EUREF Permanent Network

EUREF High Rate GPS for Positioning, Atmospheric Effects and Natural Hazards Warning System

EPN Study Group Chairmen

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Pan-European Positioning

- Using EUREF-IP for a Multi-station solution
- Transmitting user's request and resulting position by GPRS/UMTS
- 1 Hz data and balanced spatial coverage needed
- Software for large baselines needed until real-time networks become dense enough
- Political obstacles (EUPOS, all countries with existing RTK services, private firms)
- EUREF is no legal entity, no fees and no responsibilities

Instant Models of the Troposphere and the Ionosphere

- Model of the troposphere can improve regional RTK services
- Assistance of weather services
- Sudden changes in the ionosphere as precursors of earthquakes?
- 1 Hz data and balanced spatial coverage needed
- New software for large baselines has to be developed, a huge computational power is required (resulting solutions within minutes, spatial resolution 50 km or better)
- Convincing the RTK providers of using the results may be difficult (European grid of numerical values as a standard?)

Contributions to Natural Hazard Mitigation

- Spatial resolution not sufficient for local phenomena (avalanches, floods, land slides, volcanoes)
- Earthquakes and tsunamis as producers of quick crustal and marine movements at a long range
- Amplitudes of P- and S- waves are still to small to be detected, surface waves can be measured
- 1 Hz data or faster needed, for location of the epicenter a station cluster is needed
- No general warning possible in the earthquake region, measurements are used for research
- Synergetic effects with geology, seismic institutes, ECGN may play a key role (gravity changes)

Tsunami Warning System

- European policies not very clear how to do it
- http://www.tsunami-alarm-system.com an official system already (see sheets with GFZ and EC logos)
- In fact, a tsunami alarm system for Europe does not exist
- Tsunami detection and measuring at sea is only possible by buoys and satellites
- Tsunami warning by seismic stations is a very delicate race (surface waves 2-4 km/sec, tsunami waves 0.2km/sec)
- Precise GPS receivers can serve as rovers in an EPN RTK network

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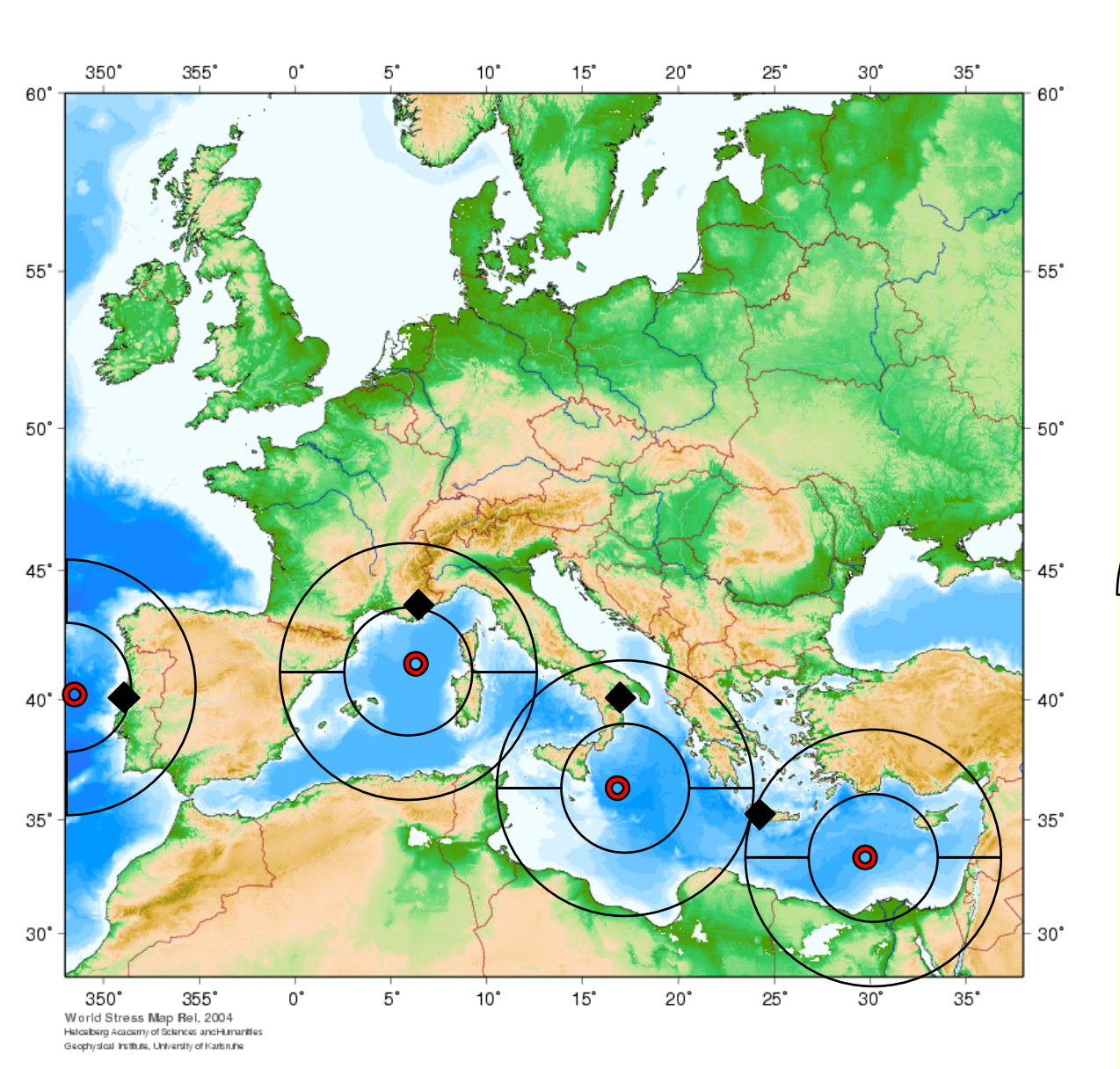
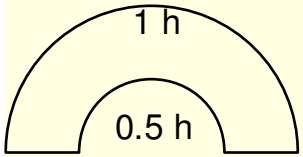
" Buoy Watching" Scenario





