SubCoast

Building services for monitoring hazards from ground subsidence in coastal lowlands

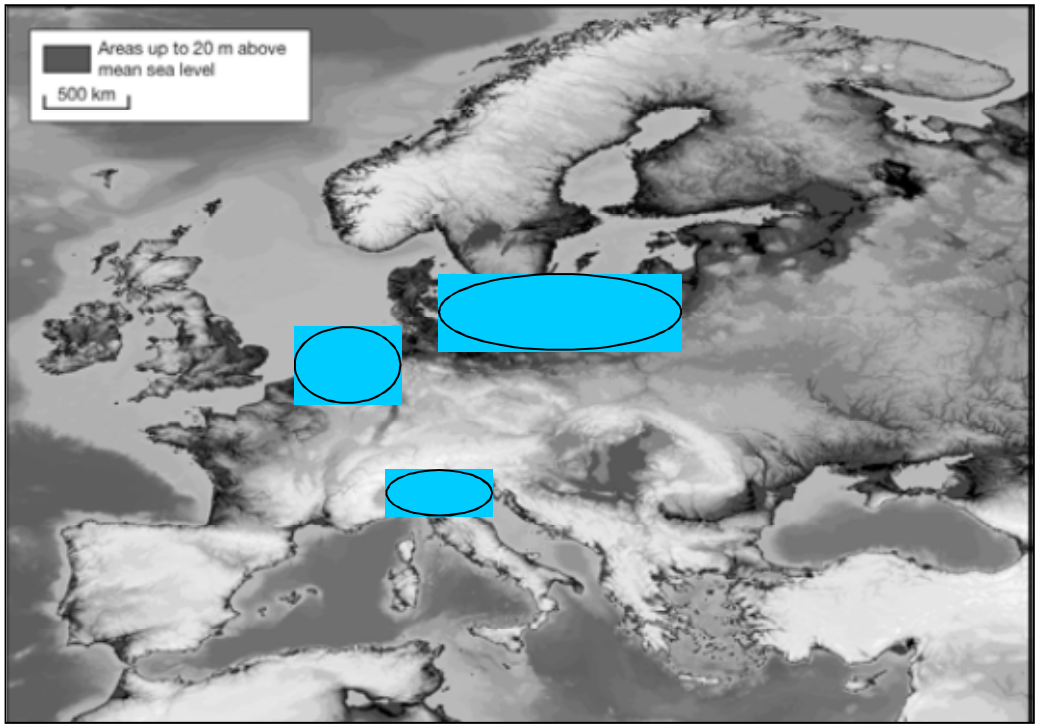
Rob van der Krogt

EuroGeo, 15th June 2012, Bologna

Hansje Brinker Dijkmonitoring

SubCoast Project

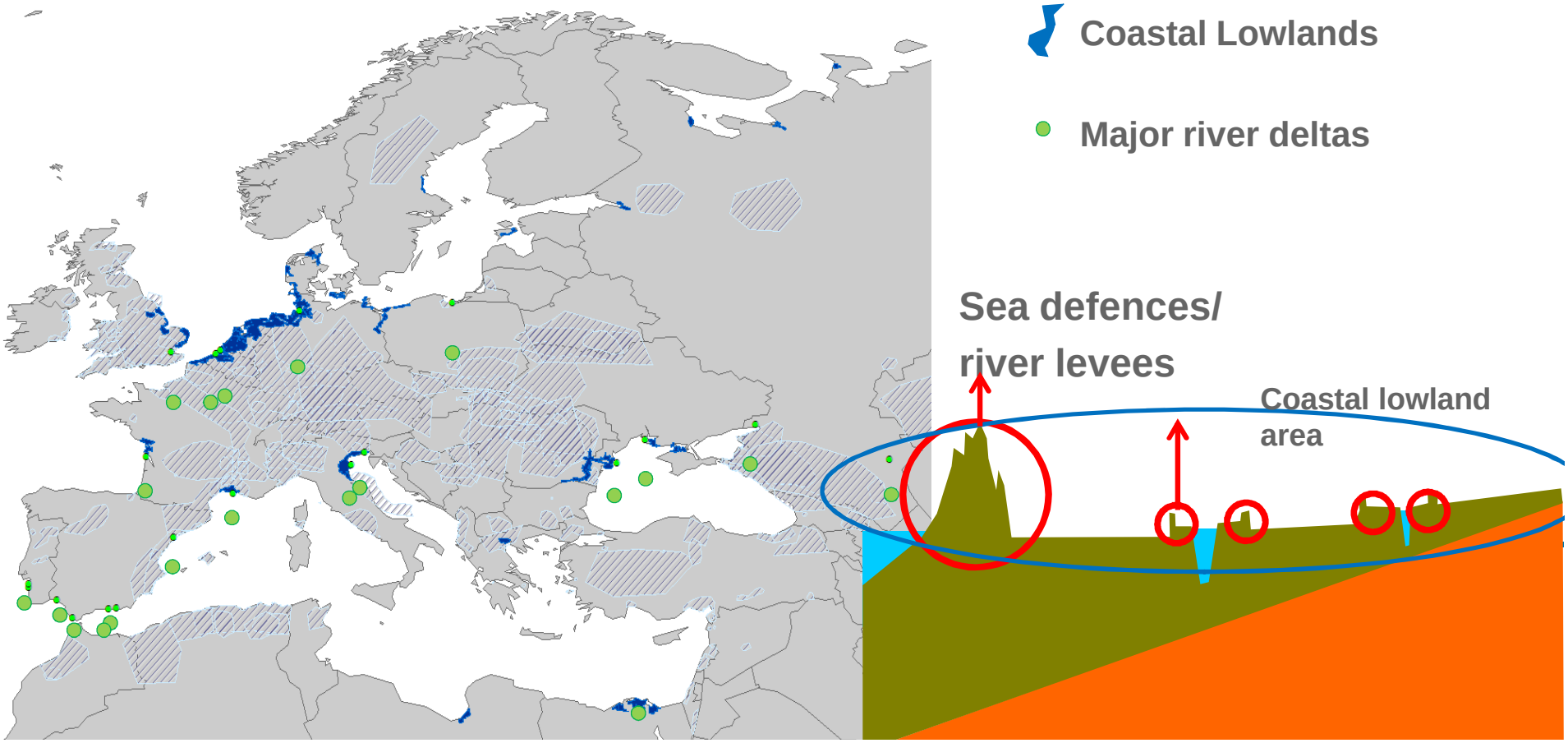
FP7 project to demonstrate GMES downstream (satellite) services for monitoring and forecasting subsidence hazards in coastal areas in the EU



