



quality certificate for carbon analytical results

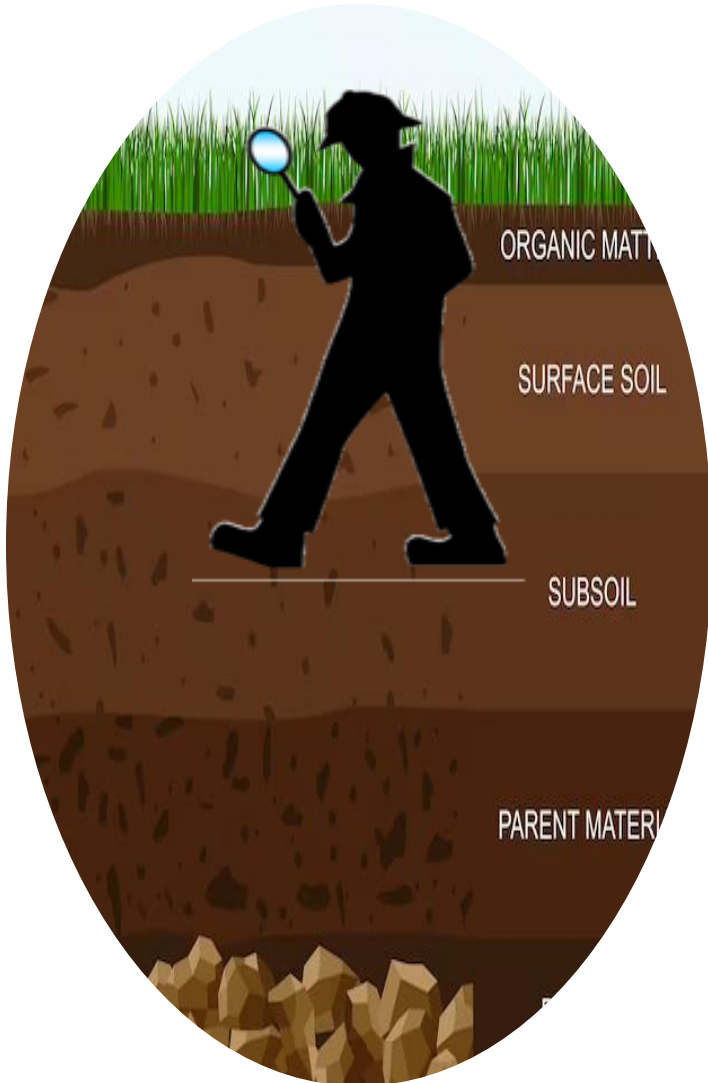
**why and how,
it should be
quickly implemented**

GLOSOLAN Steering Committee

Ms. Nopmanee Suvannang
Ms. Hanane Aroui-Boukbida
Mr. Christian Hartmann
Mr Michael Watts
Mr. Rob Dehayr

**the soil is a
black box !**

**knowledge about soils
(including carbon content)
needs lab data**



**soil
data?**



**management
decisions!**

soil
data



management
decisions

Traditionnaly:

soil analysis

=>

fertilisation
classification

(national)

soil data



management decisions

soil analysis \Rightarrow fertilisation classification (national)

+

(GLOBAL)