Distances for tsunami traveling times (velocities 500-700 km/h)

◆ ***EPN stations (example only)***

◎ ***Potential buoys (near the epicenters)***

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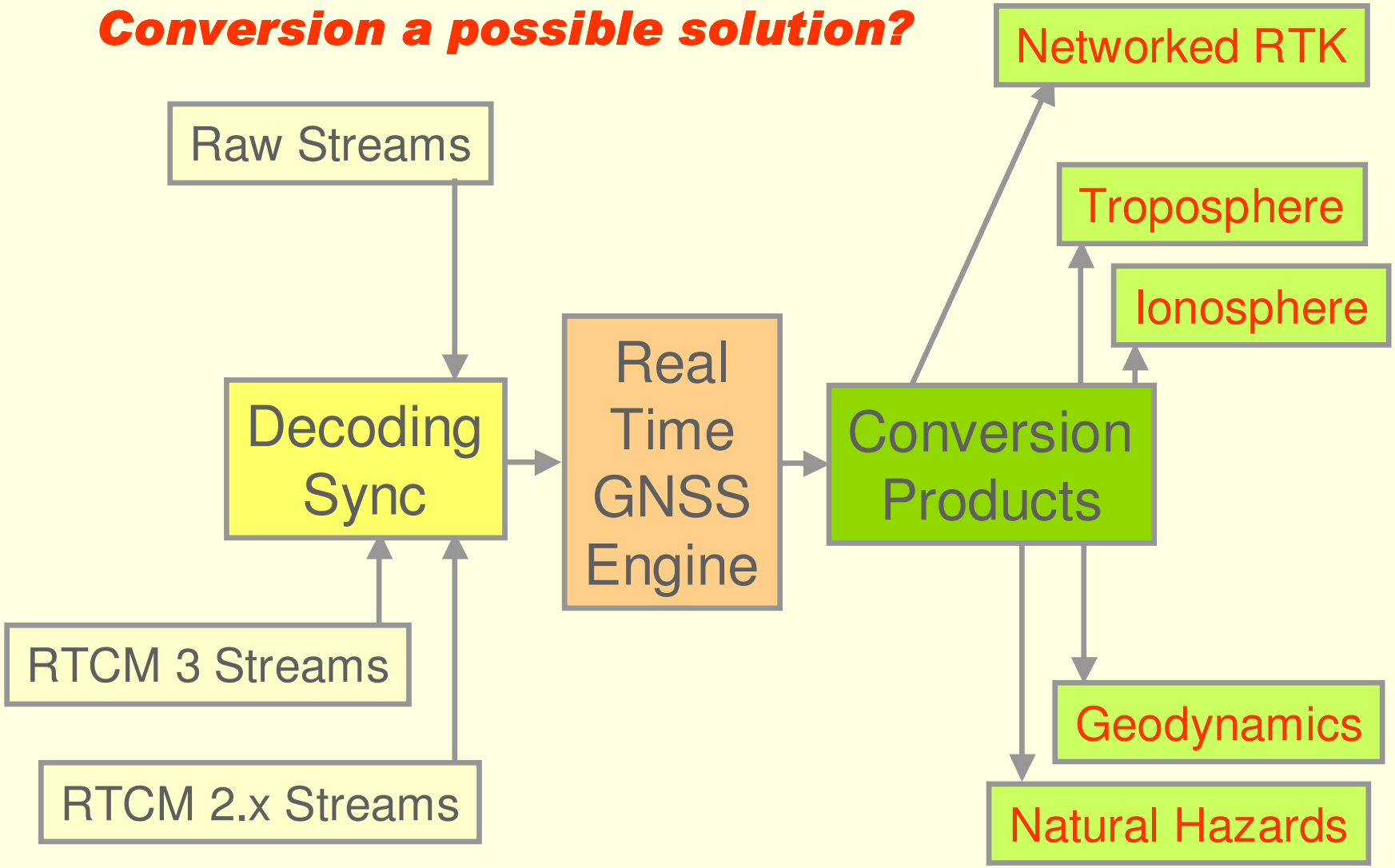
Real-Time GNSS Stream Conversion a possible solution?



Conclusions and Questions

- Developing a long range RTK software and provide High rate GPS data seems to be useful for various purposes
- EPN would be able to cover some demands of the public for mitigation of natural hazards
- EUREF should cooperate with national institutions and commercial agencies at all positions
- The question of legal entity of EUREF is still unresolved
- How should EUREF answer the requests of the Tsunami research group?
- Which financial sources could be provided for the future extended tasks?
- Will EUREF take the chance and the risk of being an absolute pioneer at the research fields mentioned above?