EUPOS (European Position Determination System) a Cooperation of 17 European Countries for Union Use of Spatial Data

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Introduction

- Standardization Activities of EUPOS
- Segments, Correction Types and Services
- Equipment and used transportation Layers
- Intrnational cooperation
- Exchange of Spatial Data
- Conclusions

SC-104 Differential GNSS Standardization

Participants include vendors, service providers, and government agencies from around the world

Standards are subjected to performance and interoperability testing prior to adoption and publication

Private Services Messages

The purpose of the private services messages is to have a secure coding/decoding mechanism which allows transmission of authentic data (charging...) and prevents re-broadcasting.

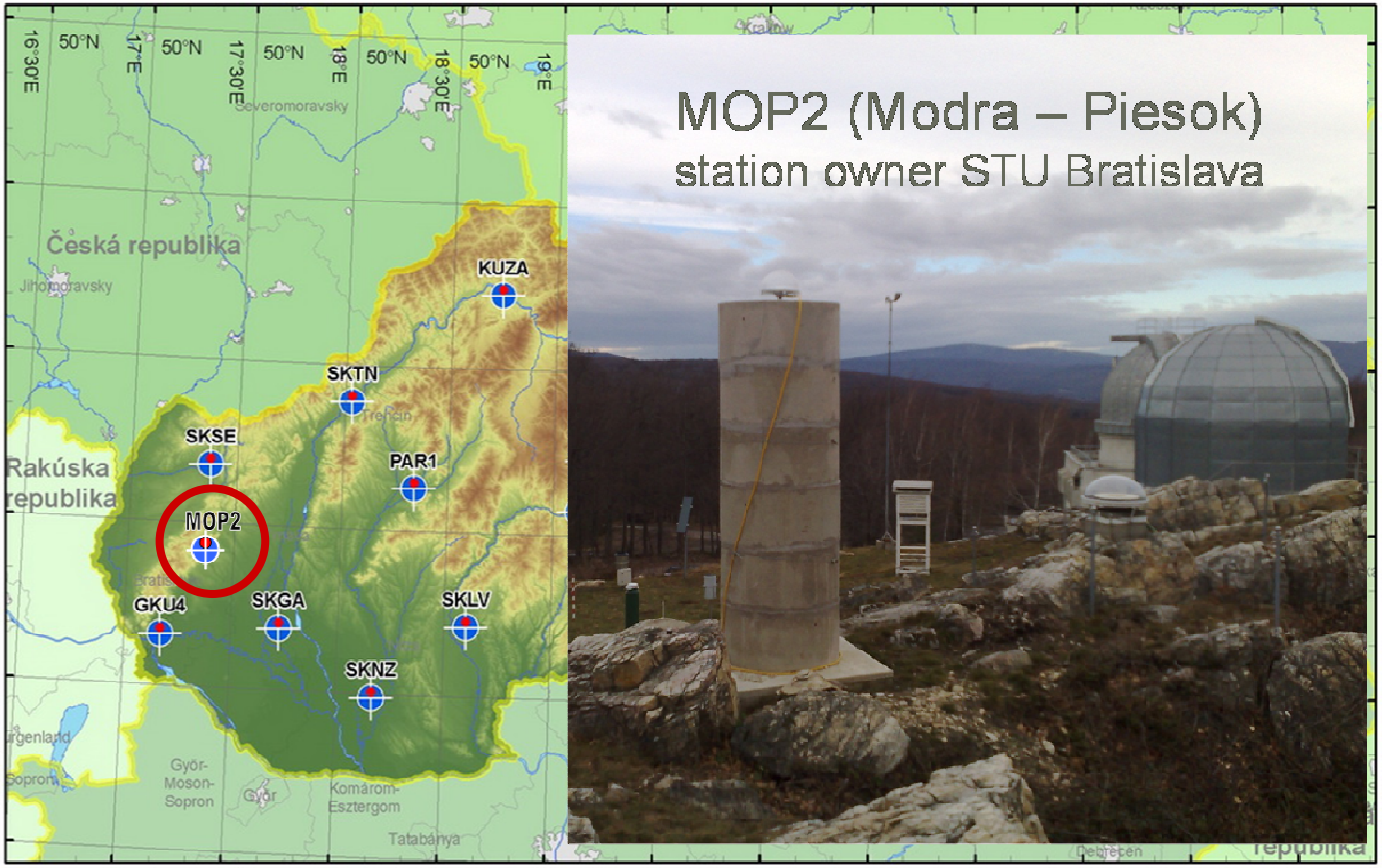
Private Massages Workflow

Operation

- During this phase the service provider broadcasts the RTCM messages through supported data links. The encryption of the messages is done with respective keys for different services and time periods. A registered user/rover selects the decryption key from the key table received through the registration phase which is indicated in the broadcasted messages. This phase is a pure broadcast **(uni-directional)** communication phase and does not require bi-directional communication between rover and service – “flat rate mode”.

