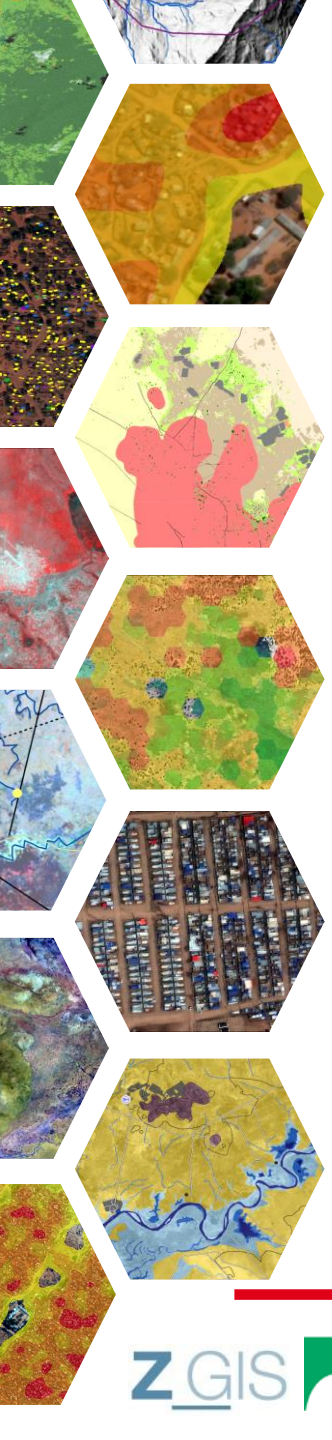


EO4HumEn+

Extended EO-based Services for Dynamic Information Needs in Humanitarian Action

FFG

United Nations / Pakistan / Prince Sultan Bin Abdulaziz International Prize for Water - 4th International Conference on the Use of Space Technology for Water Management
Islamabad
26.Feb. – 02.Mar. 2018

Lorenz Wendt, Stefan Lang, Dirk Tiede,
Martin Sudmanns, Barbara Riedler

Tools and Services for the Humanitarian Community for Groundwater Exploration and Water Management

Z_GIS UNIVERSITY of SALZBURG DLR spatial services ÖSTERREICHISCHES ROTES KREUZ EBERHARD KARLS UNIVERSITÄT TÜBINGEN GROUND WATER RELIEF

UNIVERSITY of SALZBURG

Who is Z_GIS ?

Interfaculty Department of Geoinformatics – Z_GIS

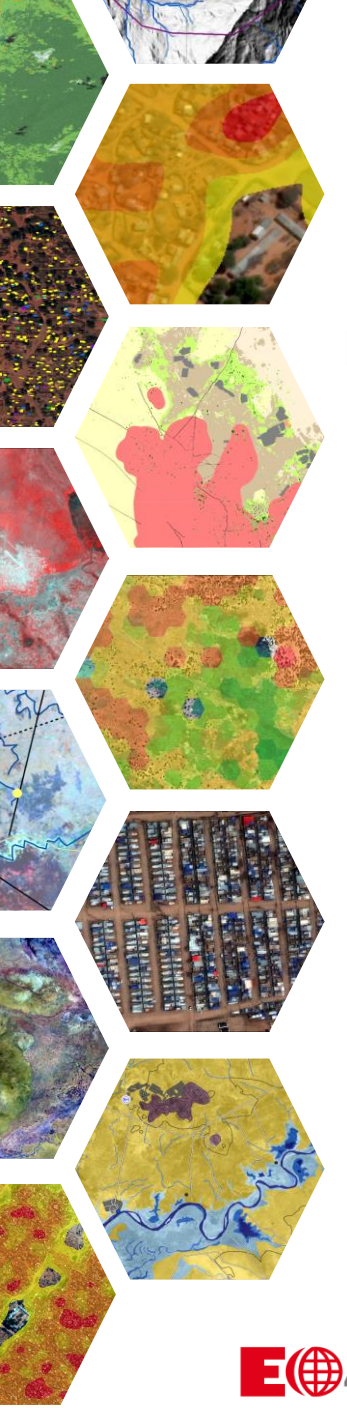
Quality of Life and Smart Mobility

Risk and Social Vulnerability

Environment and Resource Efficiency

Humanitarian Action and Human Security

E4HumEn+



EO4HumEn+

Mission:

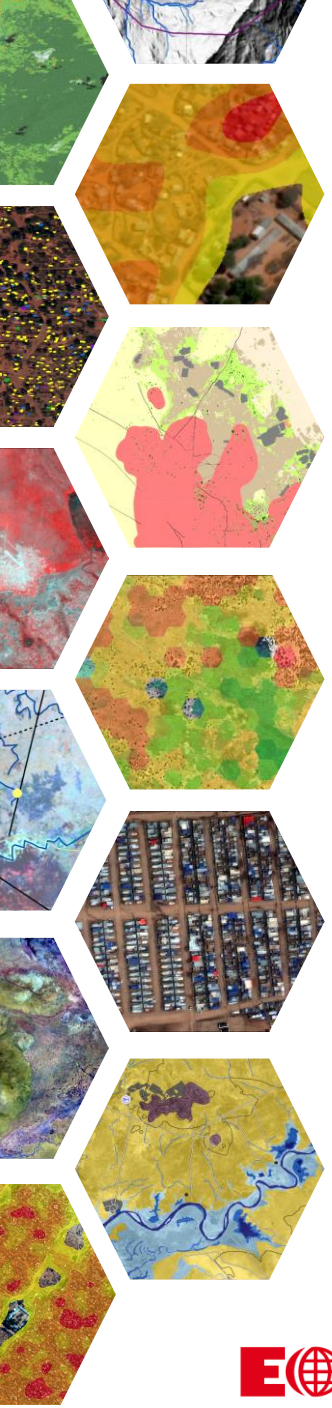
Provide Earth-Observation based geospatial information products to humanitarian actors

Constraints:

- **Difficult security situation on the ground**
- **Limited time frame**
- **Limited knowledge about region**
- **Decision makers are not experts**

What can remote sensing do to help?

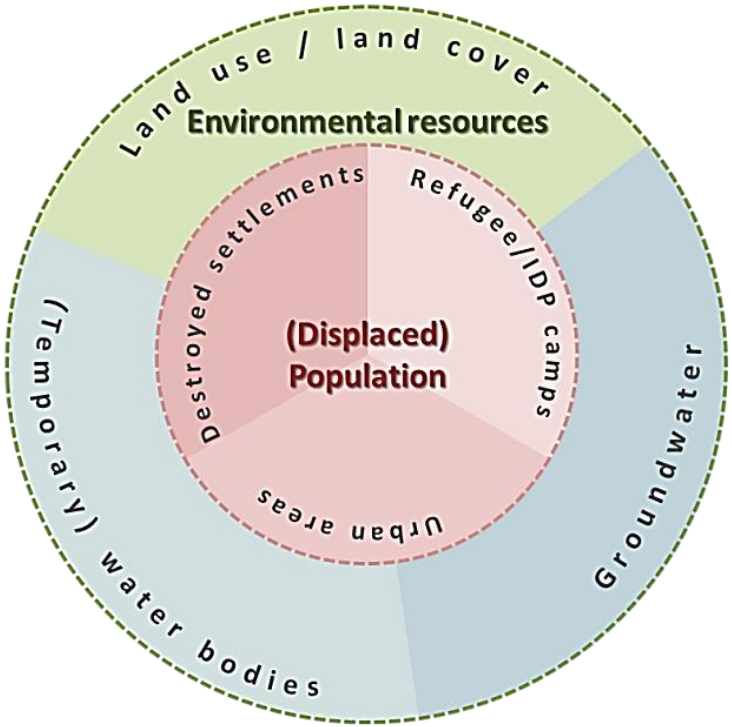
(it should be the perfect tool, right?)