- Project 4.1 MEUR
- Start: April 2010
- End: November 2013
- 12 partners, 7 countries
  - 5 geological surveys
  - 3 commercial data processors
  - 3 geomatic research institutes
  - 1 value adder

SubCoast: Scope

- Coastal Lowlands prone to flooding *and* subsidence
- Flood defences in coastal lowlands prone to subsidence



Causes of subsidence in coastal lowland areas

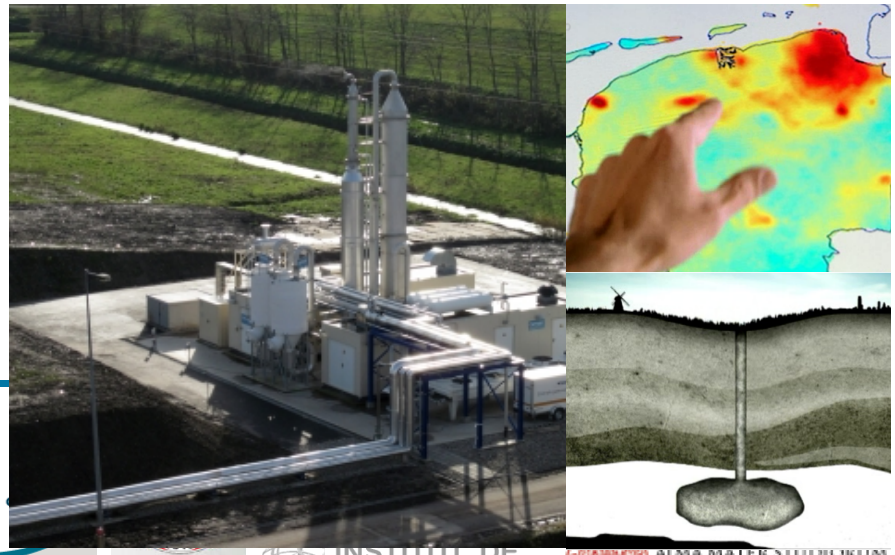
Compaction

Oxidation

ground water extraction, etc.

‘Deep’ instability

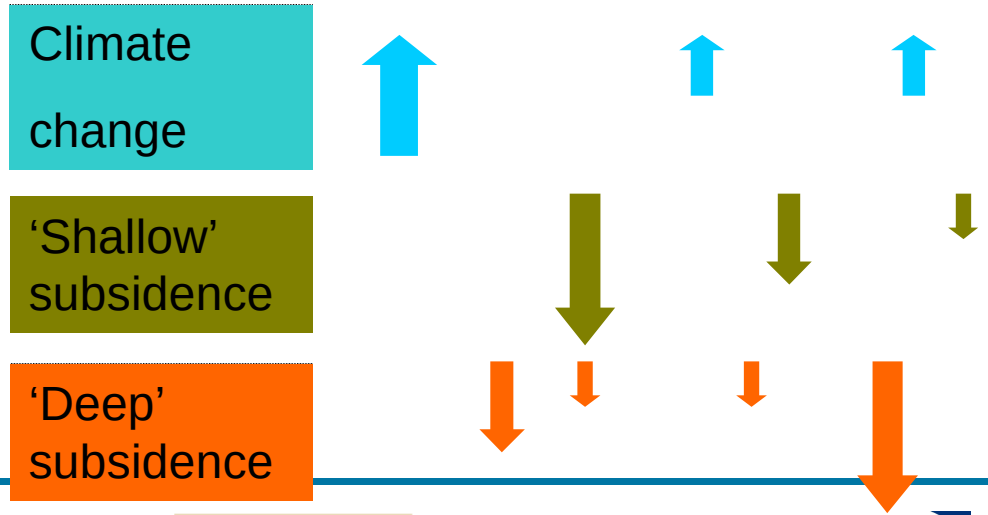
Mining, oil, gas extraction, etc.



Coastal Lowland Subsidence and Flood Defence

Increasing Flood Risk through combination of:

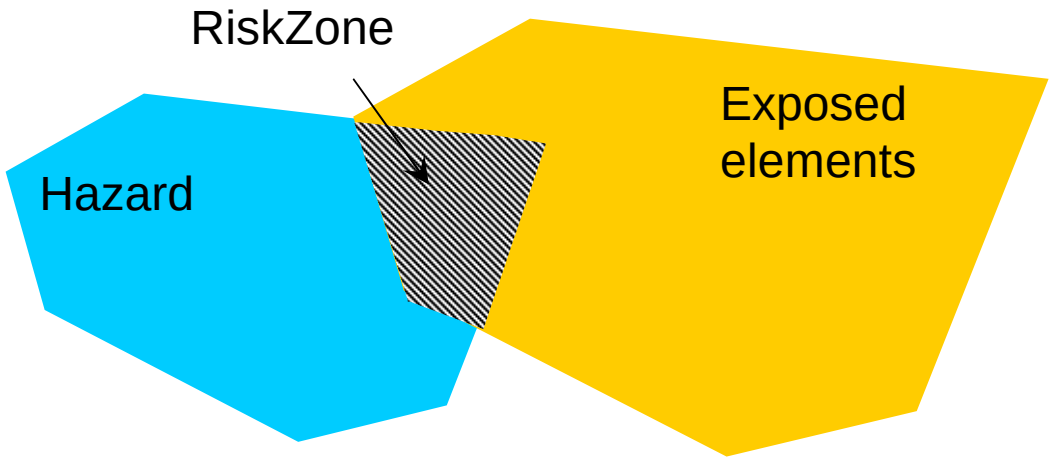
- Sea level rise (Climate Change)
- Ground subsidence
- (in-)Stability of flood defences



