Geospatial Copernicus Data and Standards: Applications in the International Technical Cooperation

Clémence Dubois, Michaela Frei, Thomas Lege

Bundesanstalt für Geowissenschaften und Rohstoffe

GEOZENTRUM HANNOVER

Motivation

Let's take a step back…

- Requirements in the International Technical Cooperation
  - Find solutions to major environmental challenges
  - Reconcile information from different sources
  - Create new useful information
  - Ensure sustainability

Groundwater Soil Climate Change
Landslides Energy Salinization
Pollution Resources Georisks
Water Mineral resources Natural disasters
Geothermics Mining Urban development

… to the beginning of INSPIRE

- Current Situation of the International Technical Cooperation
  - Available data limited in quantity and quality
  - Limited computing capacities
  - Limited storage capacities
  - Necessary knowledge sometimes missing
  - Willingness and transparency in the sharing of information

Outline

Case application: regional cooperation for groundwater management in Maghreb

- Goals
- Data and Requirements
- Solutions towards a Standardization
- Contribution of Copernicus
- New challenges
- Conclusion and Perspectives

Goals

- Support the local partners in

Collecting and analyzing hydrogeological information

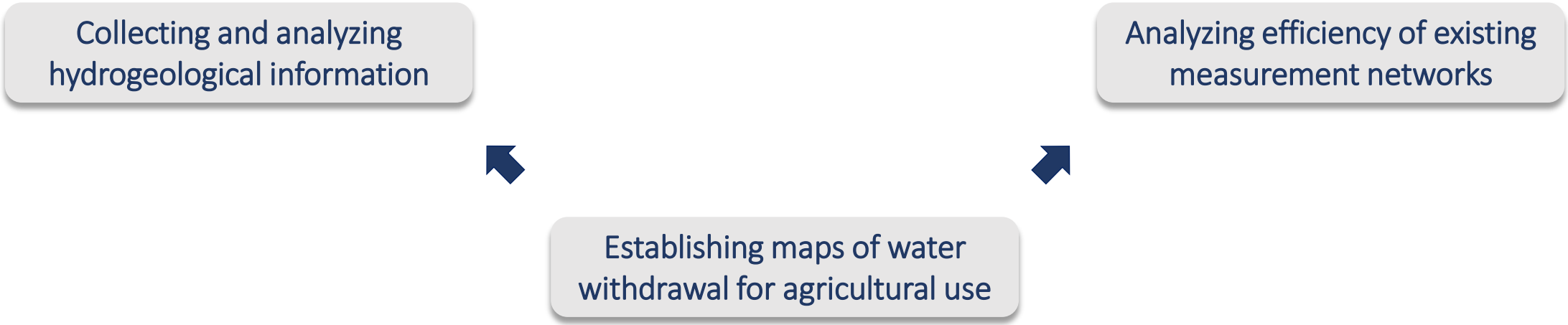
Analyzing efficiency of existing measurement networks

Establishing maps of water withdrawal for agricultural use

- Interconnected goals
  - Need of in-situ data for the establishment and validation of reliable maps

Goals

- Support the local partners in



- Interconnected goals
  - Need of in-situ data for the establishment and validation of reliable maps
  - Once validated, the maps can give information about the current hydrological situation

