

Global Reference Frame Densification Based on the Integration of Regional and National Active GNSS Network Products



Ambrus Kenyeres Tivadar Horváth (1)
 FÖMI Satellite Geodetic Observatory, H-1585 Budapest, POB 585, kenyeres@sgo.fomi.hu



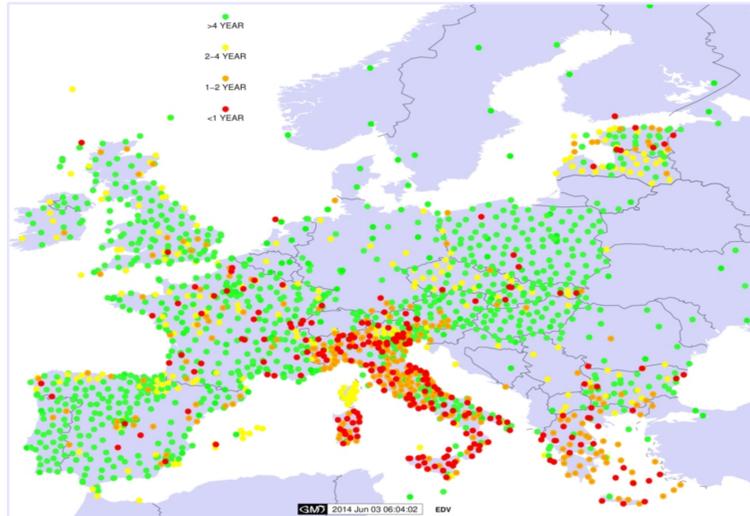
IGS Workshop 2014
 Poster session 09

A Caporali (2) - E Brockmann (3) - B Drosčak(4) - P Franke (5) - B Garayt(6) - M Gianniu (7) - I Georgiev(8) - D Hansen(9) -
 L Huisman (10) - I Jumare(11) - J Nagl(12) - P Pihlak(13) - M Ryczywolski(14) - G Stangl(15) - M Valdes(16)

INTRODUCTION

The European contribution to the IAG Working Group on „Dense Velocity Fields“ relies on the integration of the dense national permanent GNSS networks. In Europe the situation is more complex than in other regions because numerous countries operate independent networks. Fortunately the EUREF Permanent Network (EPN) and its products can be used as backbone infrastructure and the separate national GNSS data processing practically rely on the strategy defined for the EPN analysis.

In order to avoid any inconsistencies the combination is done on the weekly SINEX level. The national weekly SINEX submissions are combined with the actual weekly EPN SINEX solution, then a multi-year cumulative solution is created, which already includes all input. Before the creation of the integrated cumulative solution several quality and homogeneity tests (strategies, models, naming, data availability, site stability, weighting) are being performed. The integration is done with the CATREF software using the Minimum Constraint approach.



LENGTH OF THE AVAILABLE DATA SERIES FROM THE INCLUDED STATIONS - STATUS: JUNE 2014

DATA AVAILABILITY (GPSweeks 1400-1790)

provider	country	submission speciality
(1) SGO	Hungary	
(2) UPA	Italy (Padova)	
(3) AGNES	Switzerland	cumulative only (igs01)
(4) GKU	Slovakia	
(5) GREF	Germany	
(6) SGN	France	global
(7) HEPOS	Greece	only RAW data
(8) BUL	Bulgaria	daily GAMIT solutions
(9) BIGF	UK	global
(10) AGRS	The Netherlands	
(11) GGI	Latvia	
(12) CZEPOS	Czech R	
(13) MAAAMET	Estonia	
(14) ASG	Poland	
(2) CEGRN	C-Europe	biannual campaigns
(15) CEGRN	C-Europe	
(15) AMON	Austria	regional (SE-Europe)
(15) GREECE	Greece	
(16) IGN	Spain	daily, incl. Portugal

STRATEGY

COLLECTION AND PREPARATION OF NATIONAL LONG TERM WEEKLY SINEX SOLUTIONS

- input SINEX, compatible with the EPN analysis strategy
- SINEX testing and cleaning (constraints/outliers/offsets)
- soln harmonization with EPN/IGb08

COMBINATION WITH EPN WEEKLY SINEX

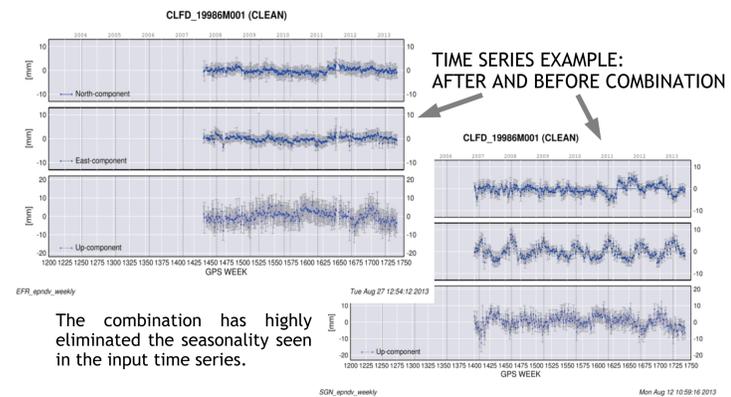
- EPN used as reference
- CATREF / Minimum Constraint approach
- same reference network as for the EPN cumulative
- clustering due to the large dataset