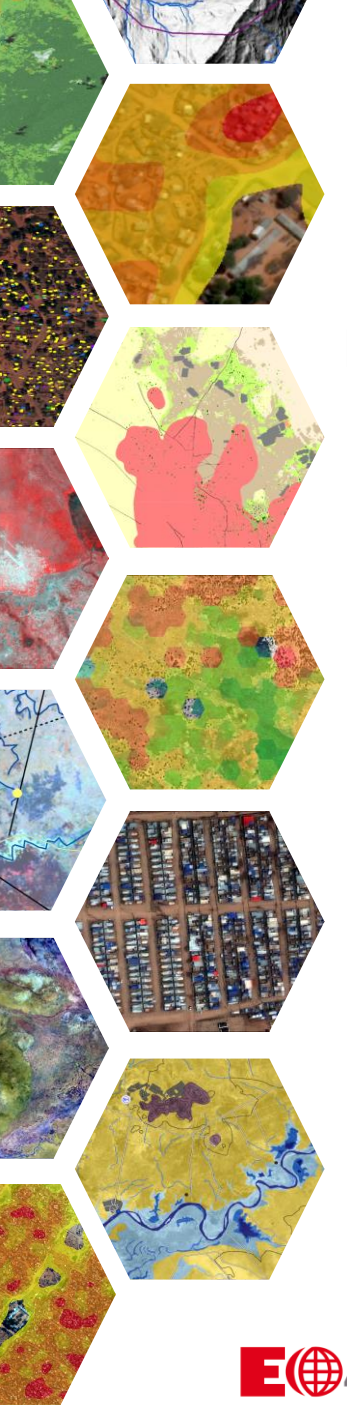
Mission:

Provide Earth-Observation based geospatial information products to humanitarian actors

Population

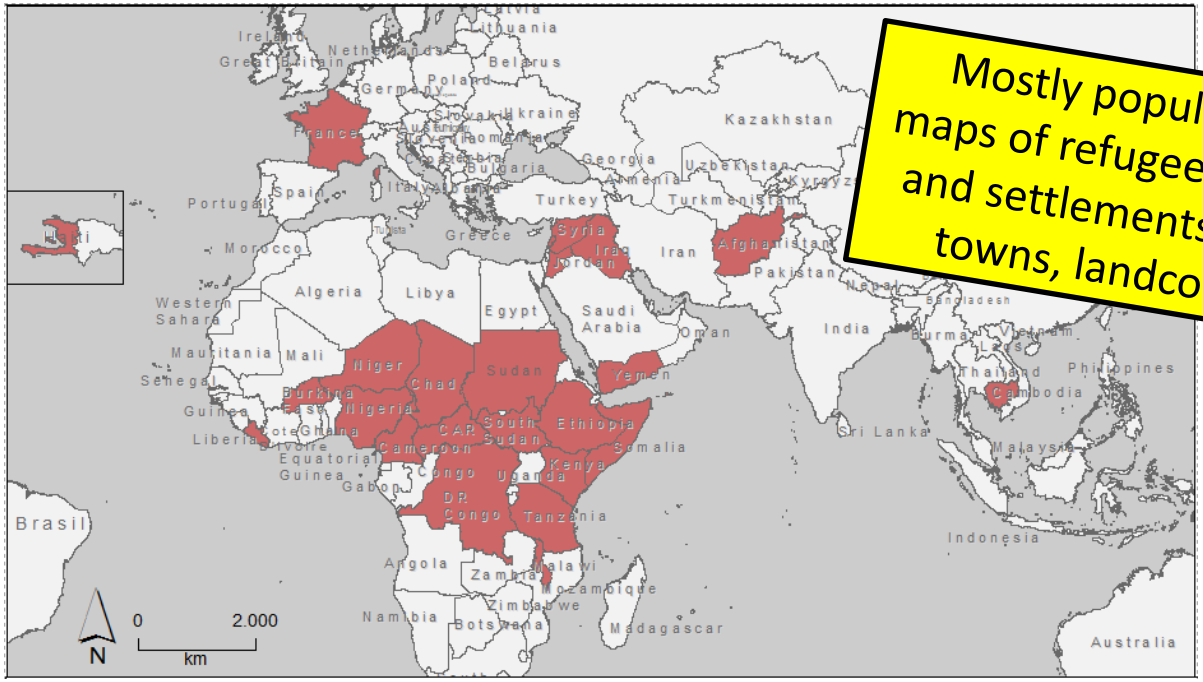


Environmental Resources (including water)

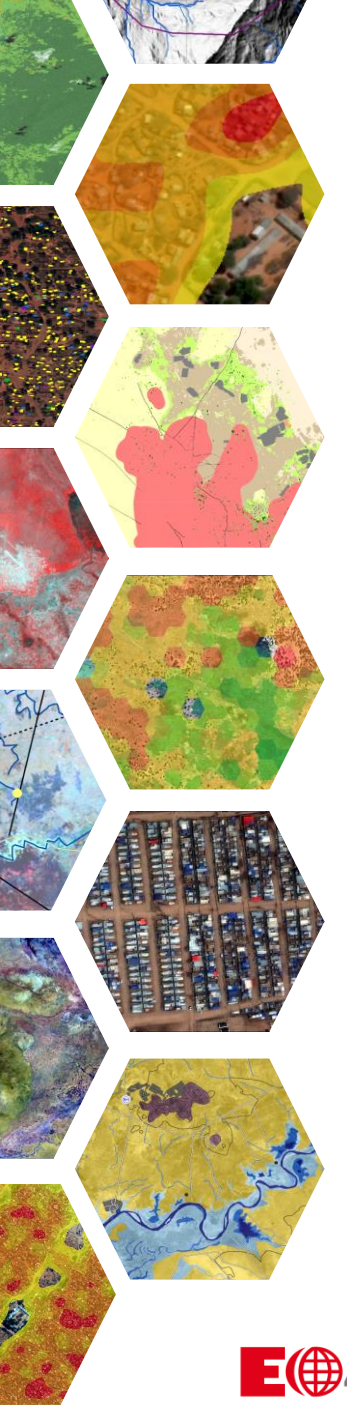


Mission:

Provide Earth-Observation based geospatial information products to humanitarian actors



25 countries, 350+ maps provided since 2011



Information products related to water to support:

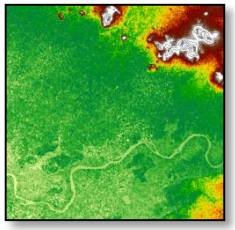
- groundwater exploration
- Installation /construction of infrastructure
- Water management

Always key issue:

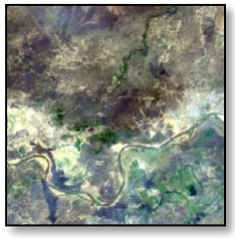
We can‘t see everything from above. Integration of existing information, field knowledge and remote sensing analysis is essential.