- The transmission from the service provider consists of two basic parts:
(1) the encrypted data encapsulated in an RTCM message (1047), and
(2) message that informs the user of key-table changes (1048)

National Segments SK*POS* Slovakia

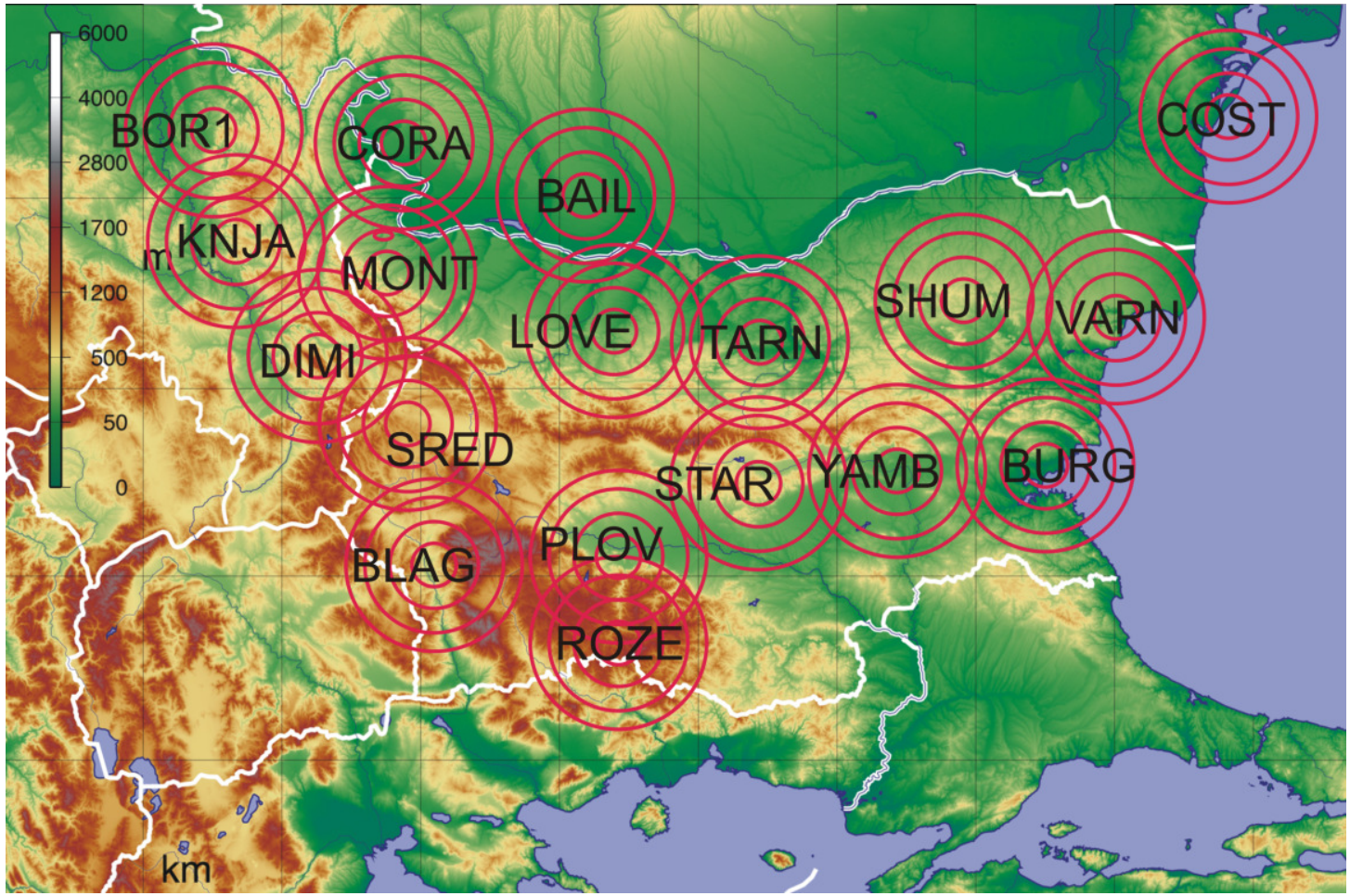


EUPOS Transmitted correction models

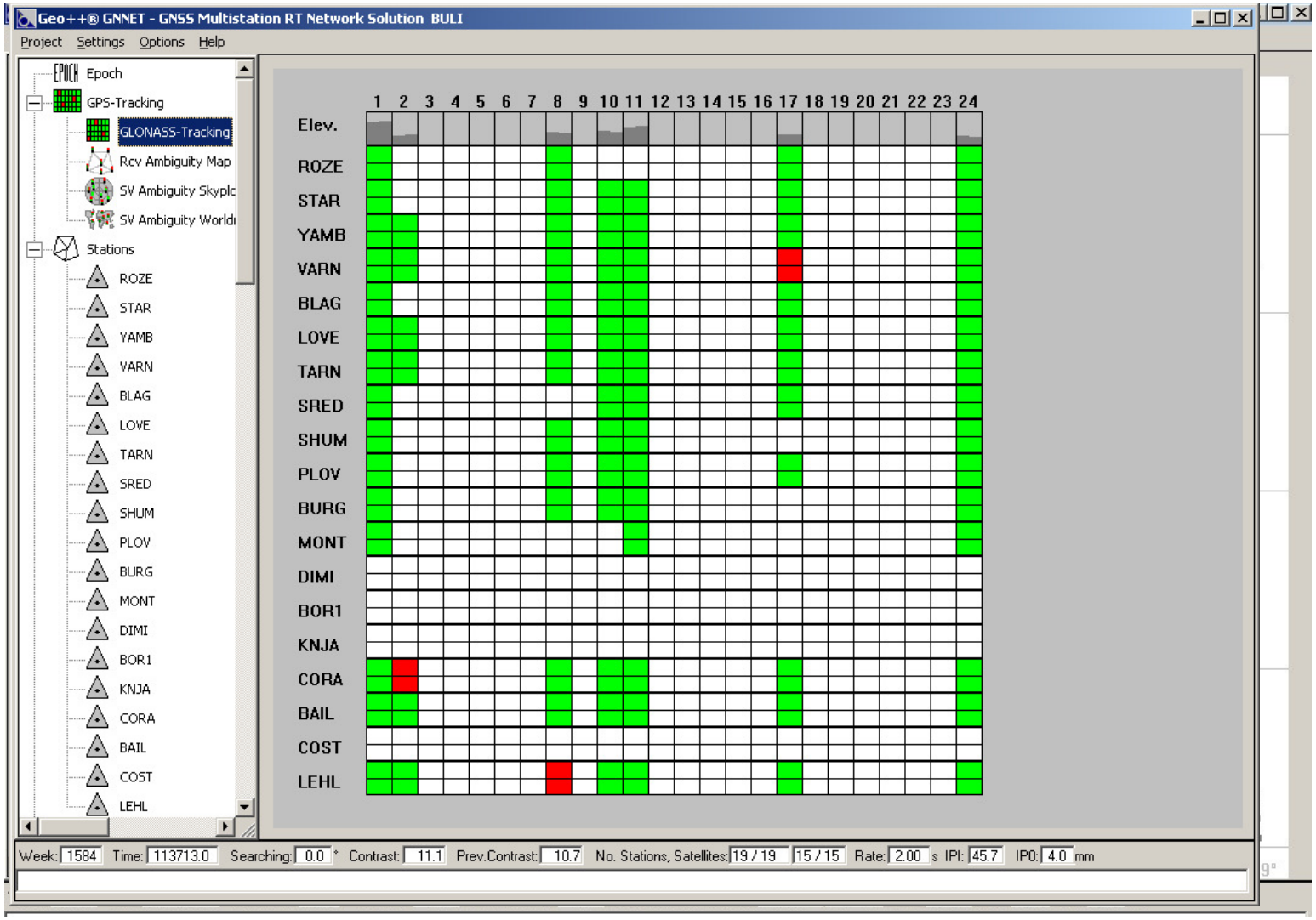
- FKP – area modeled corrections
- VRS – Virtual Reference Station (non physical ref. station)
- MAC – Master Auxiliary Concept

Flooding and disaster management projects along the Danube river

BULiPOS (BULgarian Intelegent POSition determination System)



EUPOS Balkan Region Transborder Interoperability



EUPOS Services

Service	Description	Accuracy	Format*	Transport Layer	DGNSS System
BULiPOS PP	Post processing	5 mm	RINEX	Internet	GPS+GLONASS
BULiPOS VS	Post processing virtuals station	5 mm	RINEX	Internet	GPS+GLONASS
BULiPOS RT Precise	Real time processing high accuracy	<2 cm	RTCM 2.x, RTCM 3.x	GSM, GPRS	GPS+GLONASS
BULiPOS RT	Real time processing	0,5-3m	RTCM 2.x, RTCM 3.x	GSM, GPRS	GPS+GLONASS

Typical used Rovers and standardized exchange formats

Topcon GRS-1	Trimble R6	Trimble Geo XH	Leica GPS 900	Magellan / Ashtec ProMark 500	Spectra Epoch 35
					
72 RTCM 2.3, 3.* CMR/ CMR+	72 RTCM 2.3, 3.1 CMR/ CMR+	26 RTCM 2.3, 3.0	72 (54) Leica / CMR/ CMR+	75 RTCM 2.3, 3.1 CMR /CMR+	54 RTCM 2.3, 3.0 CMR