In terms of INSPIRE:

Risk zone:

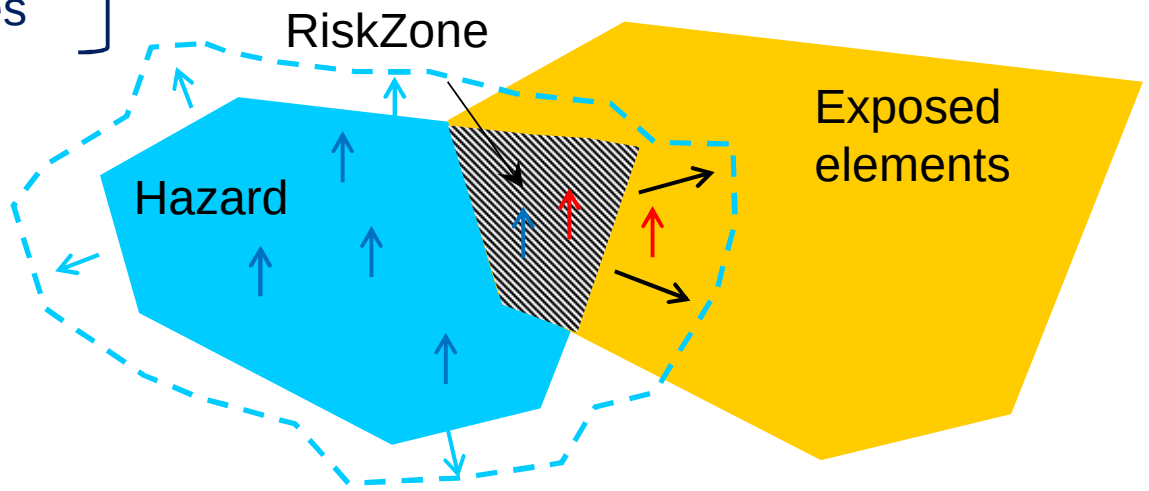
Coincidence (natural) hazard and (vulnerable) exposed elements



Subsidence (+ SLR) causes:

- Increase of hazard area
- Increase of hazard probability
- Increase of risk zone
- Increase of consequences

→ Increase Flood Risk

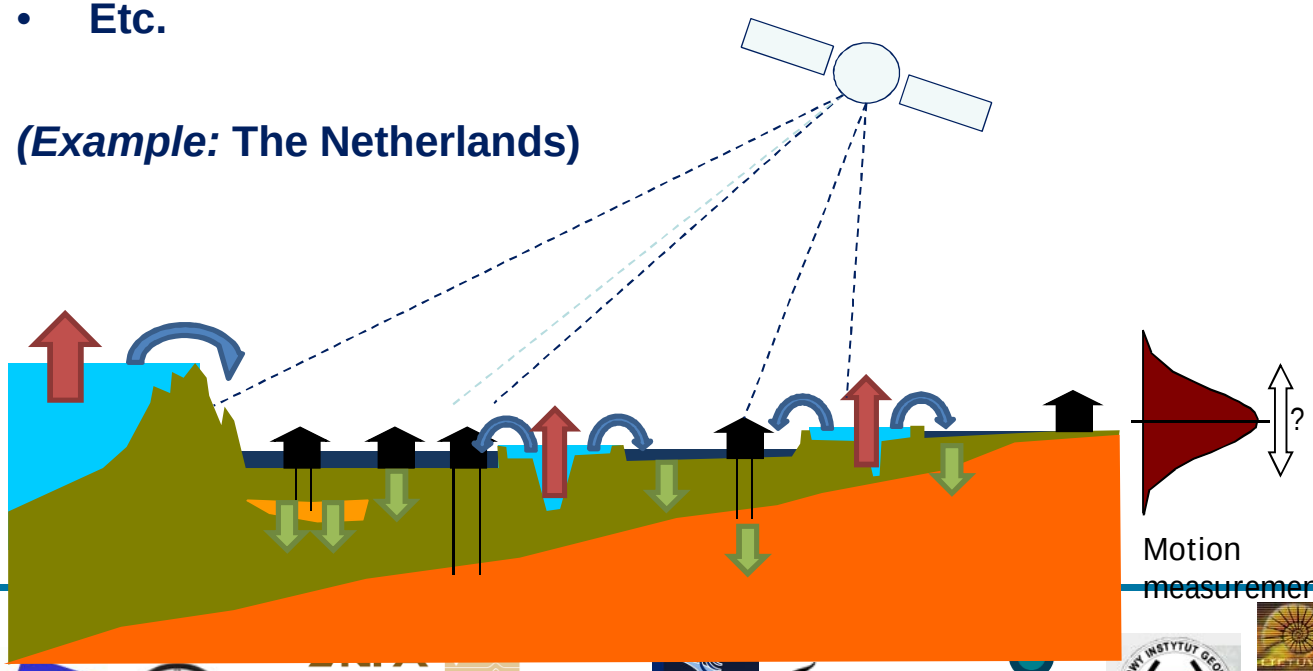


Role of EO techniques:

