Lifetime of ETRS89 Coordinates

A. Caporali, M. Lidberg, G. Stangl

Padova, 3-4 March 2011

Rationale

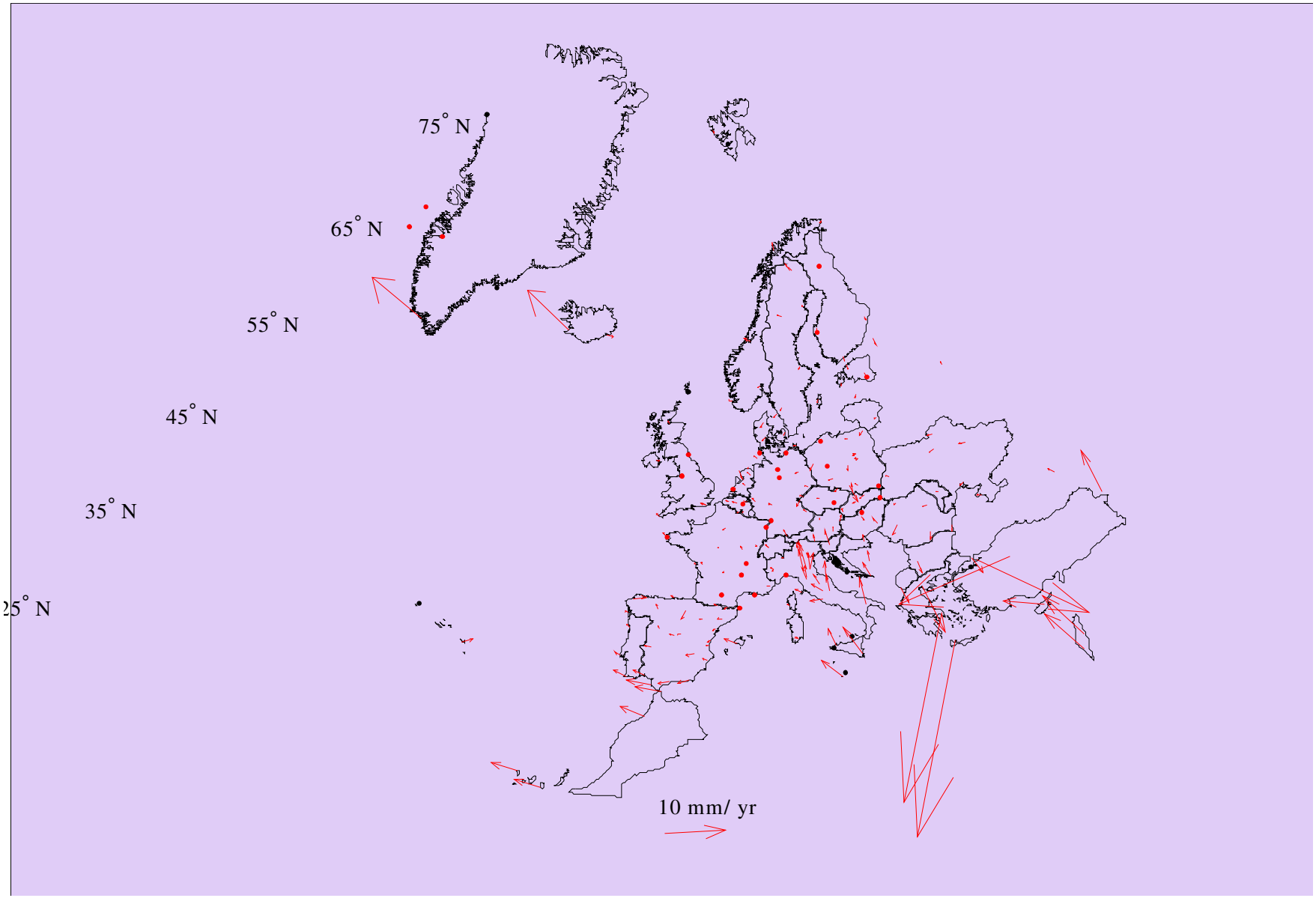
- ETRS89 makes reference to the ‘stable part’ of Europe
- Residual velocities (horizontal and vertical) relative to the Eurasian pole do exist in various parts of Europe
- Coordinates of Campaigns are validated as realization of the ETRS89 *at the epoch of the campaign*
- Although the validation as class B has no ‘expiration date’, it makes sense to think about it, due to the drift cased by such residual velocities

