

**Project INGV-DPC S5**

“Test-sites” per il monitoraggio multidisciplinare di dettaglio”

**Task 1 - Test site “Alto-Tiberina”**

UR1 WP3

Velocity and strain rate fields from  
integration of regional GPS networks

**Partecipanti:**

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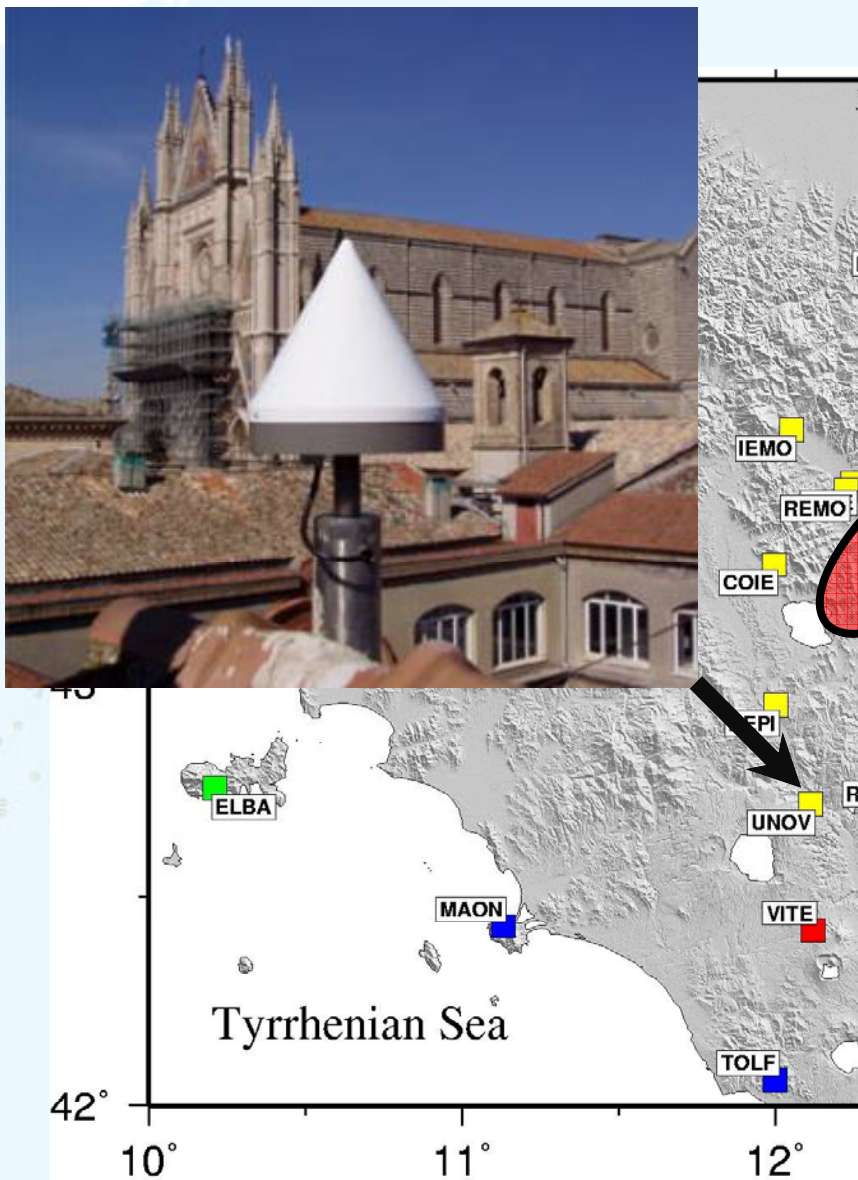
Sergio Mantenuto (INGV, Roma CNT)

**In collaborazione con UR Perugia**

**Obiettivi:**

- Combinazione di dati da varie reti GPS
- Definizione del campo di velocità e di strain rate geodetico
- Definizione del campo di deformazione sismico (rilascio momento sismico)
- Confronto tra tassi di rilascio sismico/geodetico
- Tassi di accumulo su strutture sismogenetiche (ATF, Gubbio)

