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Role of Reference Frames in a Dynamic World

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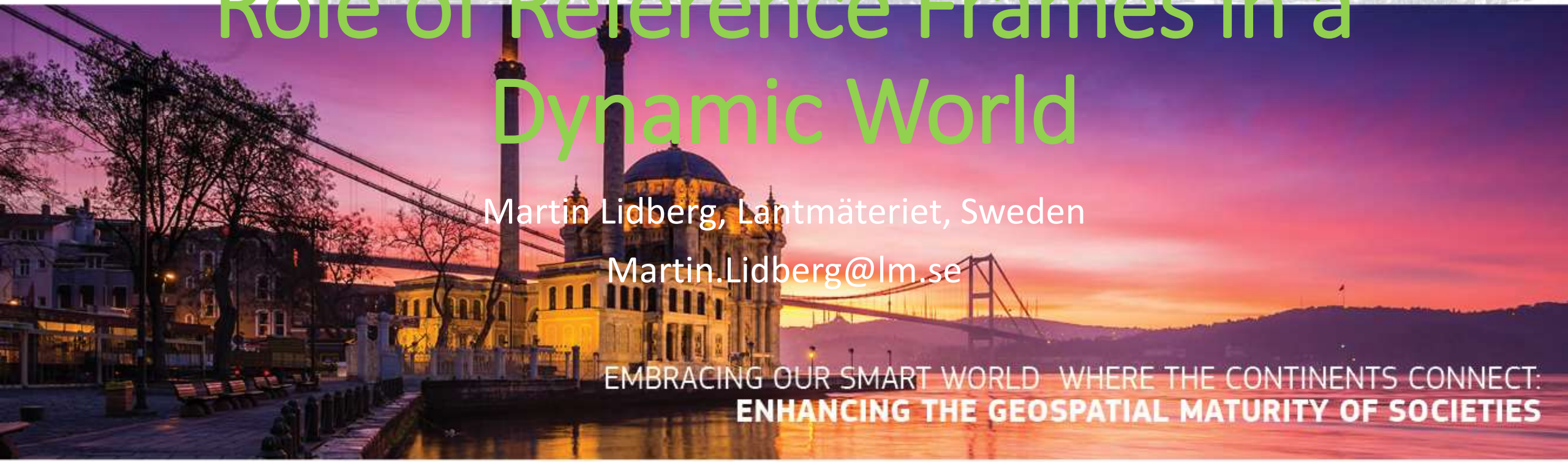