EO-based services for water: Groundwater exploration

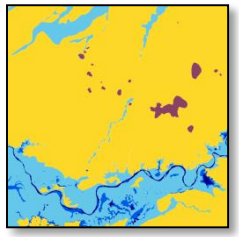
Digital Elevation Model



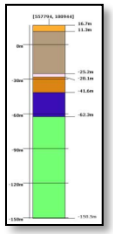
Satellite Imagery



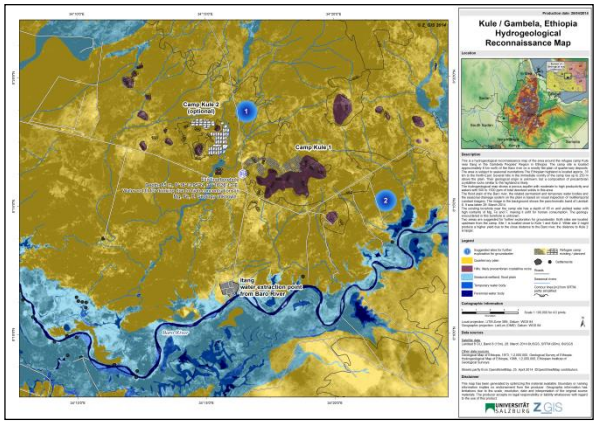
Satellite-derived geological map



Road network



Hydrogeological Reconnaissance Map



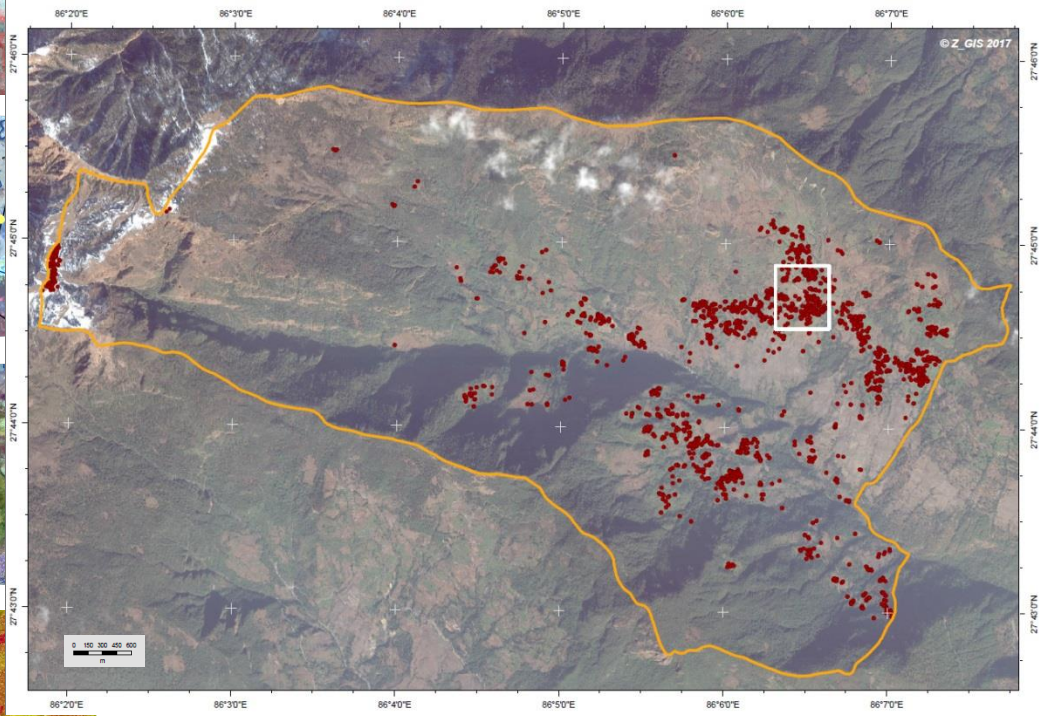
available geological maps

+ Expert evaluation

SEE NEXT TALK BY GERAINT BURROWS, GROUNDWATER RELIEF!

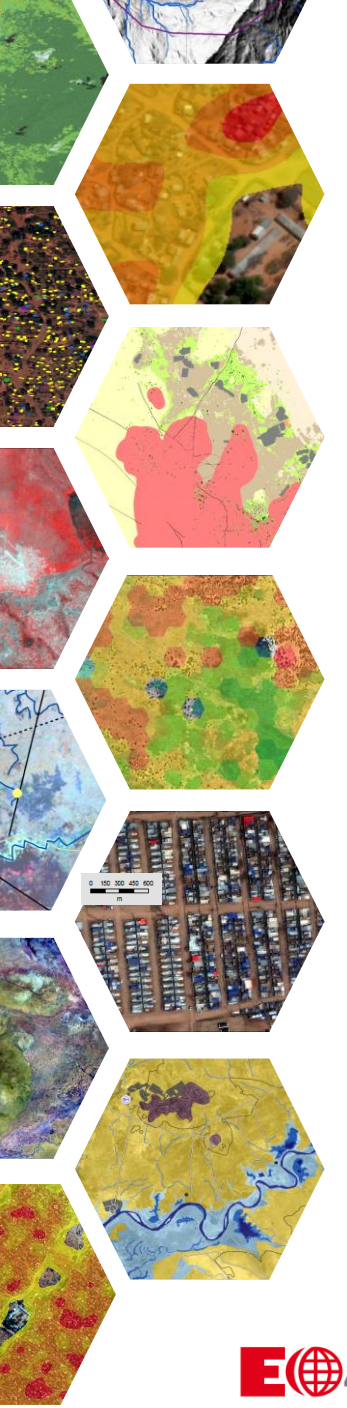
EO-based services for water: Installation of Infrastructure

- Nepal: Reconstruction of water pipelines in Lapilang, Nepal
- Cooperation with Austrian Red Cross



Where is the water needed?

→ **Mapping of buildings in VHR images + local survey**



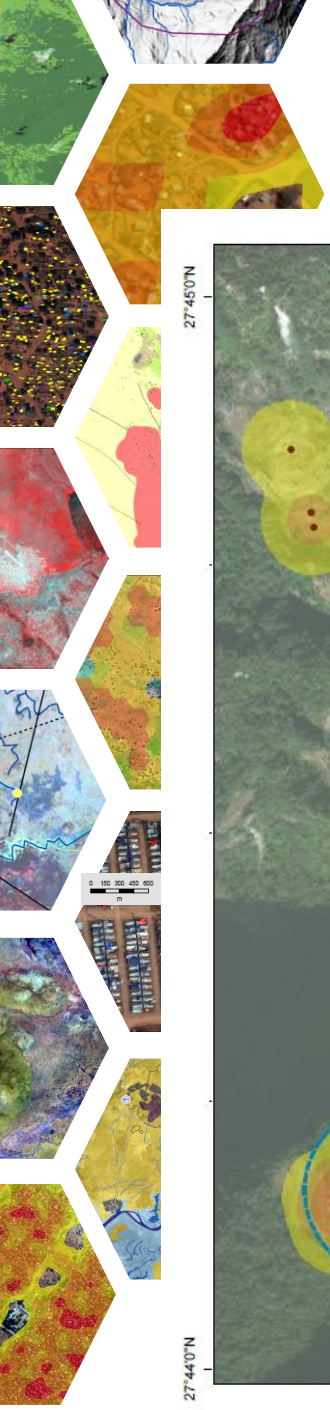
EO-based services for water: Installation of Infrastructure