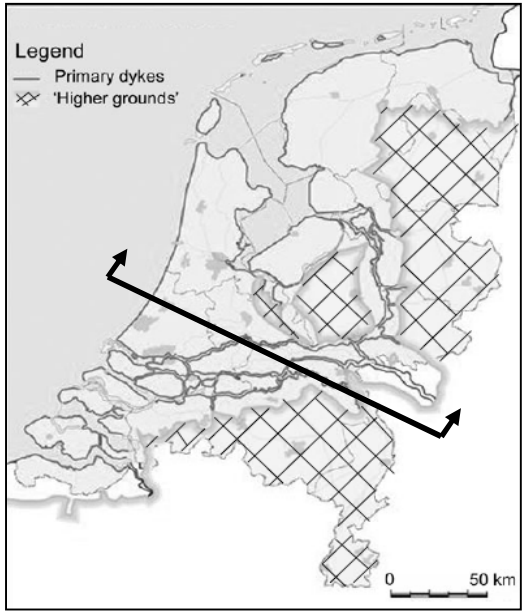
(PSI, combined with leveling, GPS, geological data,…)

- **Area wide subsidence monitoring**
- **Monitoring flood defences**
- **Validation of geo-hydrological subsidence models**
- **Etc.**

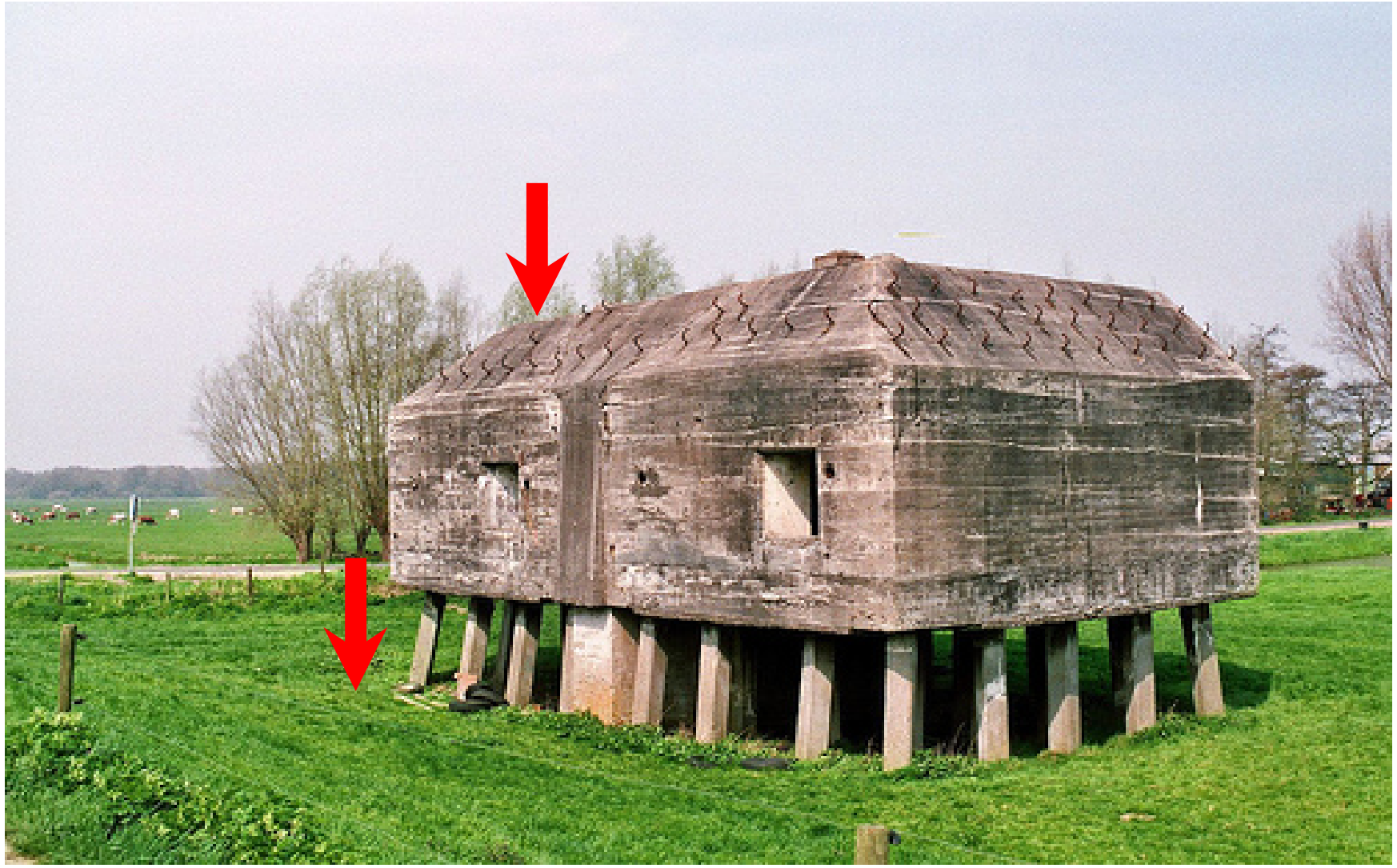
***(Example:* The Netherlands)**



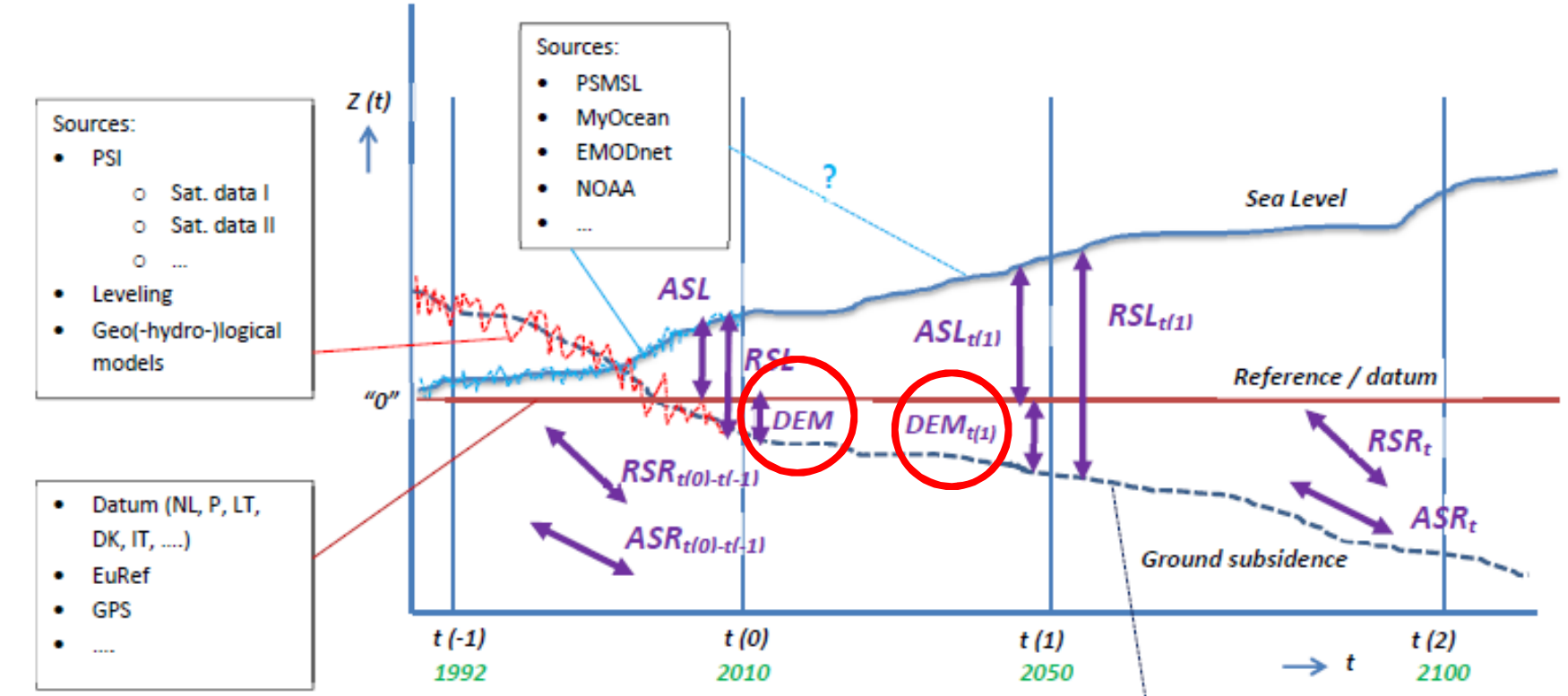
Motion measurements



Can PSI help?



SubCoast Services



Products/ services
- DEM
- ASL ("absolute " sea level)
- RSL (("relative"sea level)
- RSR ("relative" subsidence rate)- to sea level
- ASR ("absolute" subsidence rate)

Products/ services – scenario's
- DEM$_t$
- ASL $_t$
- RSL $_t$
- RSR $_t$
- ASR $_t$

Sources:
- Geo(-hydro-)logical models

Combined with:
- PSI
- Leveling

Subcoast Services

“Core” Service: ⟶ ***other services can be derived***

