



Proposals / suggestions for tasks for new ETRS89 WG Frankfurt, Oct 27nd, 2011

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L A N T M Ä T E R I E T



Action item 10 from Chisinau - ETRS89 Working Group

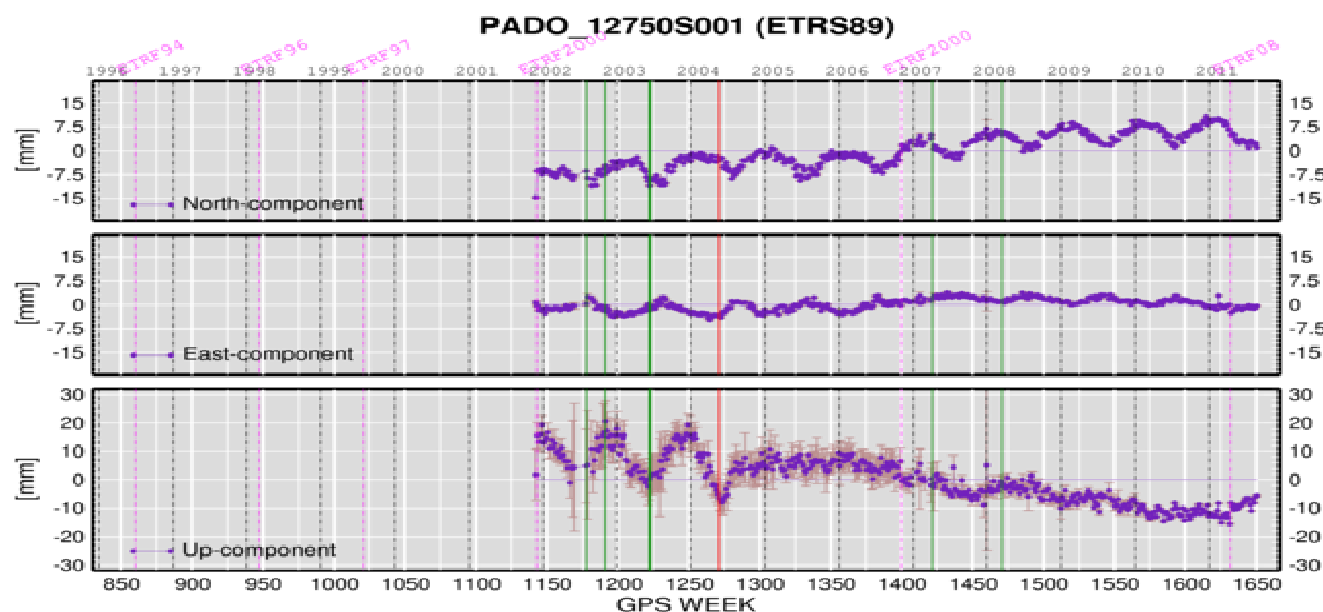
“CB proposes to close this WG and to start a new one with actual and clearly formulated tasks. Previously proposed members for new WG: AC, HHa, ML, GS. ML will collect ideas and present at the next TWG”

I assume that we agree that:

- The ETRS89 reference system is in principle tied to the “stable part” of the Eurasia tectonic plate (well, or rather Europe???)
- Coincident with ITRS at epoch 1989.0
- ETRS89 coordinates are realized by transforming coordinates in ITRFxx to ITRF89 and reducing for plate tectonic motion to epoch 1989.0, using rigid 14-parameter transformation
- We have introduced ETRS2000 as conventional frame
- No modeling or correction for intraplate deformations included

