National Geographic Institute

National Centre for Geographic Information

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EU-DEM: Status and outlook

May 6th, 2015

EuroGeographics meeting

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Thinking on Copernicus Services

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Index:

- Key Questions
- Comparison EU-DEM → EU-HYDRO
- Geospatial Reference Information (GRI) and coreGRI
- Copernicus in-situ data access
- Conclusions

Geospatial Reference Data/Information(GRD): → Key Questions

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- **Today** it is possible and necessary to look for **consistency** between **geometry and topology** at different resolution levels.

- Approaches to **short and long term** are necessary built from the beginning (step by step).

- The **coherence** is necessary not only between DEM and HYDRO, it is necessary between all basic layers of GRD (transportation network, urban settlements, land cover/use…).

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❖EU-DEM: BASIN RIVER →MODELS

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RASTER DATA (DTM)			
PRODUCT NAME	**Grid size (m)**	**Propietary**	**Source**
EU-DEM	30	EEA	Aster
LIDAR-DTM IGN SPAIN*	1	IGN SPAIN	Ground Class from LiDAR data

ground truth →

*$RMSE_z$<0.30 m

$RMSE_{xy}$<0.50 m

VECTORIAL DATA (River network)			
PRODUCT NAME	**Computed**	**Propietary**	**Notes**
EU-HYDRO	NO	EEA	
EU-DEM-HYDRO	YES	EEA	
LIDAR-DEM-HYDRO	YES	IGN SPAIN	Computed from ground class from lidar data

ground truth →

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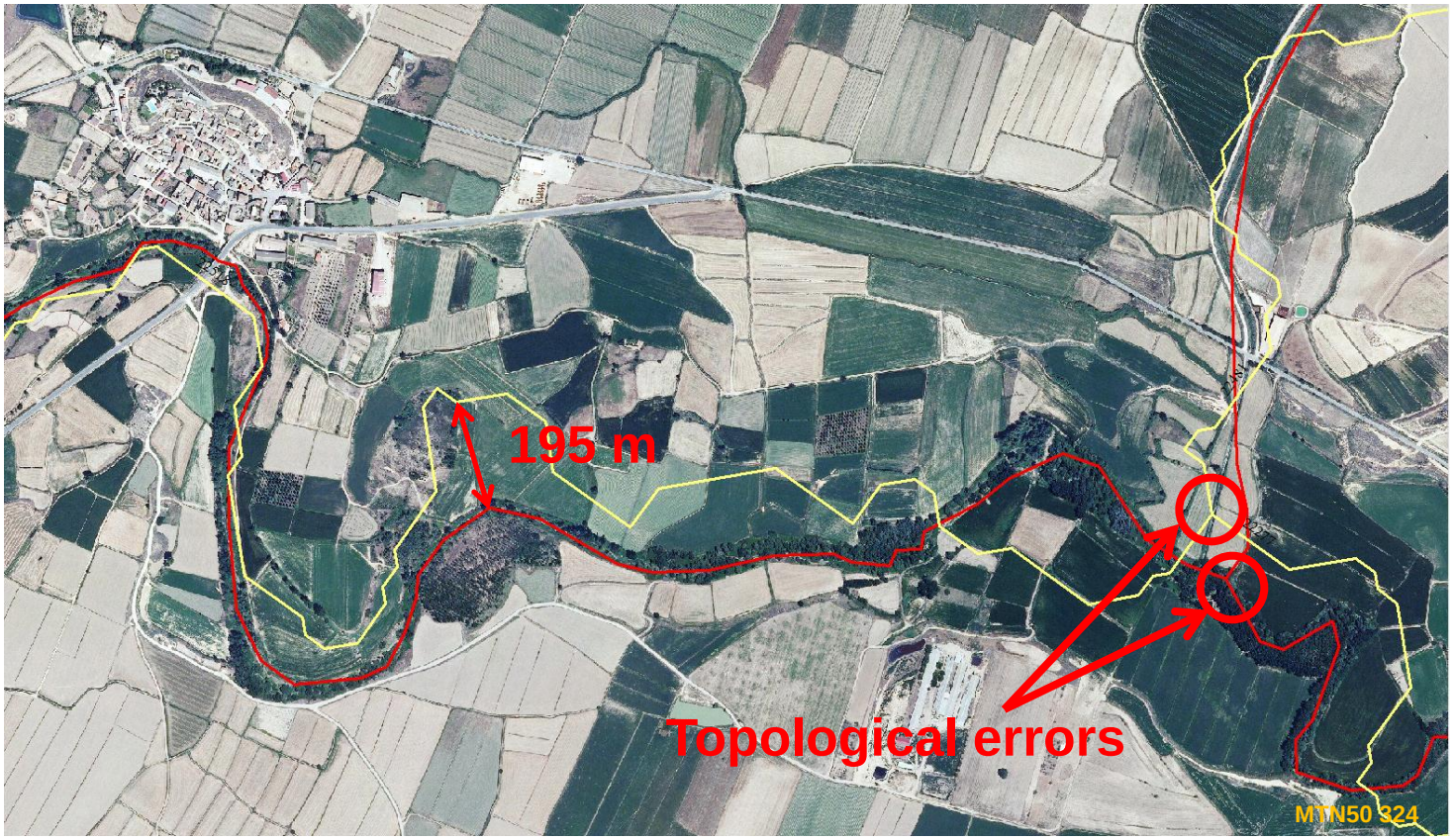
❖Comparison EU-HYDRO and EU-DEM-HYDRO