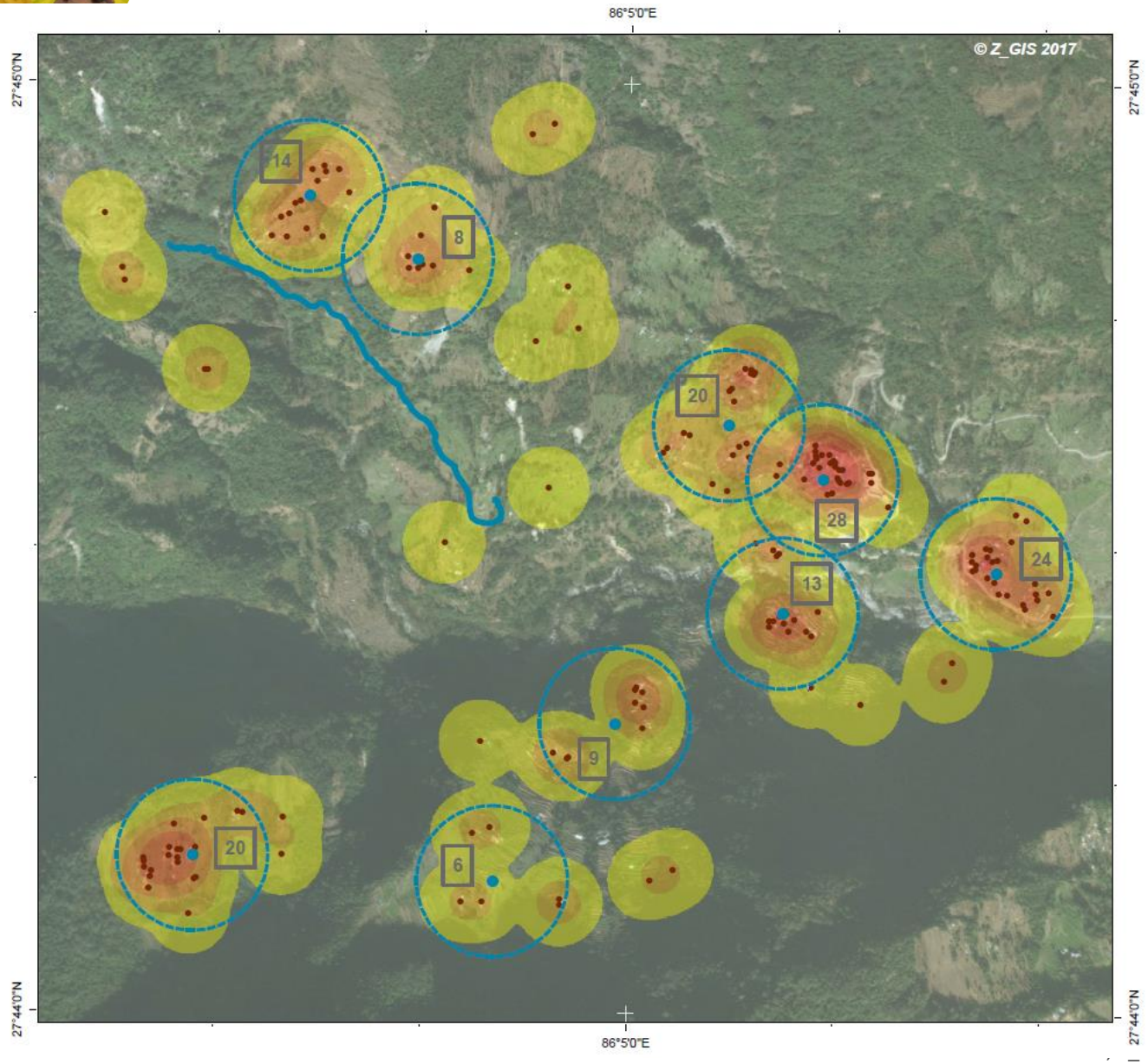
Where to place communal water taps?

Requirements: Maximum distance 150 m horizontal, 50 m vertical

→ **DEM from Spot 6 (2 m spatial resolution), spatial analysis**

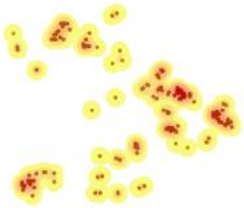
EO-based services for water: Installation of Infrastructure