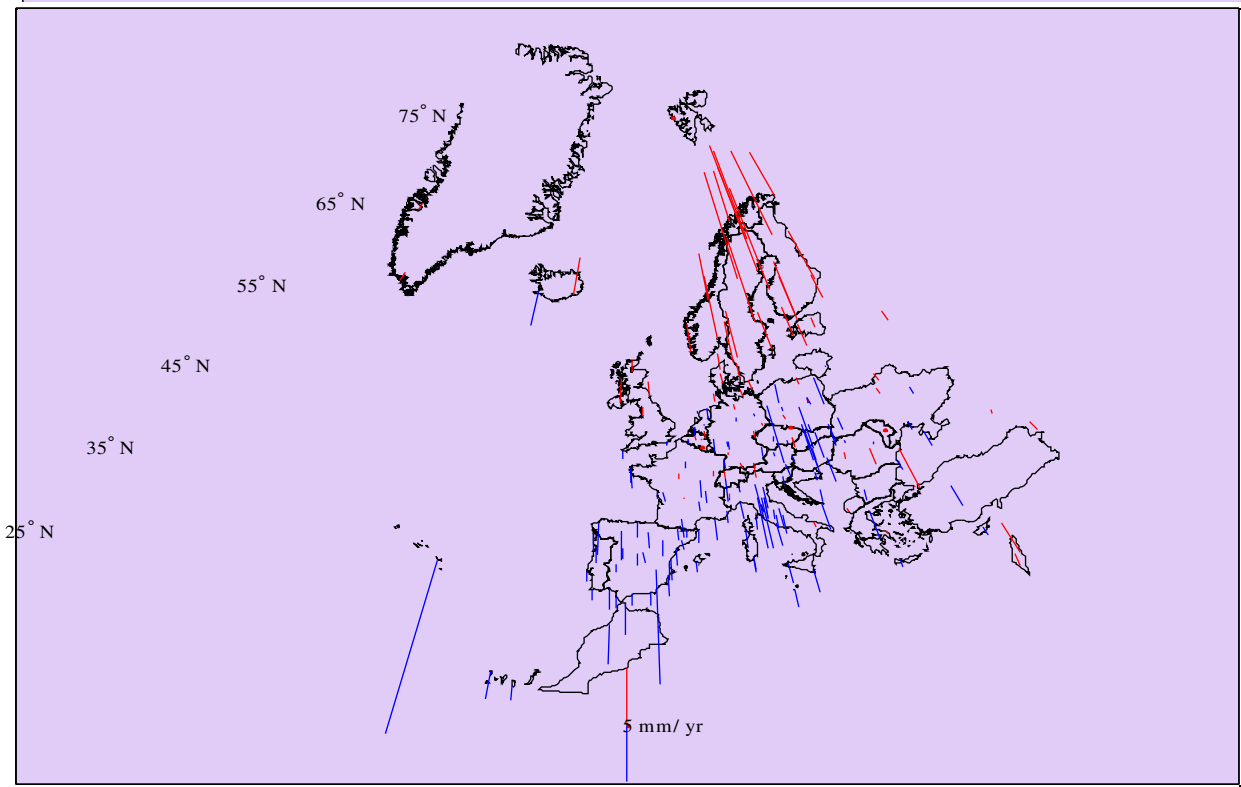
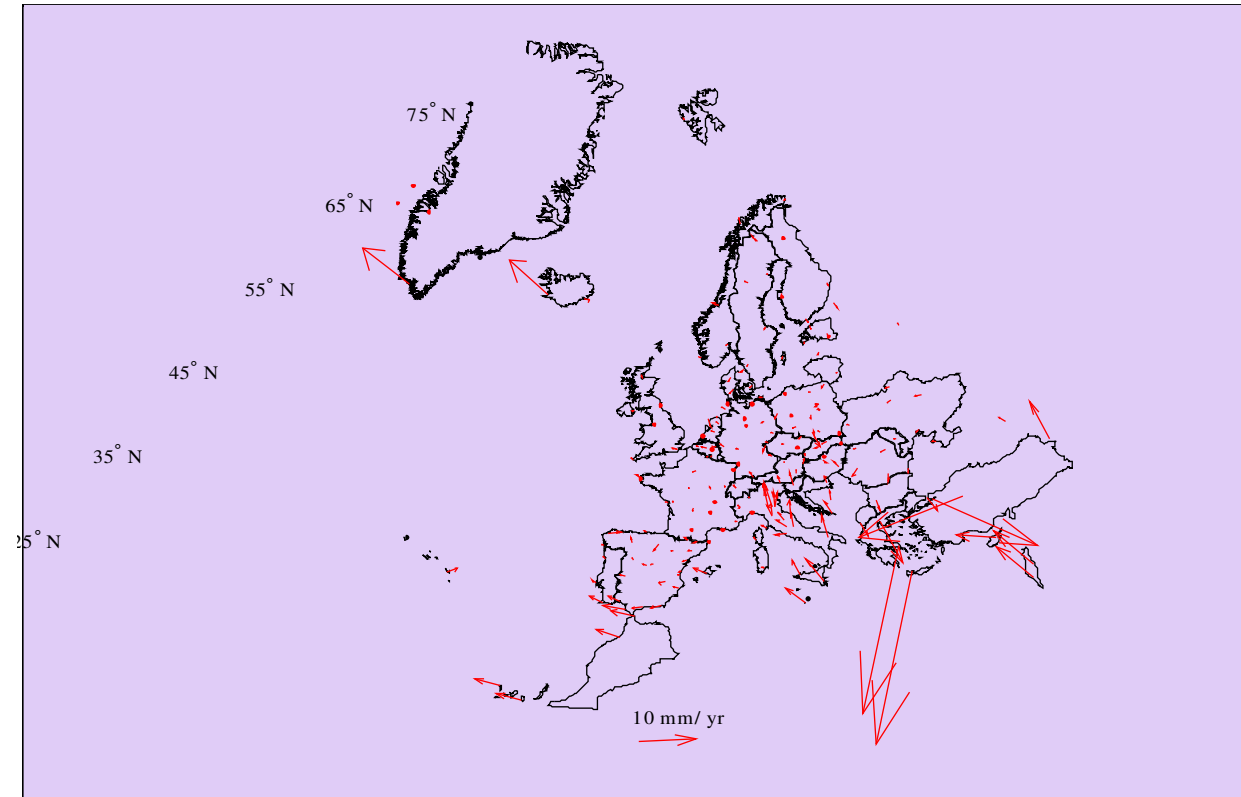
Which result in:

