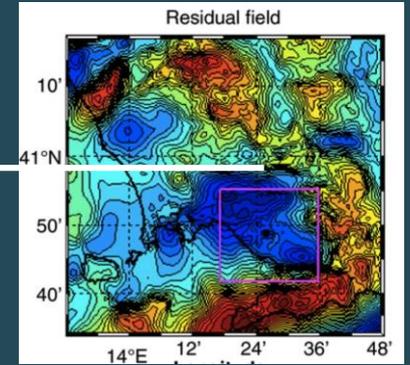
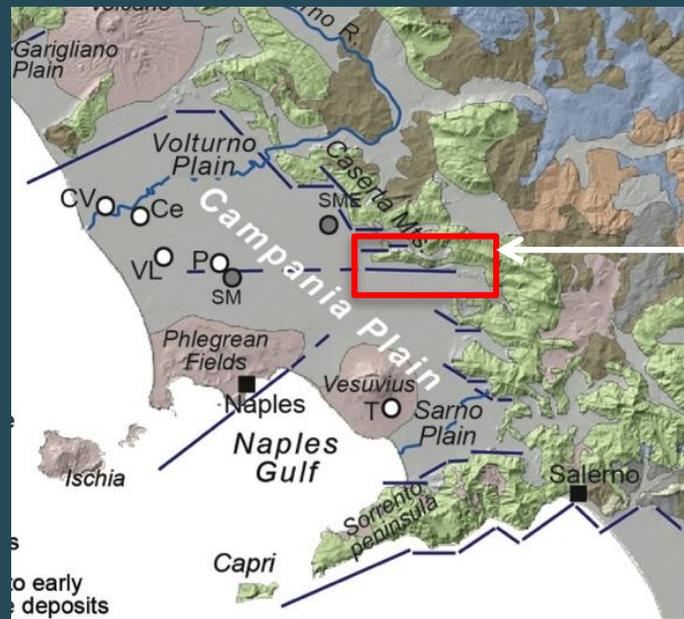
Surface geology and geomorphological constraints to:

- Long-term Quaternary vertical motions and tectonics
- Late Quaternary – Holocene vertical motions

Analysis of current deformation based on satellite (SAR) data



CANCELLO AREA: MARINE TERRACES

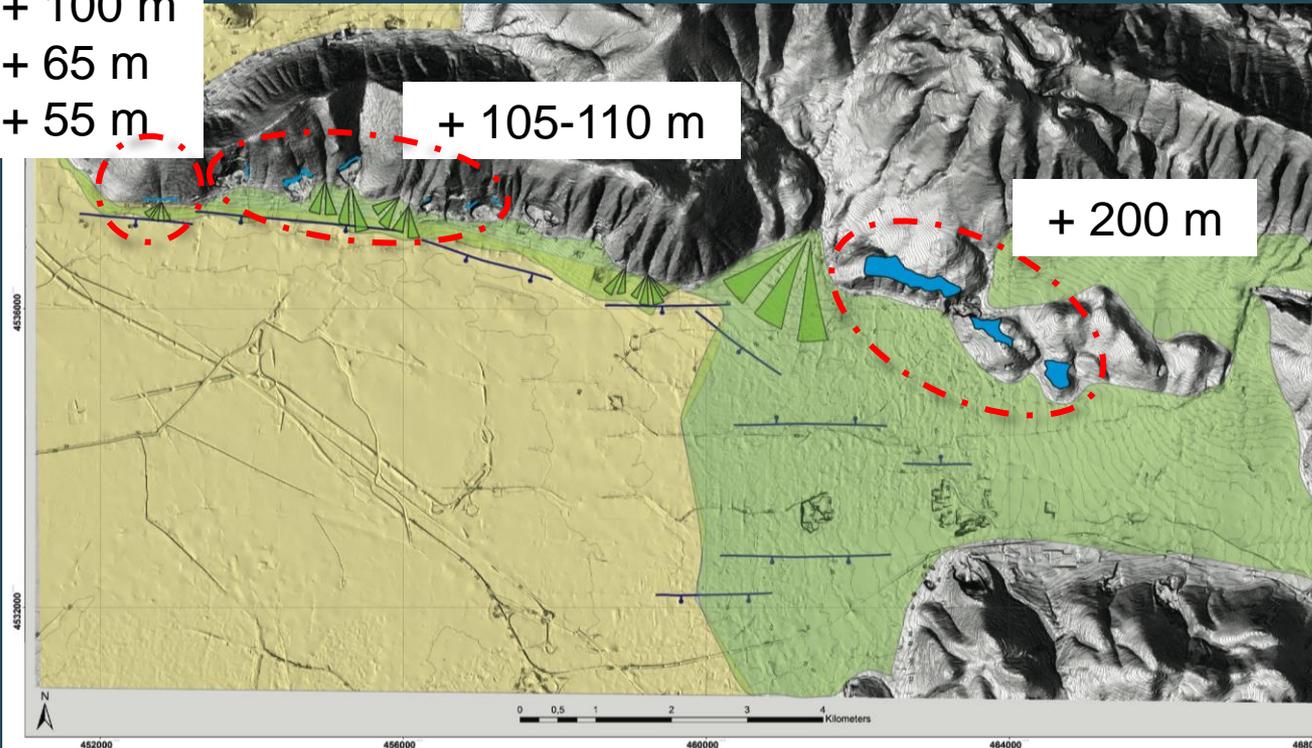


Cella et al. (2007, JVGR)

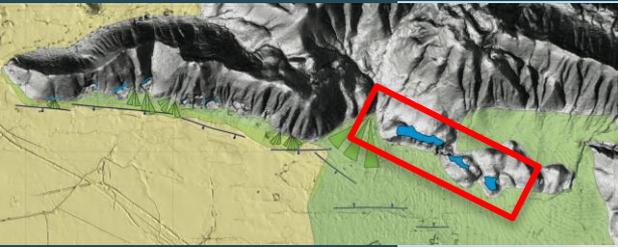
+ 100 m
+ 65 m
+ 55 m

+ 105-110 m

+ 200 m

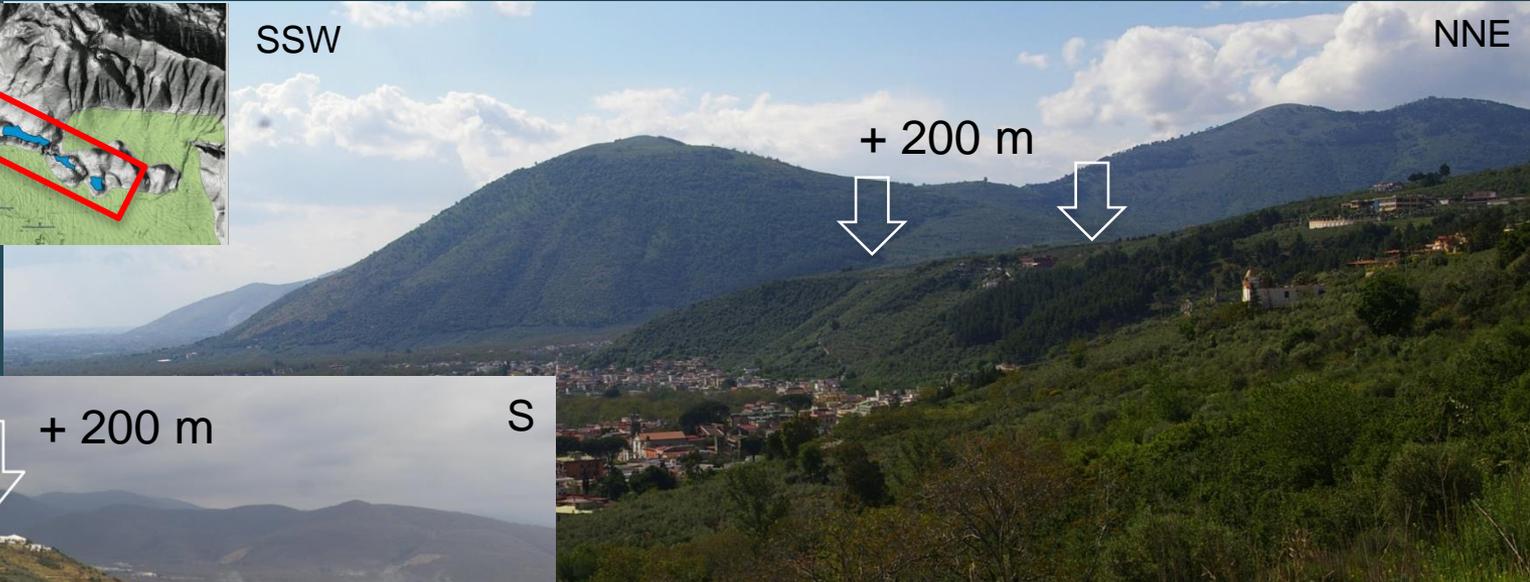


MARINE TERRACES



SSW

NNE



+ 200 m



+ 200 m



Elphidium crispum
Ammonia parkinsoniana
Globigerina sp.