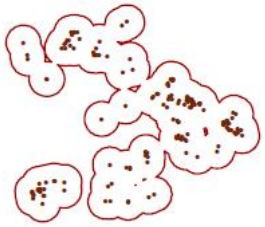


Input layers

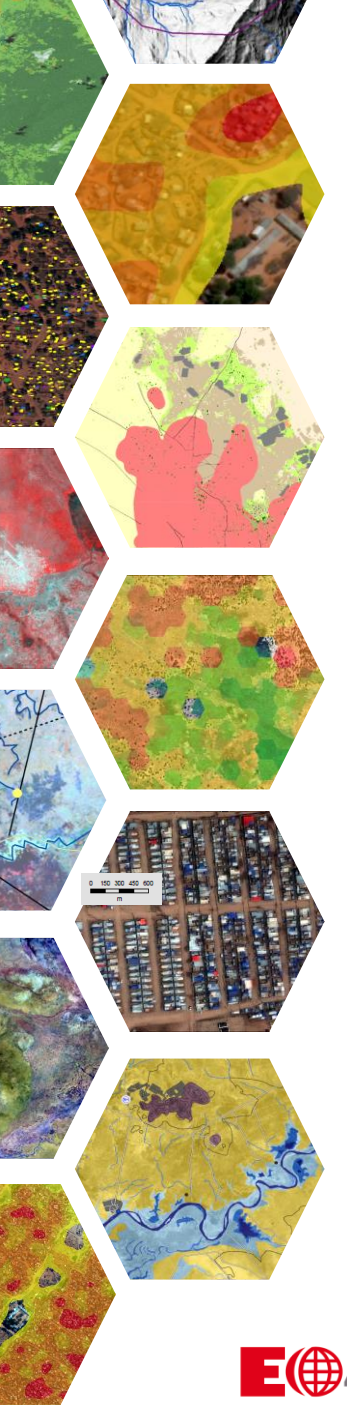
Population distribution



Horizontal distance



Height information

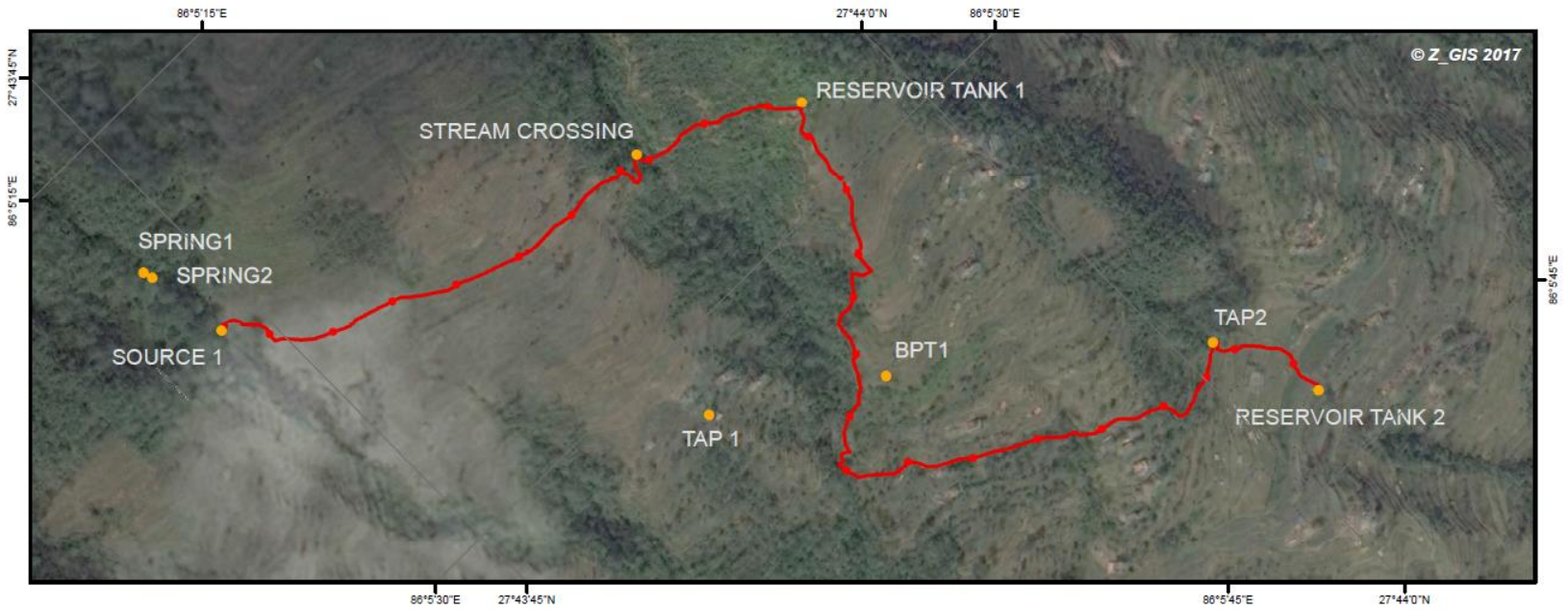


EO-based services for water: Installation of Infrastructure

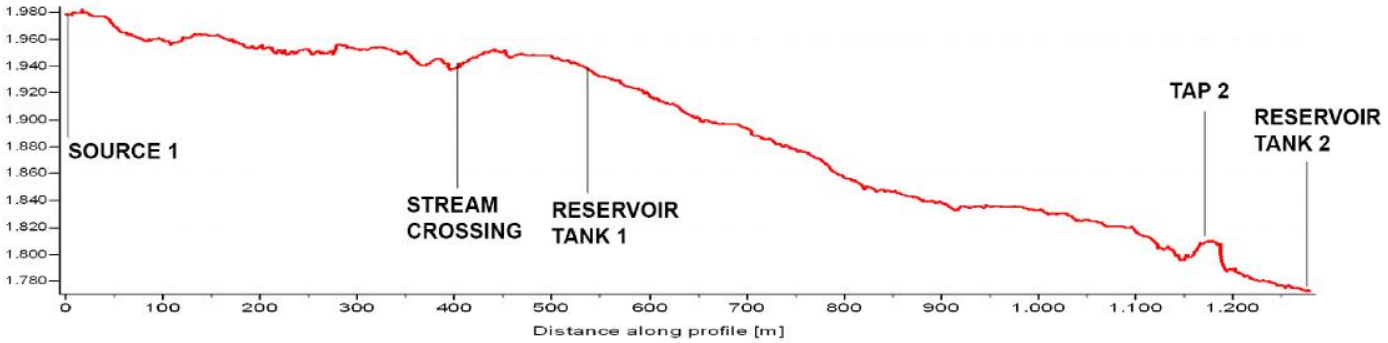
Where to build the pipelines from springs to taps?

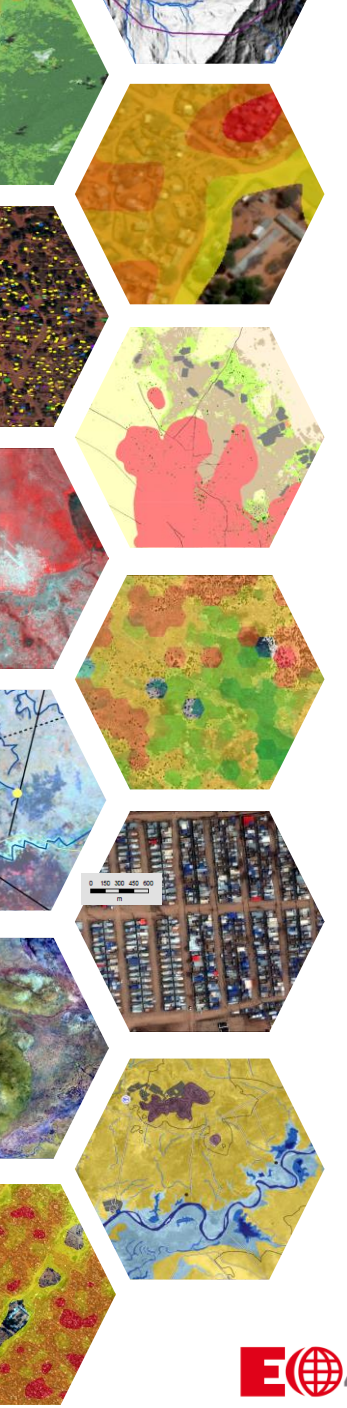
→ DEM from Spot 6 (2 m spatial resolution), longitudinal sections