soil data

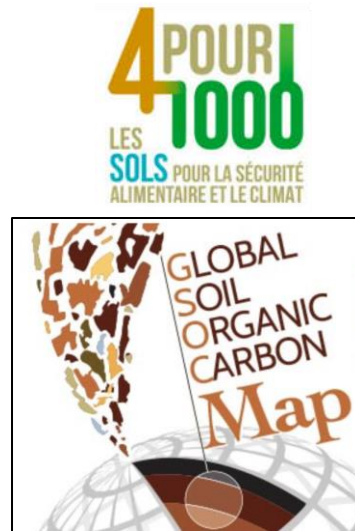
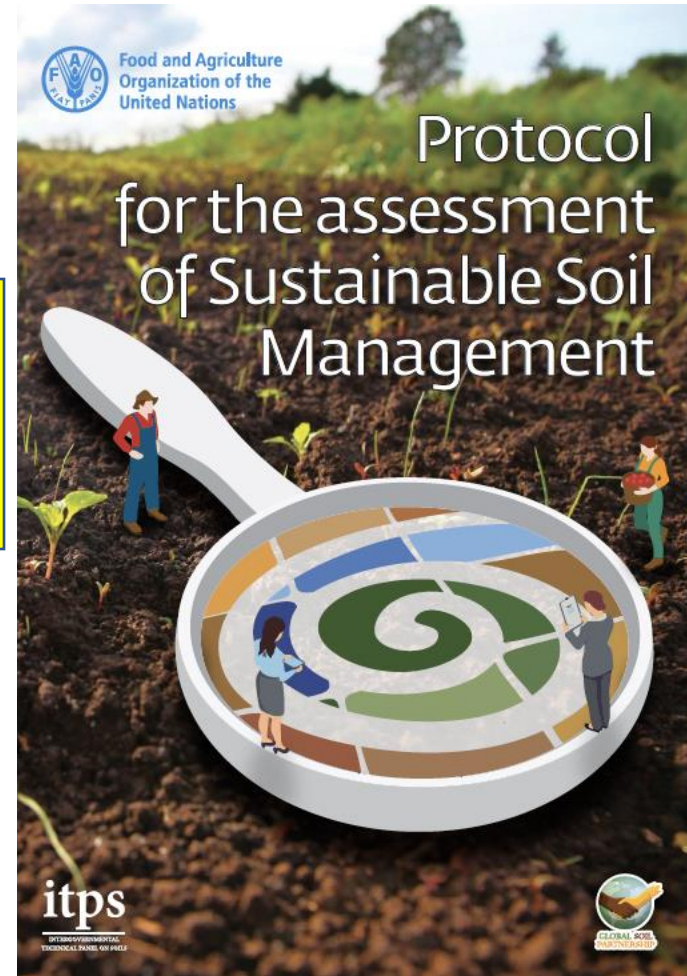


management decisions

CURRENTLY:

soil analysis => fertilisation classification (national)

+ environment management (GLOBAL)






soil data



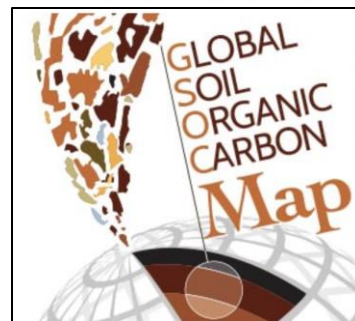
management decisions

soil analysis **CURRENTLY:** => fertilisation classification (national)

+ environment management (GLOBAL)

Soil organic carbon 	Organic carbon (%)	Walkley- Black method http://www.fao.org/3/ca7471en/CA7471EN.pdf or Dumas method http://www.fao.org/3/ca7781en/ca7781en.pdf
Soil physical properties 	Bulk density (kg dm ⁻³)	The Core Method
Soil biological activity 	Soil respiration rate (gCO ₂ m ⁻² d ⁻¹)	Laboratory based soil respiration measurement (static or dynamic)

4 POUR 1000
LES SOLS POUR LA SÉCURITÉ ALIMENTAIRE ET LE CLIMAT



soil data

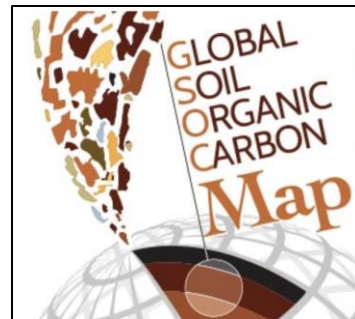


management decisions

soil analysis **CURRENTLY:** => fertilisation classification (national)

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soil data



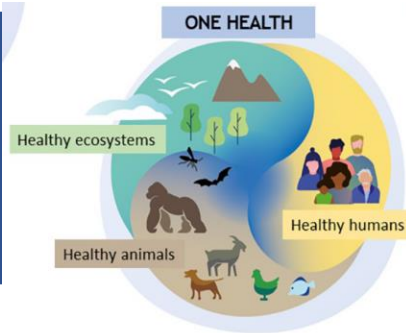
management decisions

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SOIL HEALTH



Soil organic carbon	Organic carbon (%)	Walkley- Black method http://www.fao.org/3/ca7471en/CA7471EN.pdf or Dumas method http://www.fao.org/3/ca7781en/ca7781en.pdf
Soil physical properties	Bulk density (kg dm^{-3})	The Core Method
Soil biological activity	Soil respiration rate ($\text{gCO}_2 \text{ m}^{-2} \text{ d}^{-1}$)	Laboratory based soil respiration measurement (static or dynamic)

5. Maximize the climate and environmental benefits - while containing and reducing harmful impacts - associated with agriculture and food systems by conserving, protecting and restoring land and natural ecosystems, enhancing soil health, and biodiversity, and shifting from higher greenhouse gas-emitting practices to more sustainable production and consumption approaches, including by reducing food loss and waste and promoting sustainable aquatic blue foods;

**soil
data**



**management
decisions**

**data
QUALITY ?**

CURRENTLY

?