- Crustal motions visible in time series of ETRS89 coordinates
- And this is **good** – ETRS89 useful as a scientific system in the study of geophysical, geodynamic, seismic studies!
- So, we do have position and velocities in ETRF2000
- Improvements foreseen from the EPN re-processing effort!



Velocities of class A sites

EPN cumulative solution
EPN_A_ITRF2005_C1600



Possibilities to extend “European geodetic products” in order to add value from a user perspective



- ETRS89 (and EVRS) recognised as preferred geodetic reference system for Europe (Inspire)
- Most users (geo-information community, GIS, cadastre, construction, other surveying..) need coordinates which are stable in time
- It is costly to change geodetic reference frame in a country (e.g. in Sweden it is estimated to some 30M€)
- Proposed solution: assign the ETRS89 realization an epoch for intraplate deformation (Mäkinen et al 2003 – “Time-tag everything!”) (implemented where possible and needed??)
- To be able to provide this possibility - a model /continuously improved models of intraplate deformations are needed

Different kind of crustal deformations

- The Fennoscandia PGR is large (measured in mm/yr), but seems to be relatively smooth and continuous
- Episodic events (earthquakes) are more complicated and I think that development work is needed to be able to model the deformations
- We also have areas at the boundary of the Eurasia plate where we (1) have large velocity differences at close by GNSS stations and (2) have large velocities relative to stable Eurasia (i.e. the area is in principle outside the Eurasia tectonic plate), e.g Greece. Usually also episodic events are common in these areas.

About “intraplate” velocities

- I think a useable velocity/deformation model for the area relevant for ETRS89 will be needed.
- I think that it is not sufficient with station velocities at e.g. EPN sites,
- but some gridded model (or some other kind of mathematical representation) is needed
- in order to be able to get values on deformation also between permanent GNSS stations.
- Models needs to include smooth velocities (like PGR), AND episodic events!
- Plate boundary zones also needs to be investigated!
- Development of models may be done in regional efforts, while EUREF (TWG) could provide the framework for how to implement the models

Propose to study

(Maintenance of ETRS89, formulate clear tasks)

Develop a **roadmap towards velocity model** with some defined uncertainty level. Included in the study:

- The Fennoscandia **PGR** seems to be the deformation process that is most easy to treat since it is relatively smooth and continuous.
- **Episodic events** (earthquakes) are more complicated and I think that development work is needed to include episodic events in a useful deformation model mechanism.
- Investigate possibilities for areas at the **boundary zone** of the Eurasia plate, and also **areas partly outside the Eurasia tectonic plate**
- Should "management of permanent GNSS stations" be included in the w.g. "maintenance and management of ETRS89"? It is important for the management of ETRS89, but I think that this kind of issues is taken care of well within EPN?