EO-based services for water: Installation of Infrastructure



Longitudinal cut along Suiri pipeline



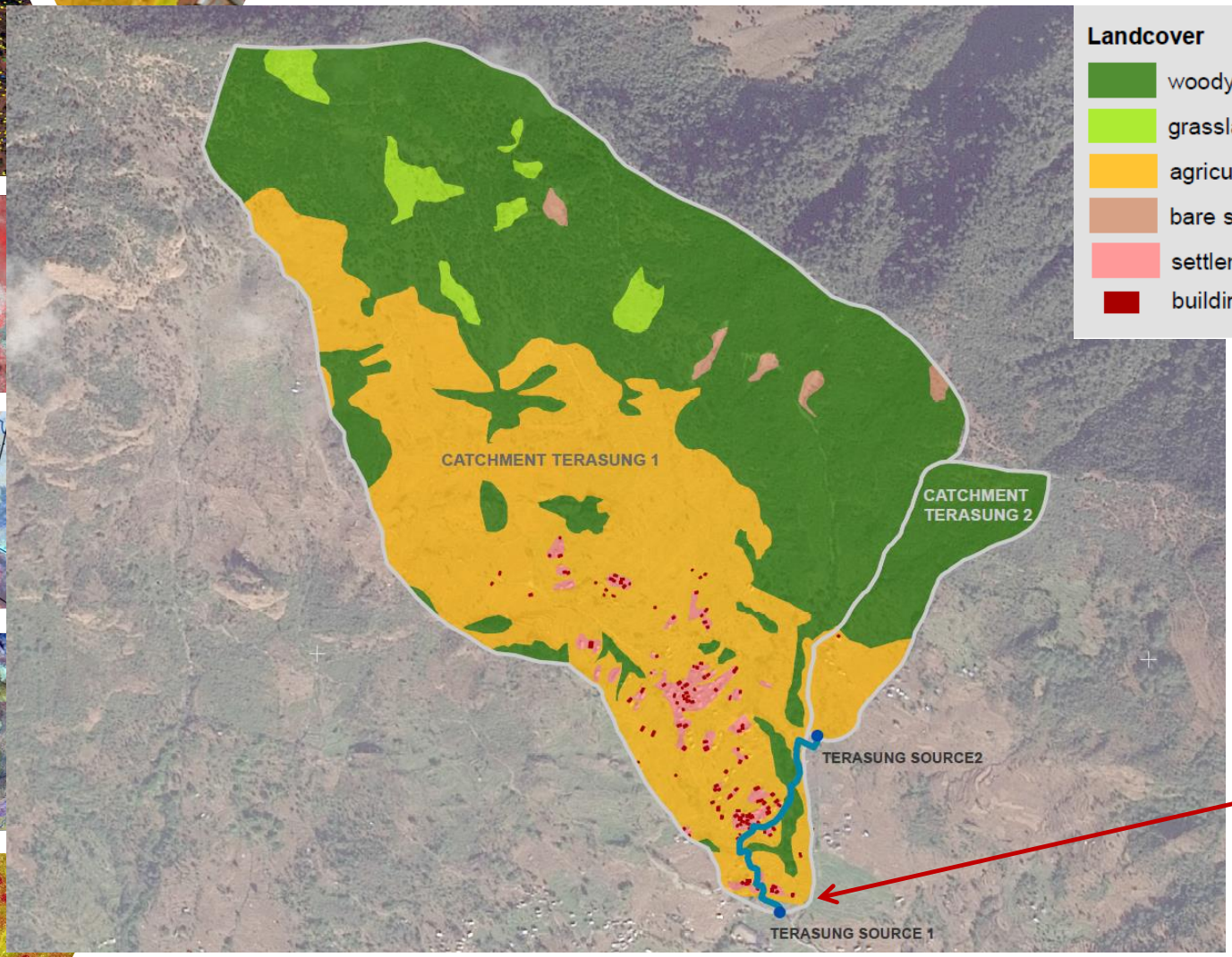


EO-based services for water: Installation of Infrastructure

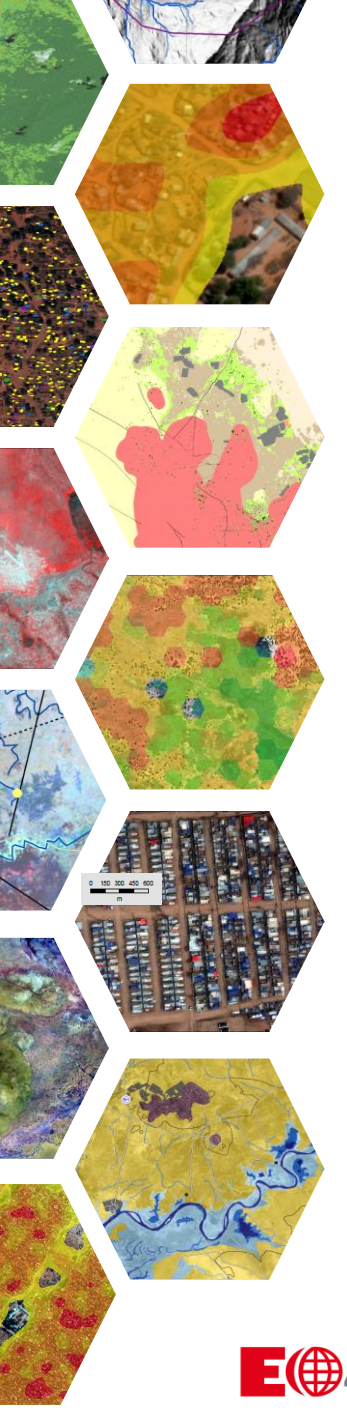
Are the sources safe against pollution?

→ Land use/land cover mapping of catchment areas

EO-based services for water: Installation of Infrastructure



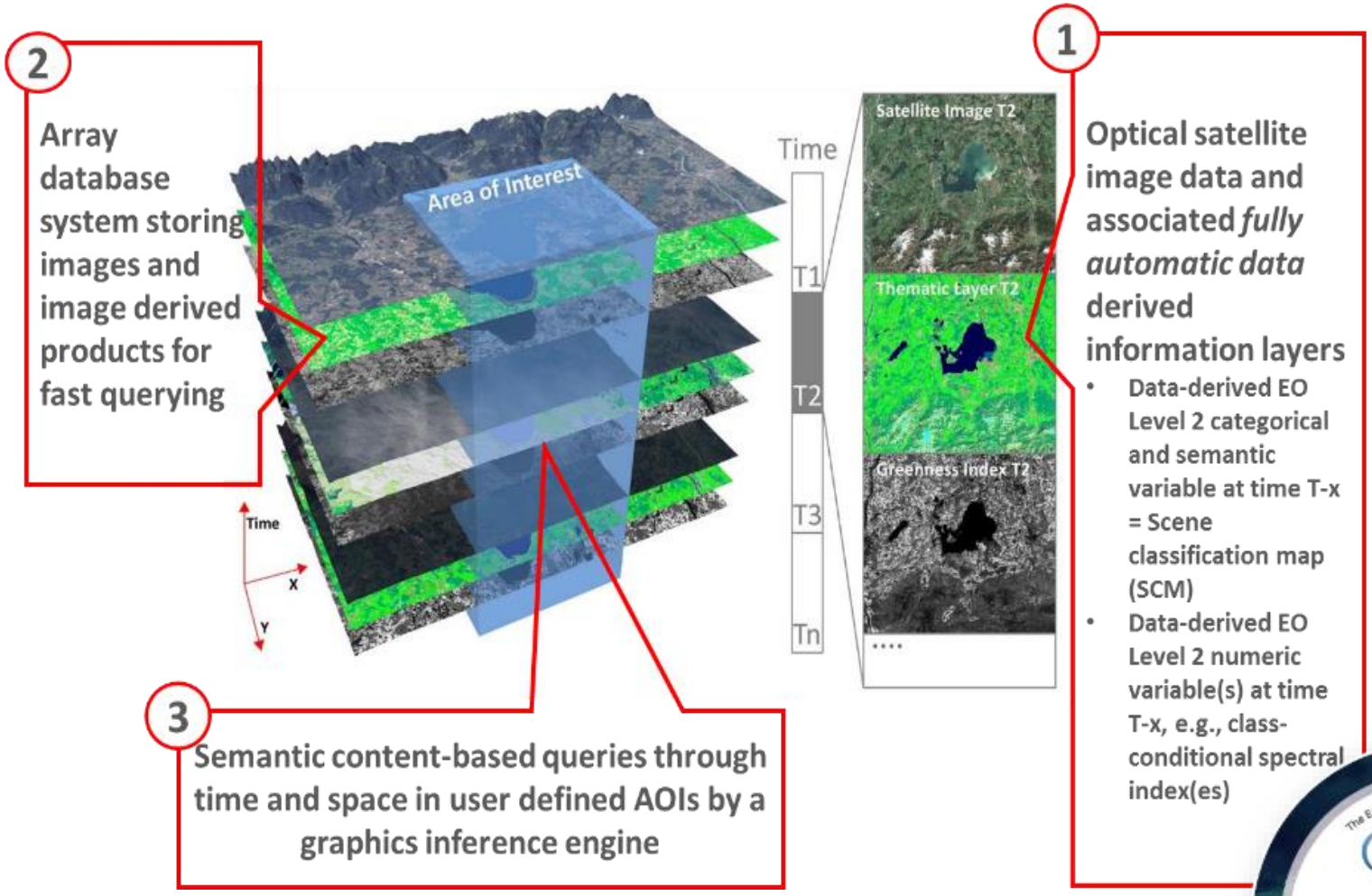
Road and buildings (stables/toilets?) only 50 m upstream of source



