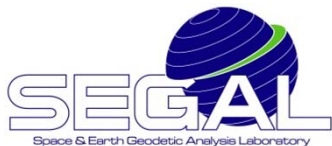


Investigation of the Current Kinematics of the Nubia-Eurasia Plate Boundary in North West Morocco

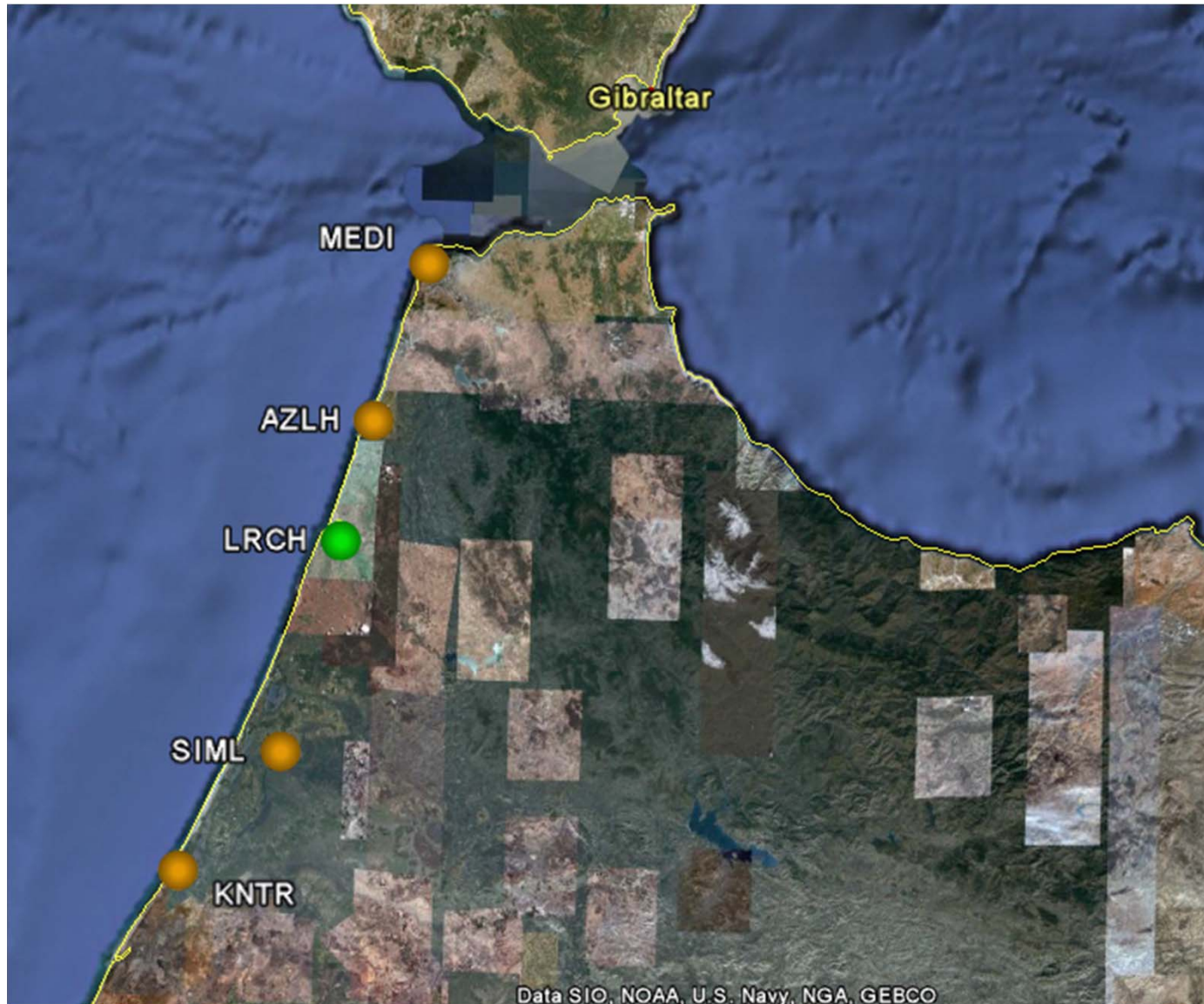
Pedro Almeida
Rachid Azzouzi
Youssef Hahou
R.M.S Fernandes



Goals

- Concentrate on the installation of a small network (4 campaign stations + 1 permanent station) on the Rabat-Tangier transect in order to evaluate the present-day of this region since several models suggest this area is tectonically active.
- Reprocessing and interpretation of other available data in the region (network installed in the framework of the AMIGO project).
- Reprocessing and interpretation of other permanent stations with available data in the region.
- Integration with GPS solutions for stations in Iberia.