Kick-off meeting - Rome, 4 July 2008



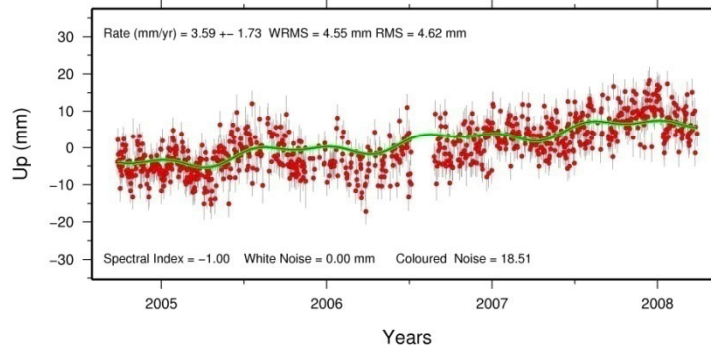
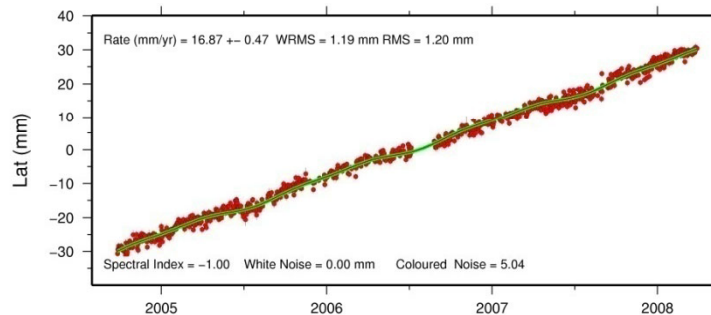
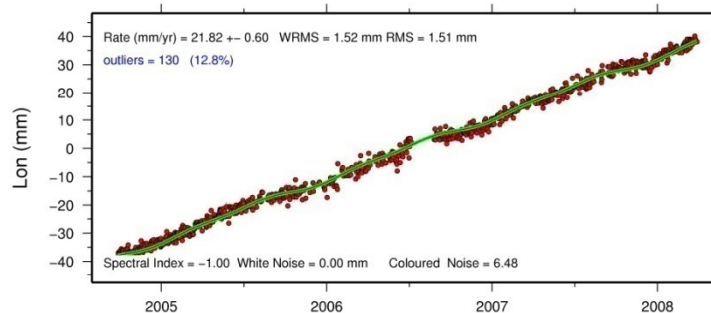
/raid/proc/time\_series/zapnet/itr05

UNOV

(err\_model: flicker)