- Lots of different data and requirements

Data and Requirements

- Identify the needs

Collecting and analyzing hydrogeological information

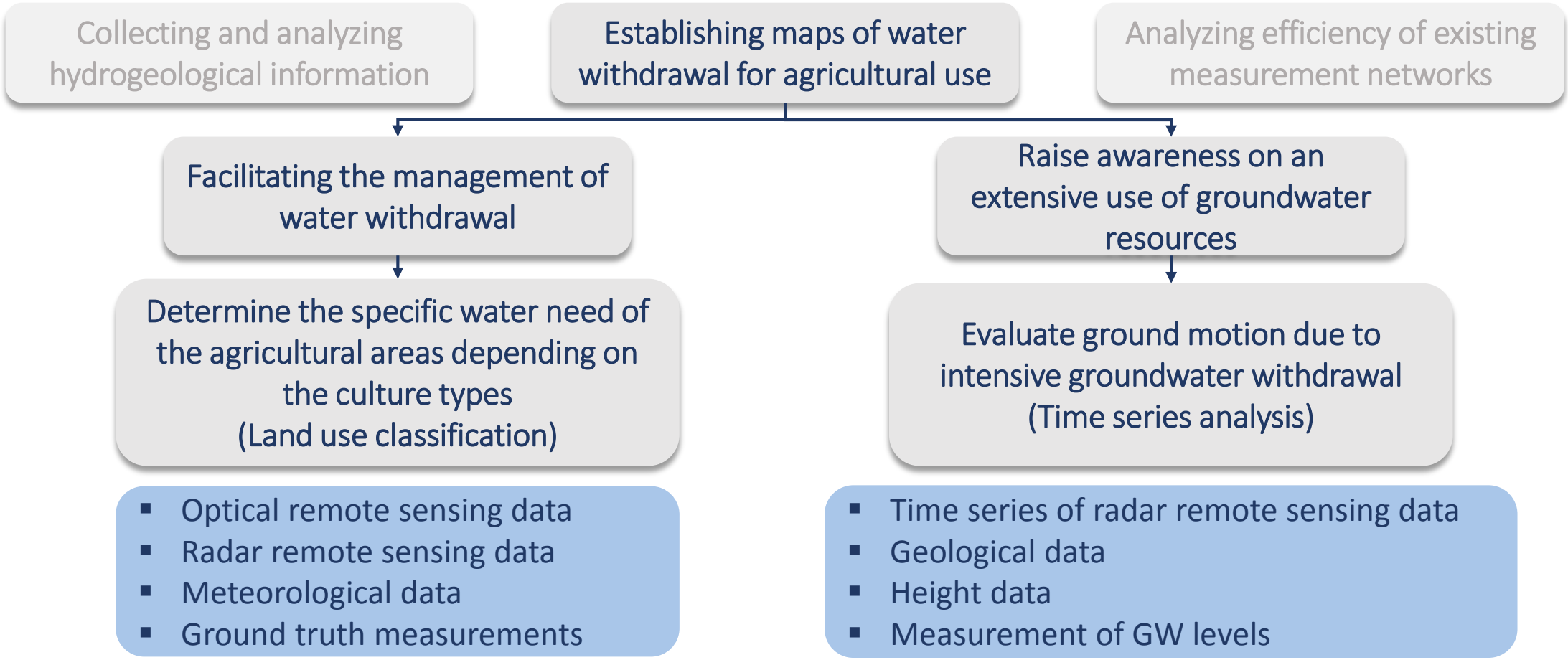
- Reports / Maps
  - Geology
  - Lithology
- Analog / Digital
- Database

Establishing maps of water withdrawal for agricultural use

Analyzing efficiency of existing measurement networks

Data and Requirements

- Identify the needs



Data and Requirements

- Identify the needs

Collecting and analyzing hydrogeological information

Establishing maps of water withdrawal for agricultural use

Analyzing efficiency of existing measurement networks

- Measurement of GW levels

Data and Requirements

- Reality: similar to obstacles identified by the public consultation in preparation of the INSPIRE directive
  - Spatial data is often missing or incomplete
    - Lots of data, often heterogeneous even inside one country

    Ex: GW level
  - Description of available spatial data is incomplete

    Ex: geological data not harmonized with no legend
  - Spatial datasets can often not be combined with other spatial datasets

    Ex: very local coordinate system or analog maps
  - Systems to find, access and use spatial data not compatible with each other

    Ex: system not available
  - Cultural, institutional, financial and legal barriers prevent or delay the sharing of spatial data