RESULTS / PRODUCTS

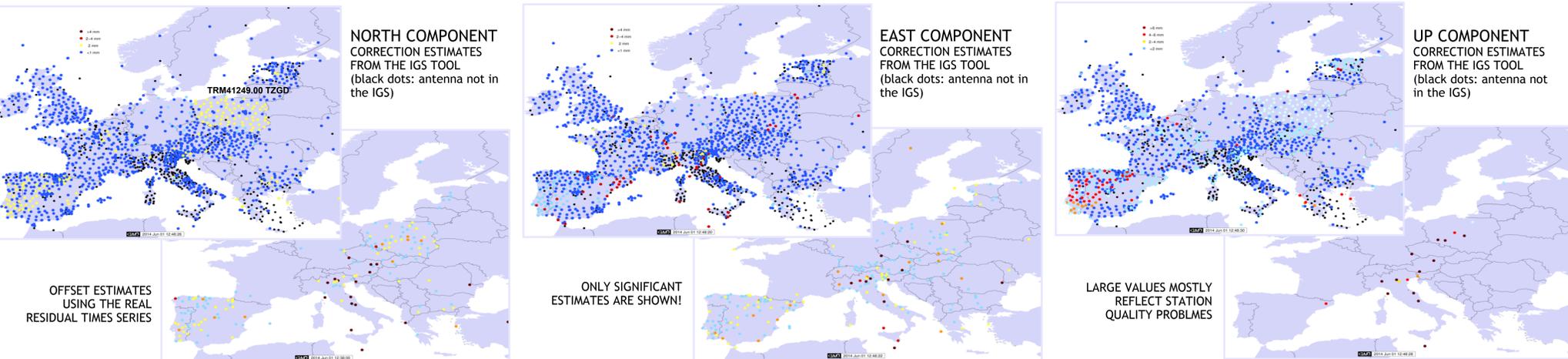
- cleaned national weekly and cumulative SINEX solutions,
- position and velocity estimates in ITRFyy/IGSyy/ETRFyy,
- time series plots,
- velocity field as **main input to deformation modeling and stable ETRS89 realization in tectonically active regions**

STATUS, OUTLOOK

- EPN DENSIFICATION WILL BE GLOBAL (BIGF, SGN)
- **MIXED ATX SOLUTIONS ARE USED (igs05, igs08, igsb08)**
 - antenna-dependent offsets - **individual calibrations are not affected!**
 - IGS corrections were not applied (see below)
- METADATA DATABASE MAINTENANCE
 - EPN, ESDB
 - EPN Associated Sites
- FIRST PUBLICATION IN 2015
- PLANNED REPROCESSING: IGS → EPN → EPN densification
- ROUTINE WEEKLY SINEX SUBMISSION, UPDATED COMBINATION TWICE PER YEAR



COMPARISON OF MODELED AND ESTIMATED OFFSETS DUE TO THE IGS05 / IGS08 ATX CHANGE AT GPSWEEK 1632

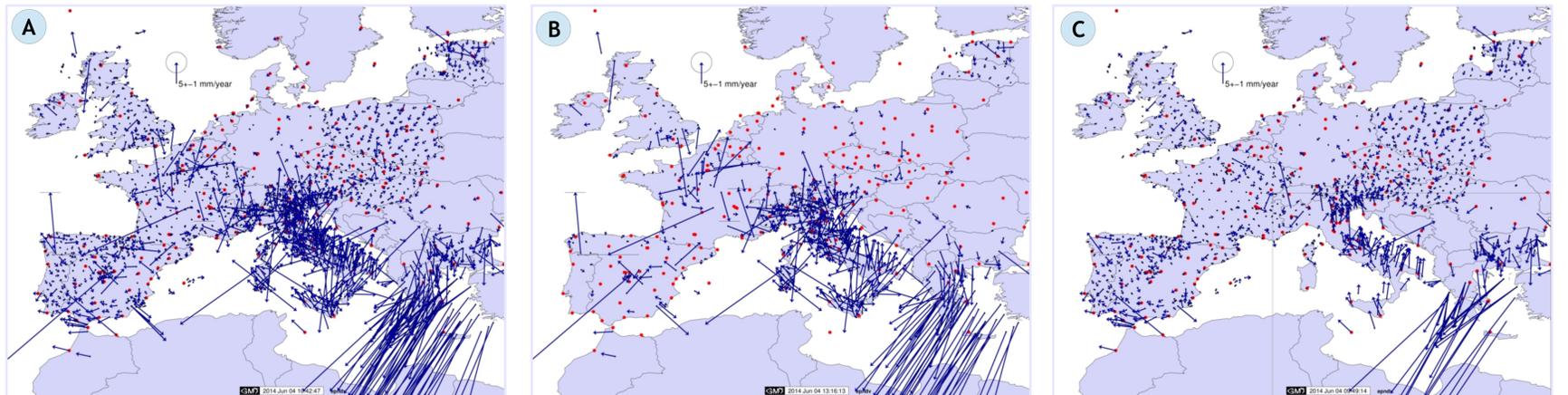


ESTIMATED VELOCITIES STEMMING FROM THE CUMULATIVE COMBINED SOLUTION

HORIZONTAL COMPONENT

- A. / ALL ESTIMATES INCLUDED
- B. / SITES WITH <3 YEARS OBSERVATION SERIES
- C. / SITES WITH >3 YEARS OBSERVATION SERIES

OUTLIERS ON PLOT C. / MAY REFLECT SINGLE STATION QUALITY ISSUE.



UP COMPONENT

ONLY SITES WITH >3 YEARS OBSERVATION SERIES ARE PLOTTED W/O UNCERTAINTIES

- REMARKABLE FEATURES:
- UPLIFT IN UK AND BALTIC
 - RISING ALPINE REGION
 - STABLE REGIONS: BOHEMIA, PORTUGAL