“Delta-DEM” or “•-DEM”:

Elevation as a function of time,

at high precision and high resolution scale

(DEM= Digital Elevation Maps)

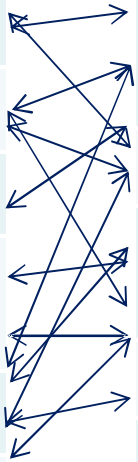
Including:

- Ground motion/ subsidence forecasts
- Connection to geodetic reference systems

Subcoast services

Potential applications and users:

Applications (Terrafirma, SubCoast)
Flood plain PSI wide area maps
Flood plain local subsidence maps
Flood defence monitoring product
Advanced subsidence modelling products
Relative sea level rise maps
+ subsidence forecasts
….



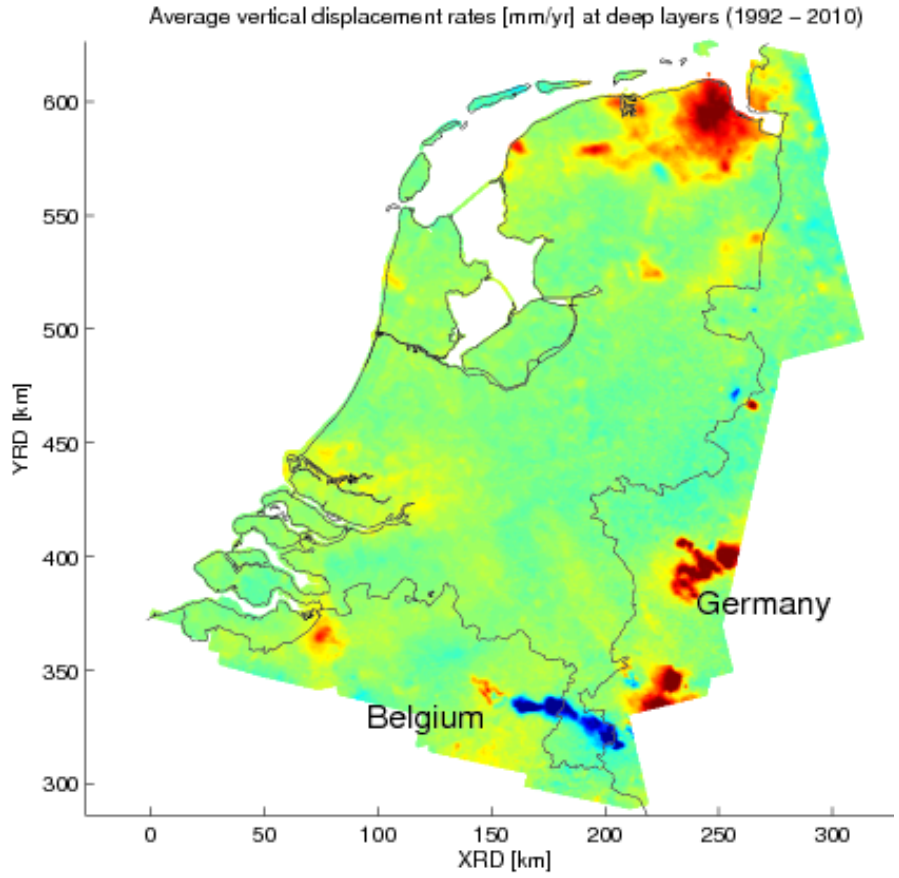
Potential Users
Diverse departments from local and regional authorities
Water boards
Diverse national governmental departments
European Agencies and DG's
Research institutes
….