REMATA network



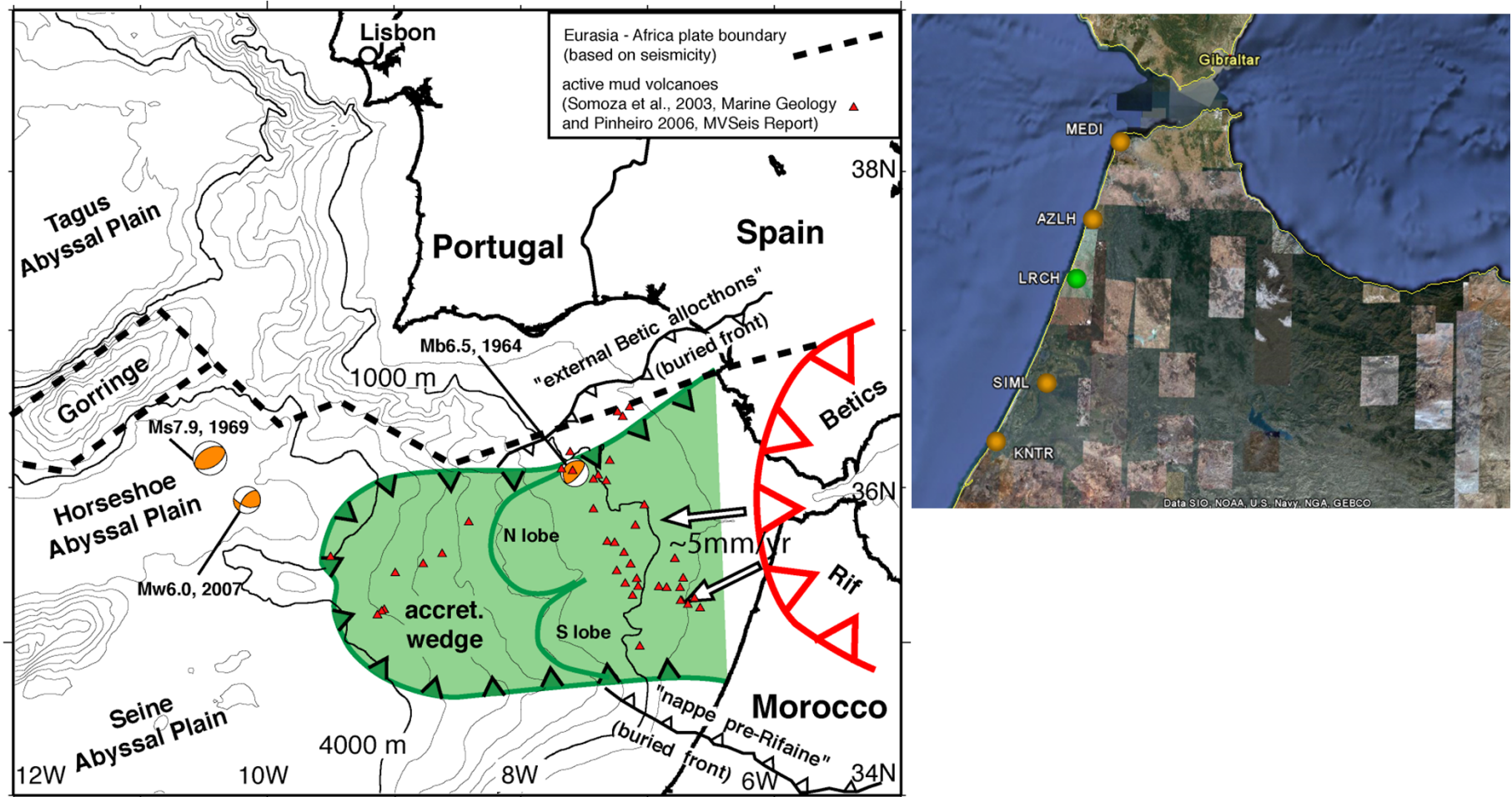
3 Campaigns:

- Jan 2008
- Jan 2009
- Oct 2009
- Mar 2011

(LRCH was permanent)

Dedicated network installed in the framework of TOPOMED project

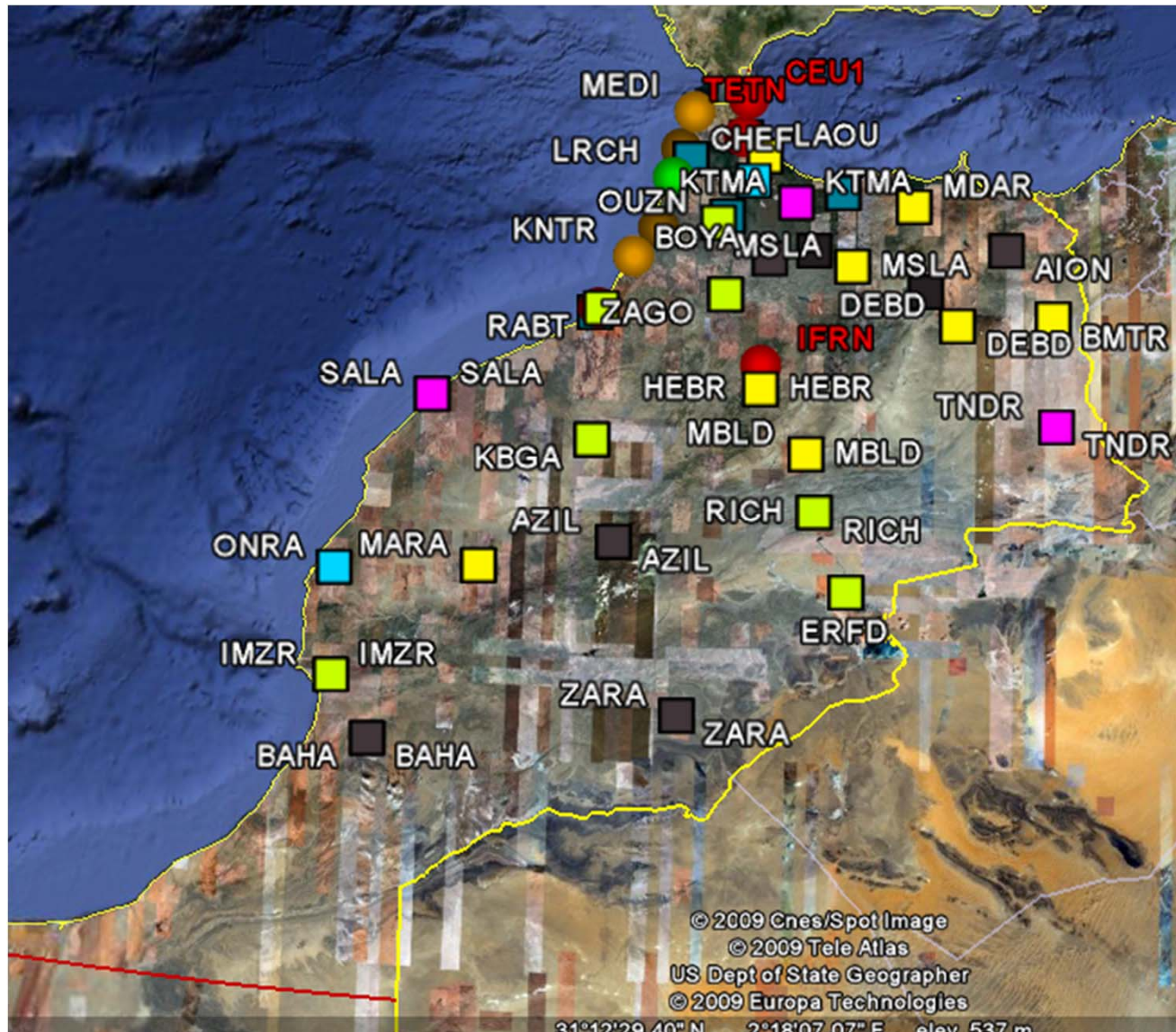
REMATA/TOPOMED network



Main Goal: trying to prove the activity in the accretionary wedge as proposed by Gutscher.