SE

NW



N

S

abrasion platform 110 m a.s.l.



W

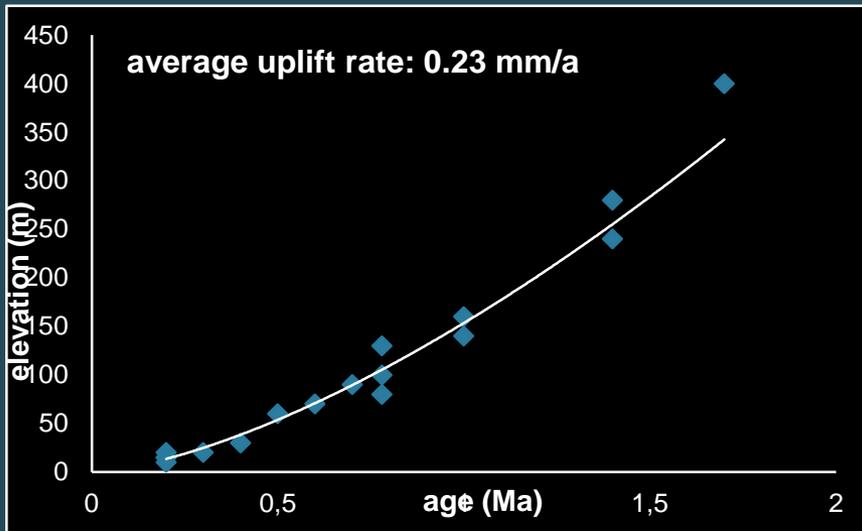
E

Elphidium crispum
Ammonia parkinsoniana

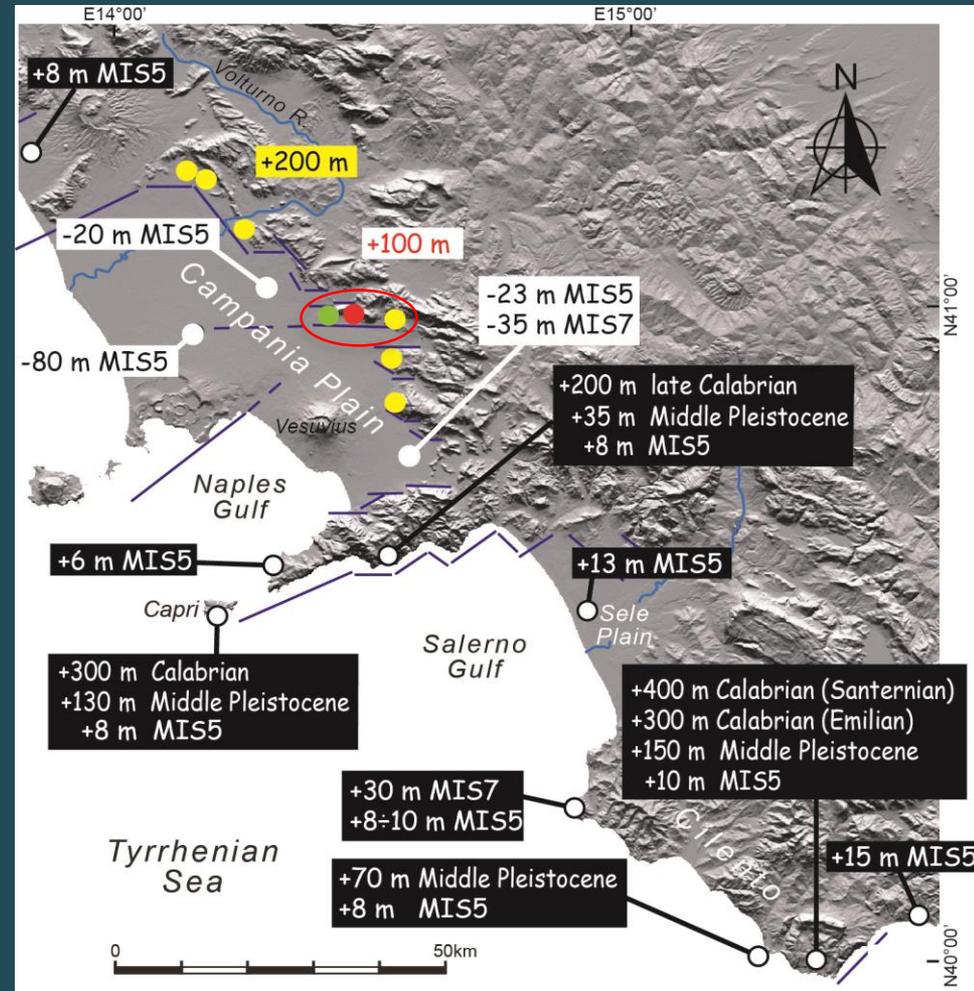
MARINE TERRACES DISTRIBUTION

+ 200 m: MIS19-21(?) (c. 800 ky)

+ 100 m: MIS11 (c. 400 ky)

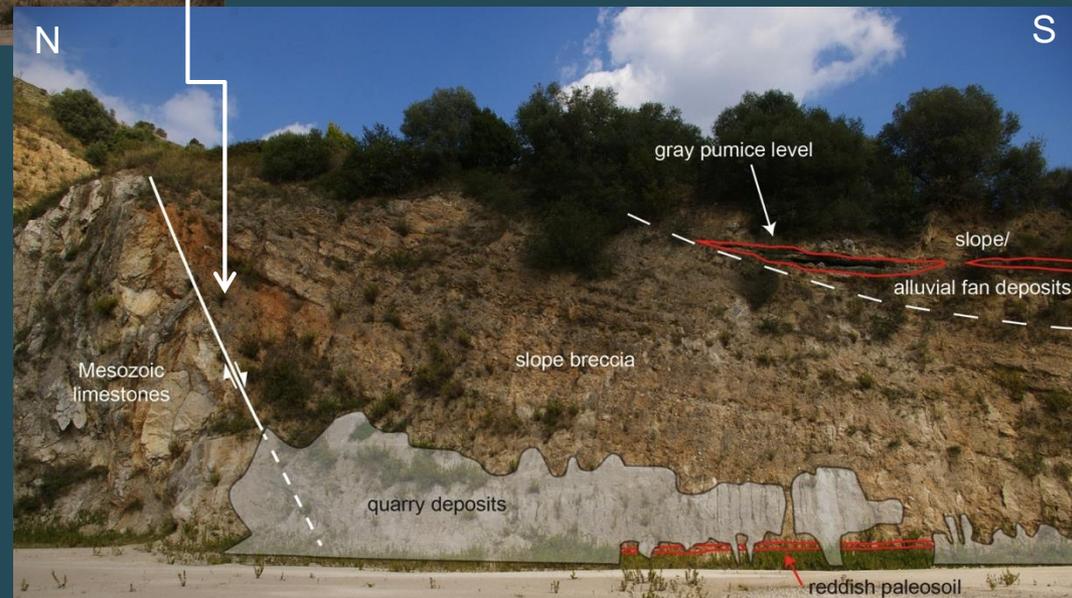


Tyrrhenian margin
(Campania to northern Calabria)