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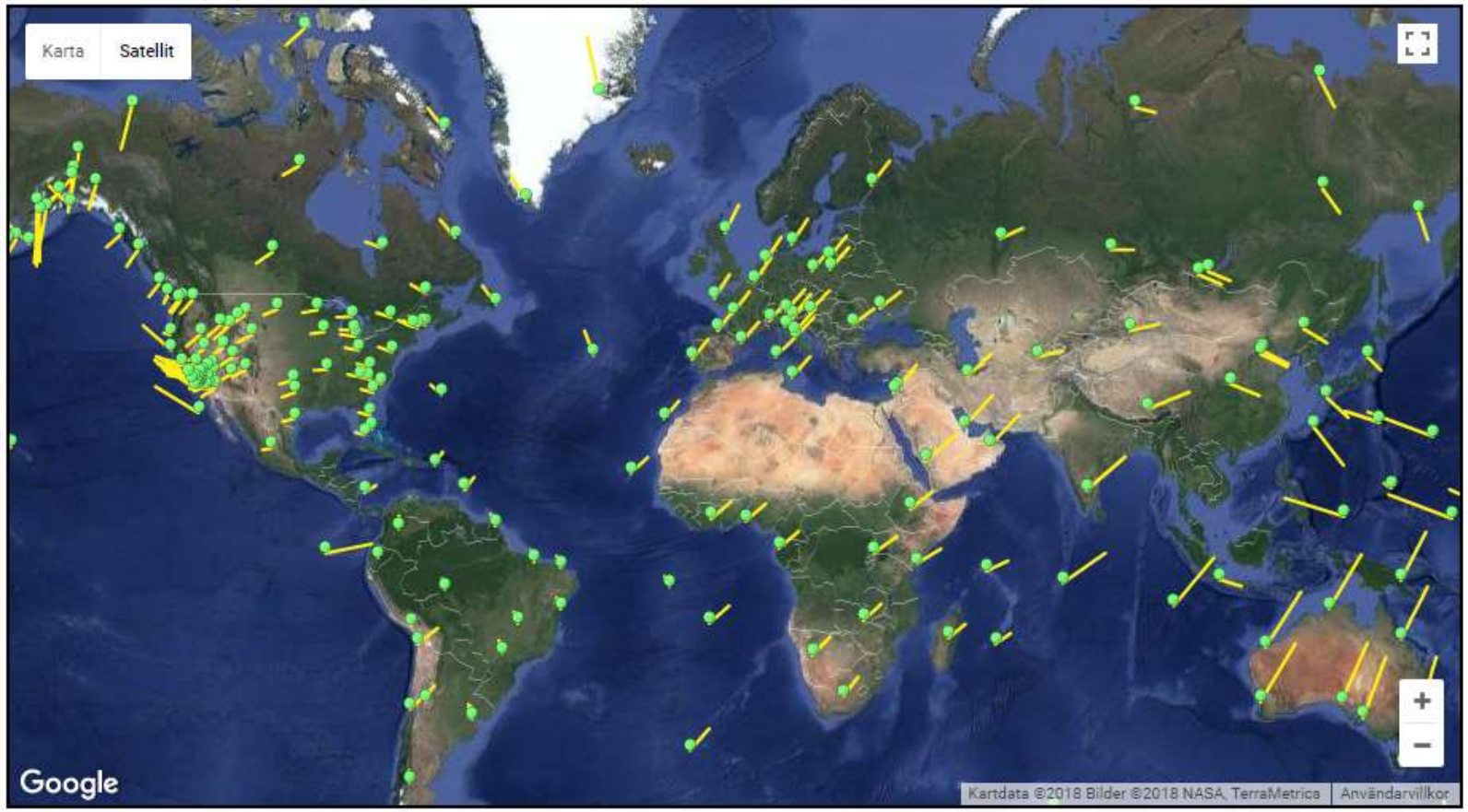
Assumed scenario

Within 3 yr?

- **Precise positioning services** available for the wider consumer market
  - e.g. using PPP from Galileo Commercial Service
  - or initiatives like Sapcorda Joint Venture
  - Work in progress to incorporate precise GNSS services in the standards for mobile phone communication (3GPP)
- These services will be consumed together with **precise spatial information** (geodata)
- The spatial information will be streamed in real-time to the user
- Position and data must be in the same Geodetic Reference Frame!

The dynamic earth



- Plate tectonic motions usually at **some cm/yr**
- Earth quake events, **meter** level deformations locally/regionally

Choice of appropriate Reference Frame

Dynamic, semi-dynamic, or static reference frame?

…well.. (and the winner are.. ;-)

- Use recent ITRF in current epoch (dynamic/kinematic frame)

or

- A frame “fixed” to a part of the earth crust or a tectonic plate

Two principles

In presence of crustal deformations

Time tag everything!