(however the time-series are still too short – more campaigns / data span is necessary).

AMIGO and Permanent network



AMIGO

5 Campaigns:

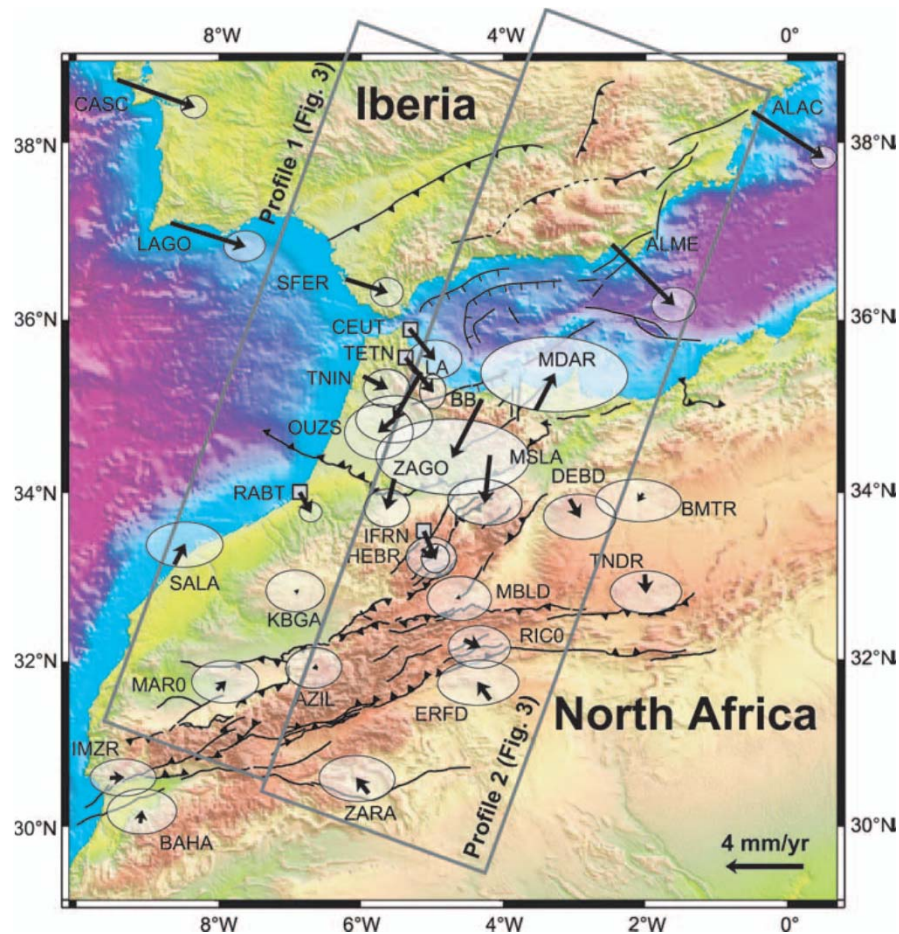
- 1999
- 2001
- 2002
- 2004
- 2006

Permanent

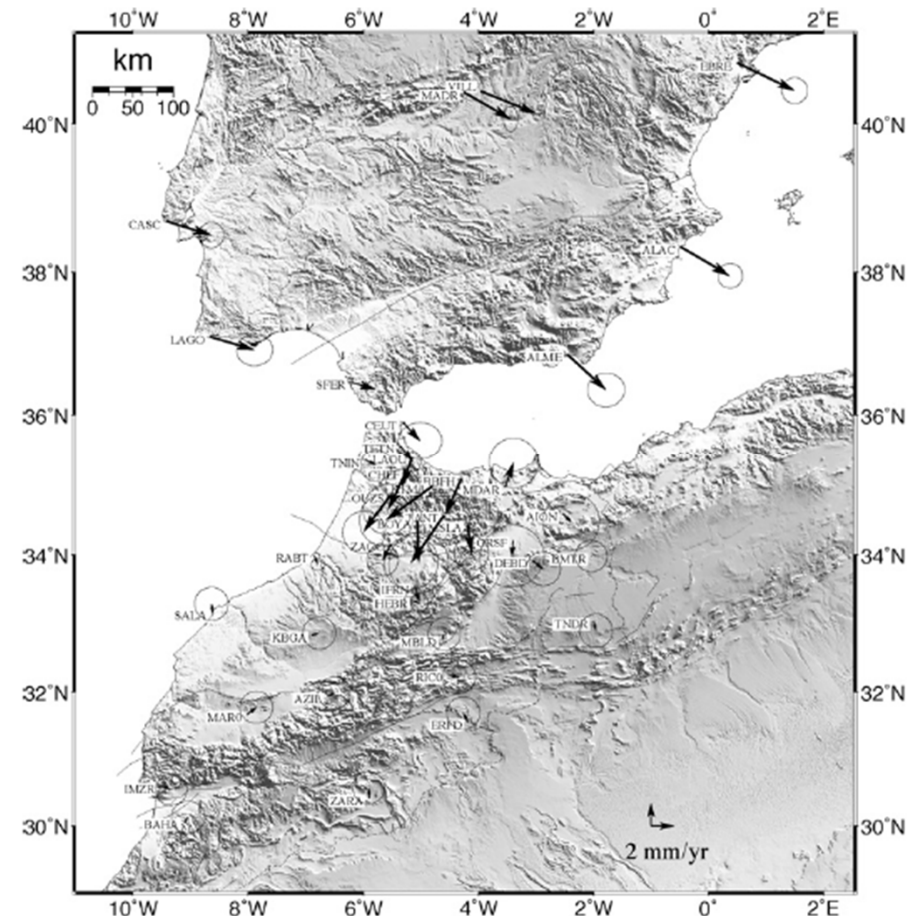
RABT
TETN
IFRN
CEU1

Campaign and Permanent stations available in Morocco

AMIGO and Permanent network