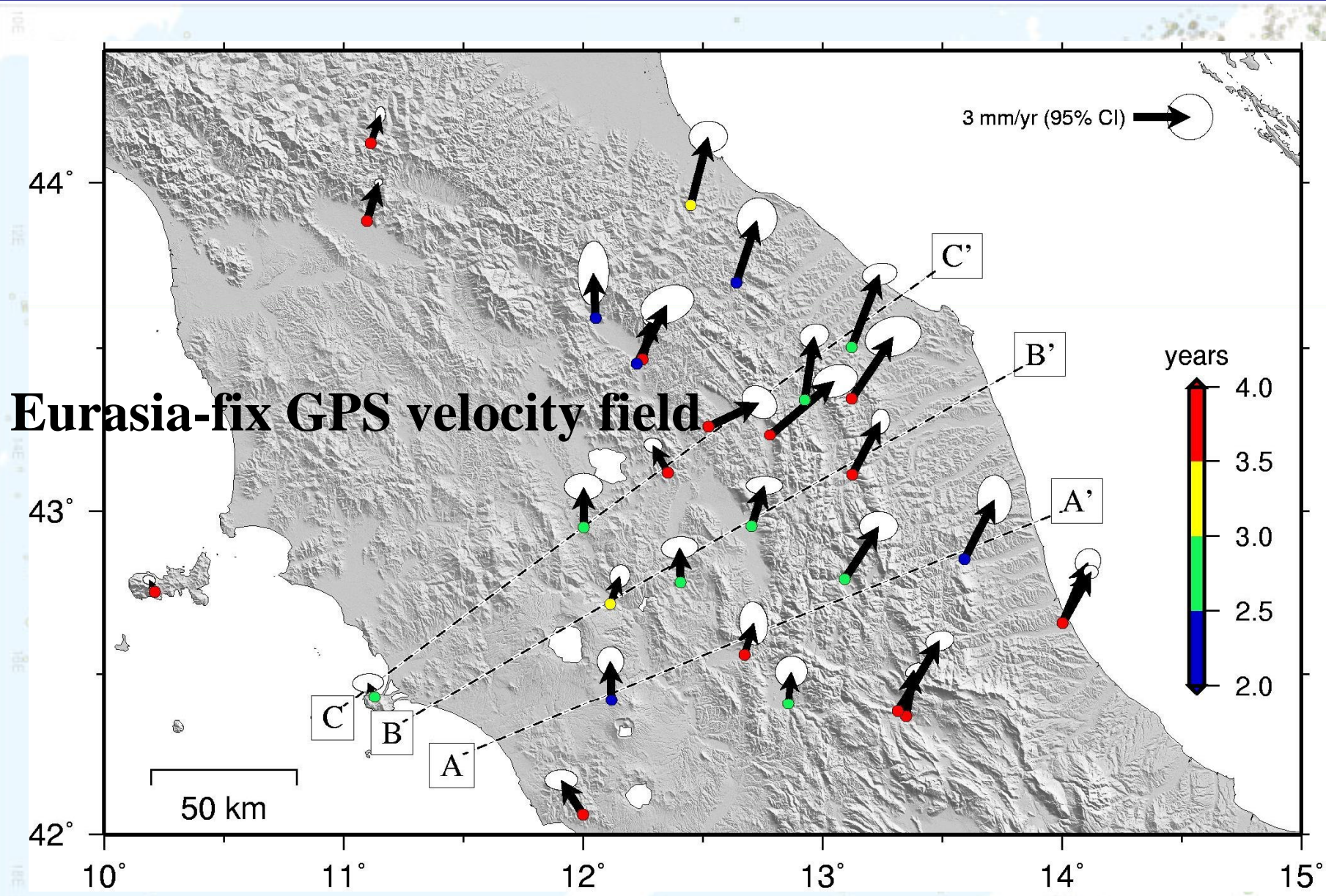
Time Span = 3.51 yrs; N= 873 ; clean/

XYZ (m) = 4589198.0367 984938.7078 4304620.4024



GM 2008 Apr 23 15:08:26

12.1131 42.7159 21.82 16.87 0.60 0.47 0.123 UNOV 3.51 873



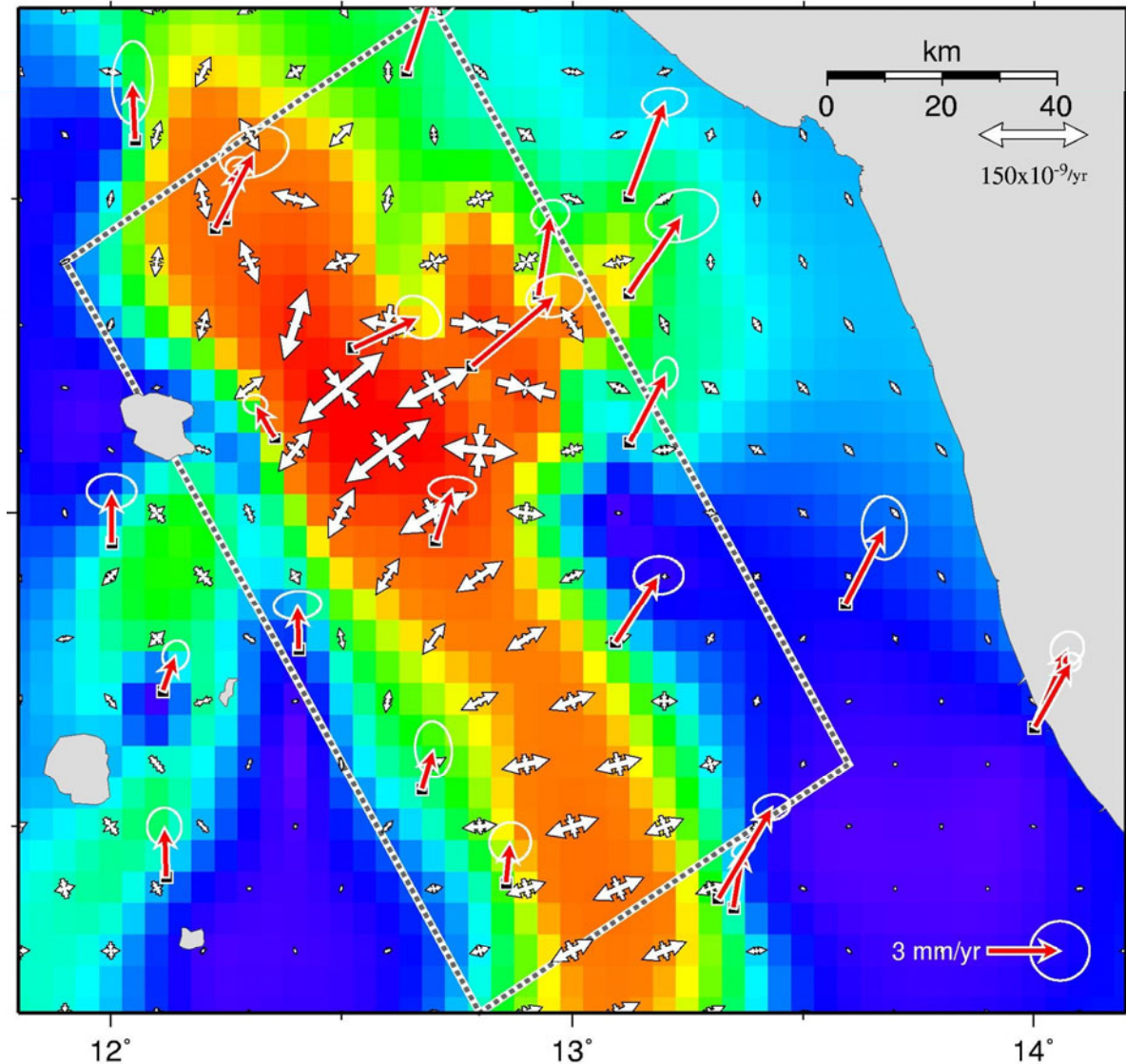
# Geodetic strain

- Continuous velocity field obtained by spline interpolation of GPS velocity field
- Strain rate tensor obtained from the velocity gradient tensor
- Geodetic moment rate obtained from Kostrov formula

$$\dot{M}_0 = \sum 2\mu AH\dot{\epsilon}$$

Min  $2.46 \times 10^{17}$  Nm/yr  
 Max  $4.31 \times 10^{17}$  Nm/yr

H = seismogenic thickness 7.5/12.5 km  
 $\mu = 3.3 \times 10^{10}$  N/m<sup>2</sup>



0 12 20 27 33 40 47 55 66 160 (10<sup>-9</sup>/yr)

