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Session ESSI 3.2: Making Geoanalytical Data FAIR: Managing Data from Field to Laboratory to Archive to Publication

French feedback from urban soil geochemical data archive to data sharing: state of mind and intent

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Urban territories collect many types of geochemical and physico-chemical data relative to, e.g., soil quality or soil functions. Such data may serve for various purposes like verifying the compatibility with current or future uses, defining (pedo)geochemical backgrounds, establishing levels of exposure to soil pollutants, identifying management options for polluted sites or for excavated soils, verifying the evolution of infiltration ponds, assessing carbon storage, etc. They may also serve to prioritize soil functions and associated ecosystem services such as, e.g., soil fertility, surface and groundwater storage or supply, purification of infiltrated rainwater, etc. Gathering such data in national databases and making them available to stakeholders raises many issues that are technical, legal and social. Should all of the data be made available or only selected portions? How can access and reuse of the data be ensured in a legal fashion? Are statistical and geostatistical methods able to deal with data from heterogeneous origins, allowing their reuse for other purposes than the initial one? In this context, it is necessary to take into account scientific as well as practical considerations and to collect the societal needs of end-users like urban planners.

To illustrate the complexity of these issues and ways to address them, we propose to share the French experience:

- on gathering urban soil geochemical data in the French national database BDSolU. We will present how this database was created, the choices made in relation with the national context, the difficulties encountered, and the questions that are still open.
- on a new interrogation system linking agricultural and urban soil databases (DoneSol and BDSolU), which have different requirements, and the corresponding standards. Such linkage based on interoperability is important in the context of changes of soil use, with for example agricultural soils becoming urbanised soils, or soils from brownfields intended for gardening. It is also necessary to ensure a territorial continuity for users.

The objective is to define a robust and standardised methodology for database conceptualisation, sharing and final use by stakeholders including scientists

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FRENCH FEEDBACK FROM URBAN SOIL GEOCHEMICAL DATA ARCHIVE TO DATA SHARING: STATE OF MIND AND INTENT

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BDSolU: Historical development

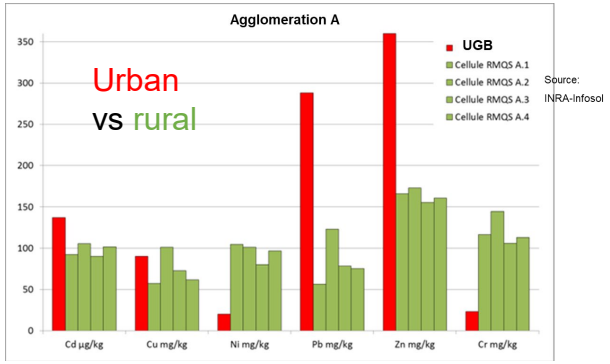
- Urban soils: poorly known
- No soil guidance values in France
- Compare (potentially) contaminated soils to
  - uncontaminated neighbour soils
  - geochemical background.

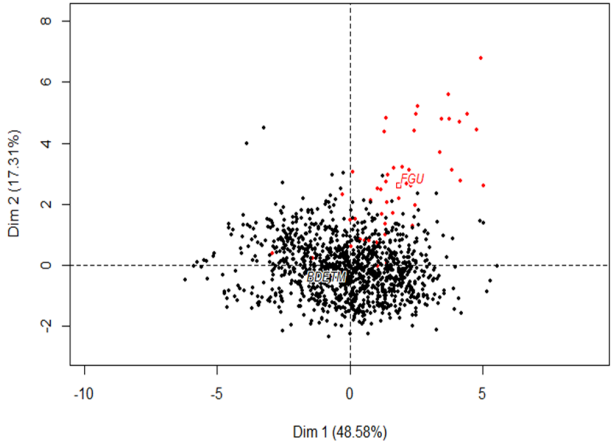
- Need of data => **BDSolU**

Urban Soil Analyses National Database

Initial data = soil diagnoses

- on schools located on former industrial sites (since 2010)
- excavated soil reuse (since 2014)



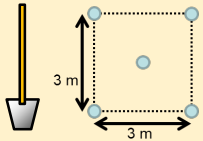


BDSolU: Content

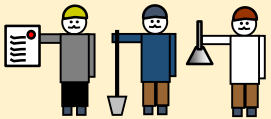
DATA

> METADATA

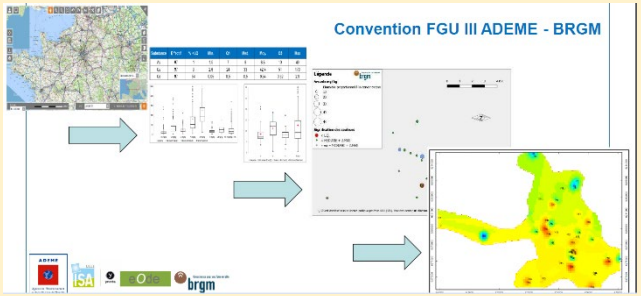
- Sampling location
- Stakeholders
- Sampling method/depth
- Sample
- Sample preparation
- Analytical method