Fadil et al., 2006

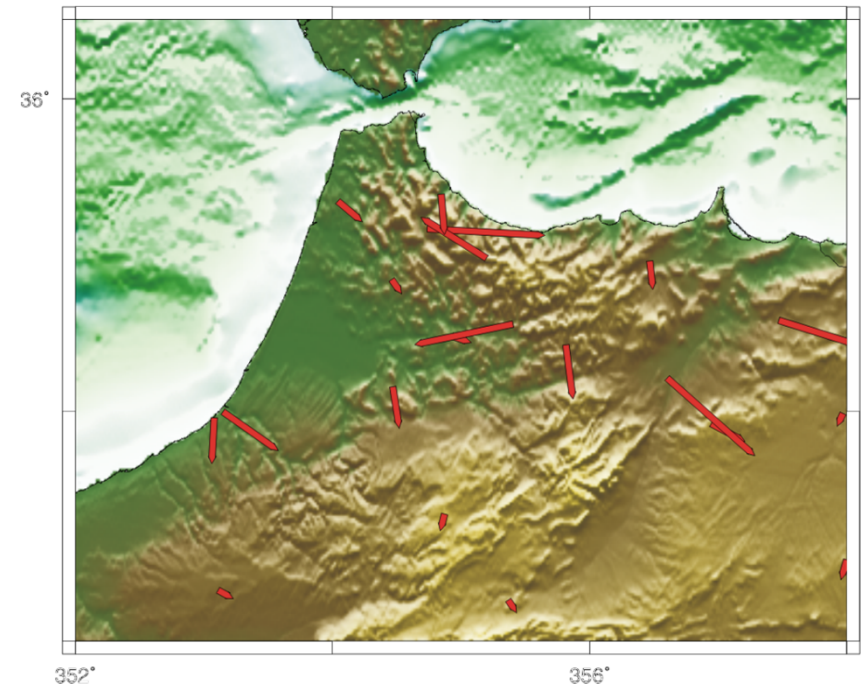
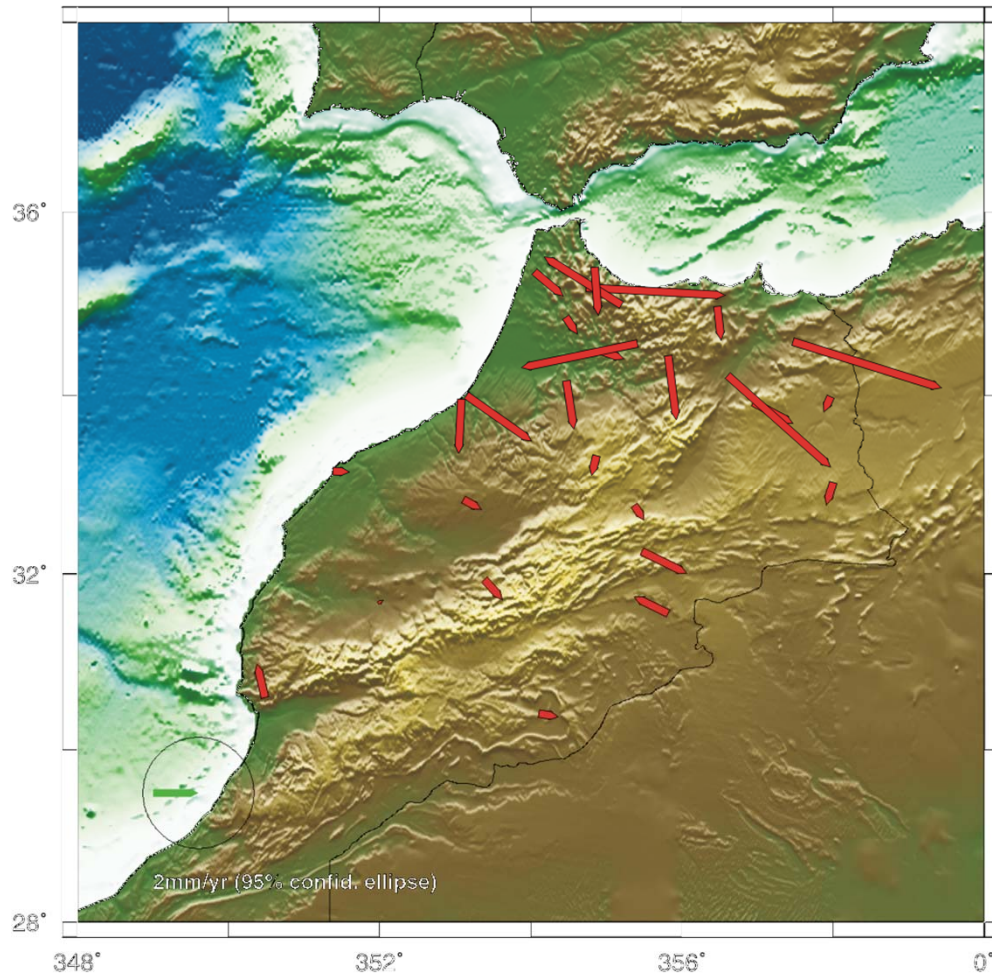


Tahayt et al., 2008

Objective: Compare our solution (computed with GIPSY) with the velocity fields estimated by other groups.

Estimation of the Velocity Field

AMIGO network



**GIPSY Solution
1999-2004**

AMIGO Velocity Field with respect to NUBI (DEOSVel model)