QUATERNARY FAULTING

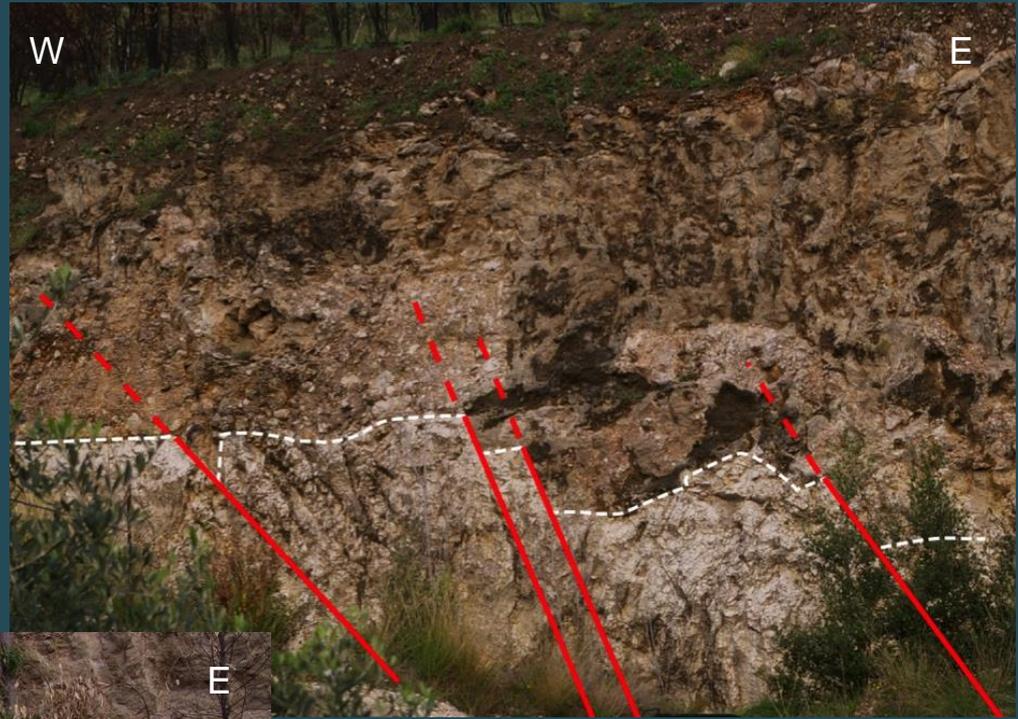
abrasion platform overlain by sand
105 m a.s.l.



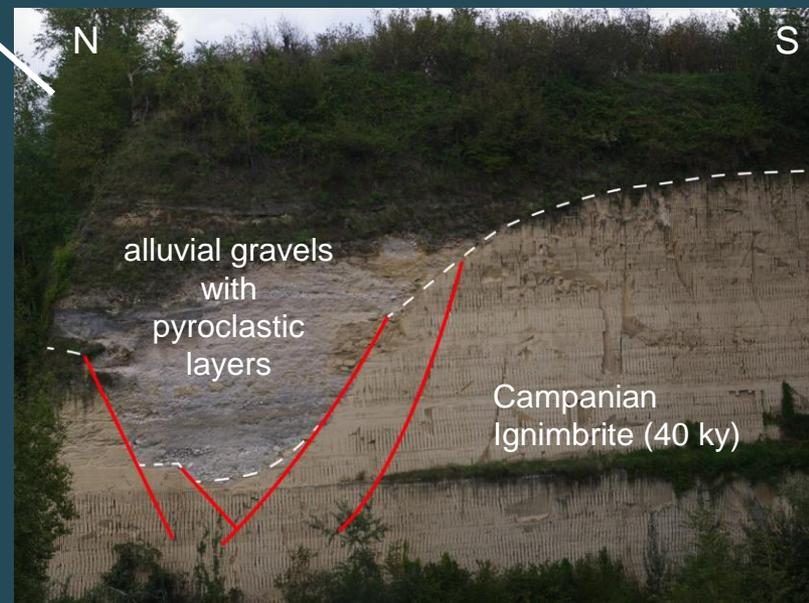
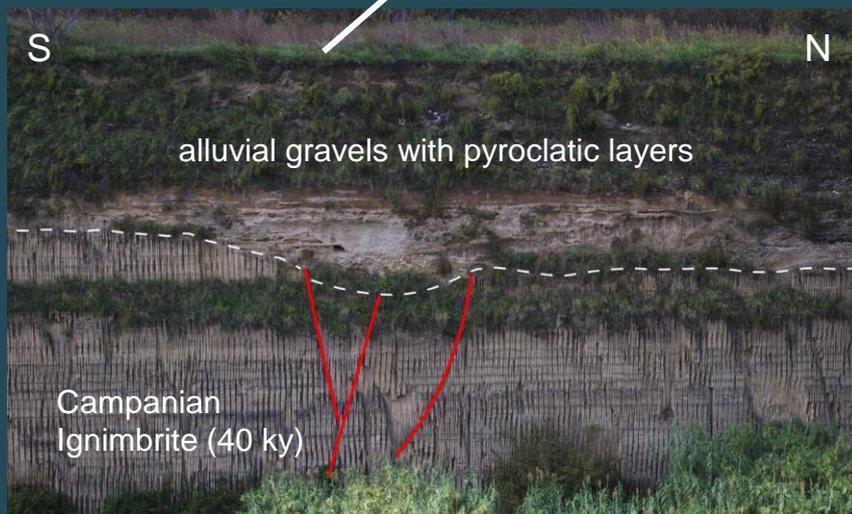
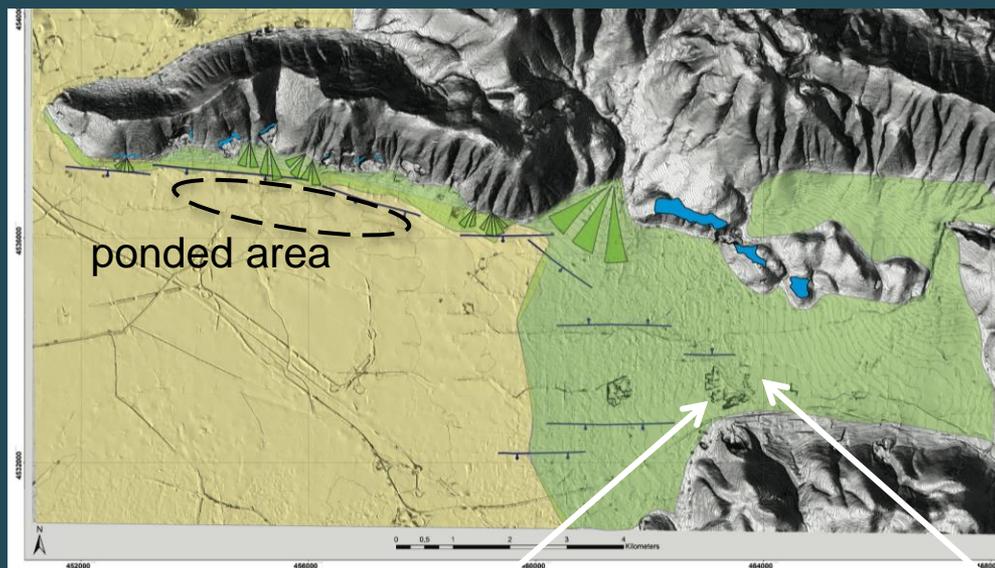
- Extensional faults trending around E-W
- Migration of activity towards the S