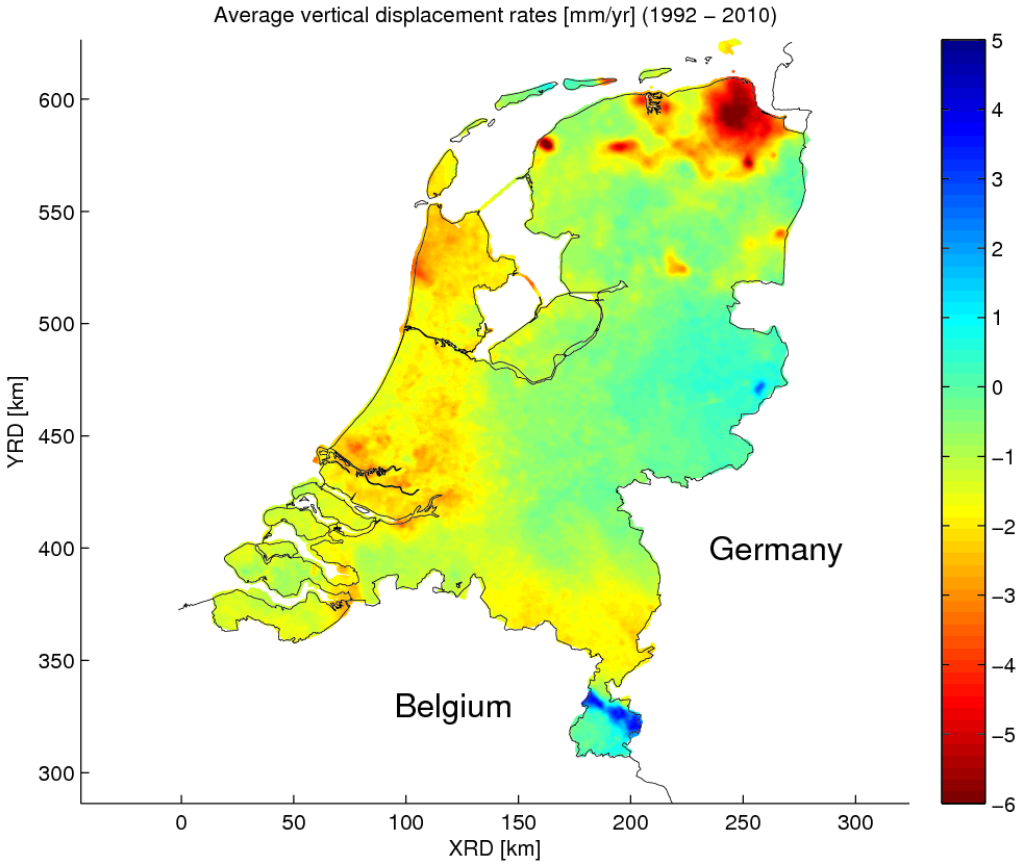
→ **Poster Presentation**

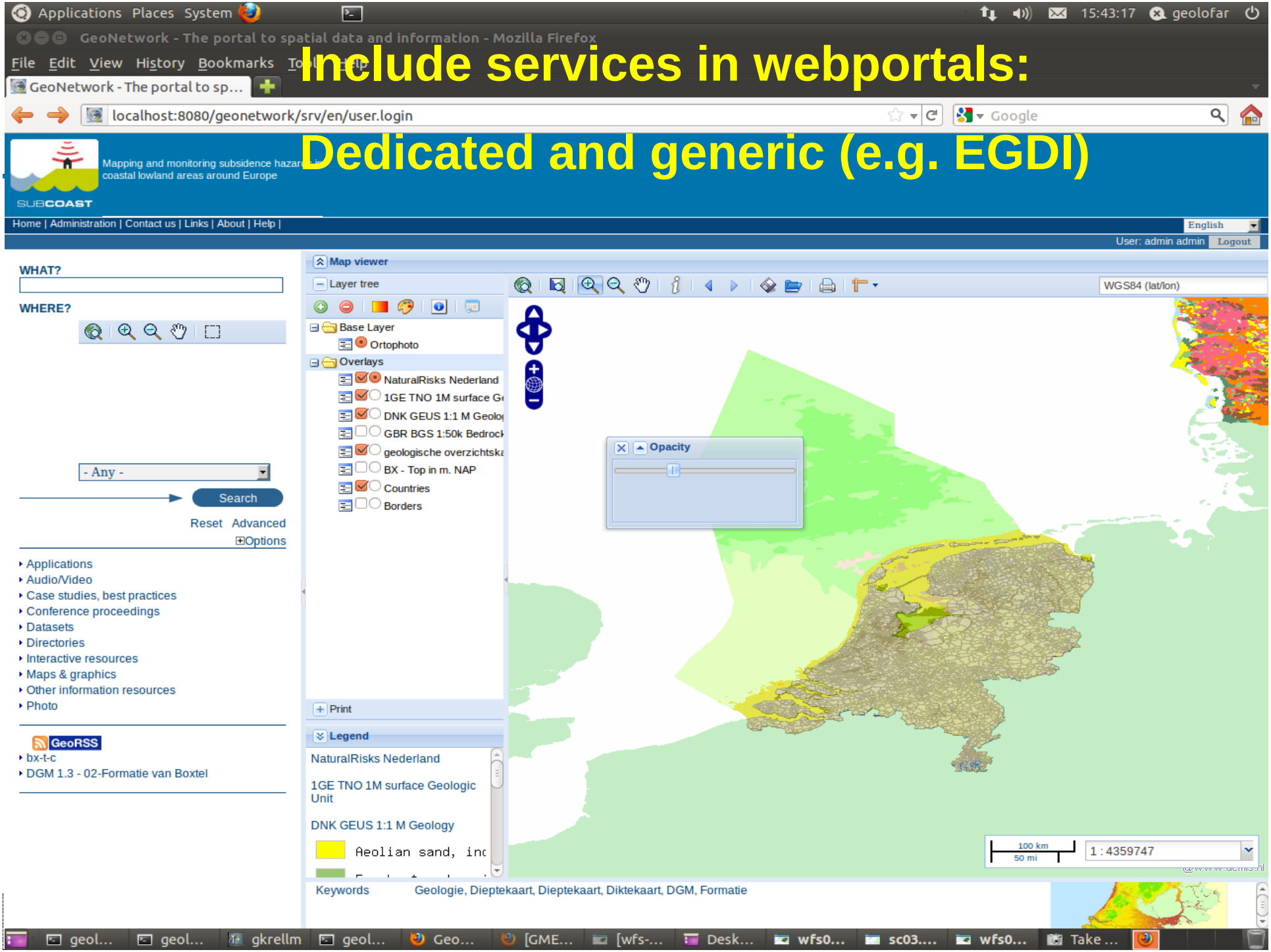
Univ. Bologna; Deltares

- ***EO-applications are in many cases intermediate products within workflows of end users***
- ***Valid applications need knowledge of objectives and workflows of users***

Example: Nation wide subsidence map of the Netherlands



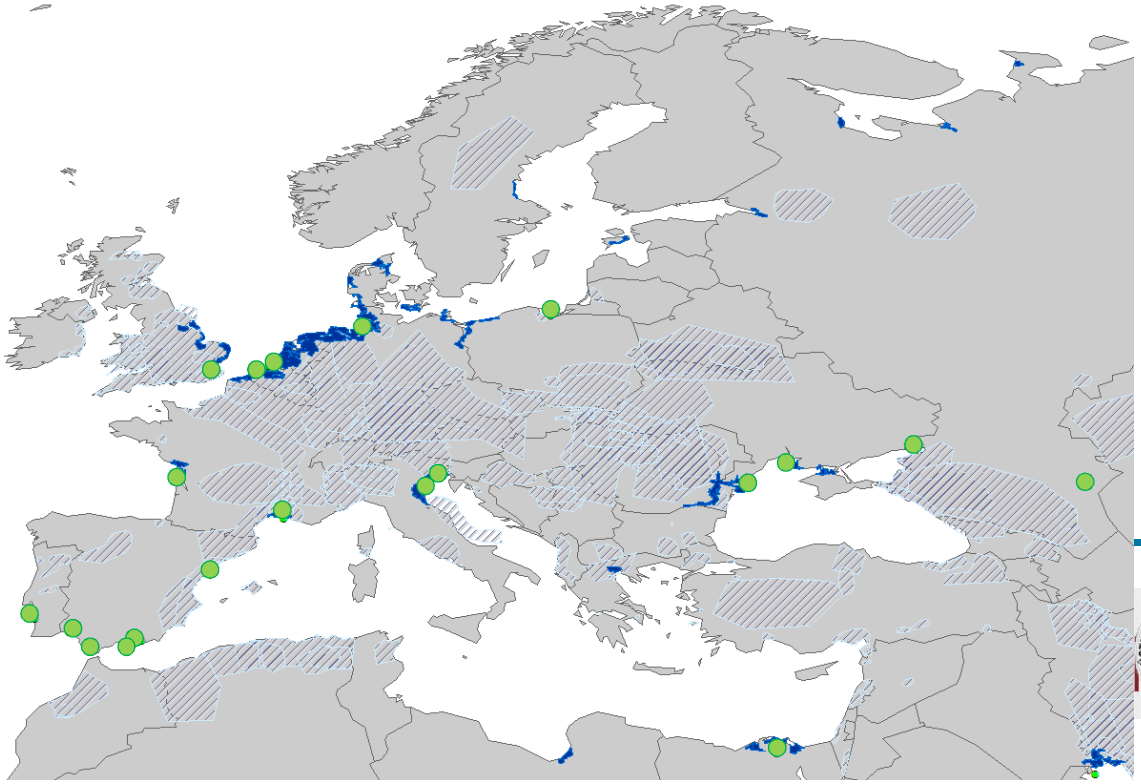



Include services in webportals:
Dedicated and generic (e.g. EGDI)
GeoNetwork - The portal to spatial data and information - Mozilla Firefox
localhost:8080/geonetwork/srv/en/user.login
SUBCOAST
Home | Administration | Contact us | Links | About | Help |
Map viewer
Layer tree
Base Layer
Ortophoto
Overlays
NaturalRisks Nederland
Countries
Borders
Opacity
WHAT?
WHERE?
- Any -
Search
Reset Advanced
Options
Applications
Audio/Video
Case studies, best practices
Conference proceedings
Datasets
Directories
Interactive resources
Maps & graphics
Other information resources
Photo
GeoRSS
bx-t-c
DGM 1.3 - 02-Formatie van Boxtel
Print
Legend
NaturalRisks Nederland
1GE TNO 1M surface Geologic Unit
DNK GEUS 1:1 M Geology
Aeolian sand, inc
Keywords
Geologie, Dieptekaart, Dieptekaart, Diktekaart, DGM, Formatie
1 : 4359747