DEOSVeI05 model

Implications on Nubia-Eurasia plate boundary

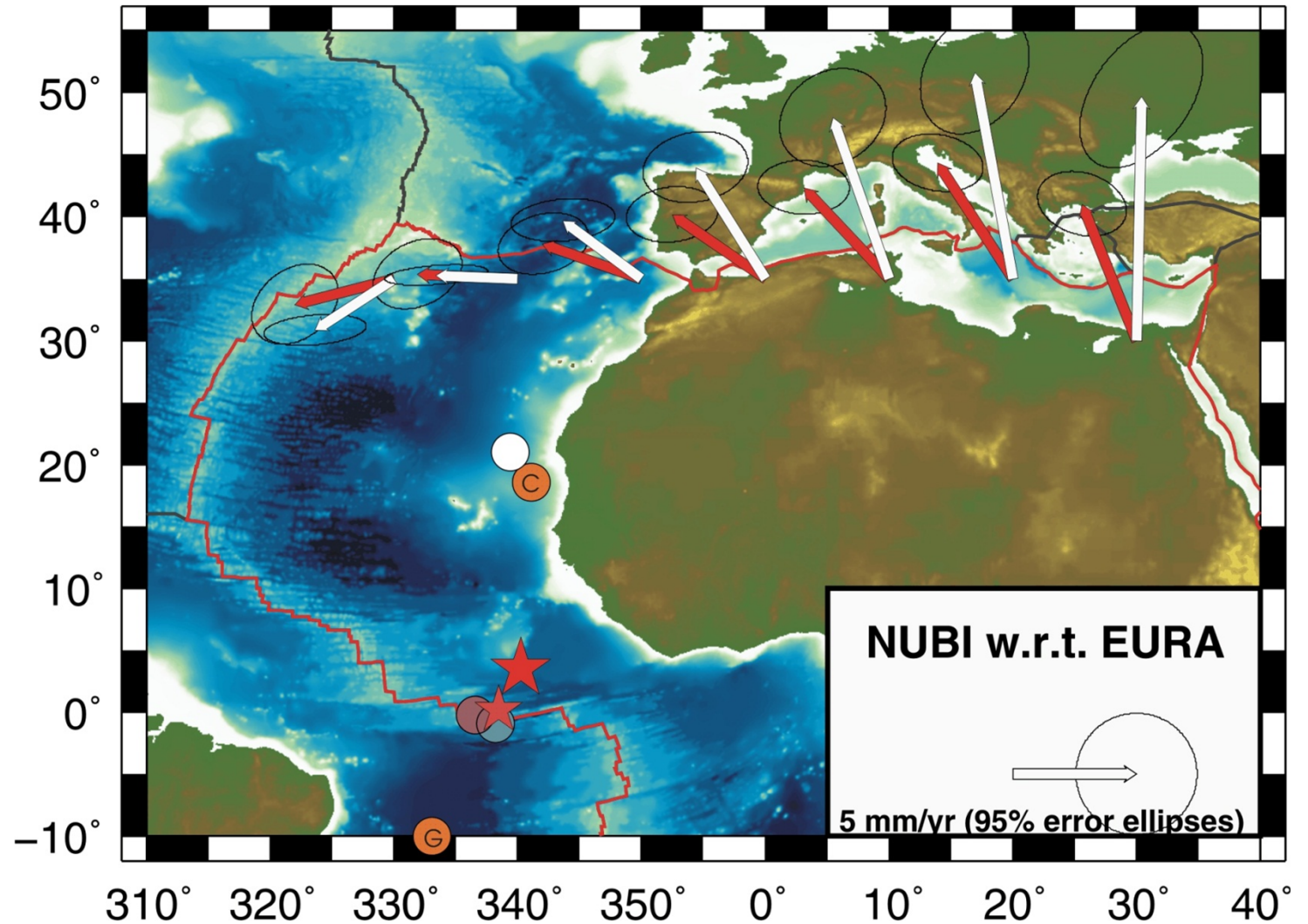
DEOSVeI05

DEOS2k
(Fernandes et al.)

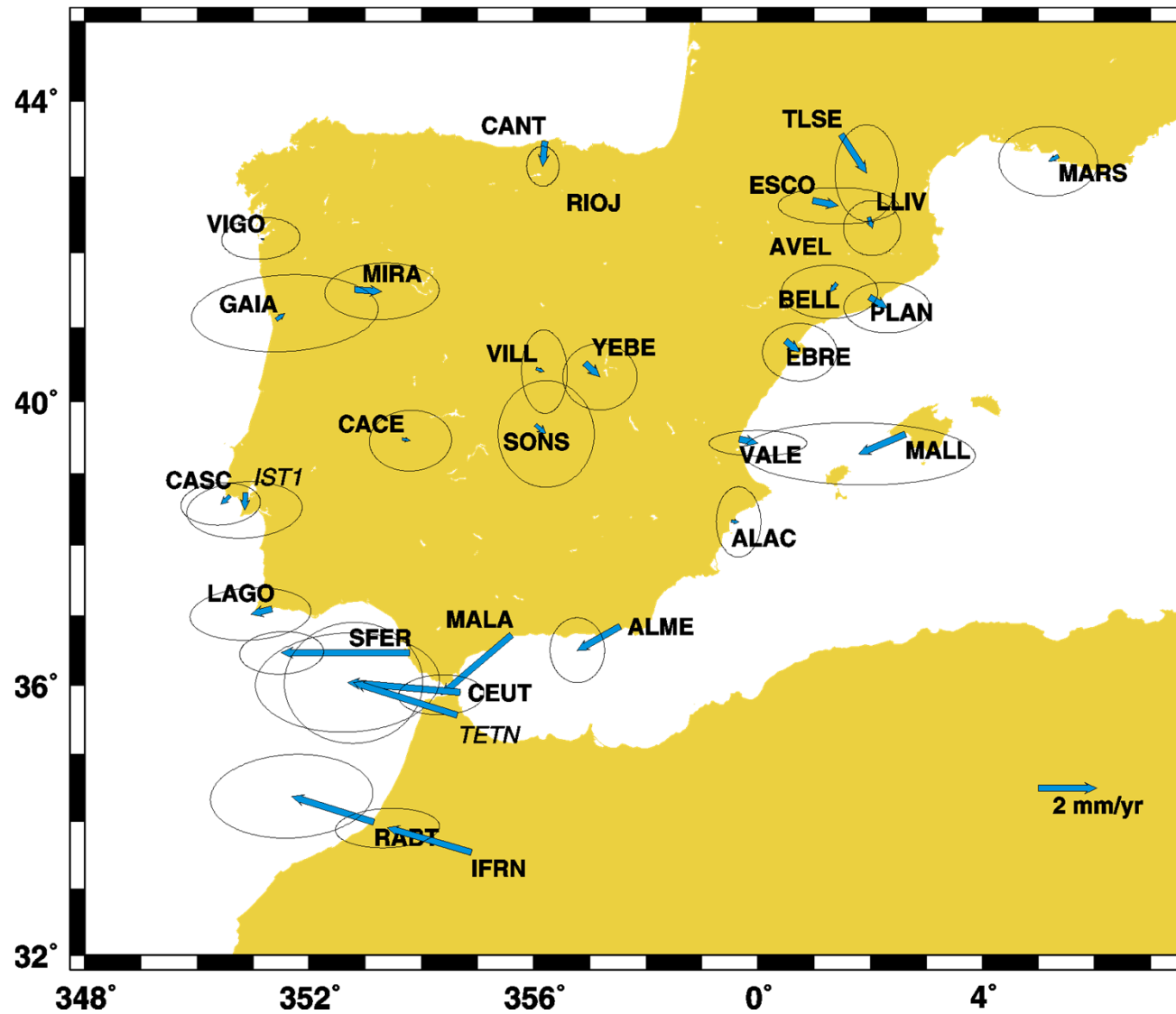
McClusky et al.