Spatial Data Definition

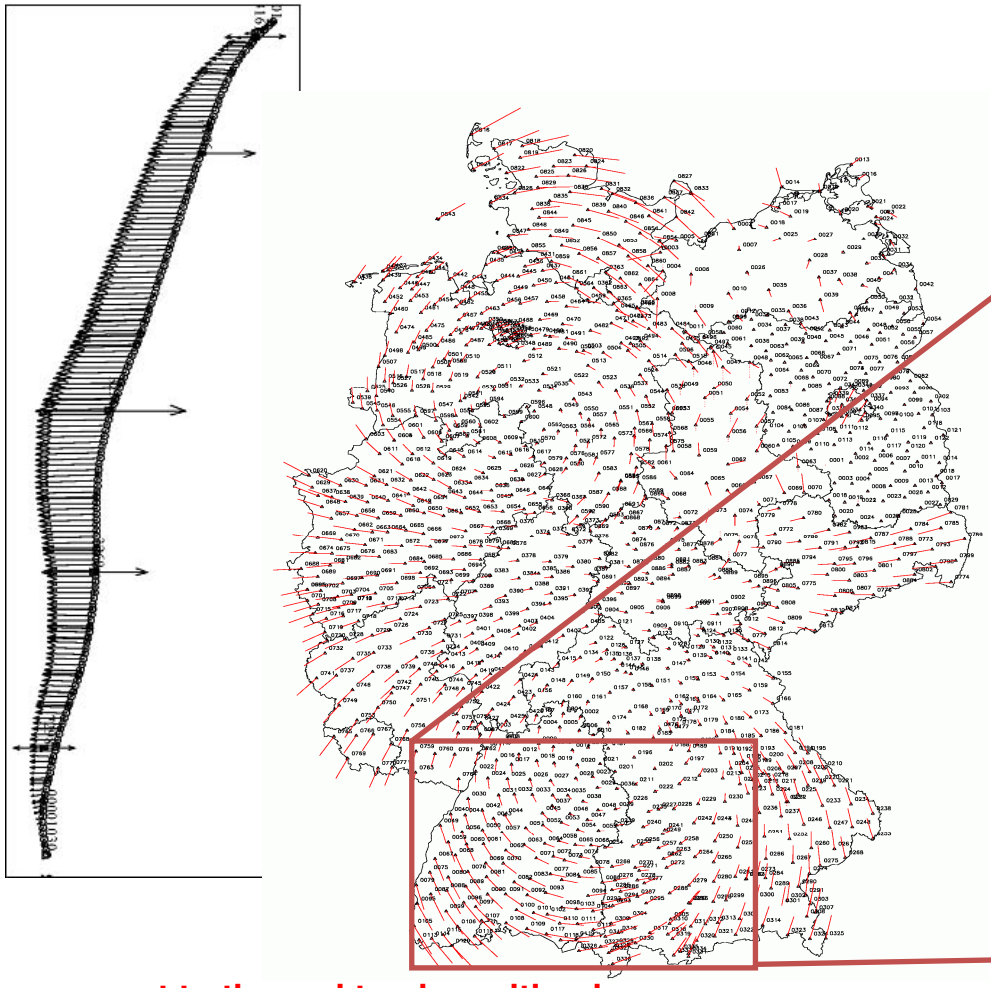
- Also known as *geospatial data* or *geographic information* it is the data or information that identifies the geographic location of features and boundaries on Earth, such as natural or constructed features, oceans, and more. Spatial data is usually stored as coordinates and topology, and is data that can be mapped. Spatial data is often accessed, manipulated or analyzed through Geographic Information Systems (GIS).

Why Homogenous Reference Frame ETRF89?

Spatial Data are:

- non-homogeneous, inconsistent databases and documentation
- network distorsions in former systems
- inadequate for modern surveying techniques
- satellite-based techniques not easily integrated
- no uniform transformation regulations
- different coordinate systems applied national- and European wide