2nd Invariant Strain Rate

S5

High-resolution mul

DPC 2007-2009

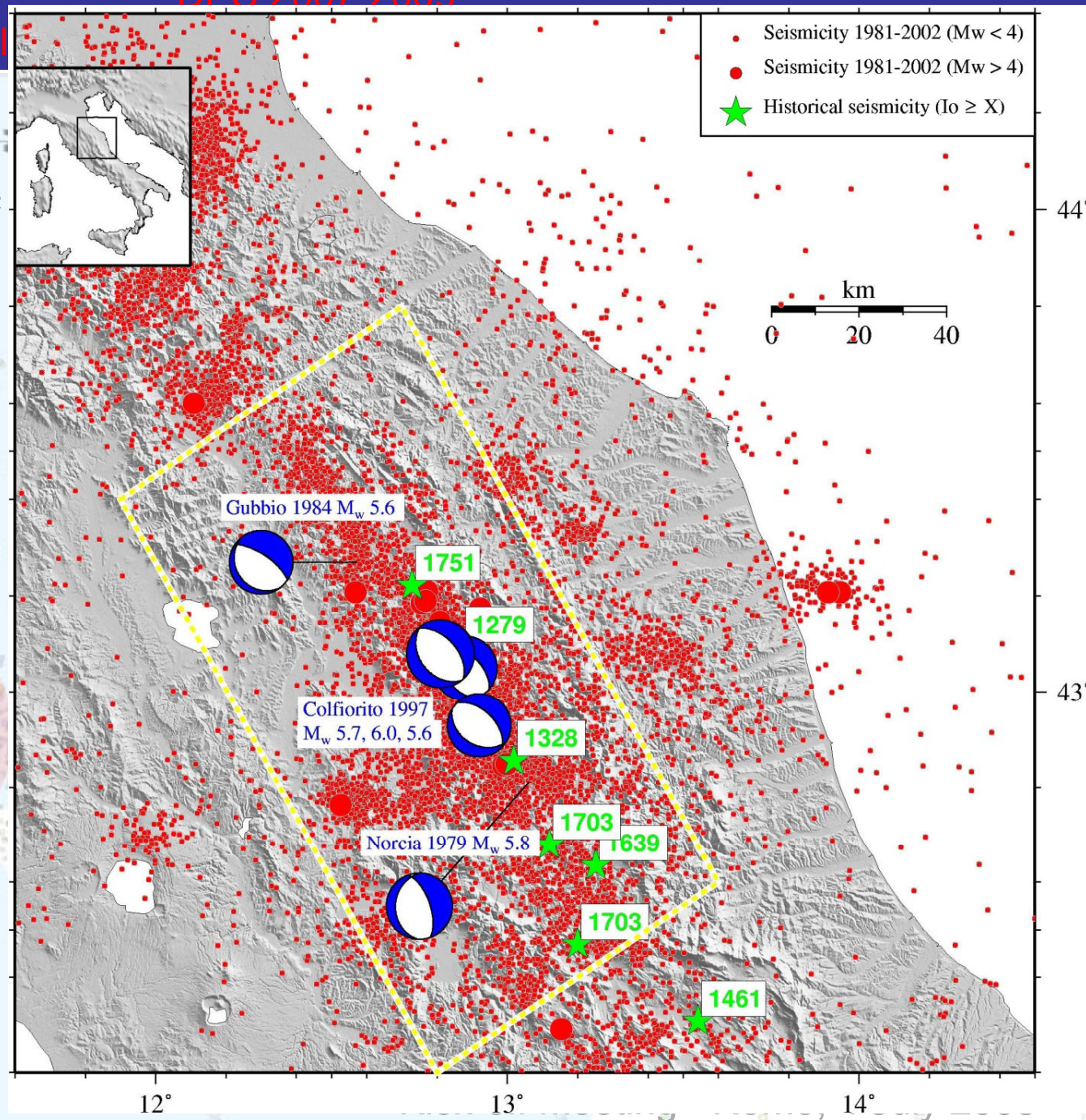
# Seismicity of the Umbria-Marche region