**decision
RELEVANCE ?**

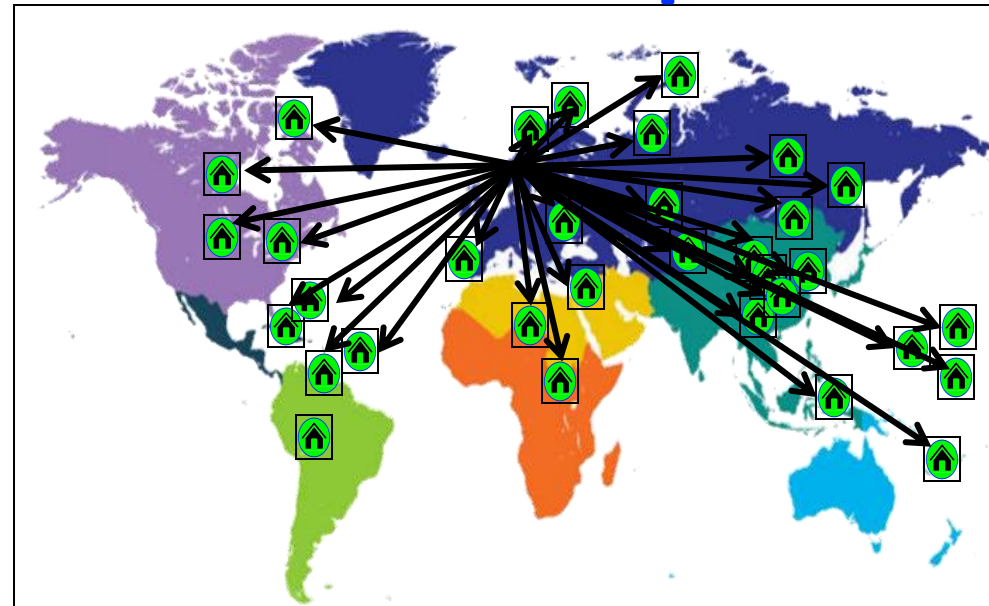
soil
data



management
decisions



Inter Lab Comparison



200 labs
> 60 countries



data
QUALITY ?

answer...

decision
RELEVANCE ?

data
QUALITY ?

answer...

decision
RELEVANCE ?

significant amount of

Low quality data

**=> irrelevant decisions +
wrong scientific conclusion**

data
QUALITY ?

answer...

decision
RELEVANCE ?

Low quality data

=> irrelevant decisions +
wrong scientific conclusion

exist

in all regions,

for all analytical methods

**HOW DID GLOSOLAN DETECT
LOW QUALITY DATA ?**

**WHAT IS 'LOW QUALITY DATA'
?**

**REPEATABILITY ?
REPRODUCIBILITY?**

of soil laboratories for C data...

REPEATABILITY ?

if I send replicates

the same sample to a single lab:

what will be the **REPEATABILITY** of the results? ?

(similarity)

REPEATABILITY ?

5 replicates of the same soil sample

REPEATABILITY ?

5 replicates of the same soil sample

good repeatability

C%

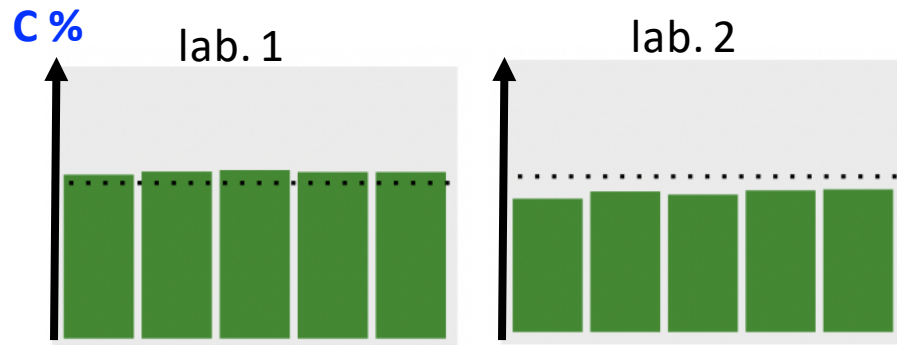
lab. 1

lab. 2

REPEATABILITY ?