EU-HYDRO

EU-DEM-HYDRO

Topological errors and inconsistency between EU-HYDRO and EU-DEM (→EU-DEM-HYDRO)

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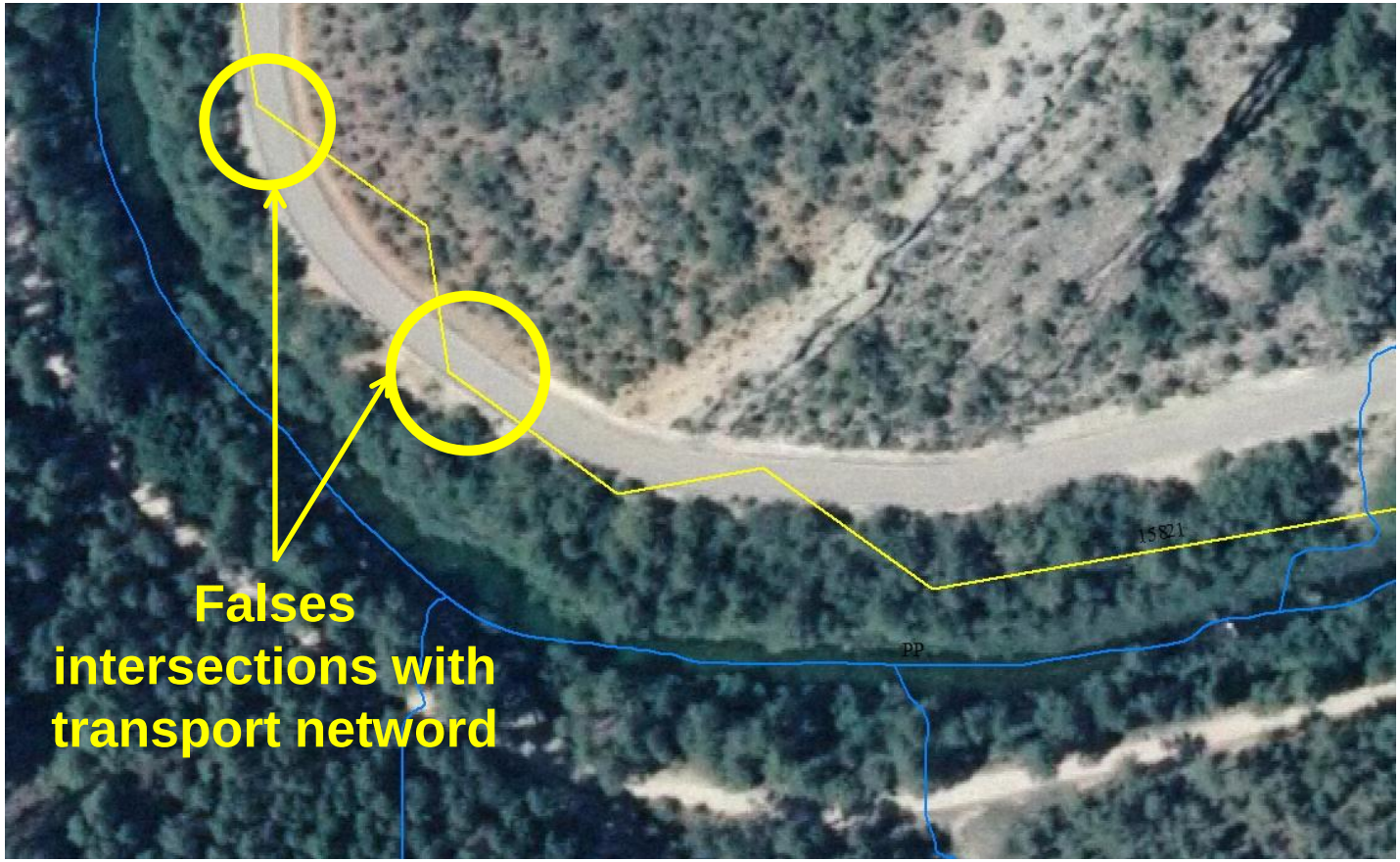
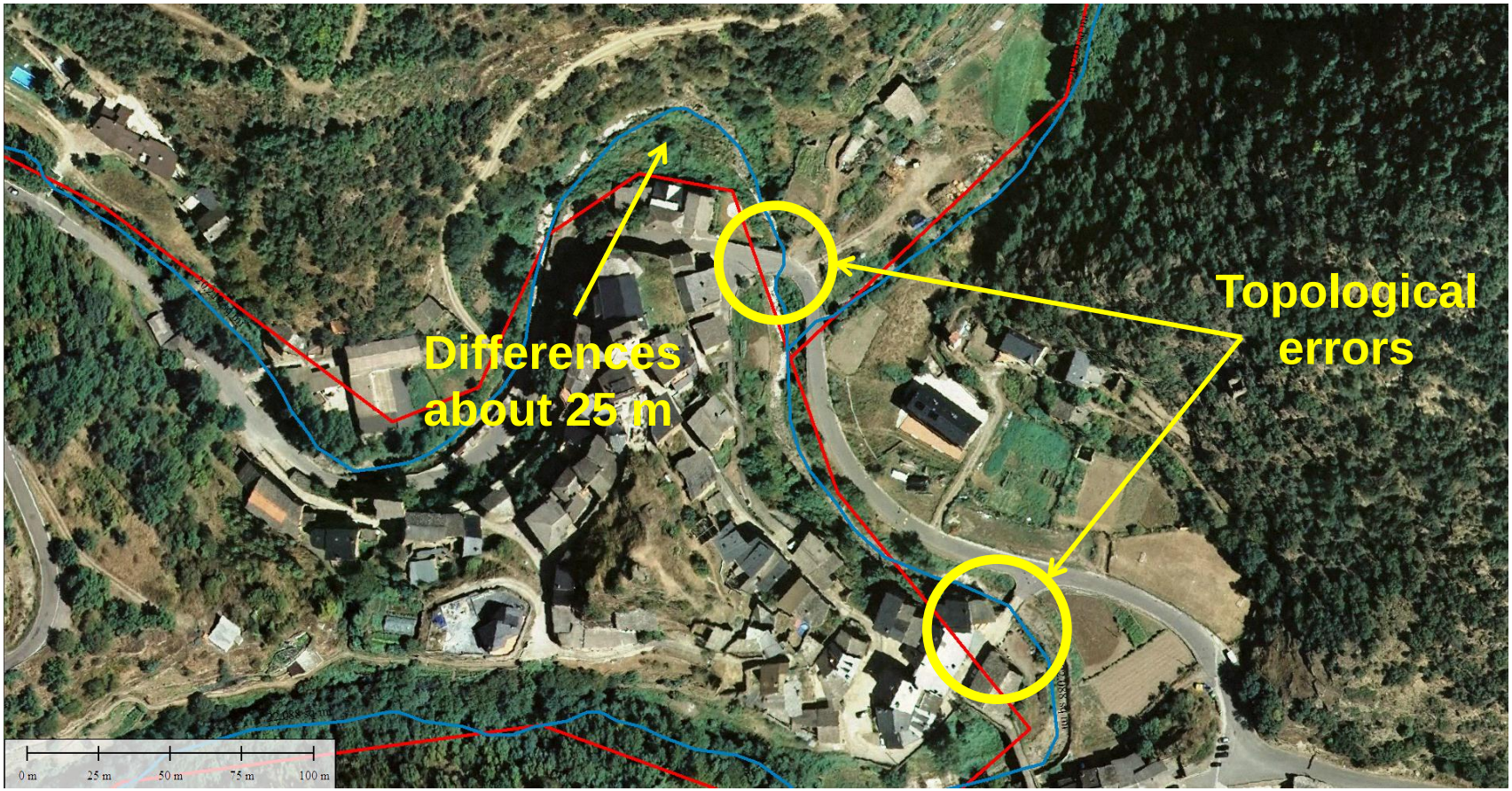
❖Comparison EU-DEM-HYDRO and LIDAR-DEM-HYDRO



