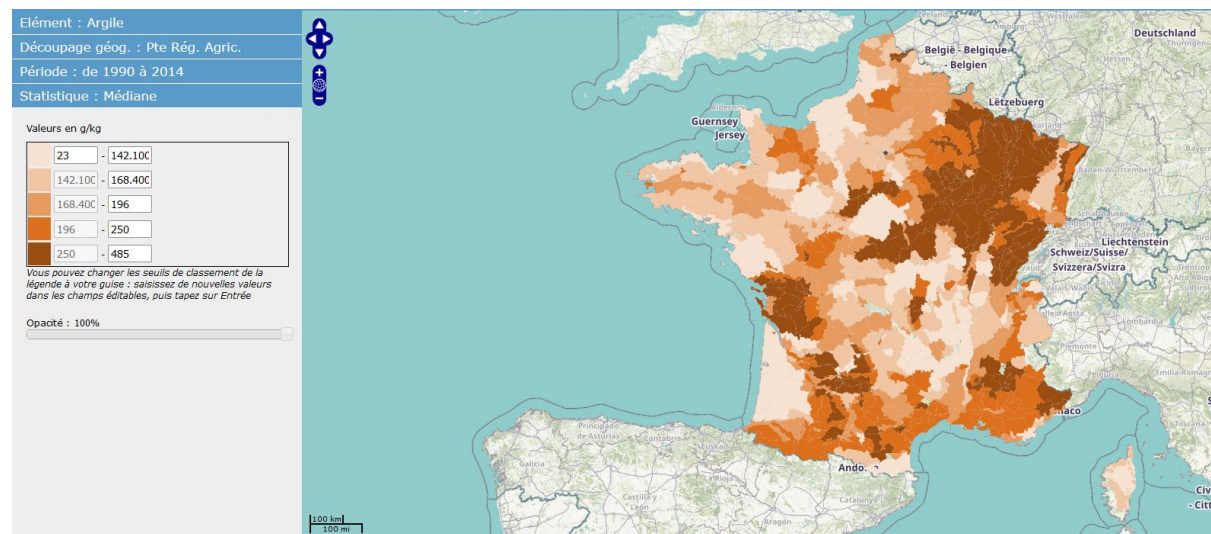


French soil-test database (BDAT)

A soil programme from the GIS SOL - Scientific group of interest on soils



Nicolas Saby and Antonio Bispo (INRAE)
Blandine Lemerancier (L'institut Agro)

Cited in the **EU Soil Strategy for 2030** - Reaping the benefits of healthy soils for people, food, nature and climate / {SWD(2021) 323 final}



To make it happen on the ground, and inspired by the French national soil sampling scheme BDAT⁷⁷, a **'TEST YOUR SOIL FOR FREE' initiative** is proposed below. Knowing more about soil characteristics (pH, bulk density, soil organic matter, nutrient balance, etc.) will help land users to adopt the best management practices. For that reason, building on years of experience surveying soils in the LUCAS survey, the Commission will assist Member States in setting up, with their own funds, a system to test soil for free for those land users that so wish, and who will receive the results of the tests. This will complement existing obligations in Member States for soil sampling. In order to maximise consistency in approaches to sampling techniques, and to ensure appropriate advice, the involvement of AKIS advisors is crucial. An estimate of the costs involved in such an initiative are included in the staff working document accompanying this strategy.

⁷³ FAO (2017), Voluntary Guidelines for Sustainable Soil Management.

⁷⁴ Gattinger A. et al (2012), Enhanced top soil carbon stocks under organic farming.

⁷⁵ https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/cap-glance_en-thenewcap

⁷⁶ New EU Forest Strategy for 2030, COM(2021)572 final.

⁷⁷ <https://www.gissol.fr/le-gis/programmes/base-de-donnees-danalyses-des-terres-bdat-62>

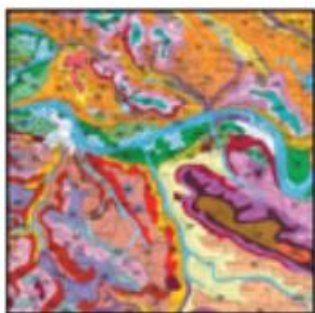
The French scientific group of interest on soils (GIS Sol)

- **Created in 2001**
 - 2 Ministries (Agriculture and Environment),
 - 2 National funding agencies (Environment and Biodiversity)
 - 4 research institutes (INRAE, IRD, BRGM and IGN)
- **Aims:**
 - Survey and monitor French soils
 - Organize and store soil samples and soil information
 - Give access to soil information
 - Support public policies
- **INRAE Info&Sols acts as the national coordinator for the survey and monitoring programmes with the financial support of the funders**