Oblique-slip NW-SE and around N-S trending transfer faults



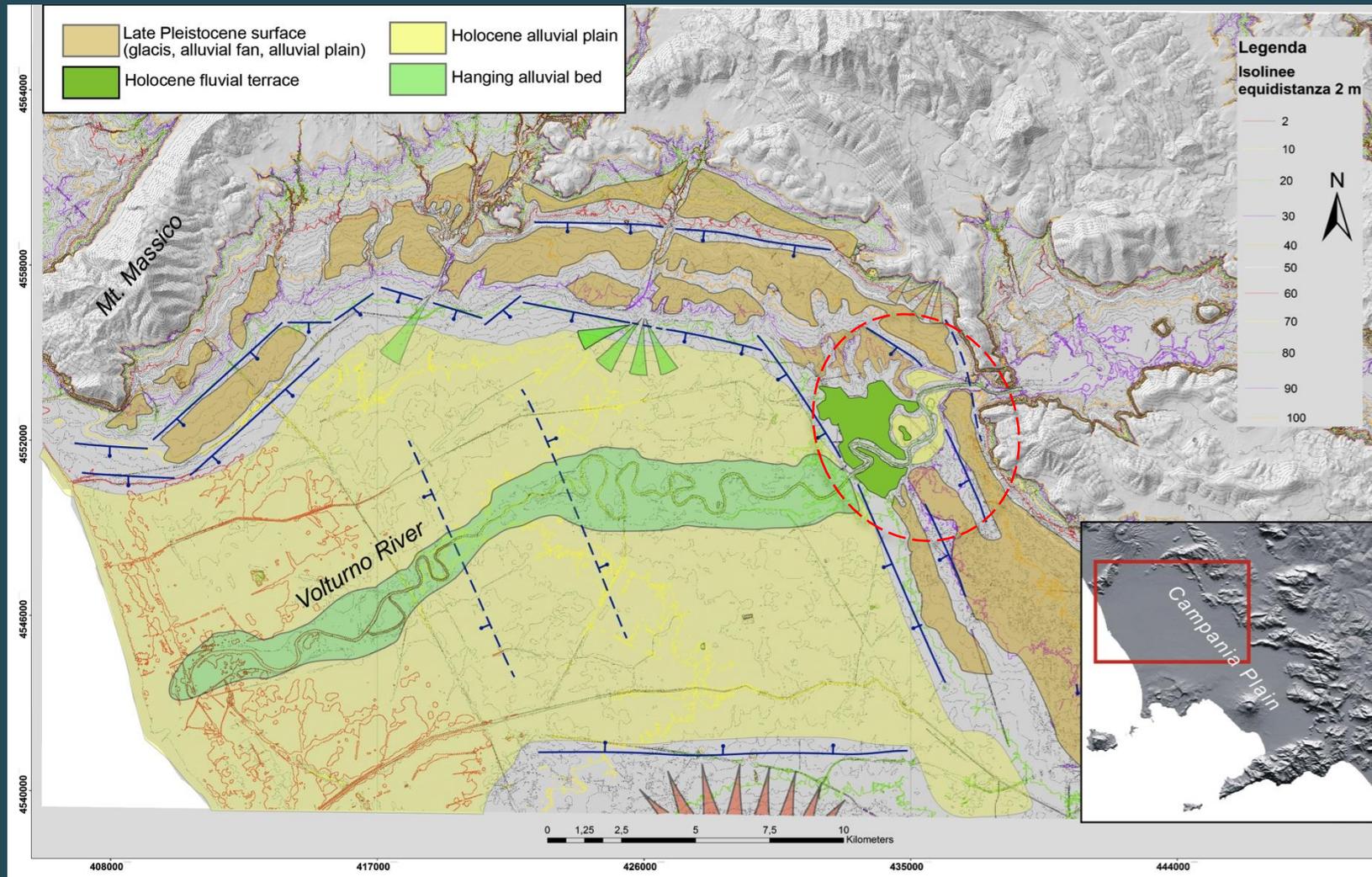
EVIDENCE OF POST-40 ky DEFORMATION



E-W trending fractures and faults

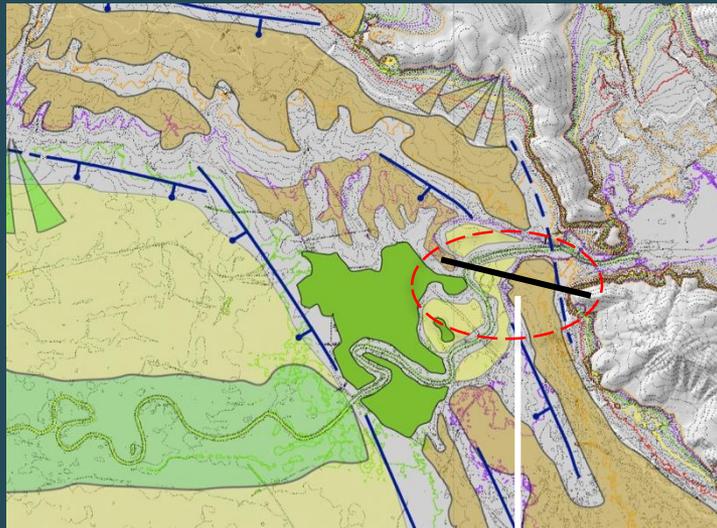
NORTHERN AREA: VOLTURNO PLAIN

- rectilinear scarps bounding the Holocene alluvial plain
- asymmetrical topography of the plain



Pre-40 ky fault offsets are shown by offset of travertine deposits underlying the CI deposits

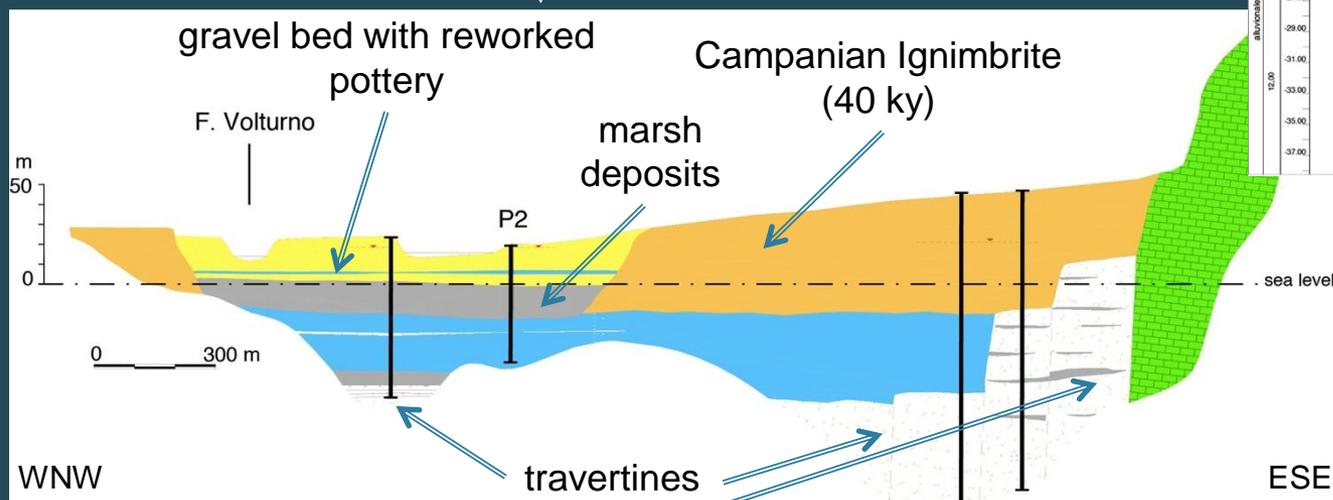
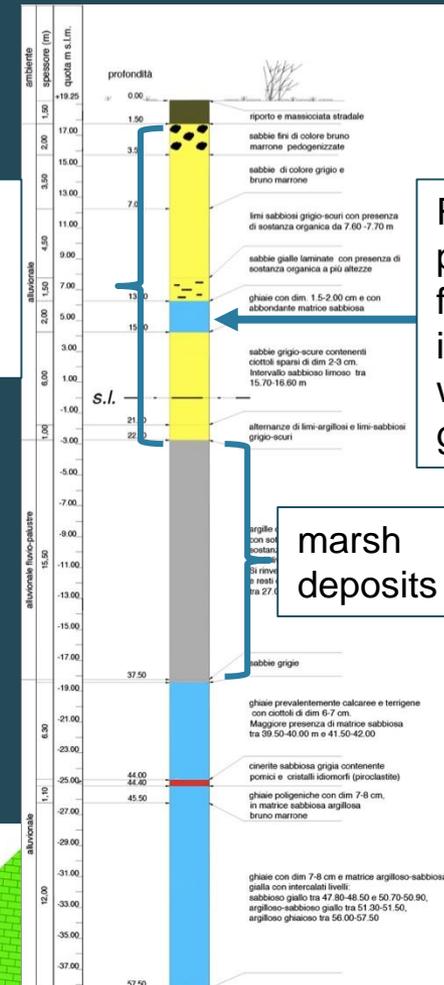
More than 15 m of fluvial aggradation in the last c. 2000 yrs suggest localised subsidence