Kreemer et al.

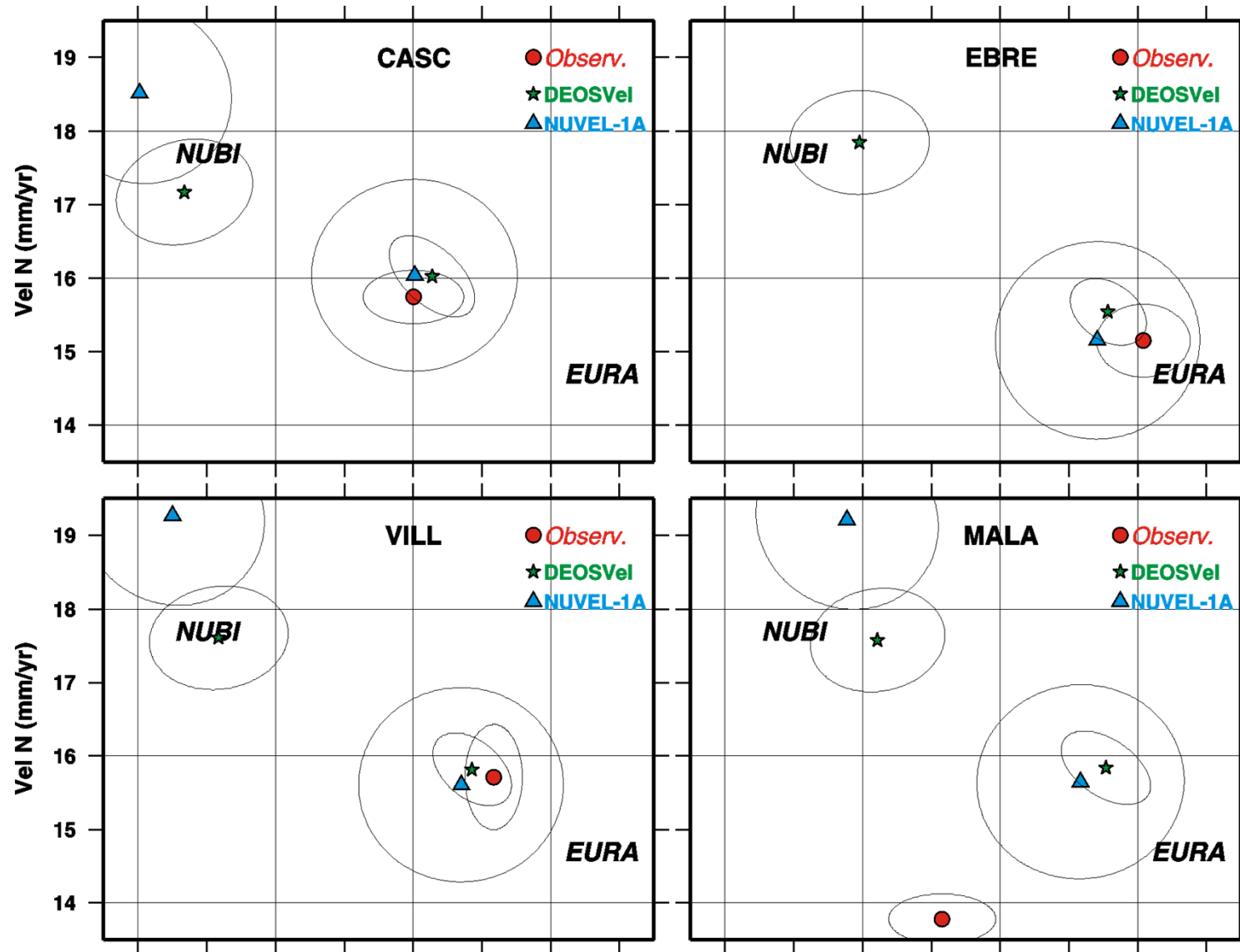
Calais et al.



Relative Velocities (with respect to EURA DEOSVeI05)