5 replicates of the same soil sample

good repeatability

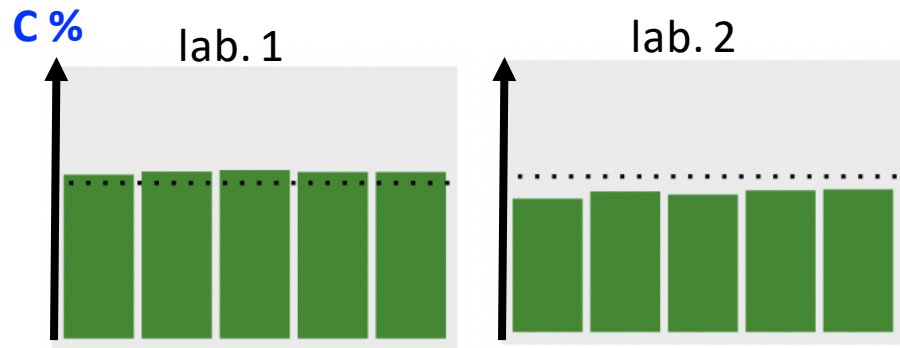


=> control of the analytical process

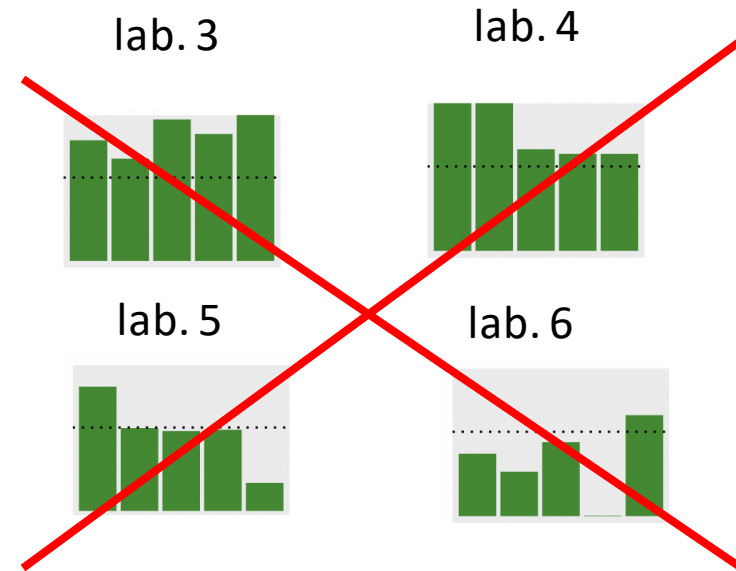
→ relevant decision

REPEATABILITY ?

5 replicates of the same soil sample

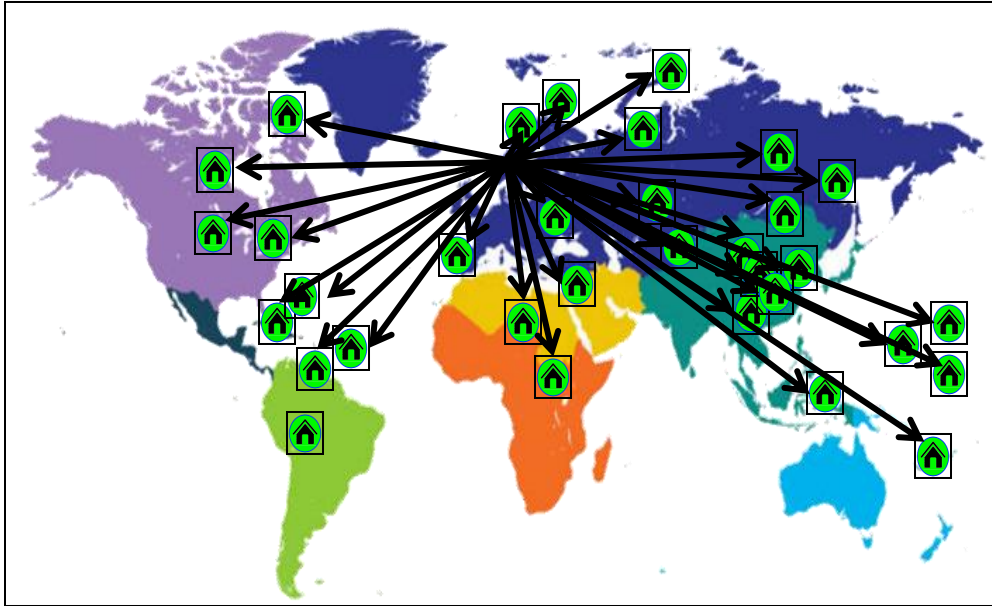


poor repeatability



→ ir-relevant decision

current situation in the world?