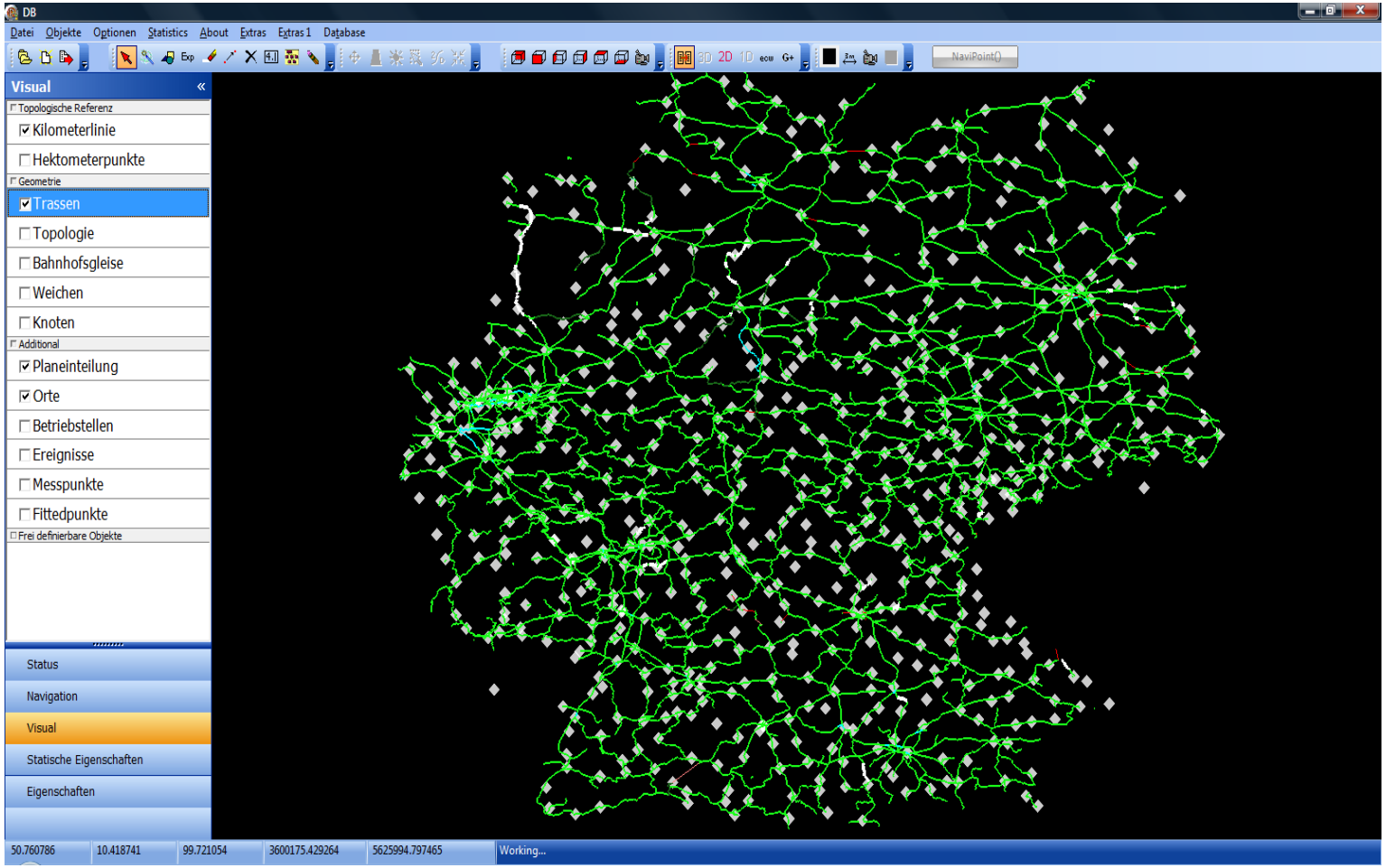
Non homogenous DHDN System ⟺ ETRF 89



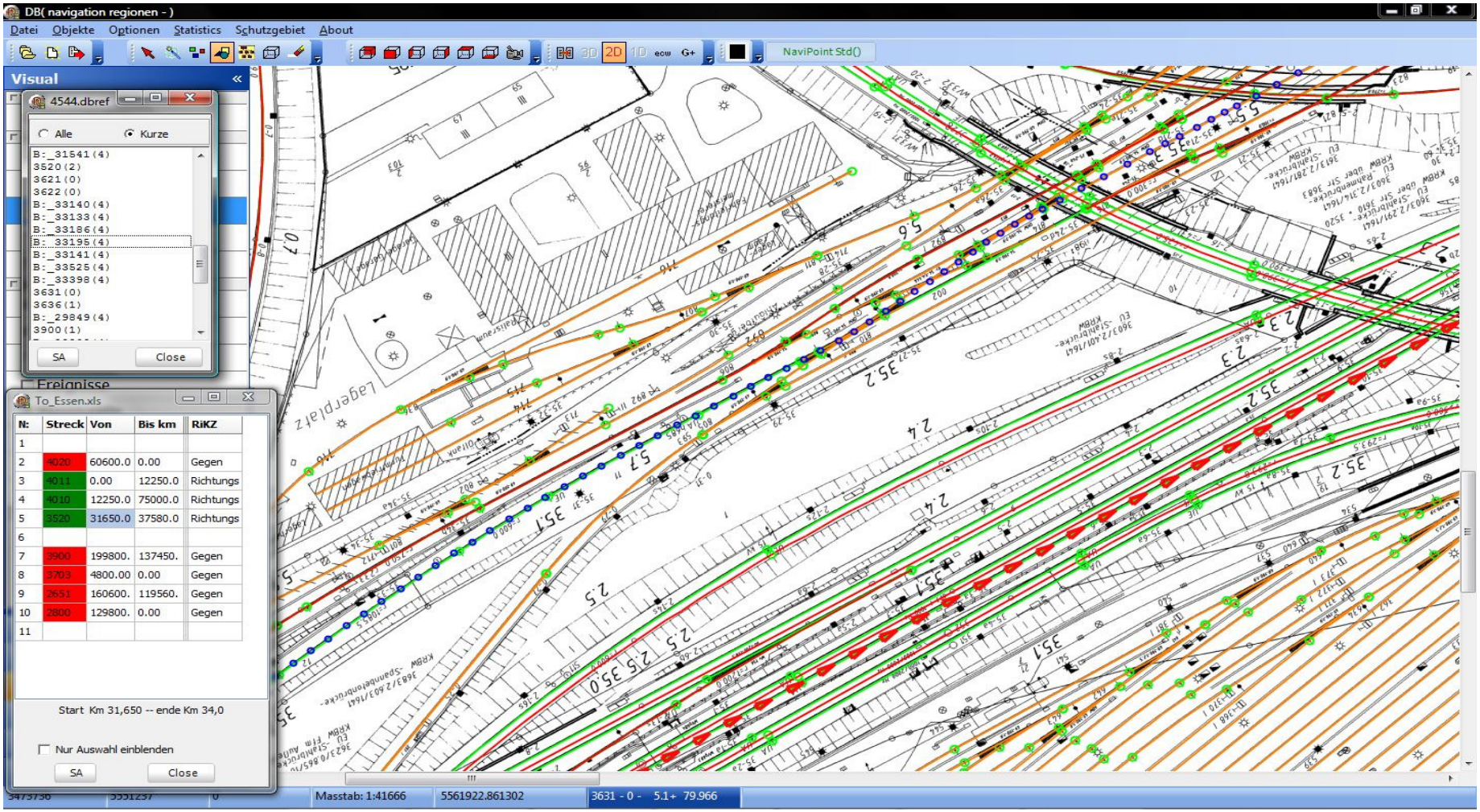
Vector size ~ 0,5 bis ~3 m

movement to the real track position by fixed point surveying

ETRS based railway spatial database for rising the quality and performance by the infrastructure maintenance