> ANALYTICAL RESULTS

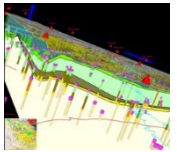


VISUALISATION TOOL



STANDARDS AND INTEROPERABILITY

- Uses known standards
- Consistency with existing database
  e.g. geosciences (boreholes, risks…)
- Allows data interpretation (2D, 3D)
  e.g. 3D GDM software
- INSPIRE Directive requirements (formalization, interoperability, diffusion)



Objectives: Help urbans stakeholders to deal with:

- *Diagnoses of (potentially) contaminated soils*
- *Excavated soils management*
- *Urban planning*
- *Health protection*
- *Impact studies*
- *Post-accident reviews*

BDSolU: Contraints and difficulties

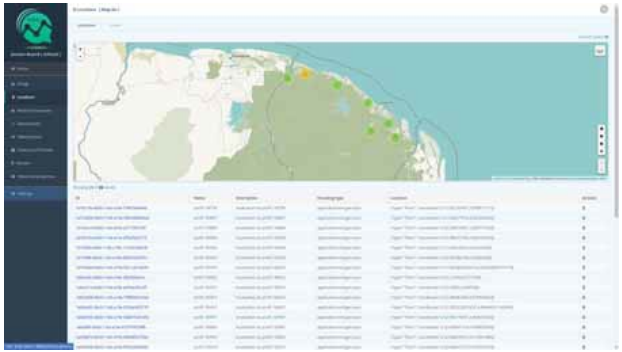
- **Technical**
  - Data themselves
    - How to deal with anthropogenic deposits (e.g. Industrial waste fillings) and soil evolution ?
    - Important spatial variability of concentration over short distances
  - Data treatment
    - Heterogeneous data originating from several suppliers or studies
    - Anticipate potentially small number of available analyses vs spatial scale chosen
    - High rate of values below quantification limits
  - Time
    - Database structure: evolution to meet requirements, readjustment of already integrated data
    - Data integration, verification, validation = time consuming
    - Automatisation of analytical data integration: negociation with labs

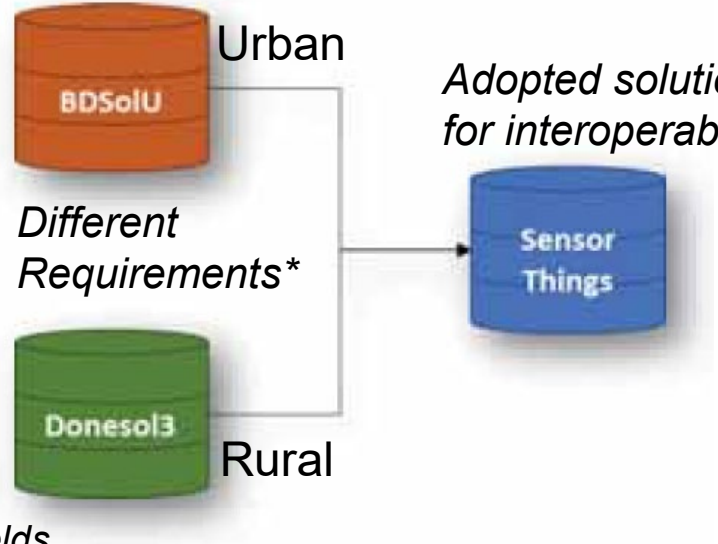
- **Juridical**
  - Ownership of data - Confidentiality of some data – cf. land owner
  - Partnership engagement : Feeding (duration, data volume and nature…), data use and dissemination
- **Economical :** Funding time consuming activities, data acquisition

Linking databases for extensive consultation/use of data

- Towards soil quality / soil health questions
- Soil continuum: urban-rural
- Mapping of 2 main databases

Extract, Transform, Load (ETL) systems:
SensorMap, SensorBoard, MapGo





** Fields*
30 with equivalence
10 with possible equivalence
60 with no equivalence

Conclusions and perspectives

From soil geochemistry to
Soil quality/functions

Towards a circular approach of data

At different scales

Site ⟺ Territory

Various purposes and users
e.g. Future uses, Geochemical baselines, Management options, Infiltration ponds, Soil functions (eg C storage) and services, Purification of infiltrated water…

Interest of public organisms involvement
Mission of data capitalisation and sharing

Access through Web platforms to soils and subsoils various properties

From national to international perspectives