Three possible countermeasures for the ‘non stable’ parts of Europe

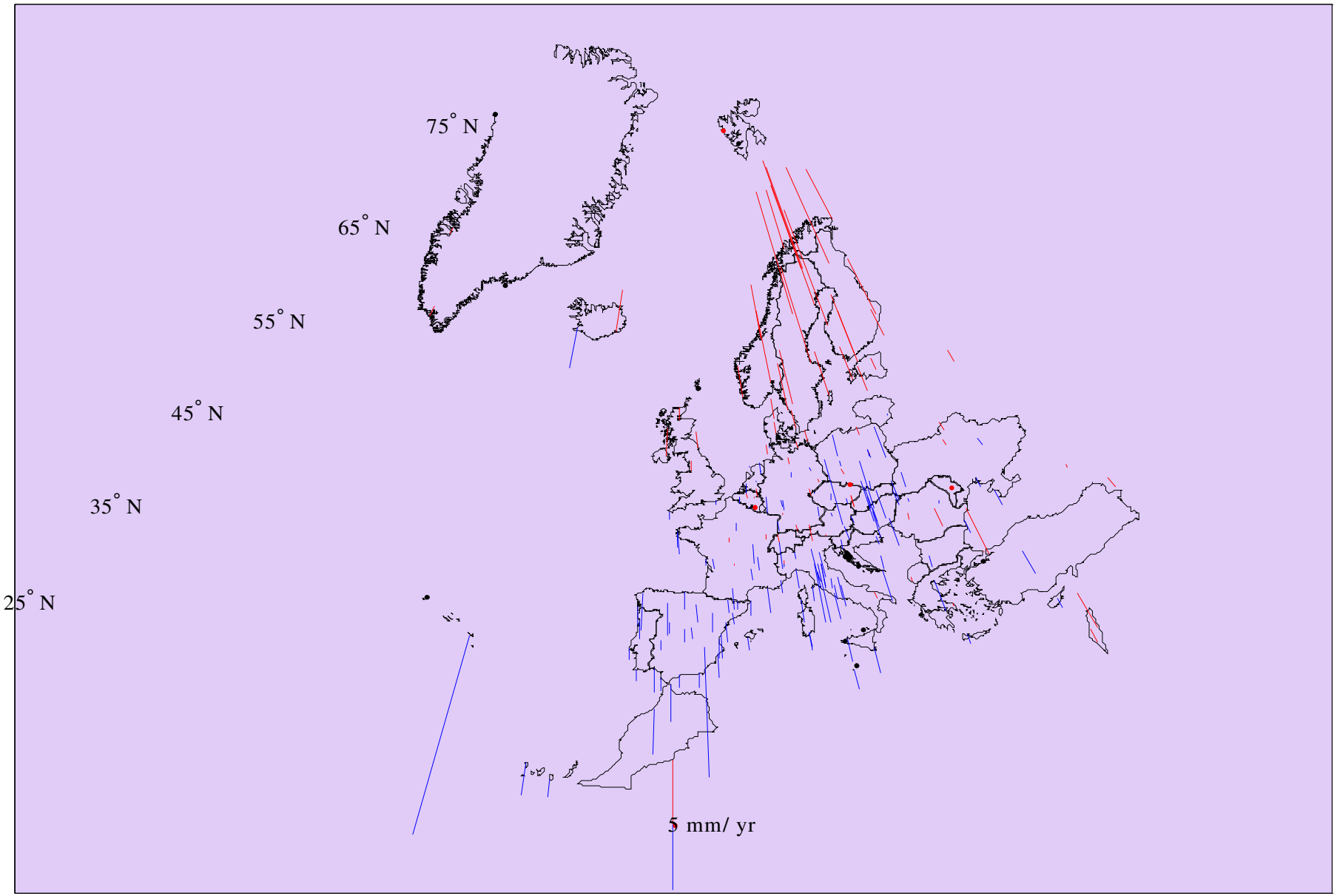
- Do the realization more often, depending on the ‘intensity’ of the local velocity relative to the rigid body rotation of Eurasia
- Introduce local velocities so that the frame realization at epoch t=0 can be linearly mapped to any other epoch
- Introduce/develop model for intraplate velocities of Eurasia at sufficient uncertainty level so position observations in “latest ITRF” and transformed to ETRS89 in the version of ETRF2000 (at epoch of observation) can be linearly mapped back to epoch t=0 of a national realization of the ETRS89.