    Ex: different partner following different legacies, political and administrative hierarchies, limited computing capacities, limited storage capacities

Data and Requirements

- Requirements for the project: similar to INSPIRE principles
  - Data collected only once and maintained effectively through one database
  - Possibility of combining spatial information of different sources and countries
  - Sharing and transparency
  - Relevance of the information level user dependent
  - Easy to find what geographic information is available

- Specific requirements for the International Technical Cooperation
  - Free data and processing services
  - Software easy to understand and operate
  - Language

Solutions towards a Standardization

- Use of Open Source (OS) solutions
  - Data:
    - Satellite: Copernicus
    - Auxiliary: GEOSS Portal – overview of what is available
  - Software: SNAP, QGIS and associated Plugins and Toolboxes
  - ➢ Possibility of use at all levels of decision
  - ➢ Adaptability to new data and software
  - ➢ Sustainability

- Standardization of the field work
  - Development of working sheets and crop catalogues for ground truth acquisition
  - ➢ Transferability to other regions

Solutions towards a Standardization

- Homogenization of existing data
  - Digitalization of geological maps
  - Regular update of groundwater measurements
  - ➢ Interpretability

- Planned: Creation of a database with relevant project information, different access rights for different users

- Training of the end users towards methods, theory and software
  - ➢ Transferability
  - ➢ Sustainability

Contribution of Copernicus

- Large coverage
- Very regular coverage
  - every 5 days since Sentinel 2B
  - every 6 days since Sentinel 1B

- Multi-temporal analysis and possibility of regular monitoring
  - ➢ Improvement of the land use classification of different crop types towards corresponding water needs with Sentinel 2 data
  - ➢ Time series analysis of ground motion with Sentinel 1 data

- Good data quality and very coherent analysis over several years
- Accuracy of the geolocation and resolution suitable for the project needs

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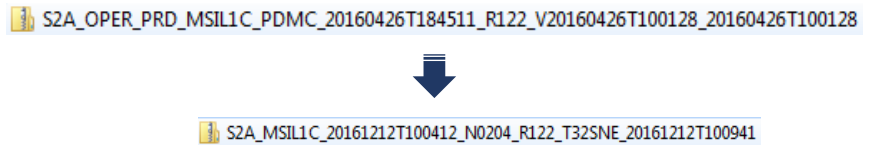
Requirements

- ✓ Data availability and maintenance
- ✓ Easy to find
- ✓ Data combination
- ✓ Relevance of the information level
- ✓ Sharing and transparency
- ✓ Open Source

New challenges

- Sentinel 2 data:
  - Size
    - until 27.09.2016: ~8GB
    - since 28.09.2016: ~700MB
  - Name convention until 06.12.16 too long for proper use in Windows



  - ➢ Download and exchange
  - ➢ Visualization and processing

- Sentinel 1 data:
  - Size: 7,5GB

  - ➢ Download, exchange and storage of time series
  - ➢ Computation time of derivate products (weeks to months on high-end computers)
  - ➢ Storage of derivate products (up to few TB)

- Not every processing possible using only OS software, or only one OS software

Requirements

✓ Software easy to understand and operate

✗ Language

Conclusions and Perspectives

- Copernicus very important for the International Technical Cooperation due to regularity and open data
- Processing utilities should also be open source and, for ensuring sustainability, easy to use
- First milestones set in the international technical cooperation, but still a long way towards a global INSPIRE

Perspective

- Cloud Services - No download, no processing, no storage on the computer
  - Solution to computing and storage capacities issues
  - Easiness of use still to be determined (code, connection)
  - Possibility of loading external data vs. privacy issues
- Amount of online (open source) download and processing platforms does not stop to increase
  - Several platforms for similar data/processing: Which one is best suited?
  - Best-practice examples and quality procedures for OS

Find more information on

www.bgr.bund.de

Merci de votre attention

Thank You for Your Attention!

Vielen Dank für Ihre Aufmerksamkeit!