Inventory

IGCS



Monitoring network

RMQS

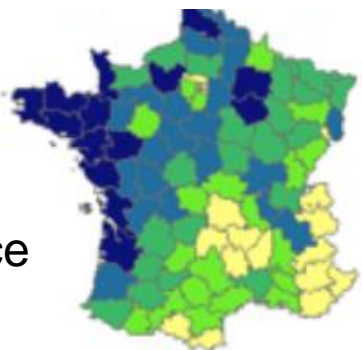


Urban soils



Agronomical parameters

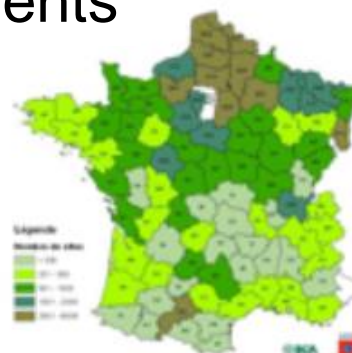
BDAT



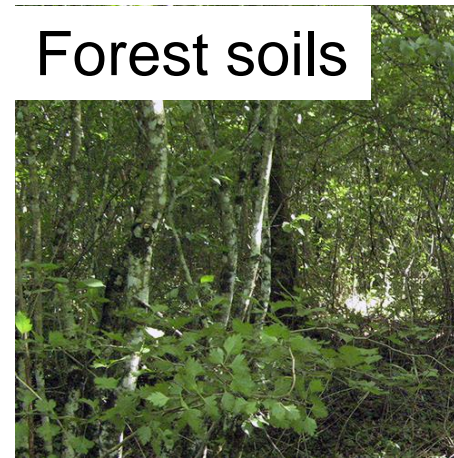
running since
1995

Trace elements

BDETM



Forest soils



How does it work ?

From the field to the database



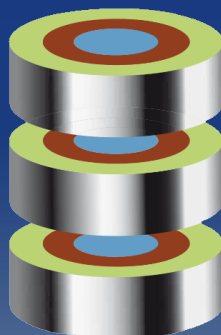
Topsoil sampling by the farmers

(plough layer or 0-25 cm topsoil layer in the case of pasture)



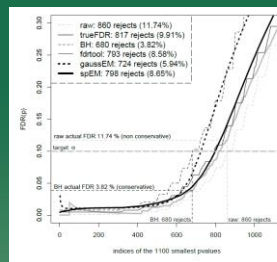
Soil determinations

(labs certified by the French ministry of Agriculture)



Data consolidation

- Quality control
- Storage
- Statistics computing



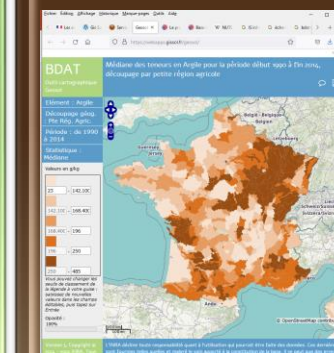
Statistical analyses (uncertainty analysis)

+

Scientific publications



Spatio temporal mapping



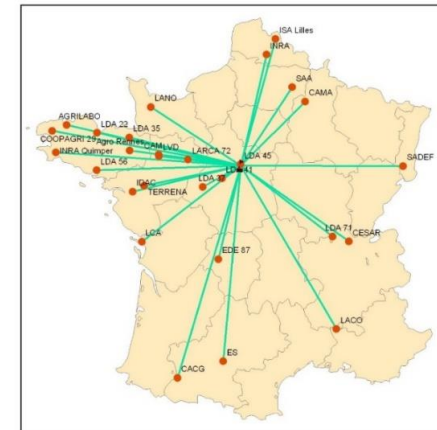
Dissemination via the Gis Sol website

6 steps from the field sampling by farmers to the computing of indicators and dissemination

The French soil-test database collection (BDAT)

• Key figures:

- Started in 1995 by researchers
- Network of more than 20 laboratories
- More than 36 millions results from soil tests...



• Data Characteristics:

- Sampling: no control on the strategy, no detailed information on 'how' and 'where'.. but sampling year is known.
- Georeferencing is imprecise – origin of the sample based on administrative units (municipality);
- Analysis made by certified labs (but several labs, results may differ)

• Costs: around 2 M€ (since 90's)

- Grant from the French ministry of Agriculture (50 K€ each year since 2003 -> around 1 M€) to pay for the time spent by labs to extract data;
- Salaries of INRAE involved to collect/verify/compute data (around 1M€);
- Extra cost not accounted: sampling and lab tests paid by farmers or farmers' cooperatives

About the agreement to share the data with INRAE

In accordance with General Data Protection Regulation (EU) 2016/679 (article 89), 27 April 2016)

Article 89

Safeguards and derogations relating to processing for **archiving purposes in the public interest, scientific or historical** research purposes or statistical purposes