Development of tools

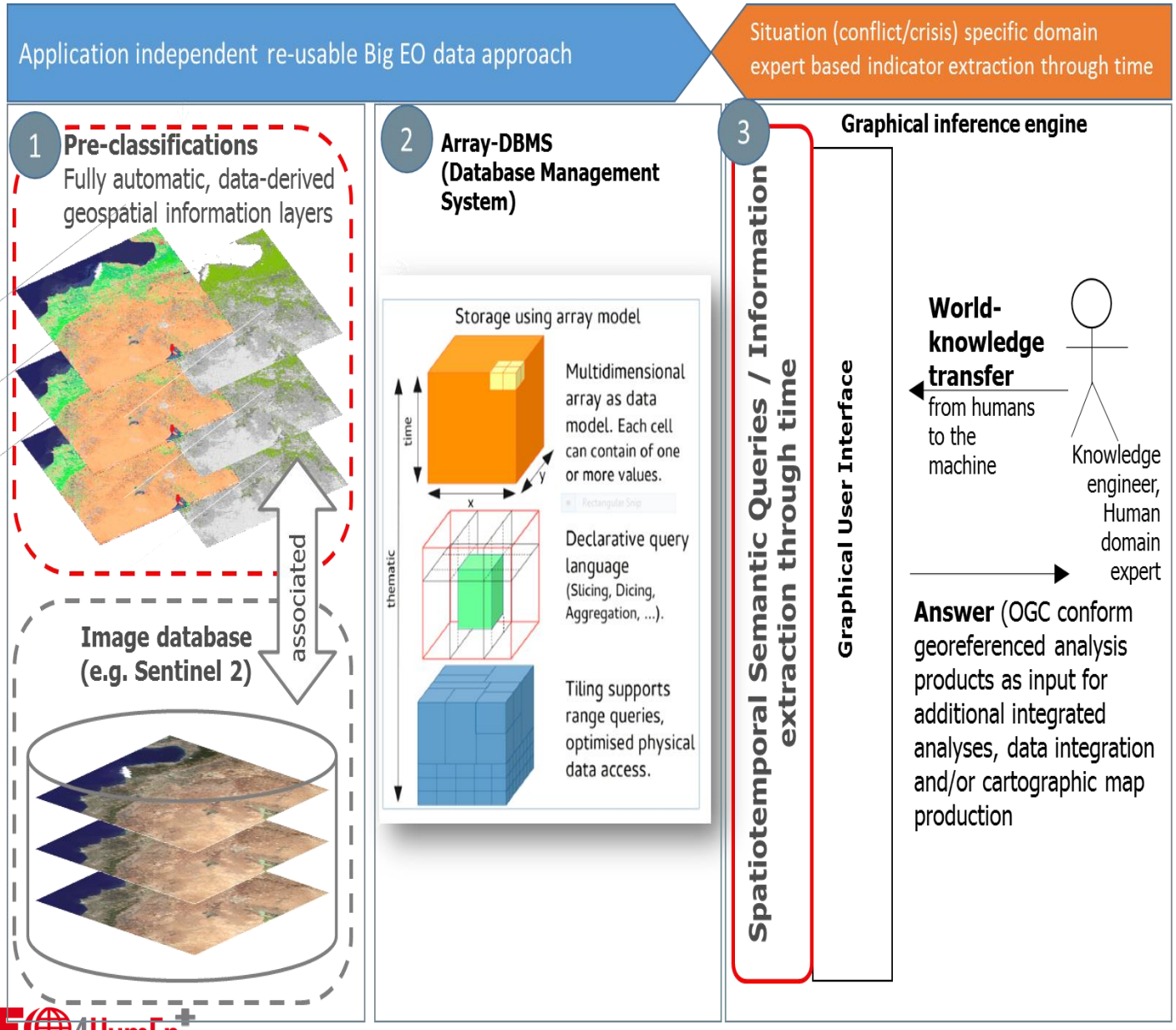
(generic, but applicable to water)

Multi-purpose technology to exploit Big Earth Data: Applications for Water Management

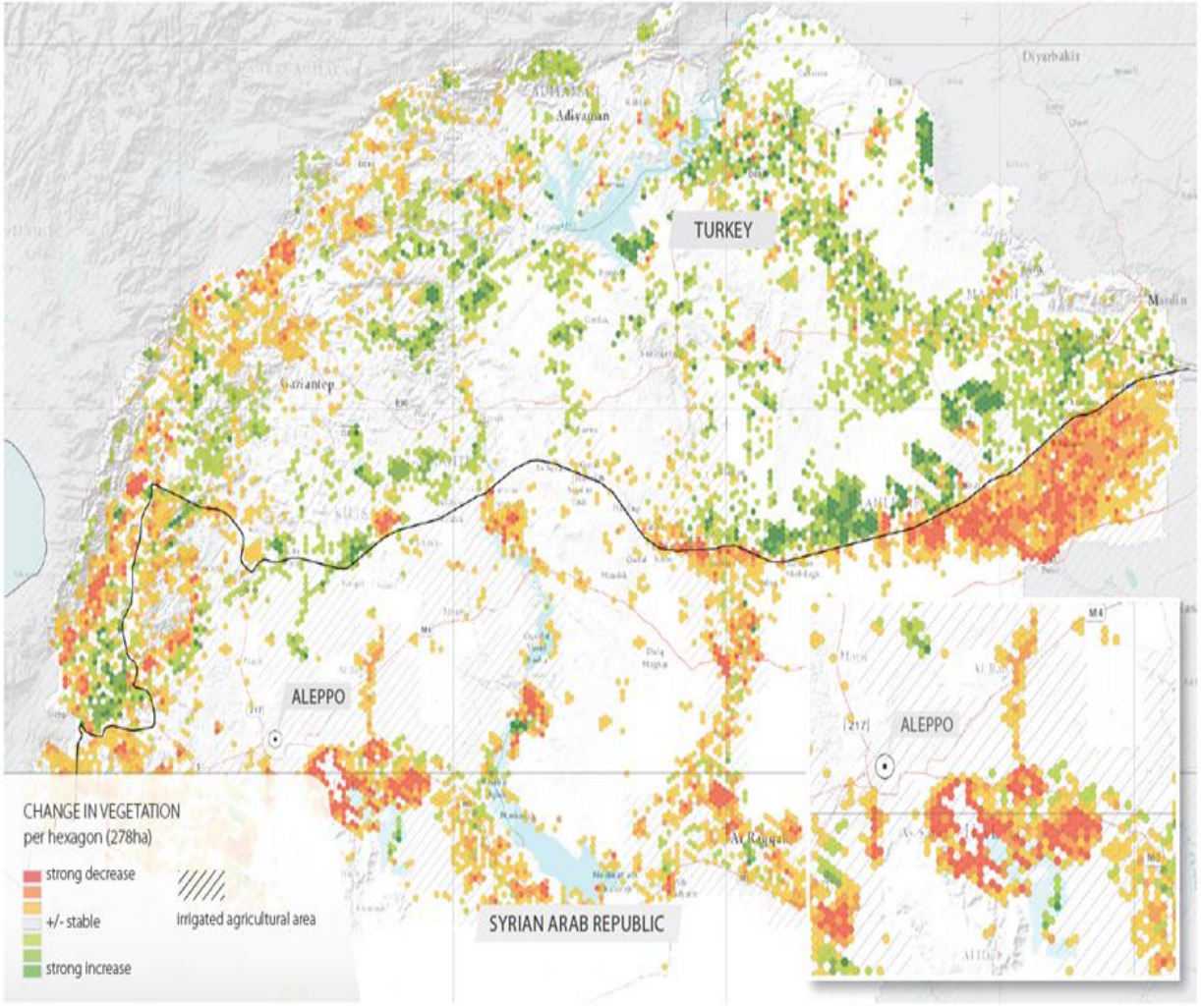


Tiede, D., Baraldi, A., Sudmanns, M., Belgiu, M., Lang, S., 2017. Architecture and Prototypical Implementation of a Semantic Querying System for Big Earth Observation Image Bases. Eur. J. Remote Sens. 50, 452–463. doi:10.1080/22797254.2017.1357432