LIDAR-DEM-HYDRO EU-DEM-HYDRO

Planimetric differences and topological errors

❖Comparison EU-HYDRO and LIDAR-DEM-HYDRO



LIDAR-DEM-HYDRO EU-HYDRO

Planimetric differences and topological errors

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PLANIMETRIC COMPARISON

AREA 207 (Flat-Rough) Planimetry				
	Points	Average Error$_{xy}$(m)	STD. DEV$_{xy}$ (m)	RMSE$_{xy}$ (m)
LIDAR-DEM-HYDRO*	Reference data set			
EU-HYDRO	41	12,32	21,13	21,40

* Lidar-DEM-Hydro (IGN Spain)

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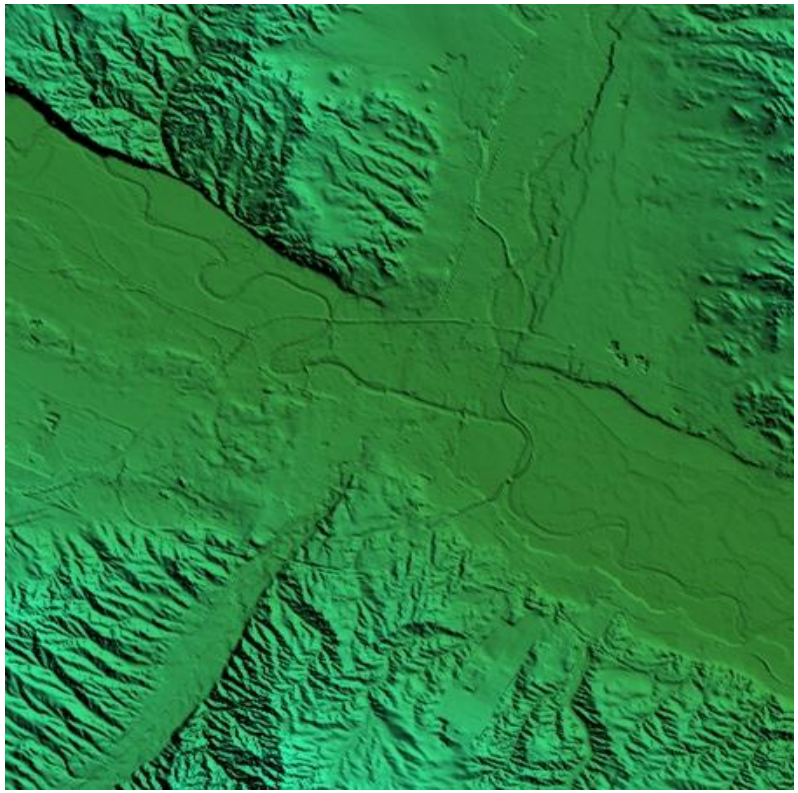
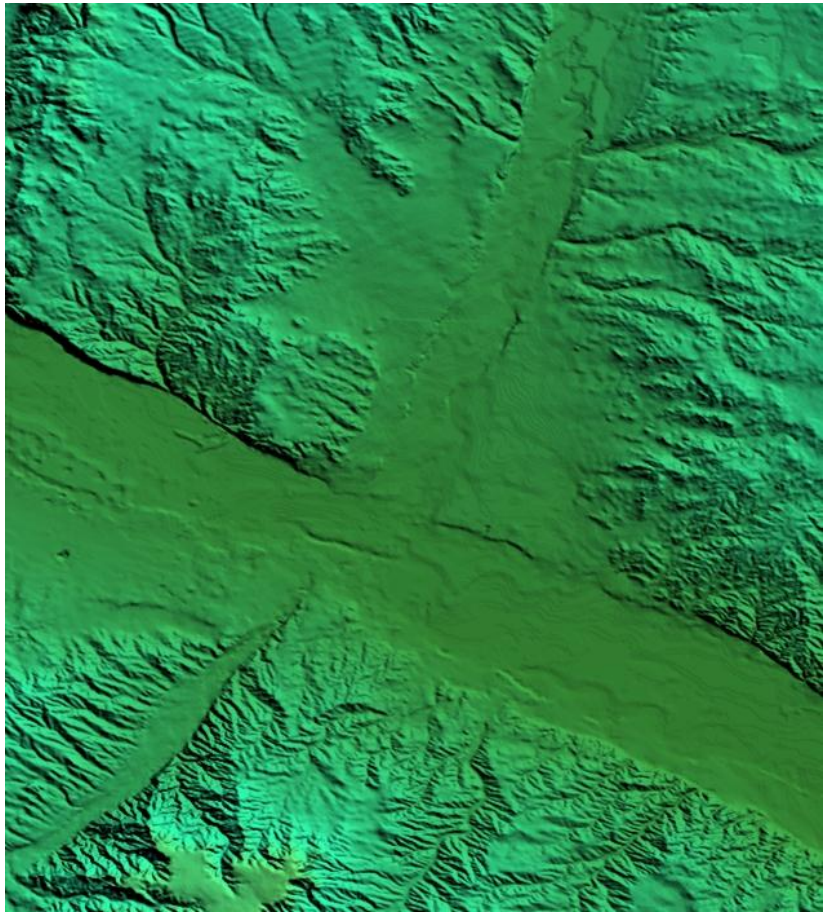
❖Comparison DEM IGN and EU-DEM