fluvial sands and gravels

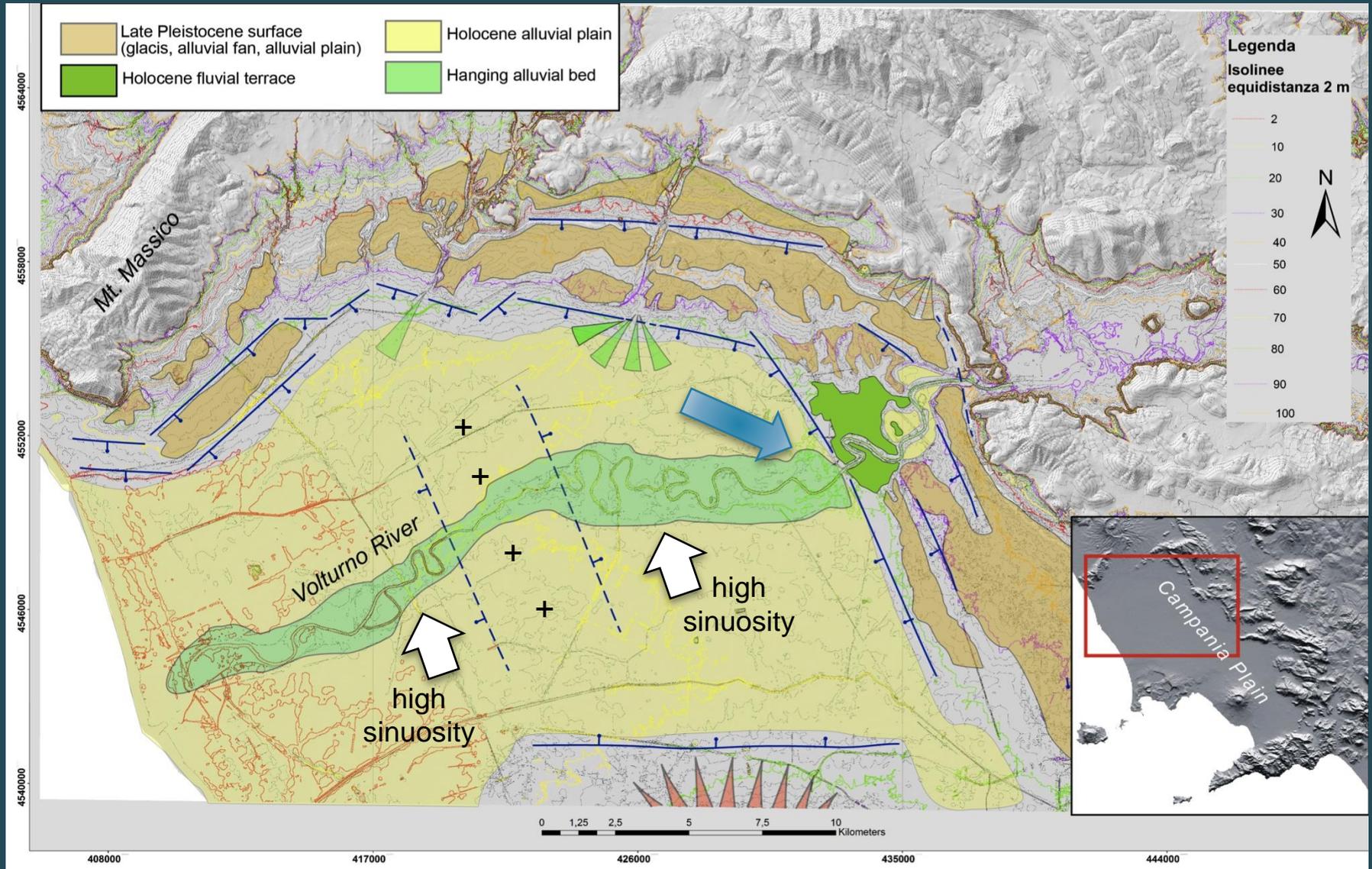
Roman(?) pottery fragments interspersed within fluvial gravels

marsh deposits



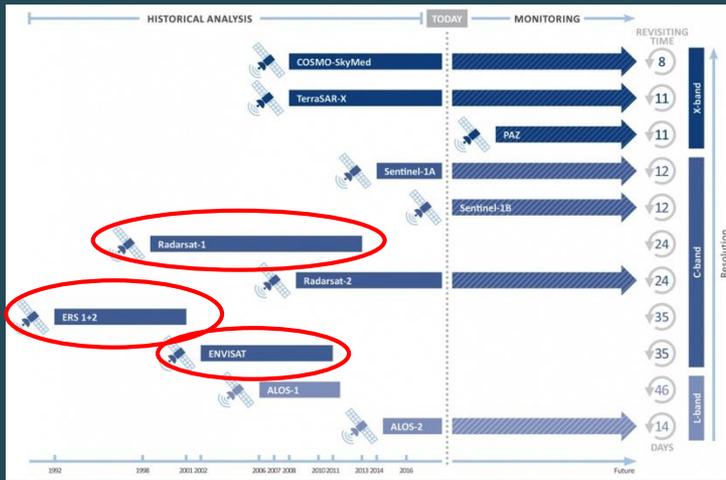
HOLOCENE FAULT ACTIVITY

- incised vs. hanging Volturno River alluvial bed
- changes in the Volturno river pattern

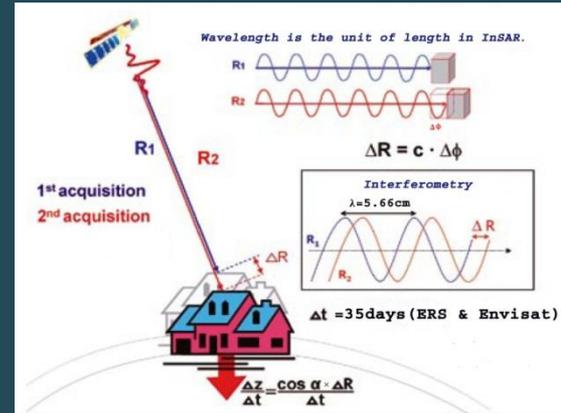


CURRENT (LAST 20 yr) VERTICAL MOTIONS BY PSInSAR TECHNIQUE

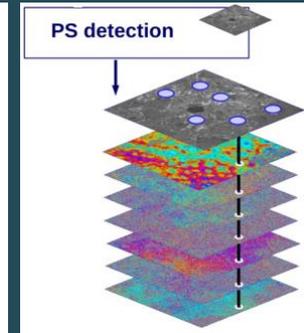
SAR satellites



Permanent scatterers (PS) technique



Tarikhi, 2013



NUMBER OF ANALYSED PS (Campana Plain area)