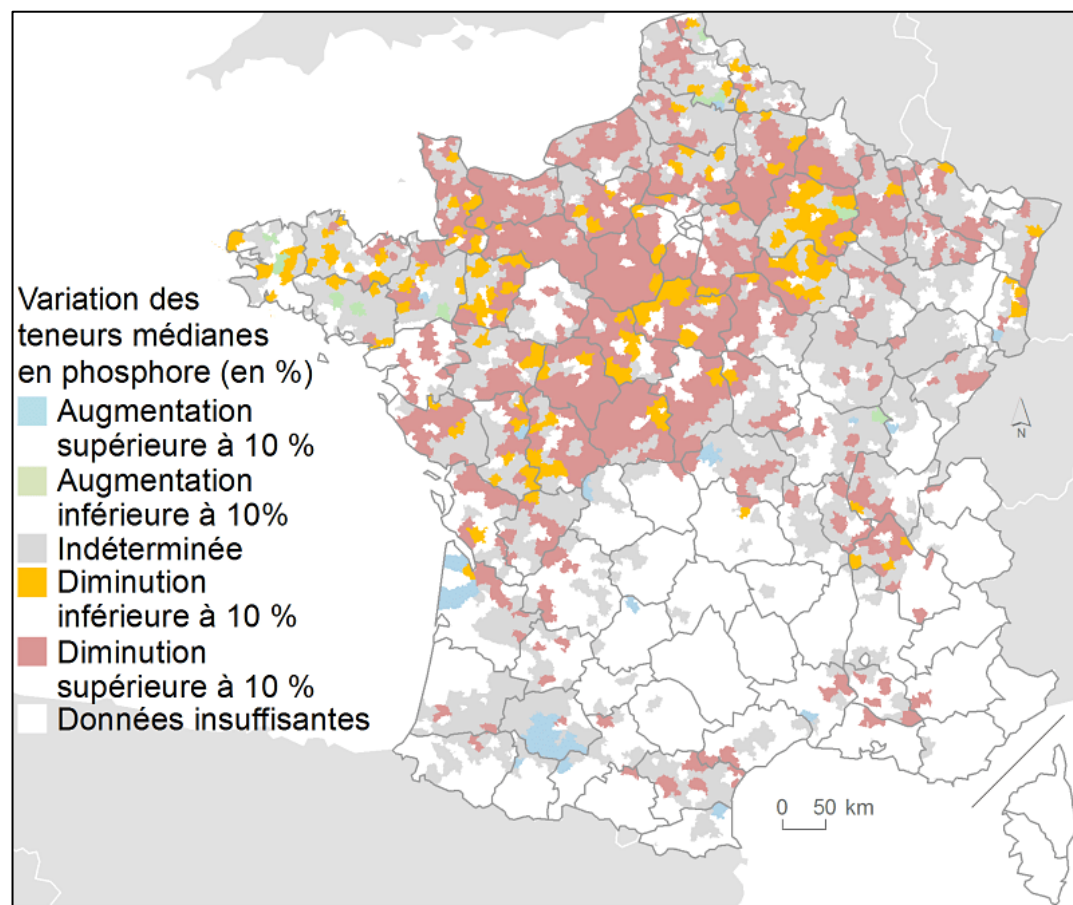
1. Processing for archiving purposes **in the public interest, scientific or historical research purposes or statistical purposes**, shall be subject to appropriate safeguards, in accordance with this Regulation, for the rights and freedoms of the data subject. Those safeguards shall ensure that technical and organisational measures are in place in particular in order to ensure respect for the principle of **data minimisation**. Those measures may include **pseudonymisation** provided that those purposes can be fulfilled in that manner. Where those purposes can be fulfilled by further processing which does not permit or no longer permits the identification of data subjects, those purposes shall be fulfilled in that manner.
2. **Where personal data are processed for scientific or historical research purposes or statistical purposes**, Union or Member State law may provide **for derogations** from the rights referred to in Articles 15, 16, 18 and 21 subject to the conditions and safeguards referred to in paragraph 1 of this Article in so far as such rights are likely to render impossible or seriously impair the achievement of the specific purposes, and such derogations are necessary for the fulfilment of those purposes.
3. Where personal data are processed for archiving purposes in the public interest, Union or Member State law may provide for derogations from the rights referred to in Articles 15, 16, 18, 19, 20 and 21 subject to the conditions and safeguards referred to in paragraph 1 of this Article in so far as such rights are likely to render impossible or seriously impair the achievement of the specific purposes, and such derogations are necessary for the fulfilment of those purposes.
4. Where processing referred to in paragraphs 2 and 3 serves at the same time another purpose, the derogations shall apply only to processing for the purposes referred to in those paragraphs.

Search for large spatio temporal trend

e.g. quantification of general trends in time for a set of properties:

- **pH:**
<https://bsss-journals.onlinelibrary.wiley.com/doi/full/10.1111/sum.12369>
- **Carbon:** Saby *et al.*, 2014
<https://hal.inrae.fr/hal-00948553v1>
- **Nutrients status:** P,K, and Mg content in French arable topsoil data
Saby *et al.*, 2016 <https://hal.inrae.fr/hal-01209243v1>

Trends of median amounts of P between 1994-2004 and 2005-2014



What are the main outputs ?

Online dissemination tool via webapp:

bdat.gissol.fr

<https://webapps.gissol.fr/geosol/>