It is appropriate to examine beforehand the epoch of ETRS89 realization in different Countries, in the context of the local velocities in the ETRF2000 Frame (solution EPN_A_ETRF2000.SSC)

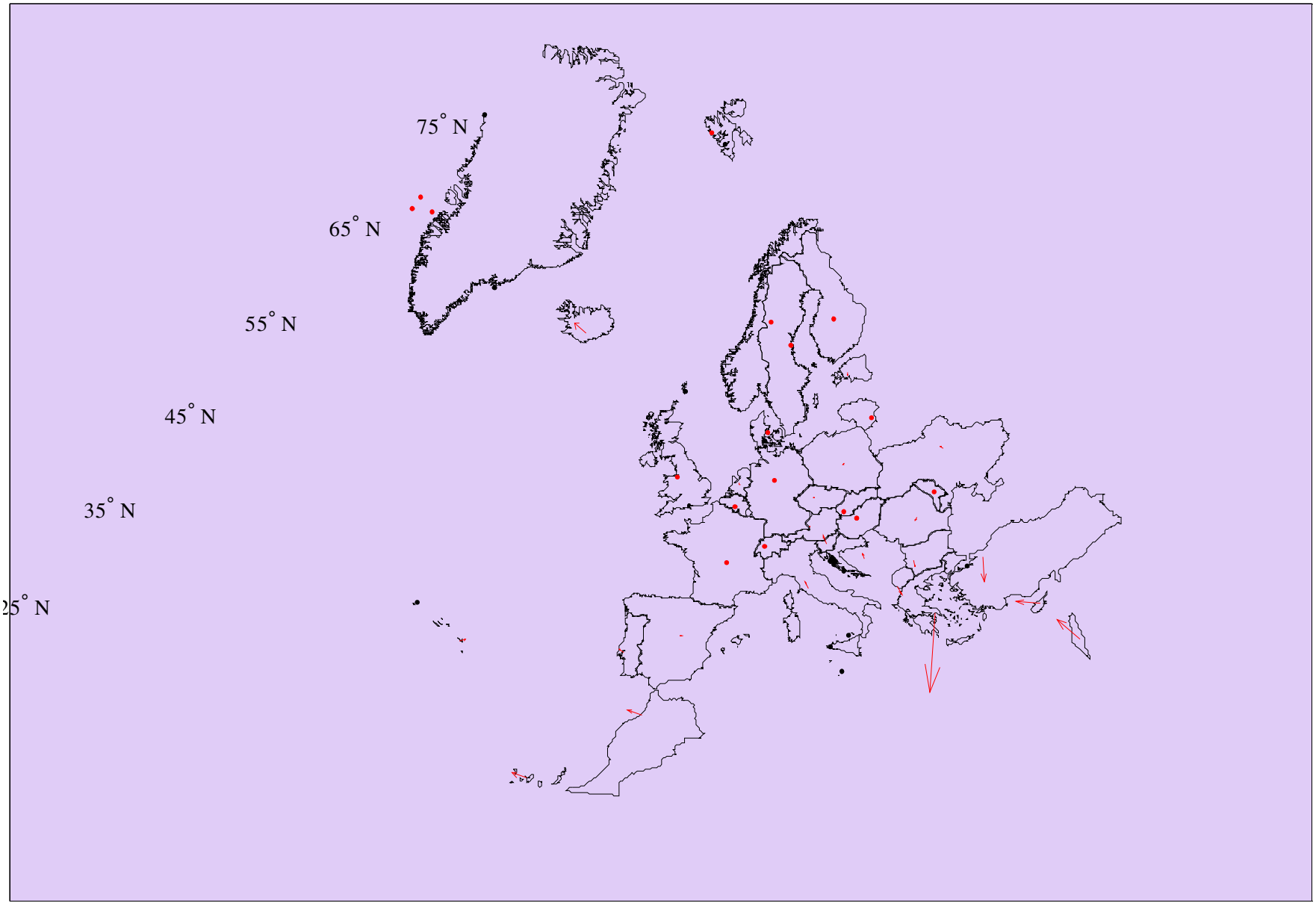
Horizontal velocities of class A sites



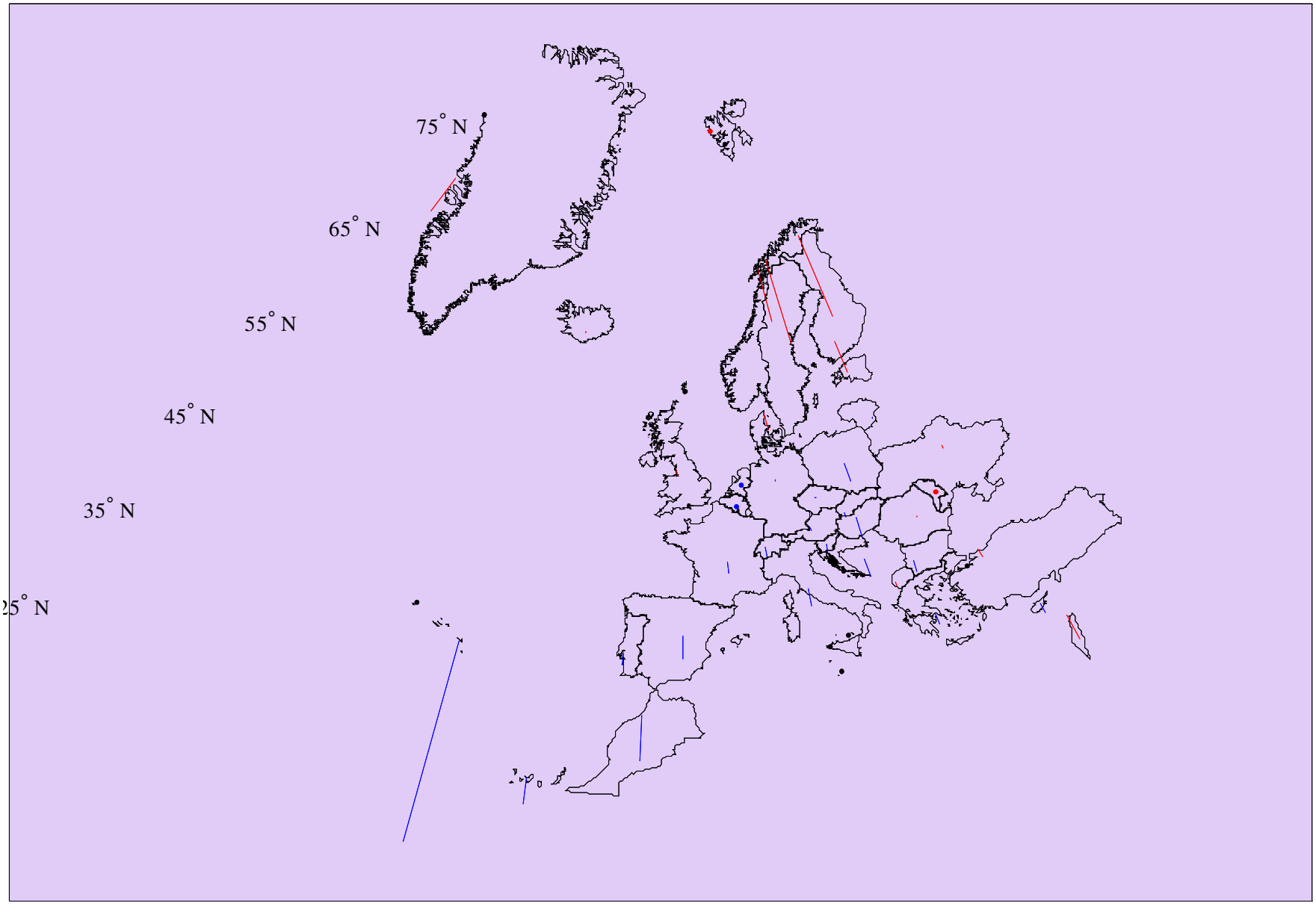
Vertical velocities of class A sites