PS ERS D **500.000**

PS ERS A **440.000**

PS RADARSAT D **580.000**

PS RADARSAT A **460.000**

PS ENVISAT D **1.500.000**

PS ENVISAT A **1.900.000**

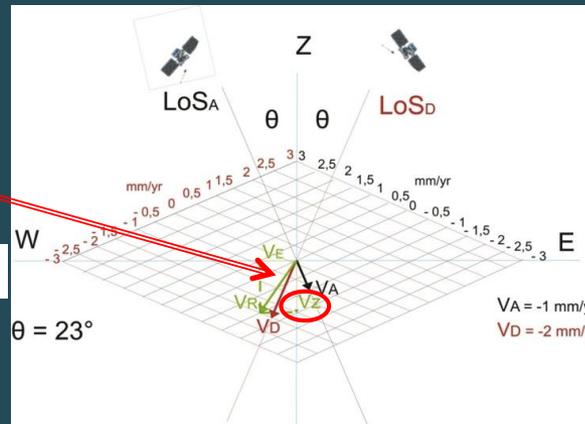
VERTICAL MEAN VELOCITY

$$v_{East} \sim \frac{(v_{LOSD} - v_{LOSA})/2}{\sin(\theta)}$$

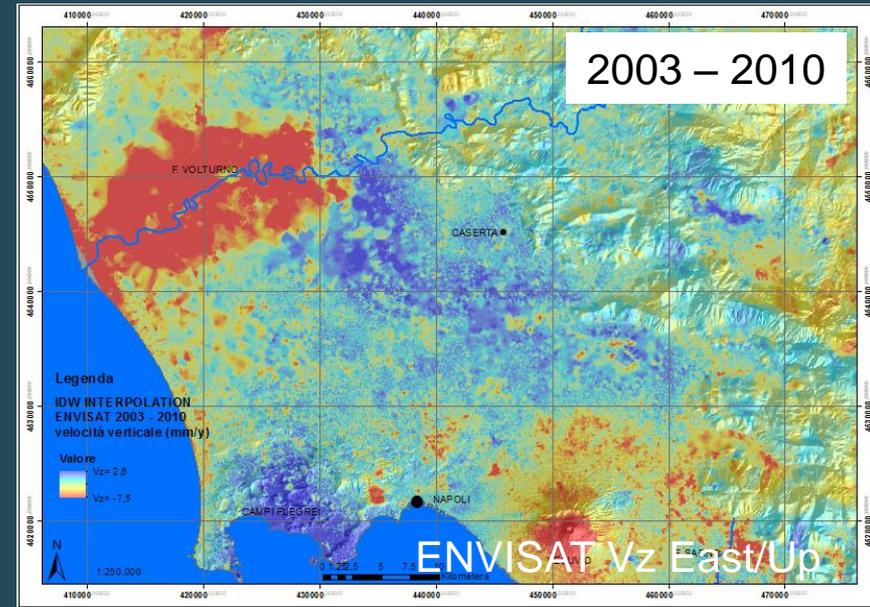
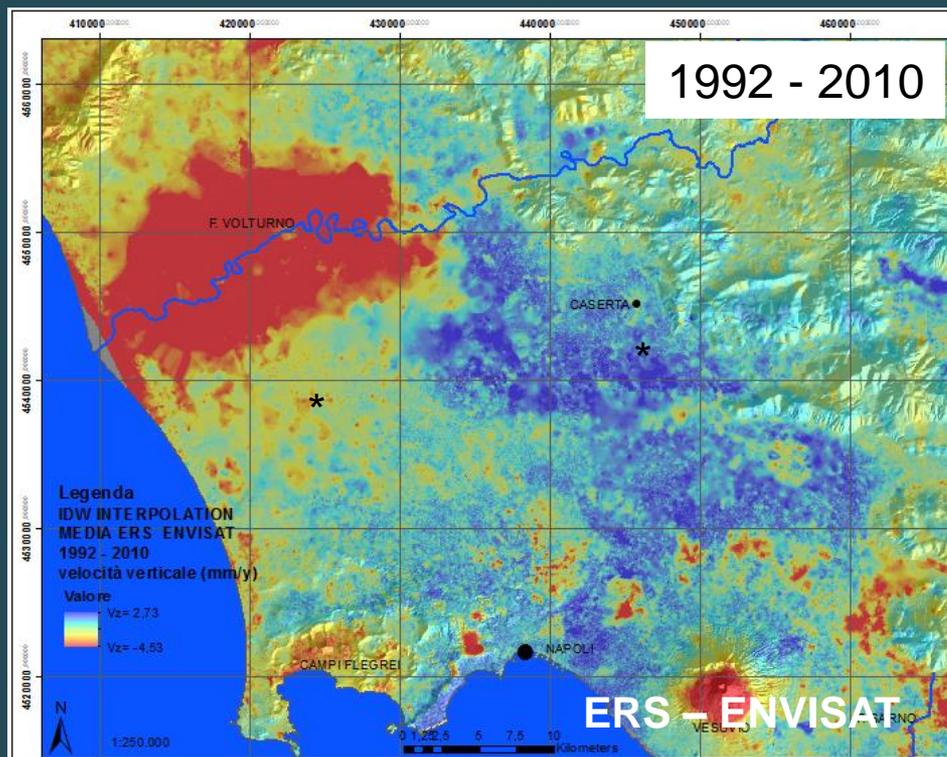
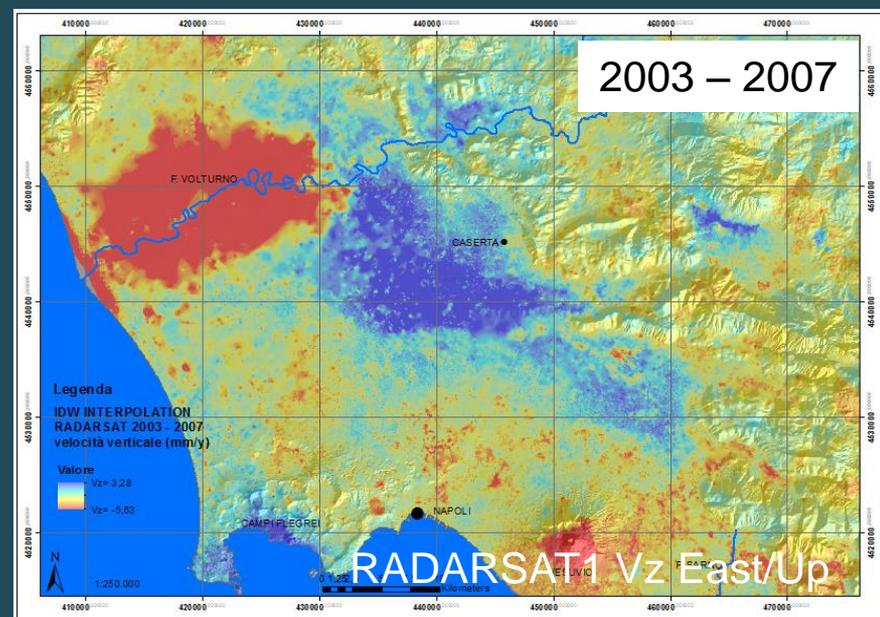
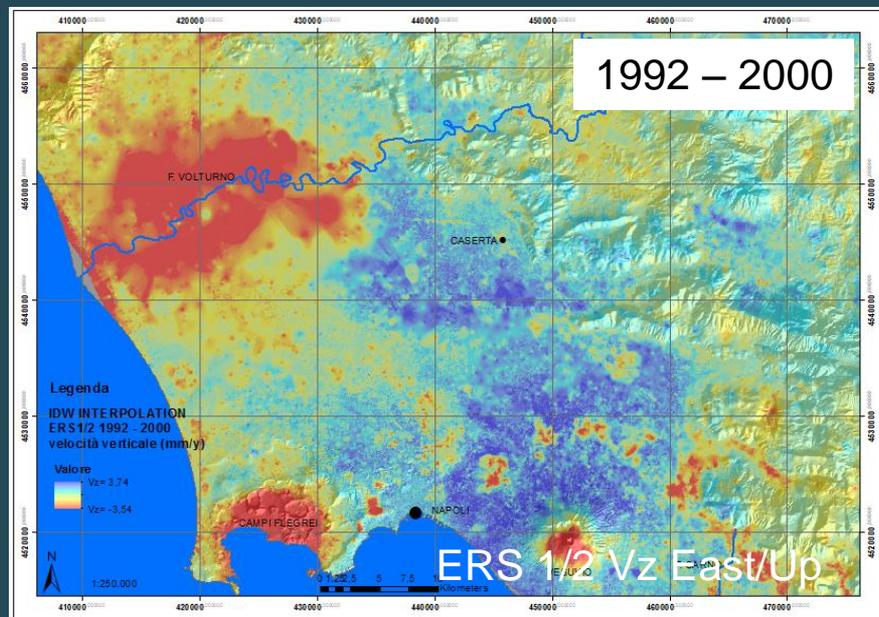
$$v_z \sim \frac{(v_{LOSD} + v_{LOSA})/2}{\cos(\theta)}$$

v_{East} : vettore velocità media annua (mm/yr) orizzontale, lungo la direzione E-W;
 v_z : componente verticale del vettore velocità media annua (mm/yr).