Whatever concept for geodetic reference frame we implement,

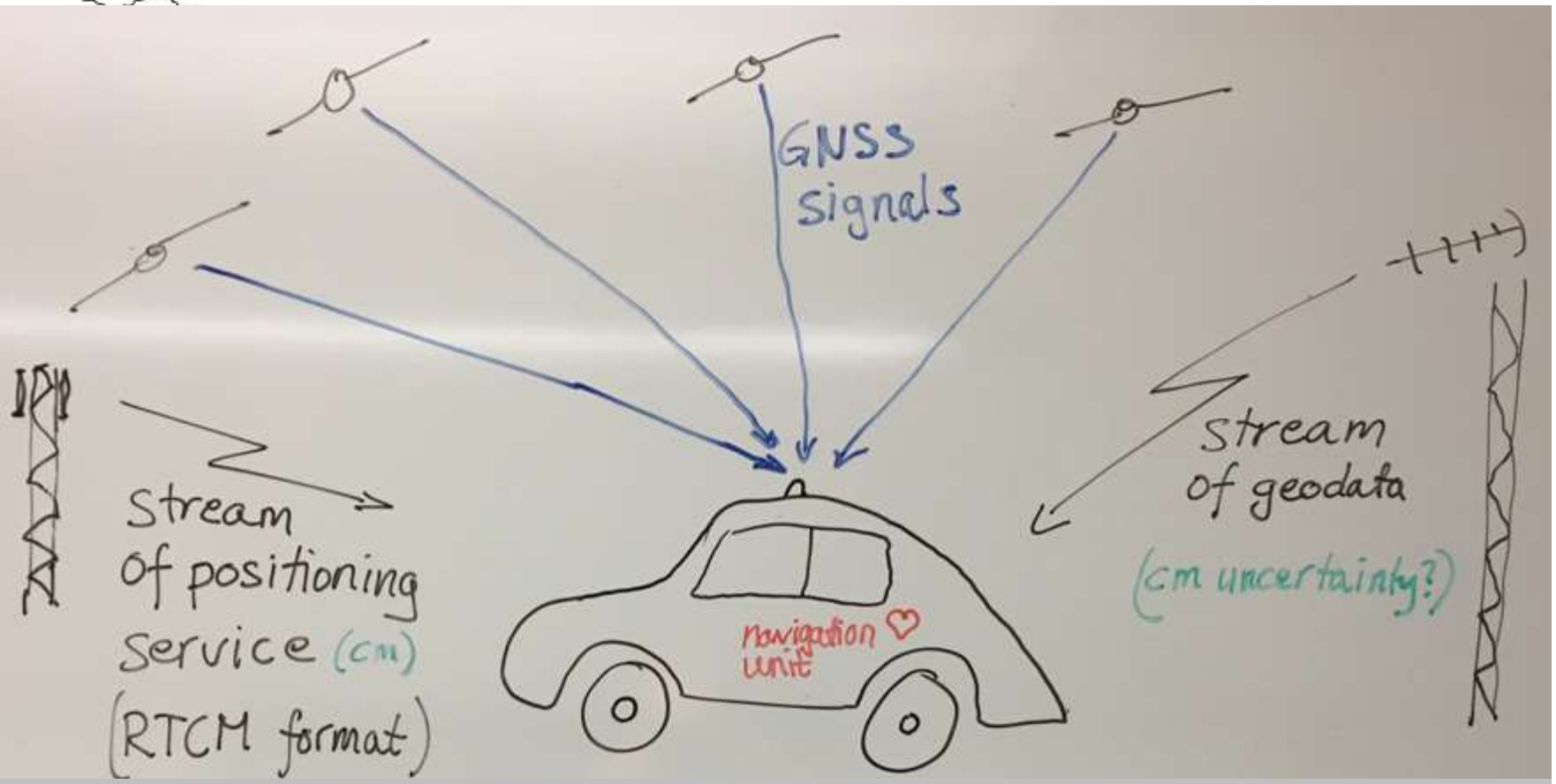
The knowledge of the crustal deformations are crucial!

The transition from “current” to “future”

- The currently used geodetic reference frames are usually somehow “fixed to the ground” or an epoch realization of ITRF (“static” frames)
- We have enormous amount of important spatial related information that are based on the existing reference frames

- Message to geodetic authorities – make sure that the **precise relation** between the **existing frames** and recent **ITRF** (ITRF2014) are known (through transformations and deformation models)

Standardization issues!



"Autonomous Navigation Integrity Monitoring"

The navigation unit needs to be able to verify that geodata and positioning service use the same reference frame!

Therefore we need reference frame information in the data streams.

And we need to include this possibility in our standards!