Proceeding / Sustainability

Determine areas of interest/ potential risk zones:

- **Coastal lowland areas: flood plains & flood defences**
- **Flood prone areas/ plains along rivers**



Coastal Lowlands

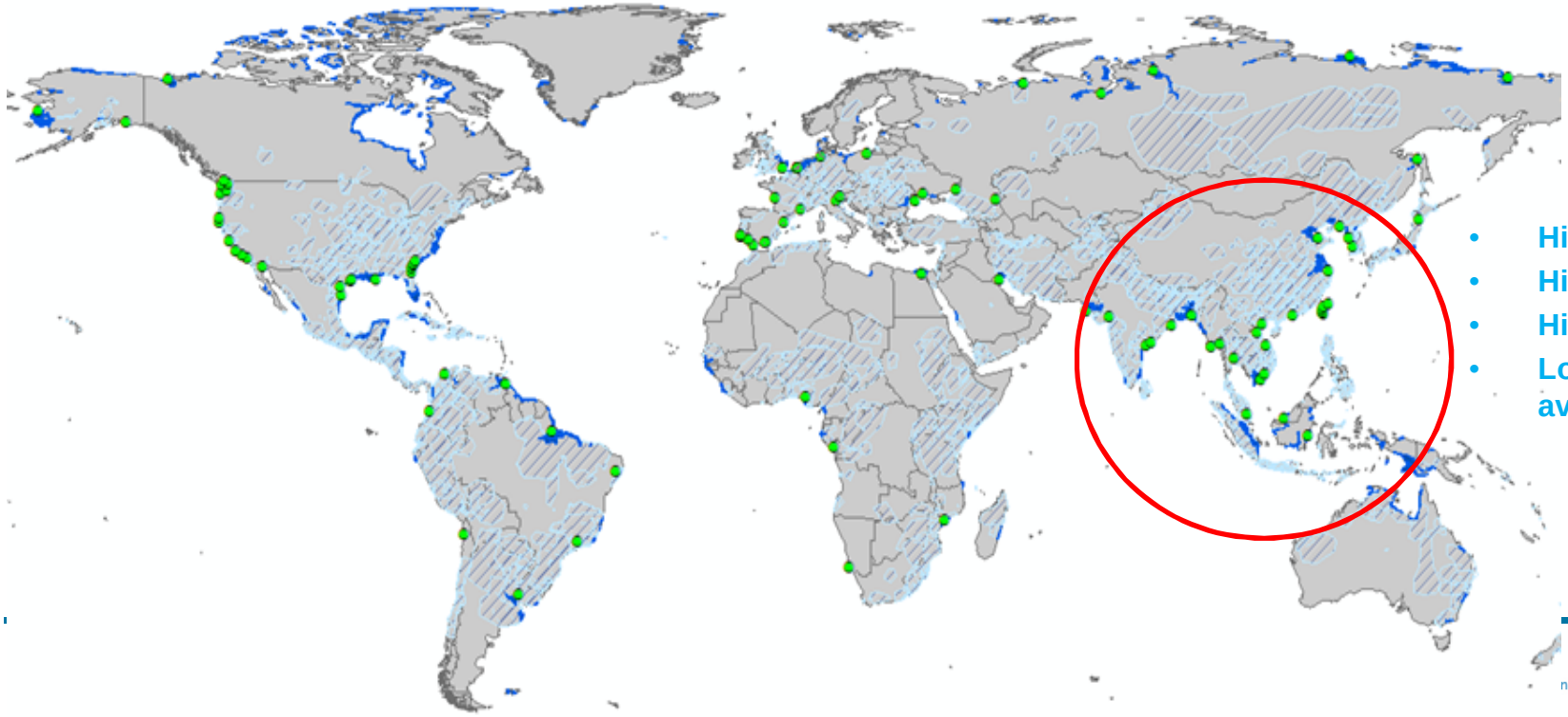
Major river deltas

Flood prone river areas

Proceeding / Sustainability

Determine areas of interest/ potential risk zones worldwide:

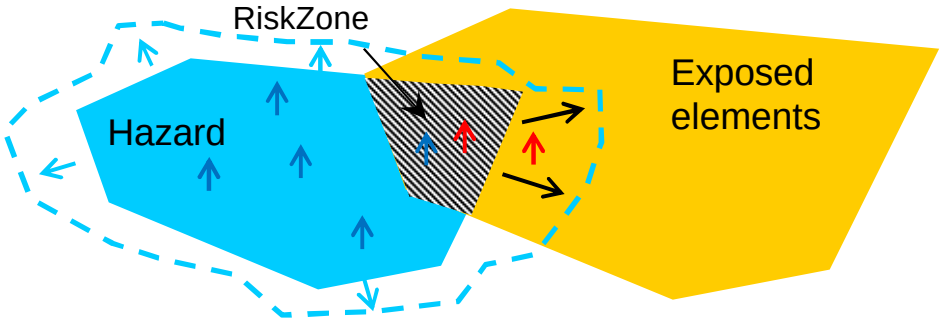
- **Europe ‘pilot area’; real interest for SE-Asia and other areas?**



- **High subsidences**
- **High Flood Risks**
- **High growth rates**
- **Low field data availabilities**

Proceeding / Sustainability

- **Subsidence mapping in every potential risk area where PSI available**
- **Add inland river plain pilots**
- **Select real areas of interest**
- **Incorporate EO-services in users workflows**



Long term perspective:

Automated sufficient resolution/ sufficient frequency subsidence monitoring; public portals with data, model and map services, worldwide

Terrafirma à SubCoast/ PanGeo à …. à ….

Hansje Brinker Dijkmonitoring

www.subcoast.eu
www.terrafirma.eu.com

"That's subsidence Sir Bryan - The charts are over here."

Thank you for your attention

TNO / Geological Survey

of the Netherlands

Rob van der Krogt

“That’s subsidence Sir Bryan – The charts are over here.”