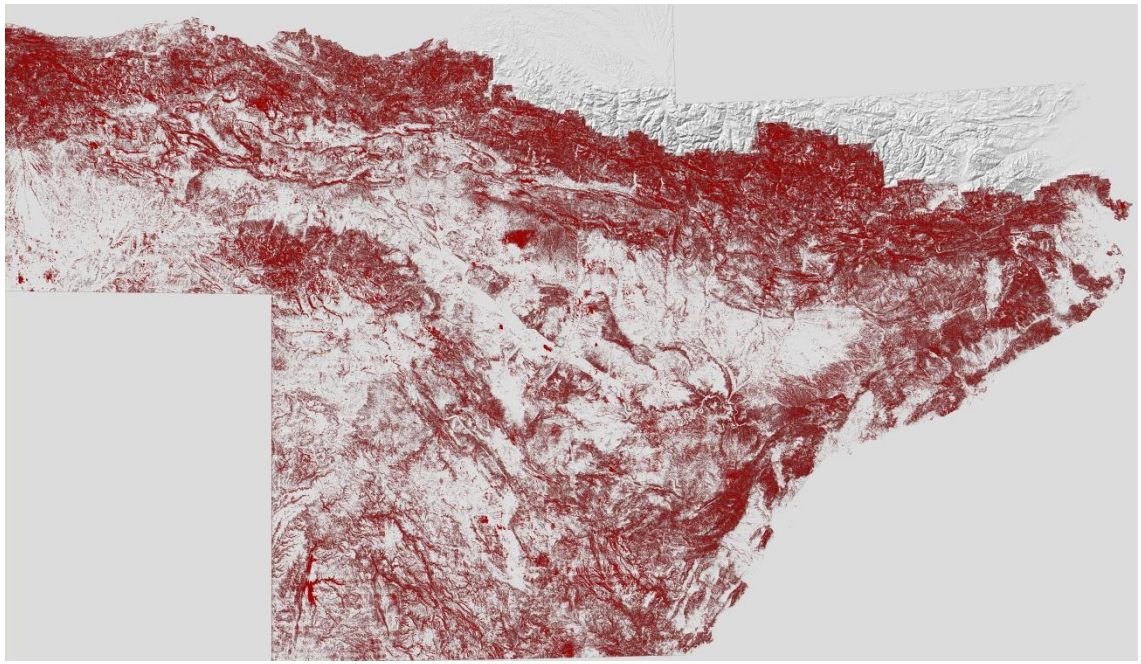


DEM IGN (50 m grid resolution)



EU-DEM (50 m grid resolution)

❖Comparison EU-DEM and DEM SPAIN



Areas with differences greater than 6m between EU-DEM and DEM50 Ebro Basin

Ebro basin

Total points: 63.064.869
Percentage of points with differences less than or equal to 1 meter: 17,41%
Percentage of points with differences less than or equal to 2 meter: 33,65%
Percentage of points with differences less than or equal to 3 meter: 47,75%
Percentage of points with differences less than or equal to 4 meter: 59,26%
Percentage of points with differences less than or equal to 6 meter: 75,29%
Percentage of points with differences greater than 6 meters: 24,71%
$RMSE_Z$ = 6,47 m
SD = 5,85 m

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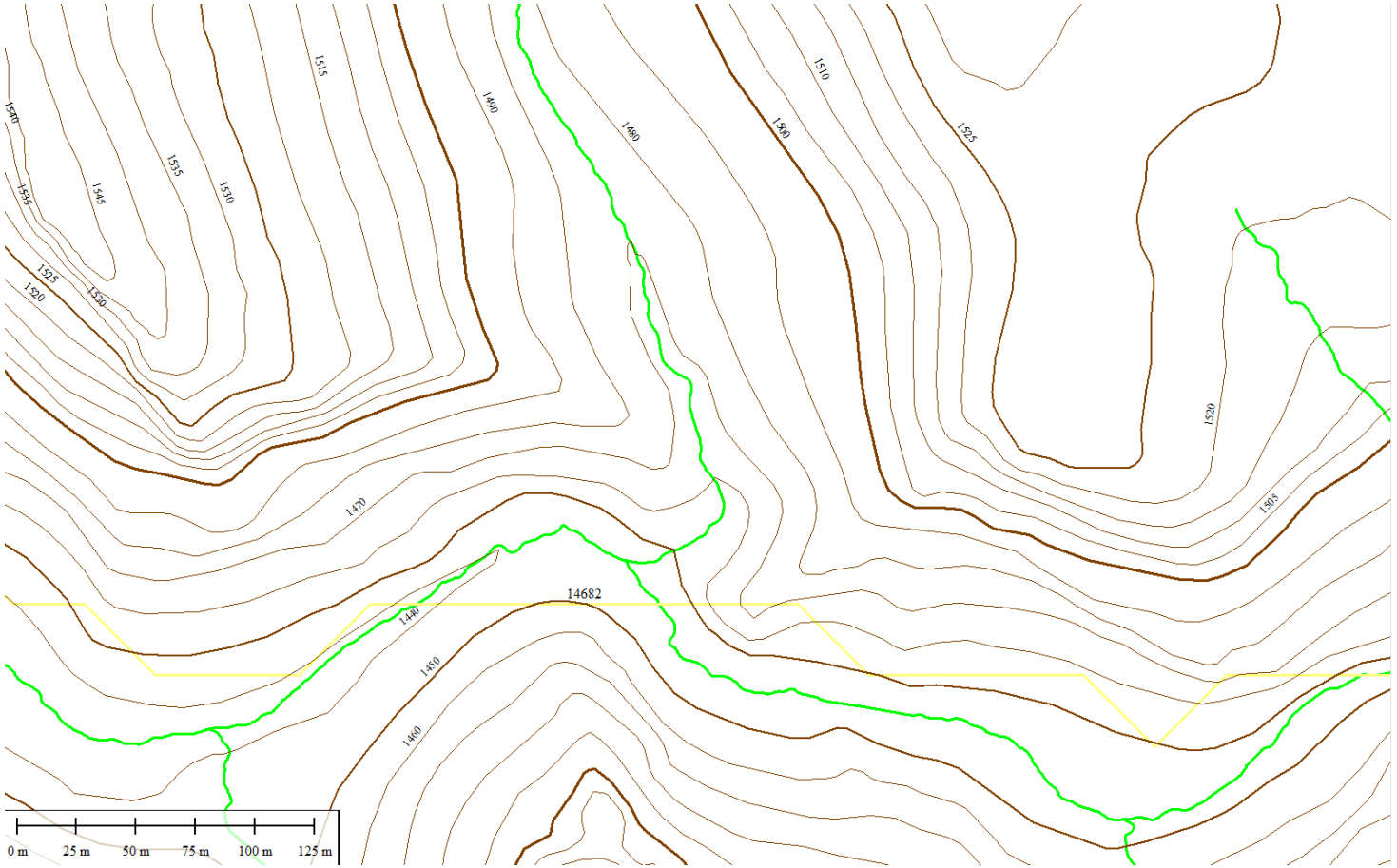
❖LIDAR-DEM-HYDRO and Contour Lines