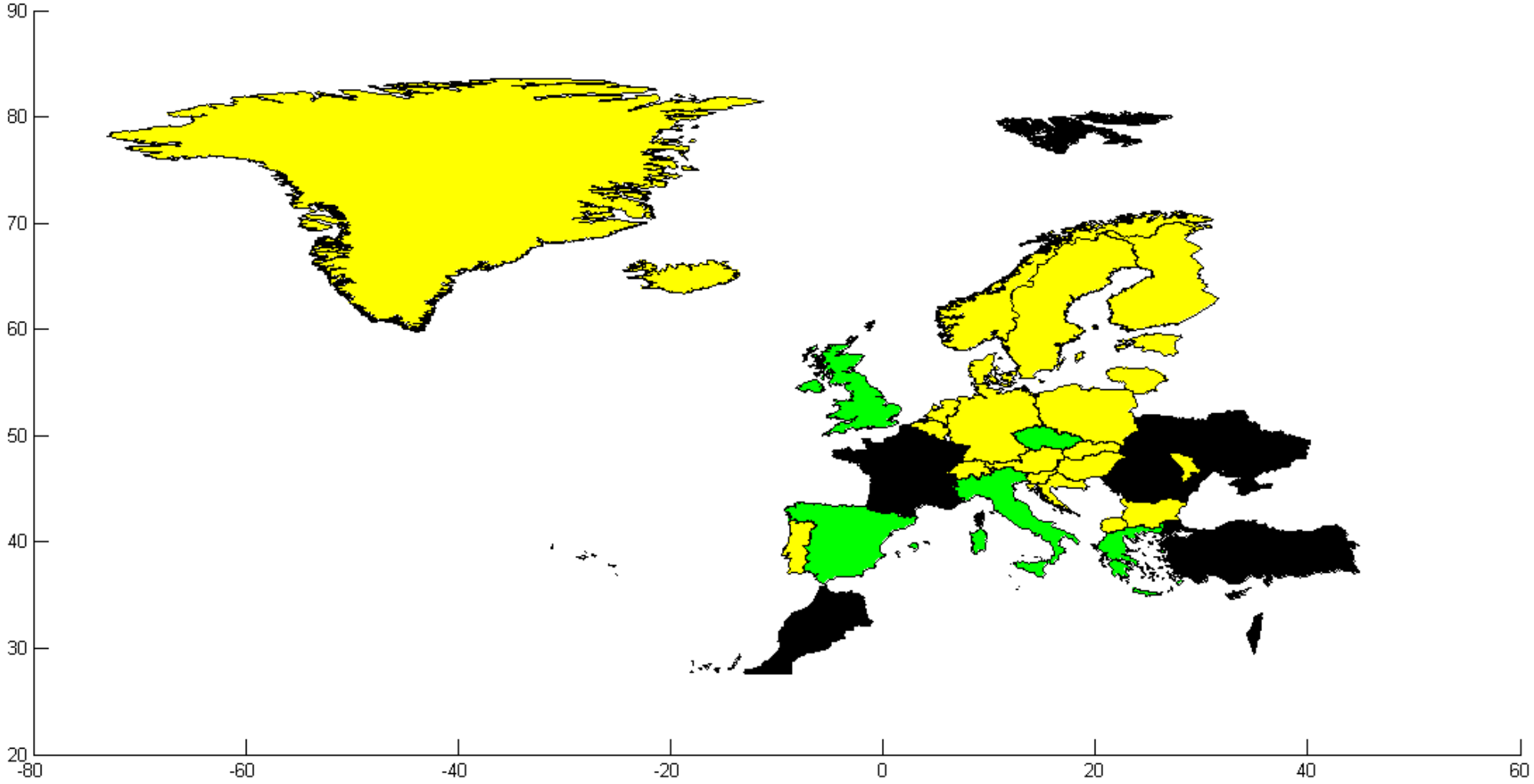
Average horiz. velocities: one arrow for each nation (→ETRS89 realization)



Average vert. velocities: one bar for each nation (→ETRS89 realization)

