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Densifying Velocity Fields in Europe: Advantages of the classical Approach

E. Brockmann



Combination Methods

- «Classical»: National partners produce combined solution:
 - velocities main focus
 - densification by simply using the velocity vectors
- «SINEX/Log-provider»: National partners provide
 - daily/weekly combined solutions
 - log files of all national stations
 - densifying: Combination of daily/weekly NEQS of all contributors + all EPN operational/repro SINEX files by an external institution (e.g. EPN)







Velocity fields



- CH08: swisstopo cumulative solution in I08
 - contrib. to EPN repro2 (1996 2014)
 - operational 2014 April 2016
 - daily, updated daily
 - since 10 yrs available <u>online</u> TXT, SNX
- EPN08: EPN cumulative solution in 108
 - EPN_A sites: week 1875 (Feb. 19, 2016)
 - repro1 and operational EPN
 - weekly updated every 15 weeks, SNX
- ITRF14
 - recent published reference frame
 - weekly (1994 2015.1), SNX
- ITRF08/IGS08
 - current reference frame realization
 - weekly (1997 2009.5) , SNX





Velocity Fields: horizontally



in ITRF2008

Έ

Velocity Fields: horizontally



Stable plate:



2.5 cm Eurasian plate movement towards northwest removed -> ETRF2000

Intra-plate movements:



in ETRF2000



in ITRF2008

Velocity Fields: horizontally



Velocity Fields: vertically



CH08 – EPN08



CH08 – ITRF2014





6 years shorter time series



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Agreement of velocity fields

Standard deviation





Regional solutions best suited for velocity field determination

- National / continental / International velocity fields agree on an extreme high level of accuracy:
 - Horinzontally: ± 0.2 mm/yr
 - Verticallay: \pm 0.4 mm/yr \rightarrow 4 mm in 10 yrs
- Detection of errors in international / continental frames
- Benefits of classical aproach:
 - velocity field is directly usable (SNX or TXT or XLS!)
 - no exchange of logfiles for national stations
 - Velocities almost independent of modelling GNSS observations (tropo models, antenna PCVs)
 - Modelling independent of models used in other countries

Impact repro2 on vertical CH-velocities



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Summary (cont)

- EPN densification project
 - Classical method is since 1-2 years no longer foreseen by the project group -> an (other) revision taken into



account results of this presentation?
Workload to combine information of x1000 stations and to ensure modelling consistency will cause quality problems of the final product.

Summary (cont)

- Benefits of classical approach (cont)
 - countries know their station best + monument. + geology
 - + instability of stations + data quality issues
 - Extendable to campaign results (national + CEGRN +...)
- Conclusion / recommendation to NMAs/partners:
 - coordinates and velocity products are the main task and responsibility for national Mapping Agencies



- contributing agencies are invited to spend the effort in generating velocity fields from their routine processing instead of send updates of logfiles and processed solutions.
- Velocity estimation is a small extra effort compared to daily processing workload
- More collaboration and direct involvement in final results (as already the case for official national coordinates)

Thank you for your attention