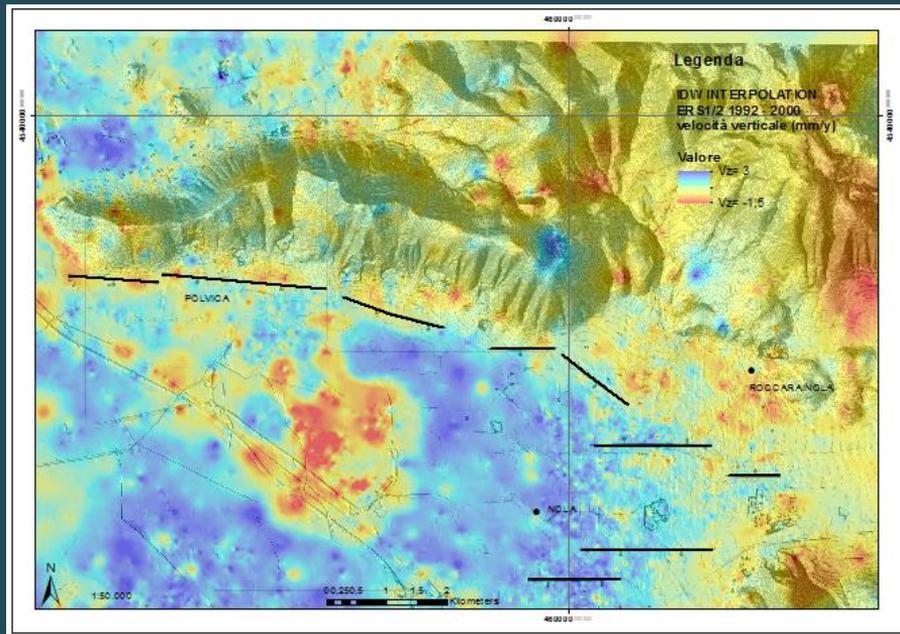
Lanari et al., 2007; Lundgren et al., 2004; Manzo et al., 2006



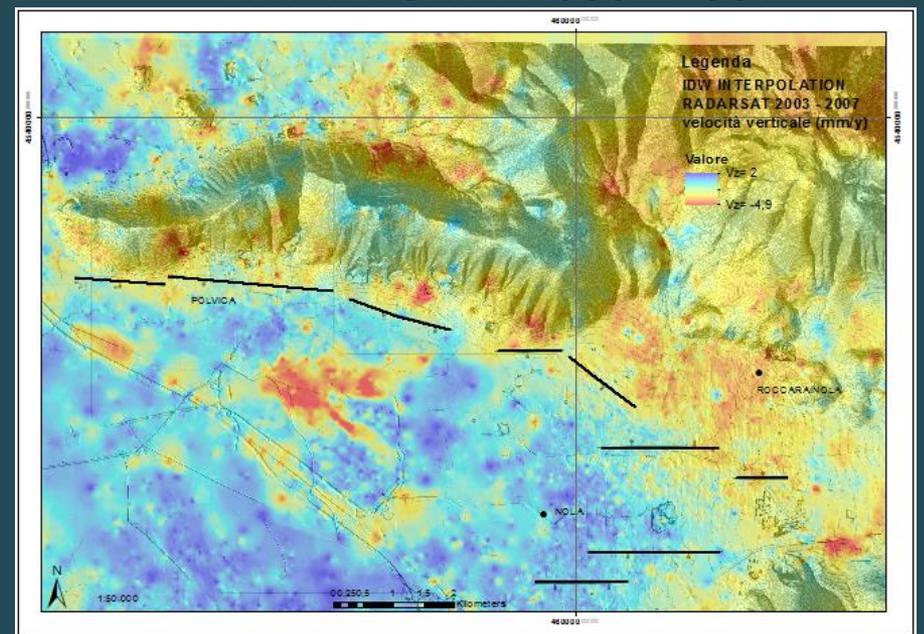
IDW GEOSTATISTICAL INTERPOLATION (50X50)