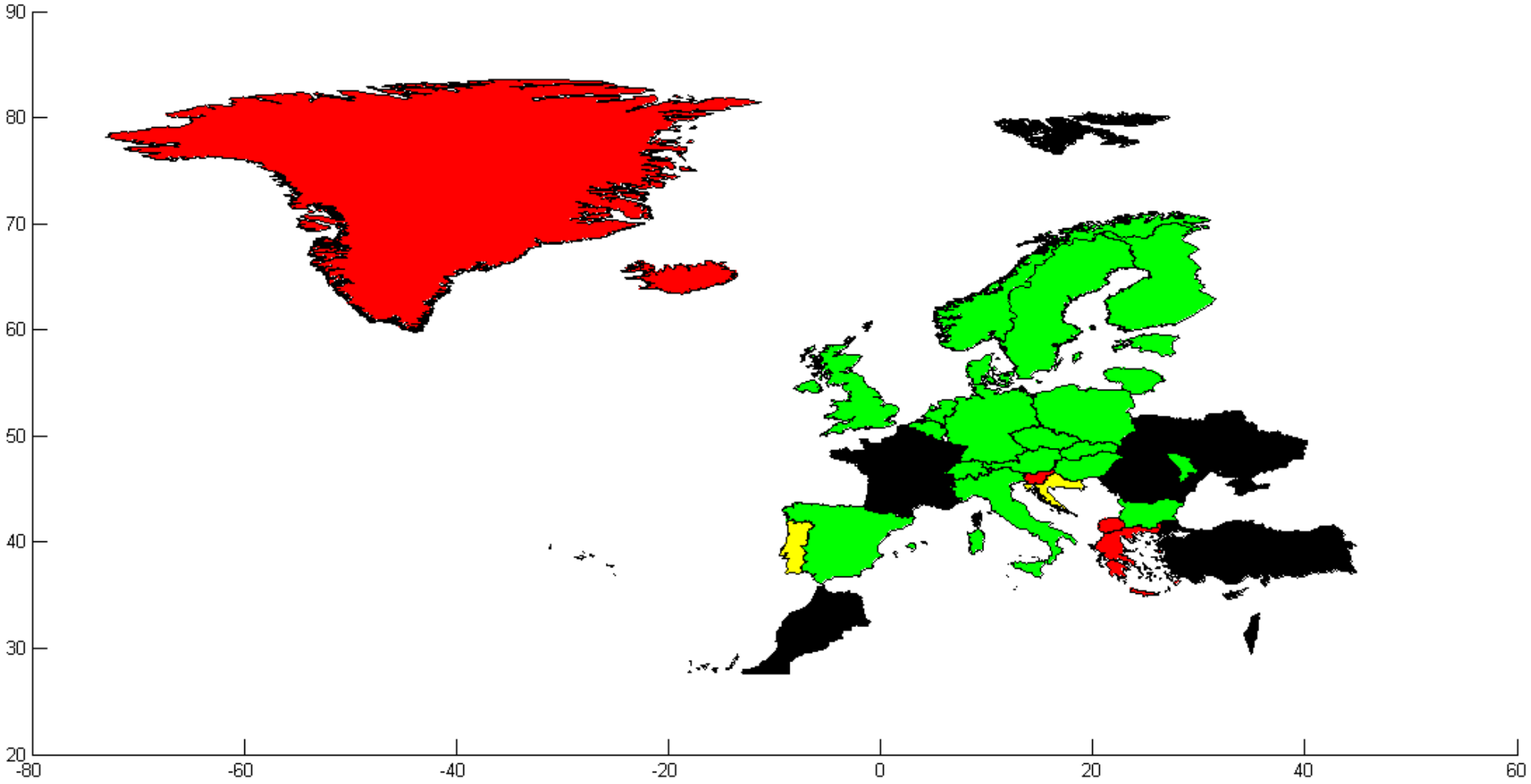


Epoch of ETRS89 realization (preliminary, from available data base)