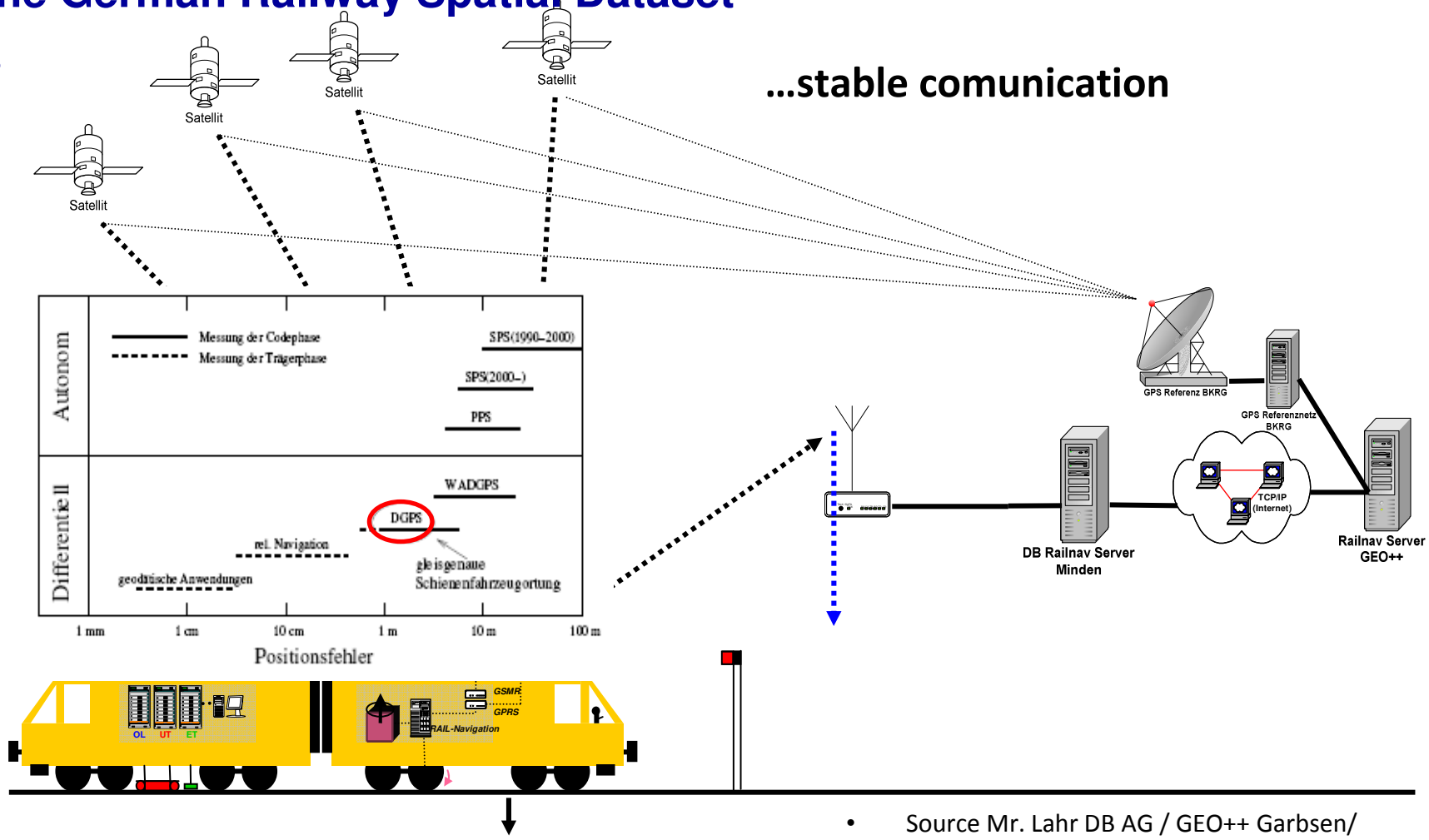


Railway Navigation – Intelligent transport system (ITS)