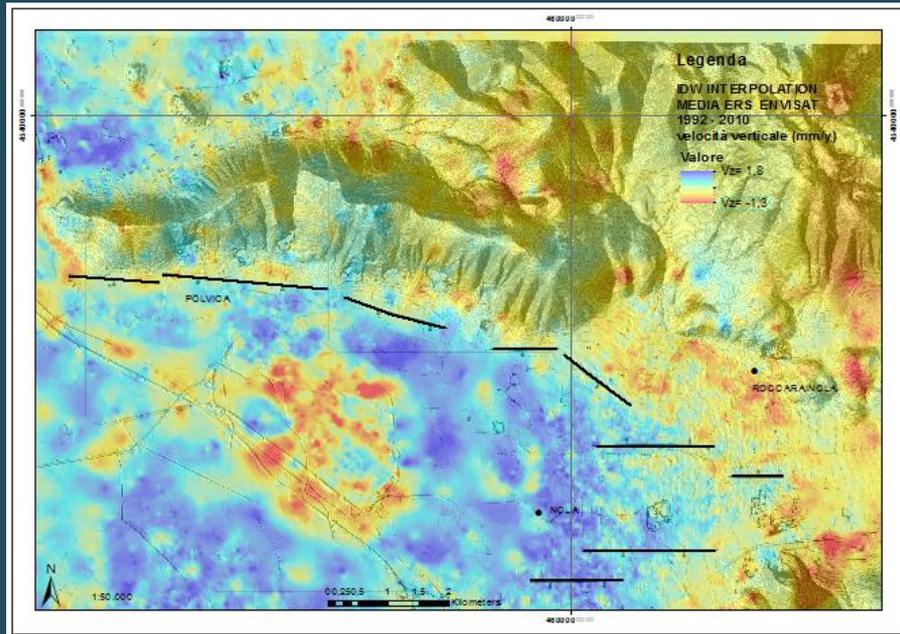
ERS 1 / 2 1992 – 2000



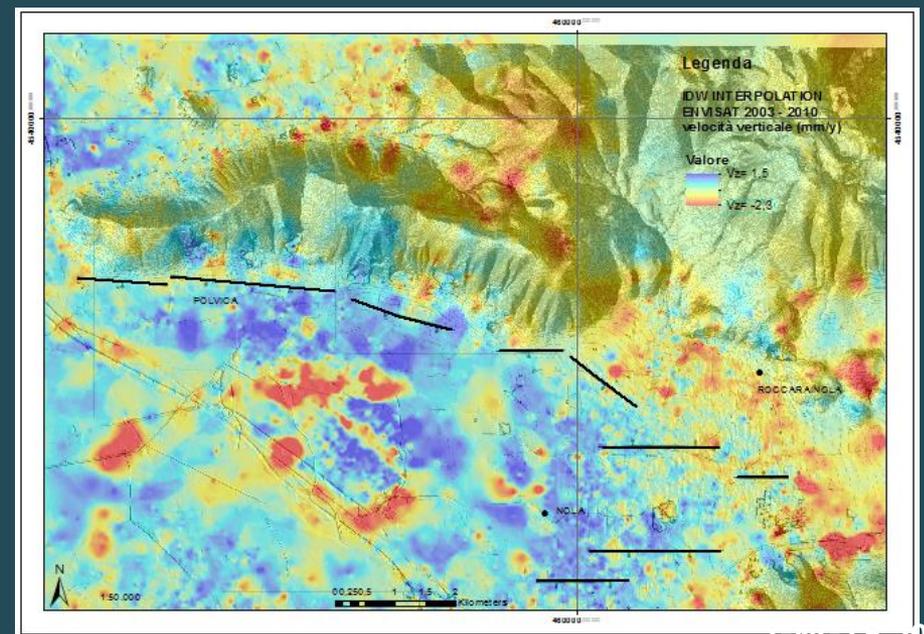
RADARSAT1 2003– 2007



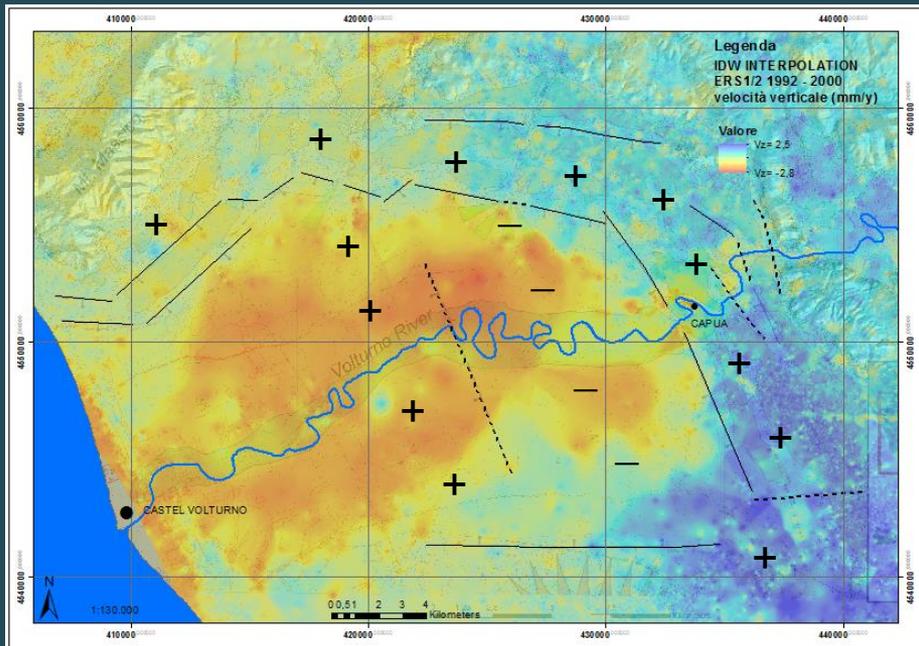
MEAN ERS – ENVISAT 1992 – 2010



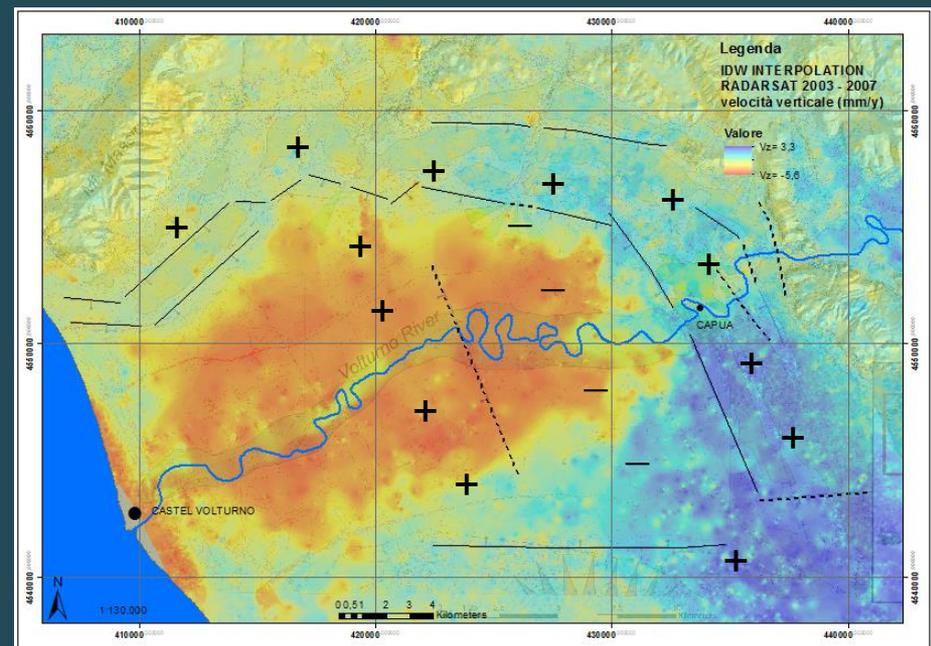
ENVISAT 2003– 2010



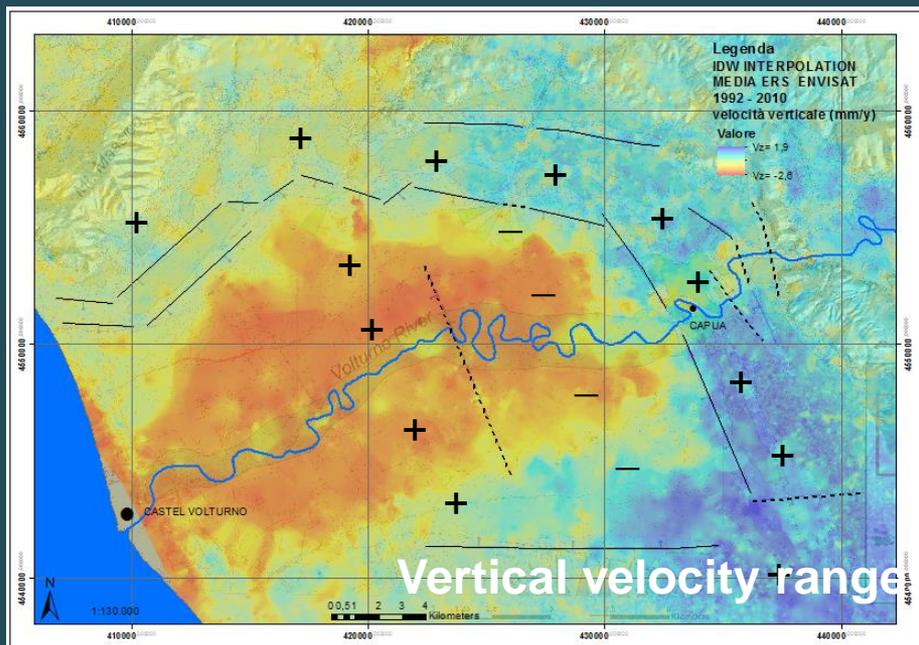
ERS 1/2 1992 – 2000



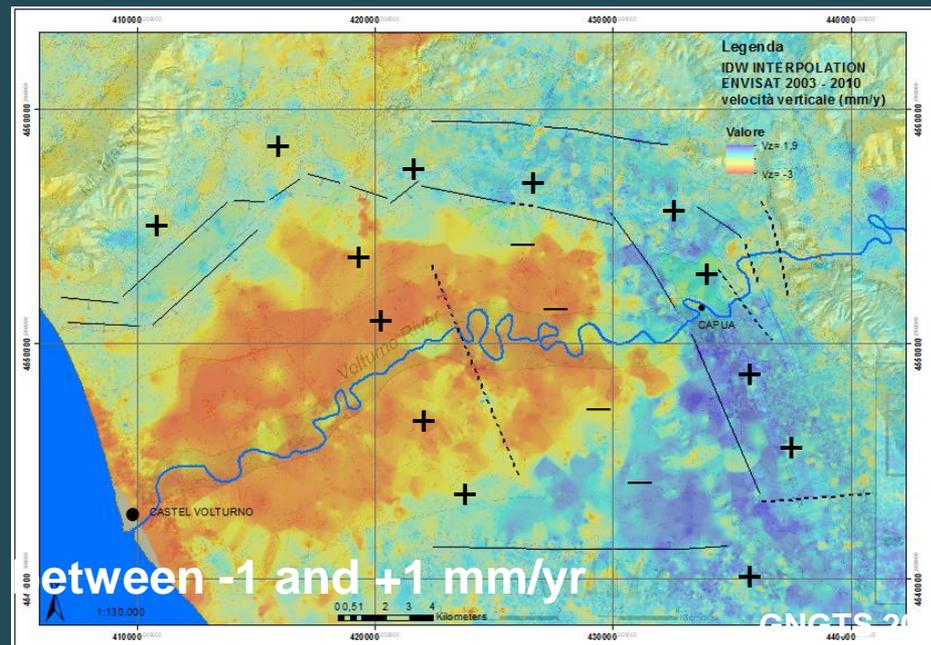
RADARSAT1 2003– 2007



MEAN ERS – ENVISAT 1992 – 2010



ENVISAT 2003– 2010



Vertical velocity ranges between -1 and +1 mm/yr