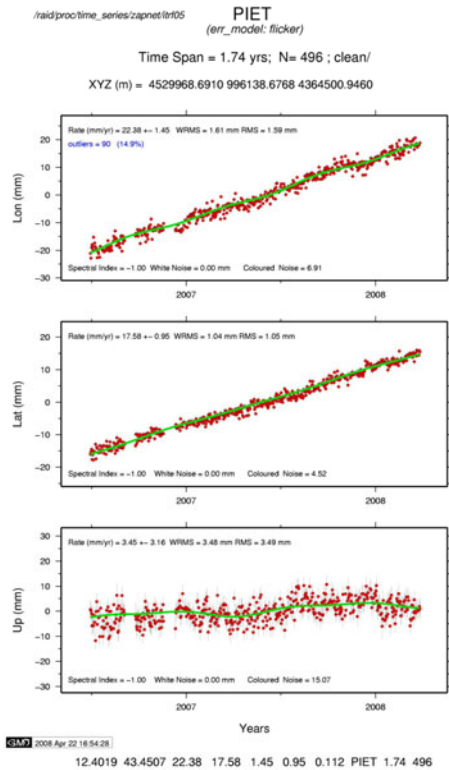
Red dots =>  
1981-2002 instrumental seismicity  
CSI 1.1 (<http://legacy.ingv.it/CSI/>)

Green stars =>  
historical  $I_0 > X$  (CPTI04)

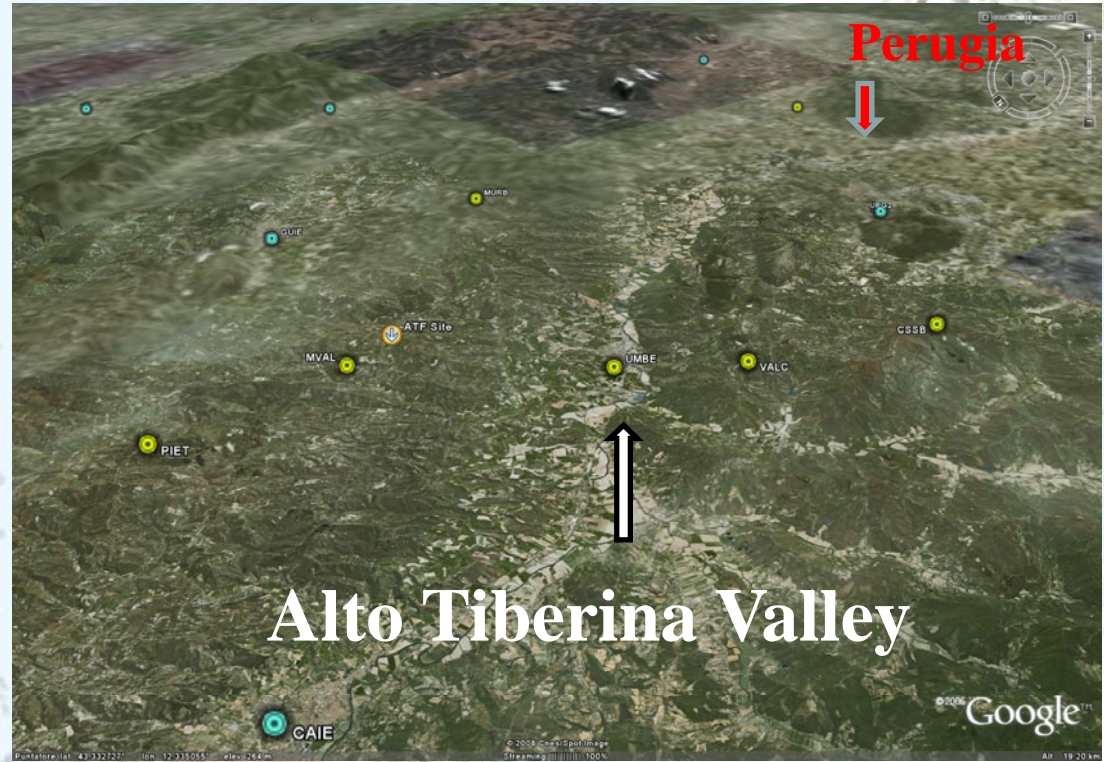
CMT focal solutions

Yellow box used for calculation  
of seismic and geodetic  
moment rate





### Rete GPS ATF



Stazione Pietralunga