MS´s produce DEM with more accuracy and resolution. There are consistency between river networks and contour lines. All products are permanently updated

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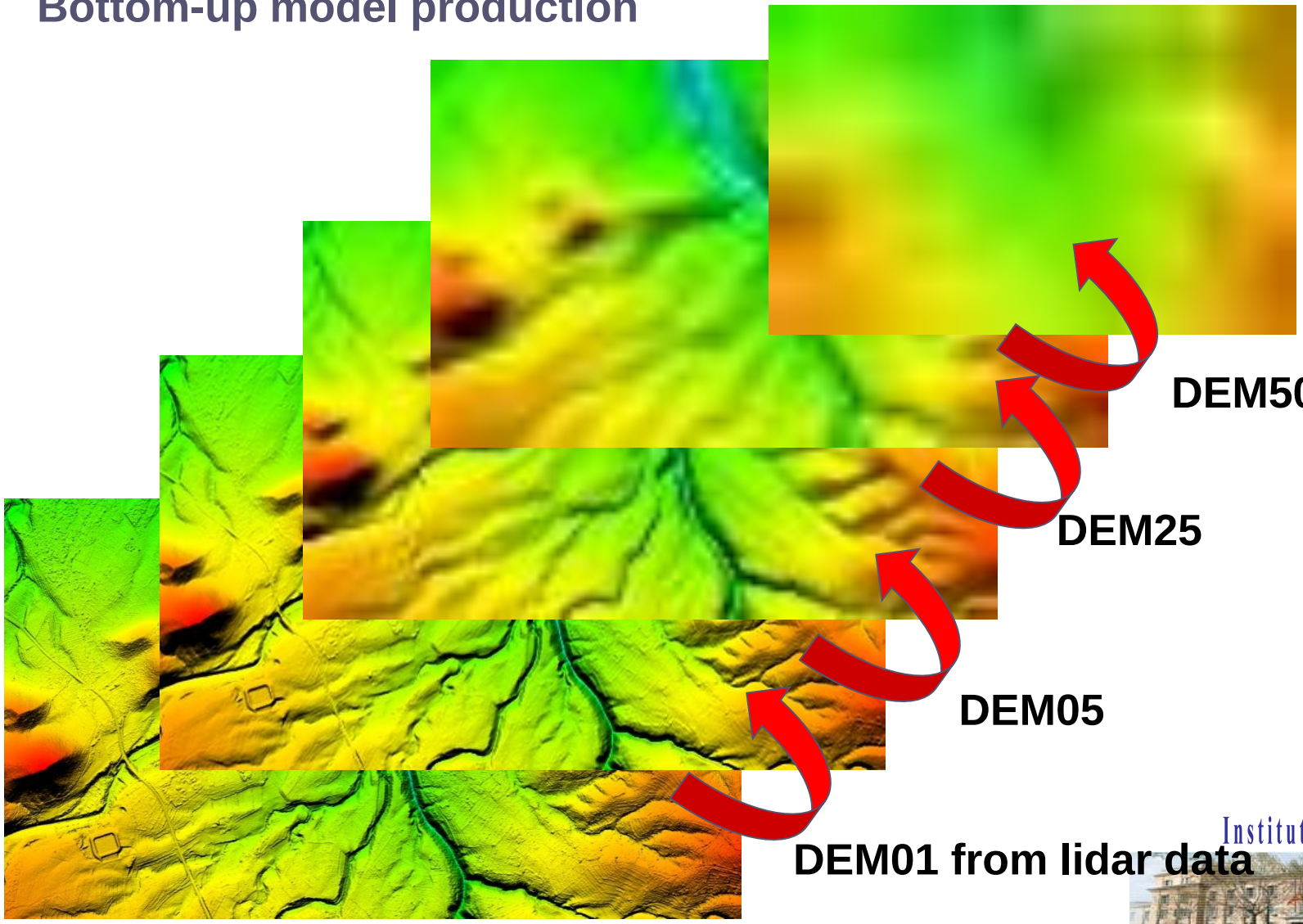
Bottom-up model production



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Trends in Countries and National Mapping Agencies (UN) Institutional Arrangements to define GRI and coreGRI

Criteria regarding GRI:

- Official
- Reliable
- Accuracy correspond to level
- Sustainable
- Homogeneous at all level (National, European and Global)
- Automatically as much as possible

→ Contents of **coreGRI** defined by each Member States regarding Copernicus and National needs