Service architecture



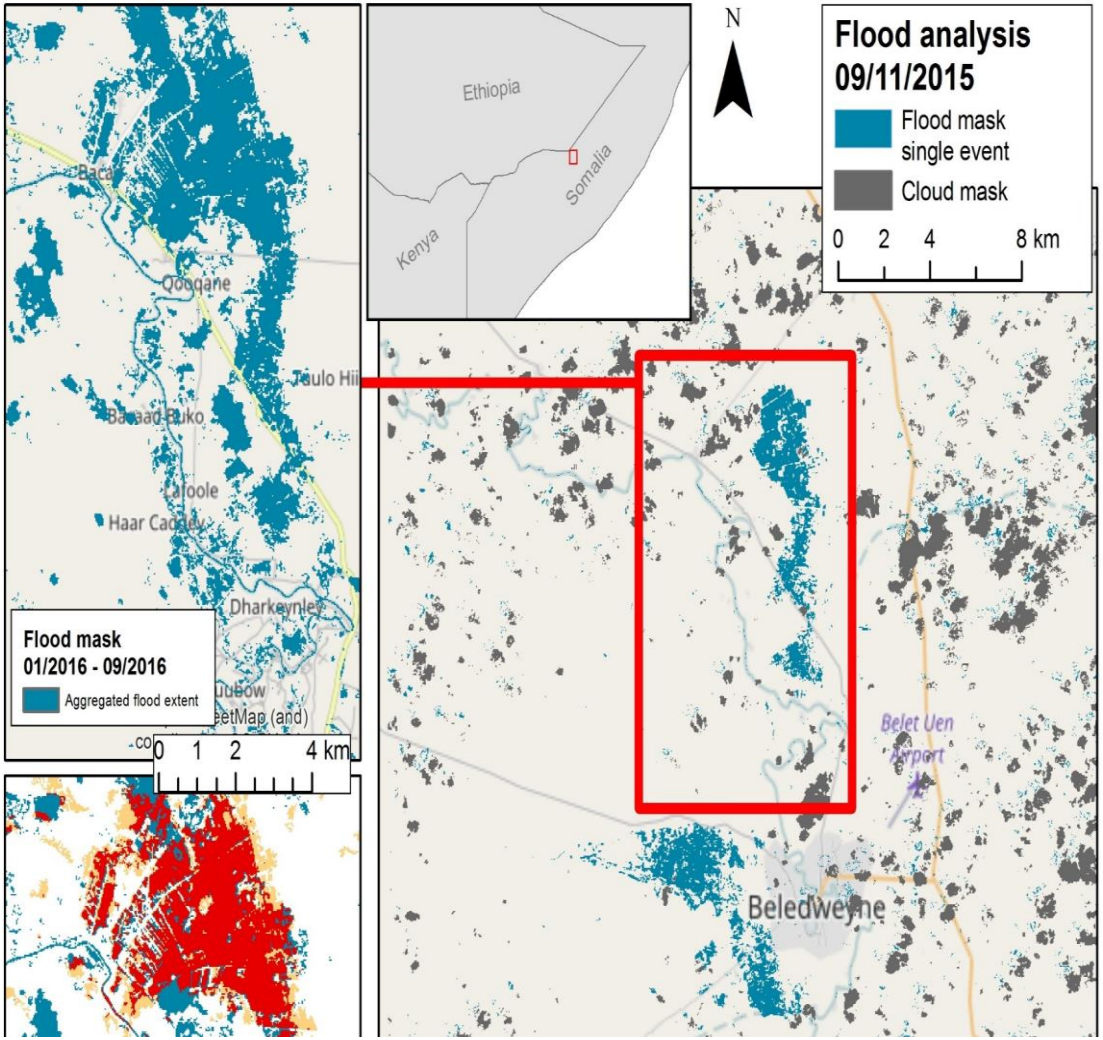
Application example: Mapping of irrigated agriculture, border region Turkey- Syria



- Comparison August 2010 – August 2014
- Relevant for water management
-
- The **generic approach** to extract such indicators **allows repetition on-the fly for different time intervals**

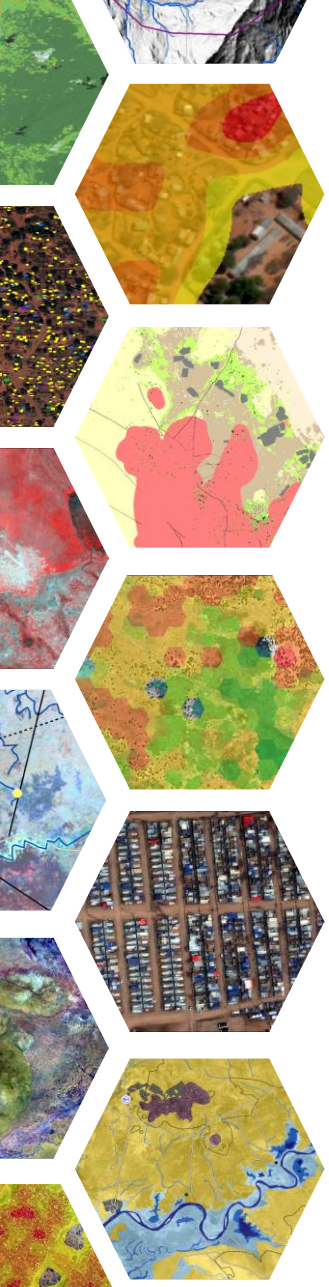
Tiede, D., Lüthje, F., Baraldi, A., 2014. Automatic post-classification land cover change detection in Landsat images: Analysis of changes in agricultural areas during the Syrian crisis, in: Seyfert, E., Gülch, E., Heipke, C., Schiewe, J., Sester, M. (Eds.), Band 23: Geoinformationen Öffnen Das Tor Zur Welt, 34. Jahrestagung in Hamburg 2014. Publikationen der Deutschen Gesellschaft für Photogrammetrie, Fernerkundung und Geoinformation (DGPF) e.V., Potsdam.

Application example: Ex-post flood extent mapping in Somalia, from Big Earth Data



- The example is based on a **dense temporal stack of 78 Landsat 8 scenes**
- **Generic approach**
- Optimized database use→ very little time of operator needed

Sudmanns, M., Tiede, D., Wendt, L., Baraldi, A., 2017. Automatic Ex-post Flood Assessment Using Long Time Series of Optical Earth Observation Images. GI-Forum J. Geogr. Inf. Sci. 1, 217–227. doi:10.1553/giscience2017_01_s217



EO4HumEn+

Extended EO-based Services for Dynamic Information Needs in Humanitarian Action

FFG

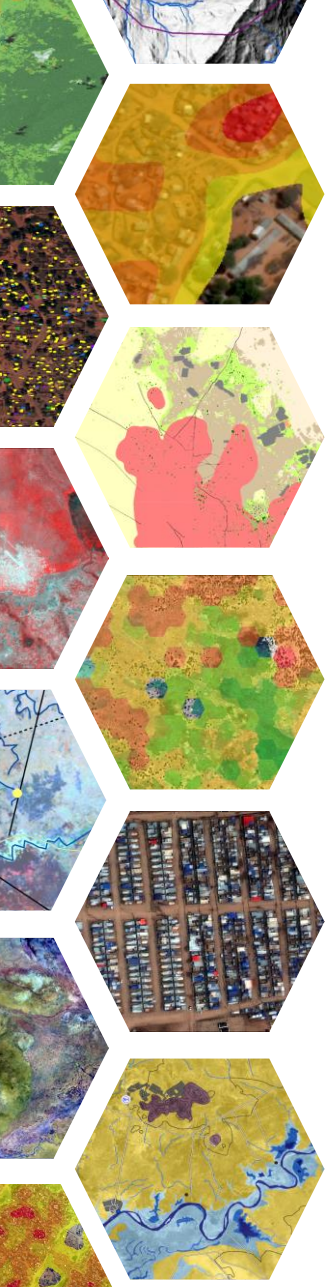
Humanitarian Services at Z_GIS:

New services

EO-based information services, proven and available on short notice

Collection and development of innovative technologies and applications

User needs



EO4HumEn+

Extended EO-based Services for Dynamic Information Needs in Humanitarian Action

FFG

Let`s be a littlebit provocative:

Remote sensing for water:

Should make life easier, but requires (at the moment) **experts and/or field data** for

calculation of:

- Precipitation
- Evapotranspiration
- Run-off modelling
- Infiltration and permeability
- Storage of *volumes* in lakes…

Solutions?

1. Tools become really simple and clear

2. We team up.

Lorenz.wendt@sbg.ac.at