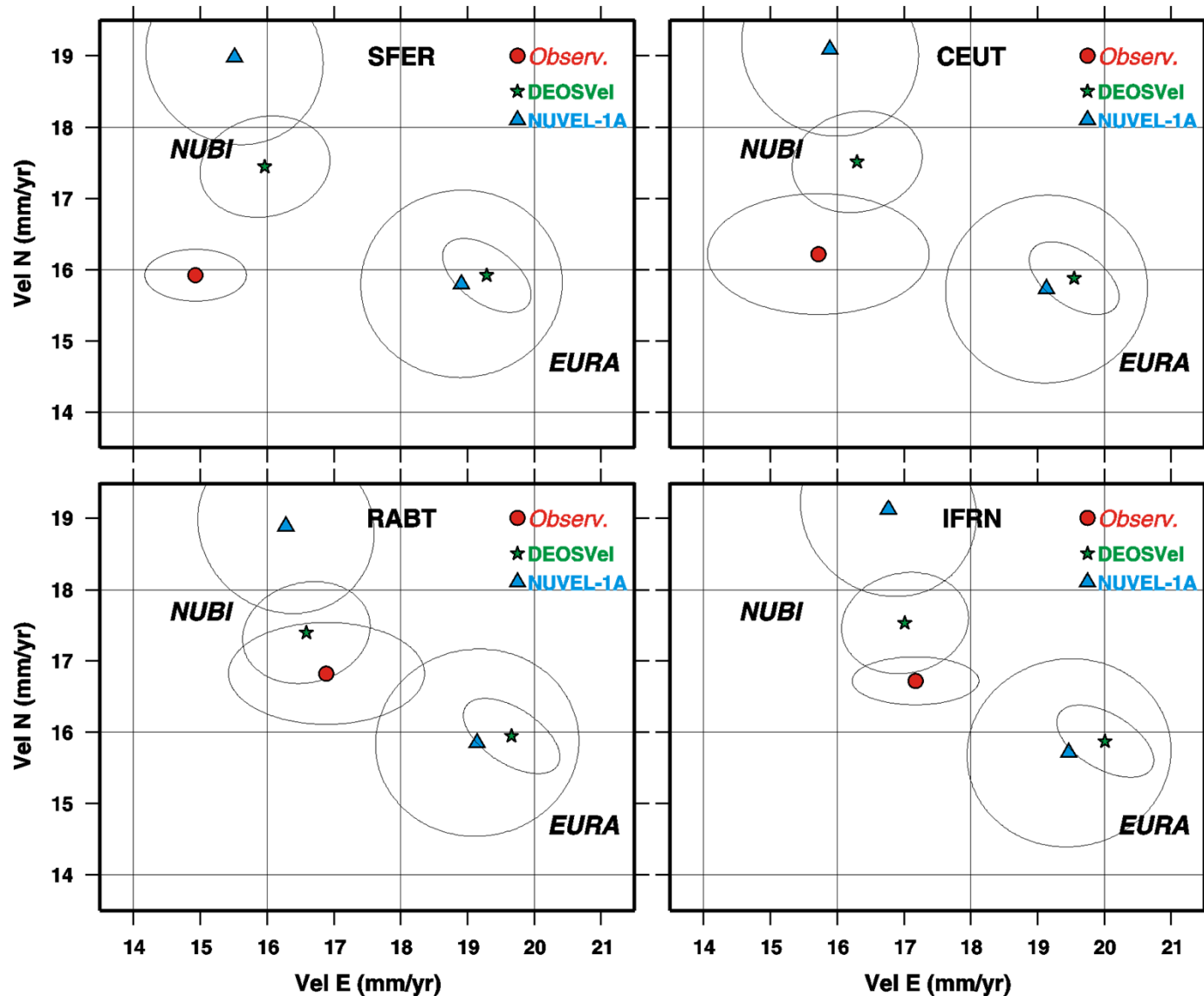


Observed versus Predicted Motions stable Iberia

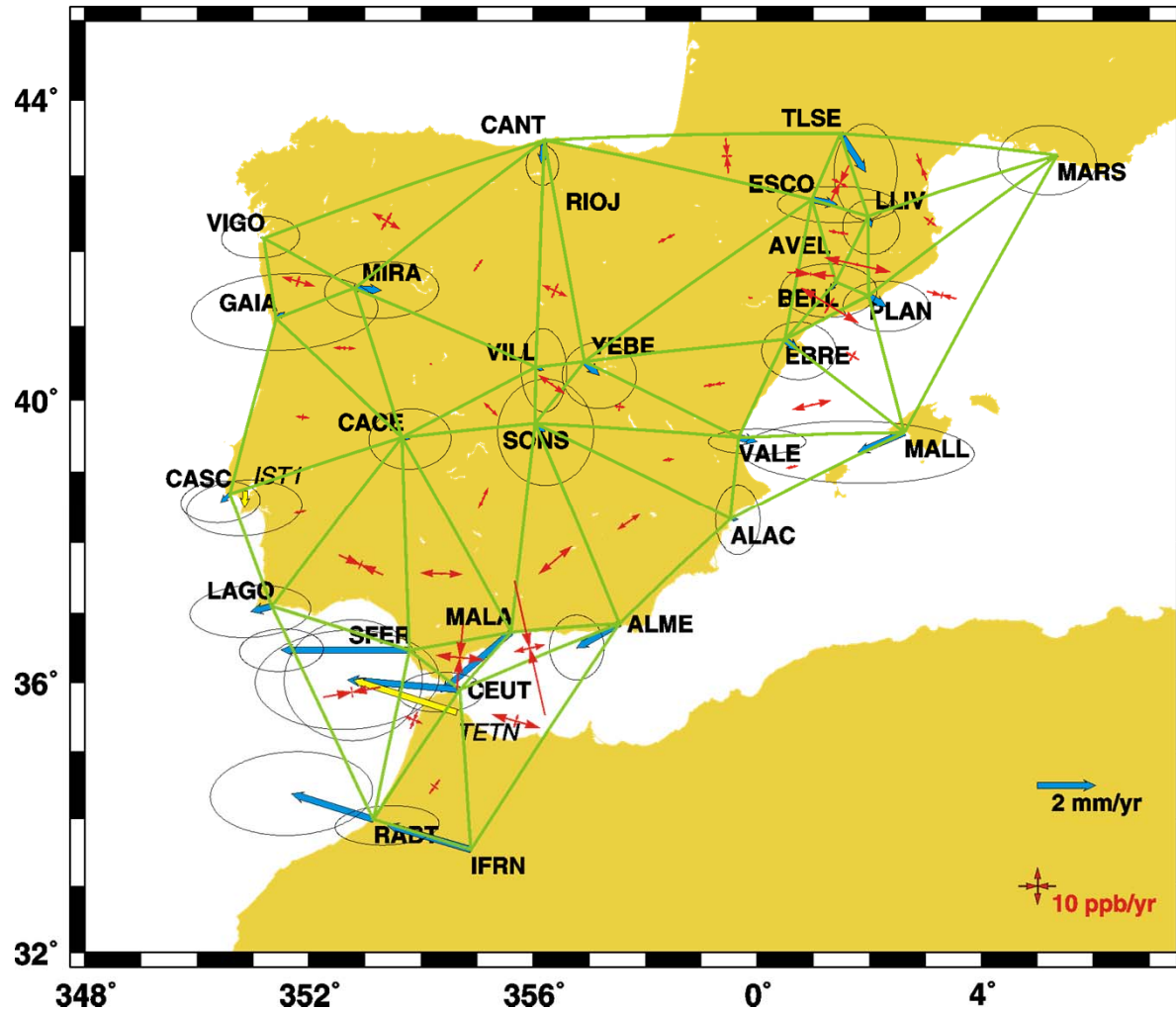


Observed versus Predicted Motions

Ibero-Maghrebian region



Strain rates



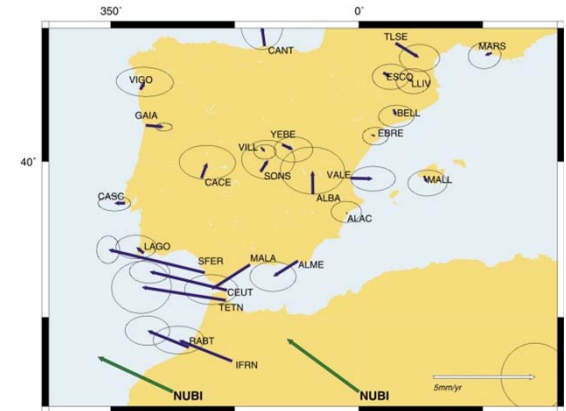
The estimated strain values are only an average of large areas, possibly comprising different tectonic systems.

Nevertheless, we can identify several well constrained regimes:

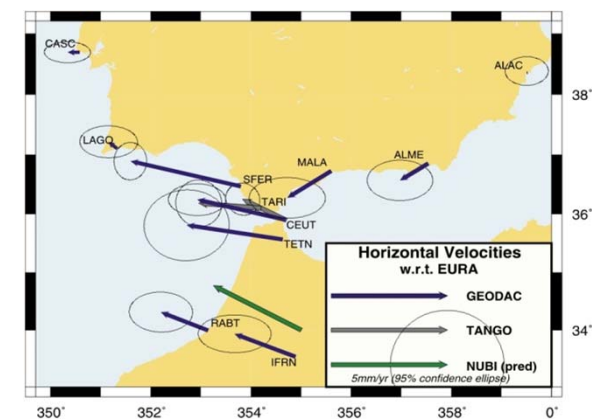
- The NNE-SSW compressive regime along a part of the Betic Cordillera,
- The approximately E-W extensional regime in the Alboran Sea, and
- The approximately E-W compression in the Gulf of Cadiz.

Discussion and Conclusions (1/2)

Most of Iberia is assumed to be part of stable Eurasia. Similarly, at our computed uncertainty level, the Moroccan stations present behavior consistent with stable Nubia (weighted r.m.s of 0.70 mm/yr for the residuals).