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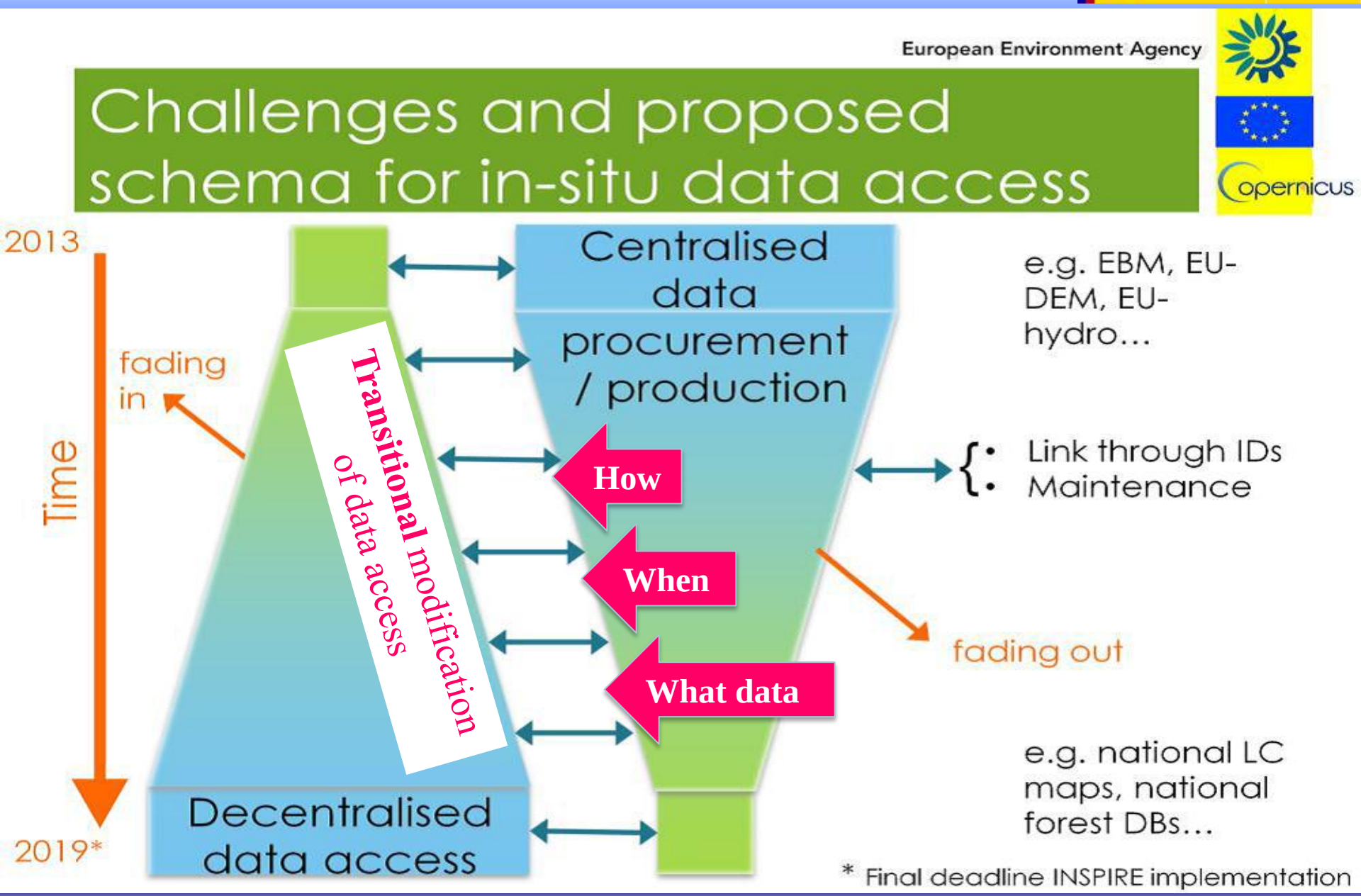
Copernicus in-situ data access