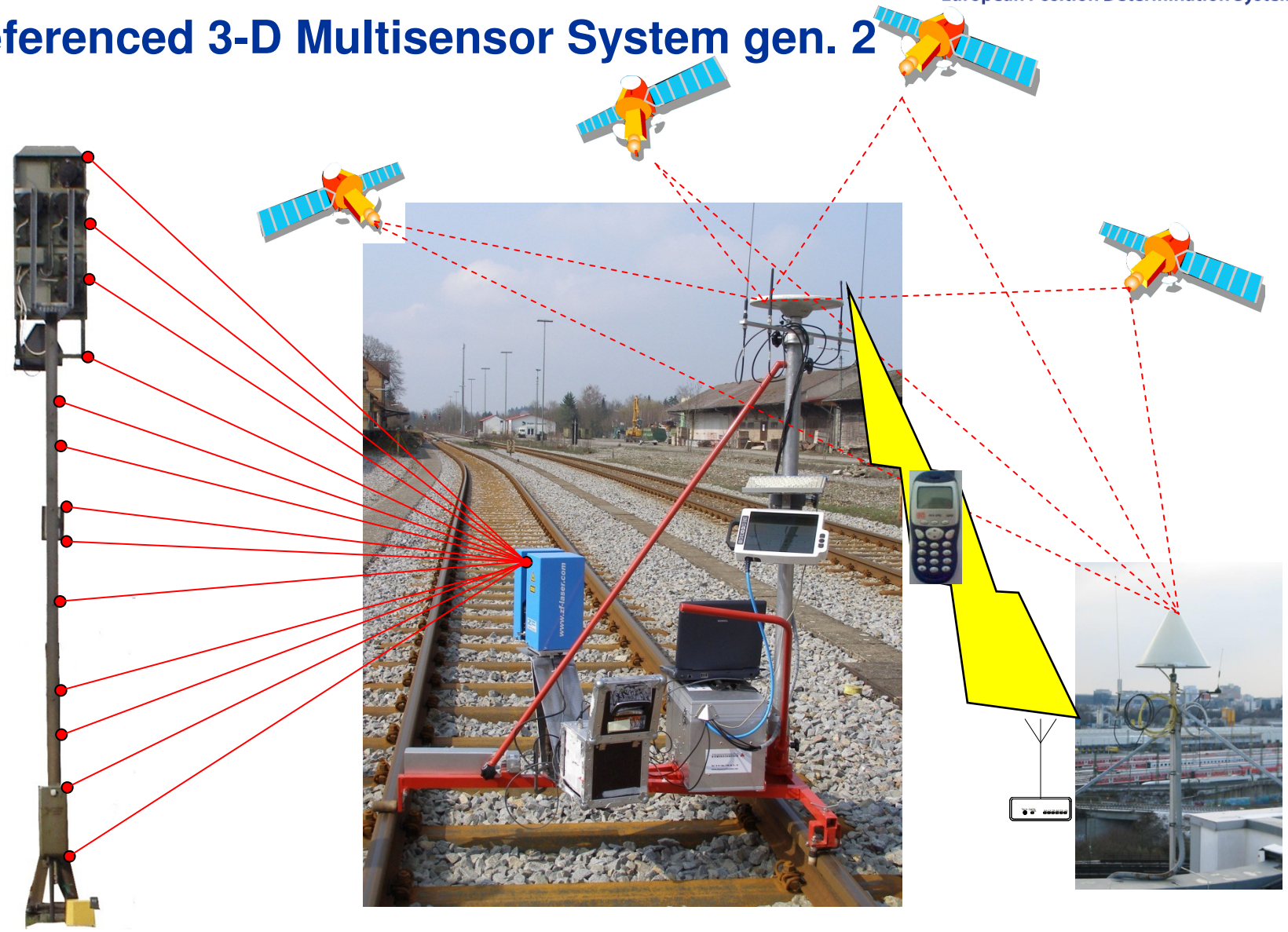
EUPOS/SA*POS*-based Vehicle Scheduling and Control System by the German Railway Spatial Dataset