However, the stations located in the Ibero-Maghrebian region clearly show a westward motion with respect to the reference (Eurasia).

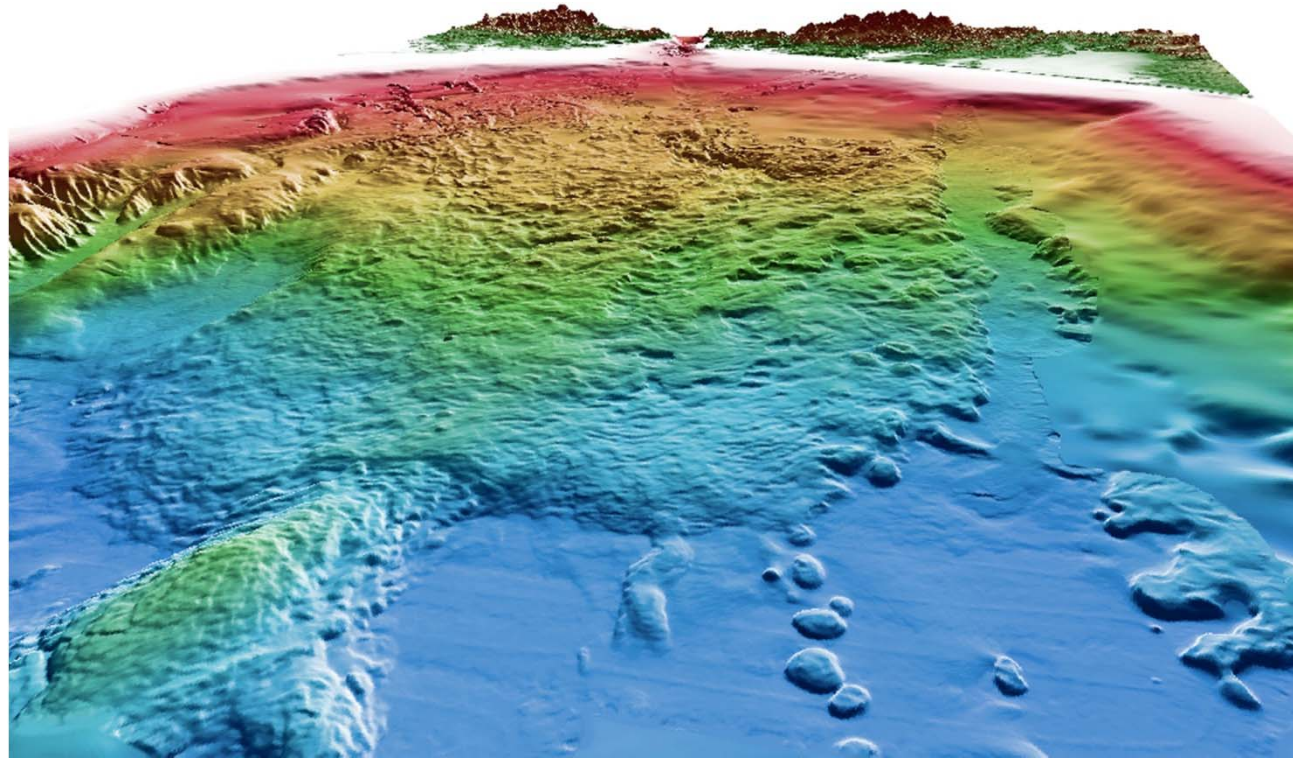


Discussion and Conclusions (2/2)

These results favor a scenario of an independent westward moving Ibero-Maghrebian Area with respect to Iberia (Eurasia) and Nubia as suggested by the thin-sheet model of Jiménez-Munt et al. (2001).

The westward motion can also be explained as a signature of slab-pull of a large lithospheric slab, below the Alboran Sea. This westward motion is observed both east and west of Gibraltar, increasing from east to west, closer to Gutscher et al.'s (2002) proposed mechanism of subduction rollback due to the slab pull.

Questions?



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