Copernicus in-situ data access

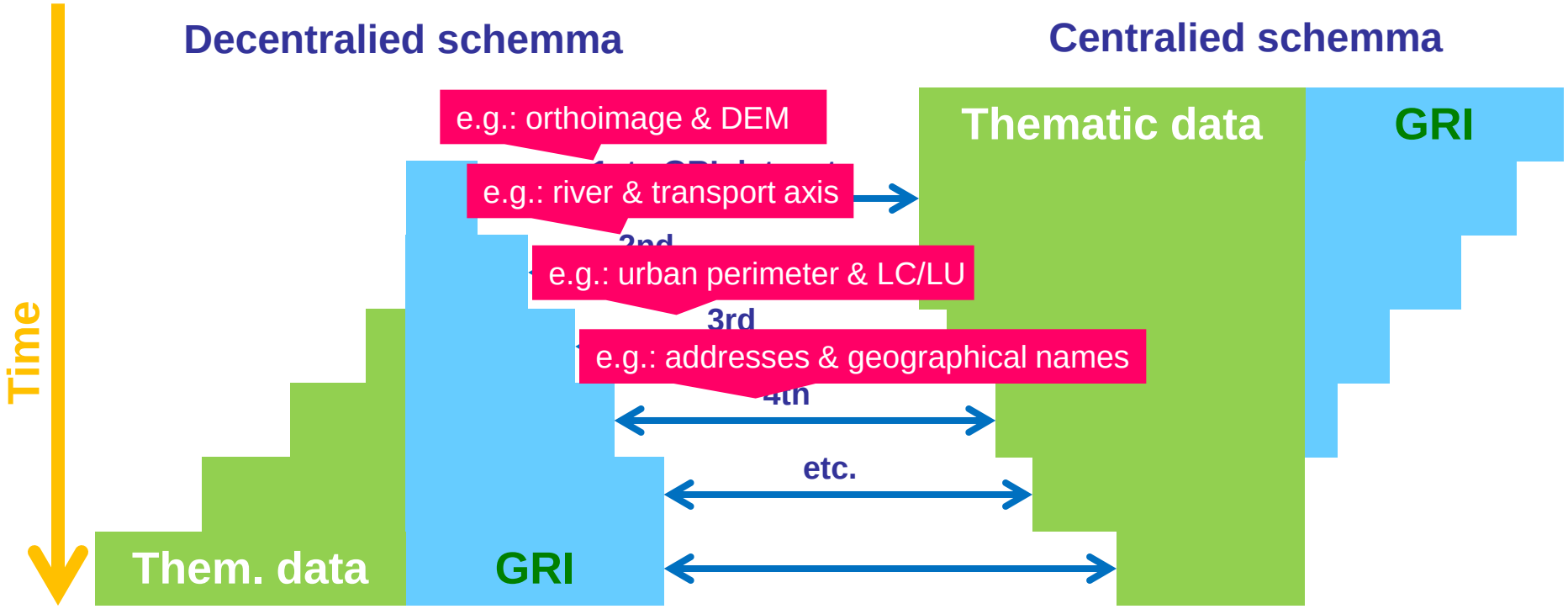
- **coreGRI** makes possible to define the **transition** from centralised access to decentralised access

- **coreGRI** should be initiated by Member States

- If the contents of **coreGRI** are defined, it is possible to schedule the transition:

  - Temporal planning
  - Volume of offered data
  - Actors involved
  - Budget

Copernicus in-situ data access



- In case that **coreGRI** will not be supplied by a Member States, centralised production actions can be carried out by Copernicus (EEA/ITT)

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Copernicus in-situ data access

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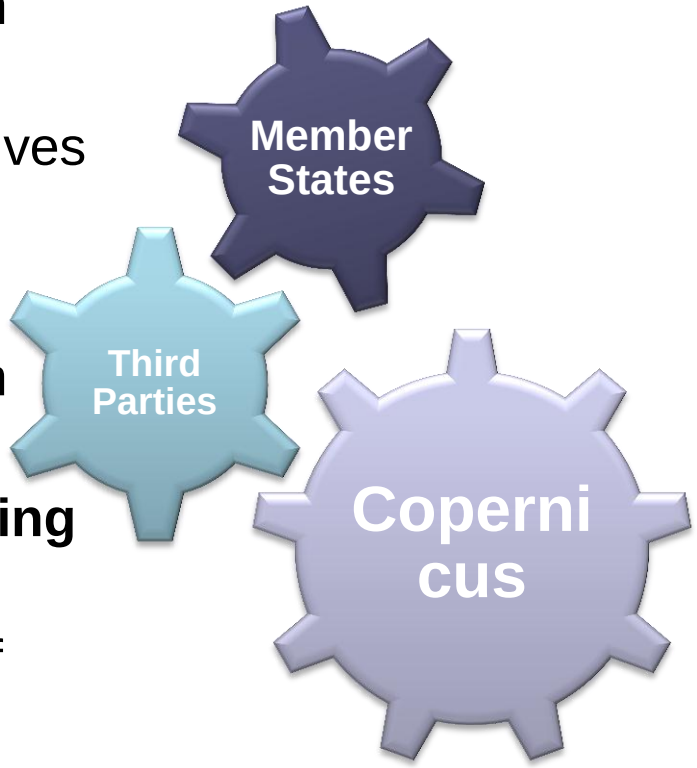
- **Benefits for Member States**
  - **Official national data** used for European responses
  - **New users and new business** perspectives
  - Future **institutional sustainability**
- **Benefits for Copernicus**
  - **Official national data** used for European responses
  - **Data comparable** between levels, **avoiding misunderstanding**
  - **Cost reduce**, avoiding new production of data
- **Benefits for Third parties**
  - Business in the **data integration** and **homogenization**



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❖ Conclusions

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- The **EUDEM-HYDRO** (→ **EU-DEM) it is not valid** at any level, National and European (geometrical and topological errors)

- The **EU-HYDRO** (*unknown sources*) **has** less details and is more generalised than computed national networks.

- At National level, some Countries are producing, in this moment, **new DEM** with other sensors (LiDAR)

- This **new DEM** implies:
  - Big differences of accuracy (*from meter to centimeters*)
  - Big differences in the geometry → with Planimetric alterations
  - In some cases Topological modifications
  - Important difficulties to integrate other informations from National level

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Thank you

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