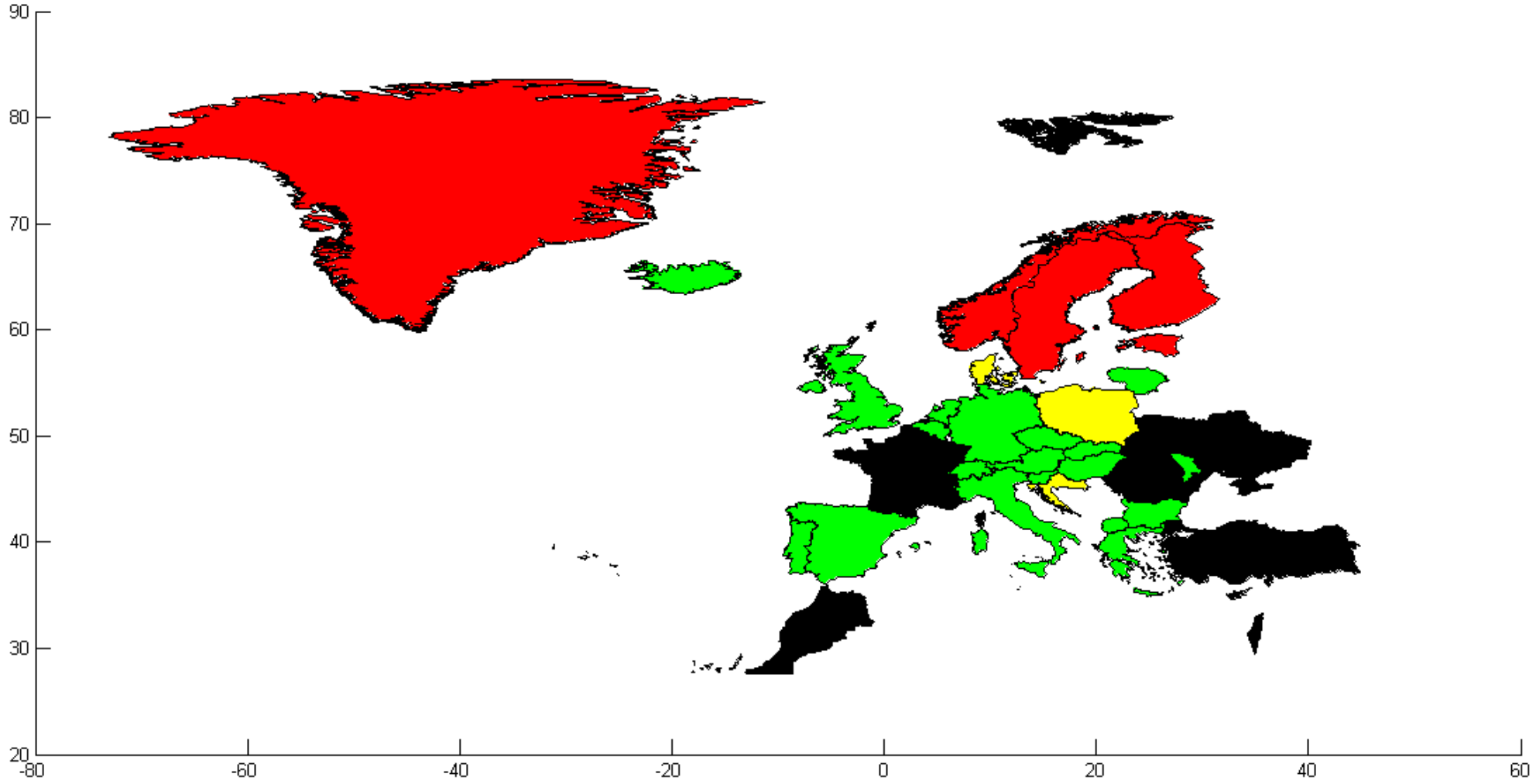
No realization	<2007	>2007

Predict when local horizontal velocities generate discrepancy from frame > 3 cm



No realization	<2012	>2012 <2020	>2020

Predict when local vertical velocities generate discrepancy from frame > 3 cm



No realization	<2012	>2012 <2020	>2020

Conclusions: lifetimes

- Assuming 3 cm tolerance, we expect, for example
  - Nordic countries: ETRS89 at 2003; vertical excess in 2010; horizontal excess in 2052
  - Estonia: ETRS89 at 1997; vertical excess in 2008; horizontal excess in 2042
  - Poland:ETRS89 at 2001; vertical excess in 2020; horizontal excess in 2031
  - Denmark:ETRS89 at 1994; vertical excess in 2015; horizontal excess in 2026
  - Greece: ETRS89 at 2010; vertical excess in 2037; horizontal excess in 2011
  - Croatia: ETRS89 at 1996; vertical excess in 2016; horizontal excess in 2013
  - Slovenia: ETRS89 at 1994; vertical excess in 2032; horizontal excess in 2006
  - Portugal: ETRS89 at 1995; vertical excess in 2021; horizontal excess in 2012
- All others >2020