- …stable comunication



- Source Mr. Lahr DB AG / GEO++ Garbsen/

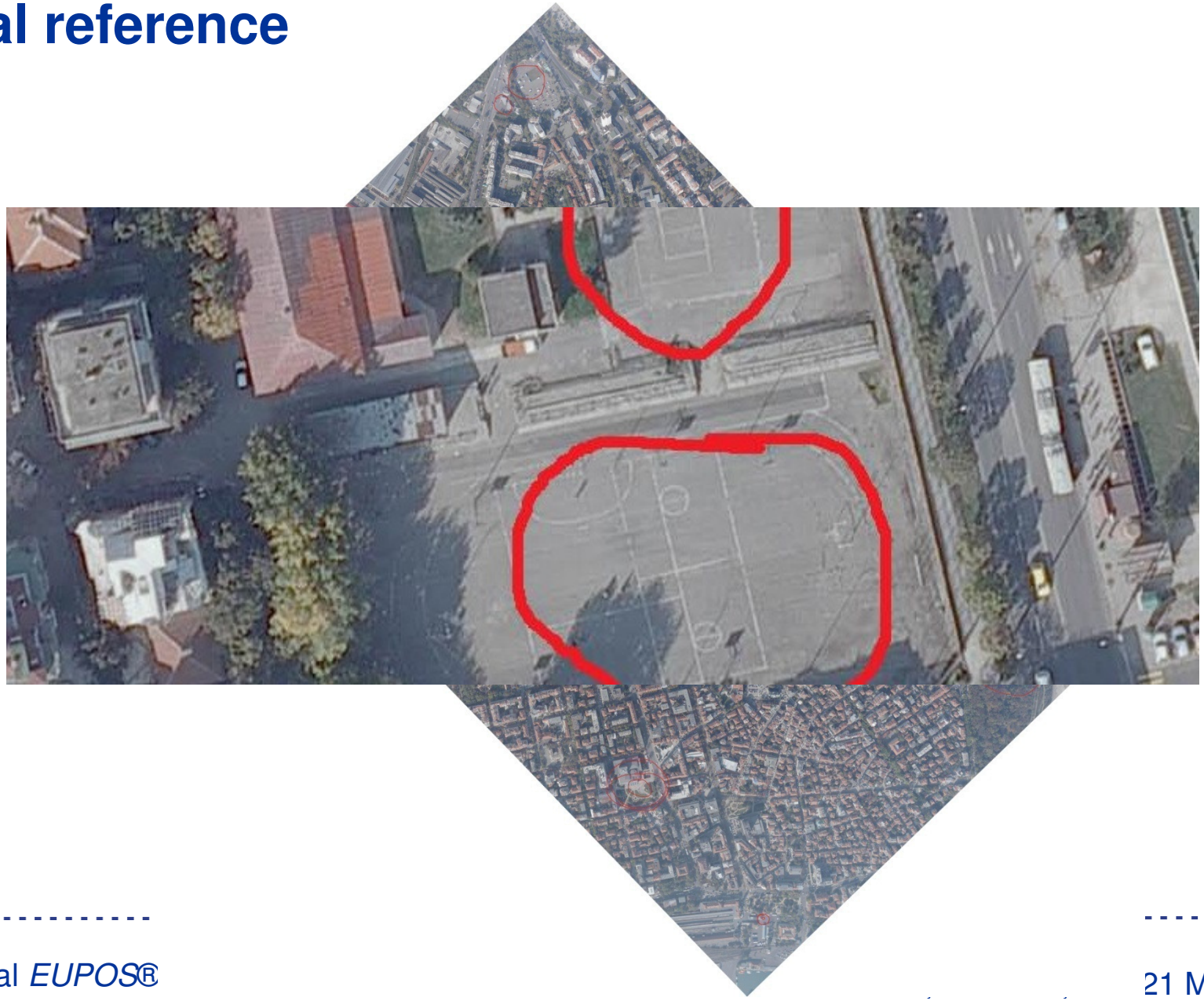
Georeferenced 3-D Multisensor System gen. 2



DGNSS Based Multi Sensor Navigator for Railway State Monitoring

Erosion and Bathymetric Monitoring on the Black See Coast by the Blom Remote sensing Group

Spatial reference



Conclusions

EUPOS
European Position Determination System

Reduce the costs by buying only a base – option - second rover.

Very quick solution fixing using a good reference network design

Reducing the need for searching reference points.

Easy agreement with the neighbor countries because it is a community based on the same interests

Full coverage in the border regions – homogeneous

The customer profits from this level of standardization

Action is needed in the spatial data exchange

EUPOS is a integrated part of the development of DGNSS infrastructure and rises the acceptance for the exchange and common use of spatial data use ITRF/ETRF as common Frames

Thank you for your attention!

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