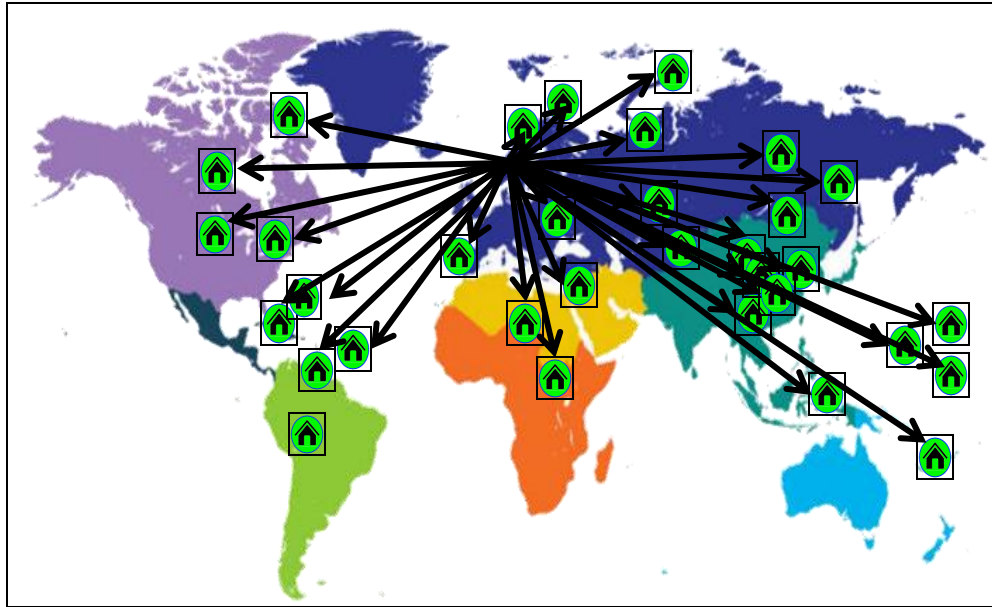


Walckley & Black method

(oxydation = wet chemistry)

160 labs

What is the worldwide situation?



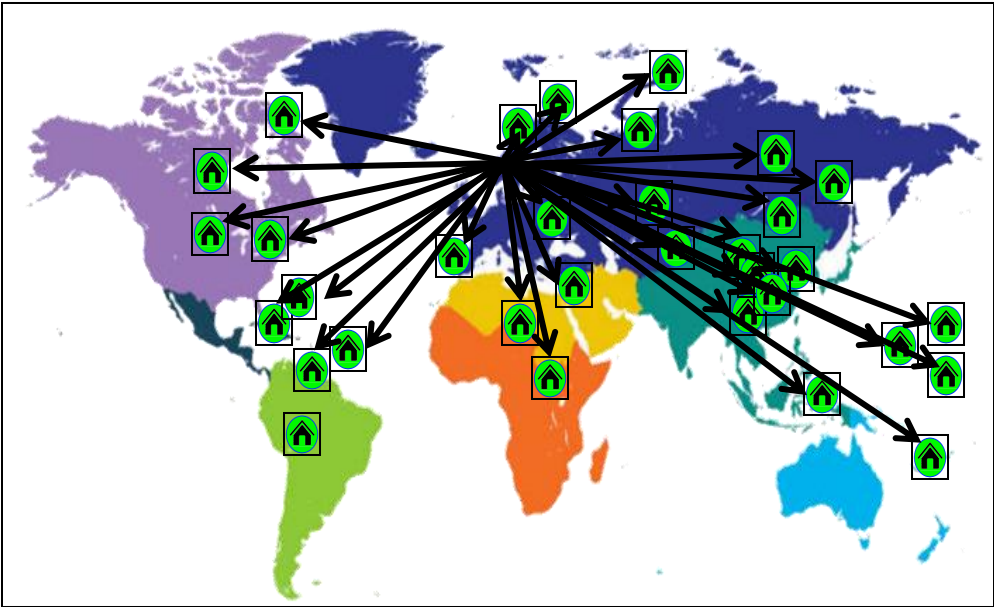
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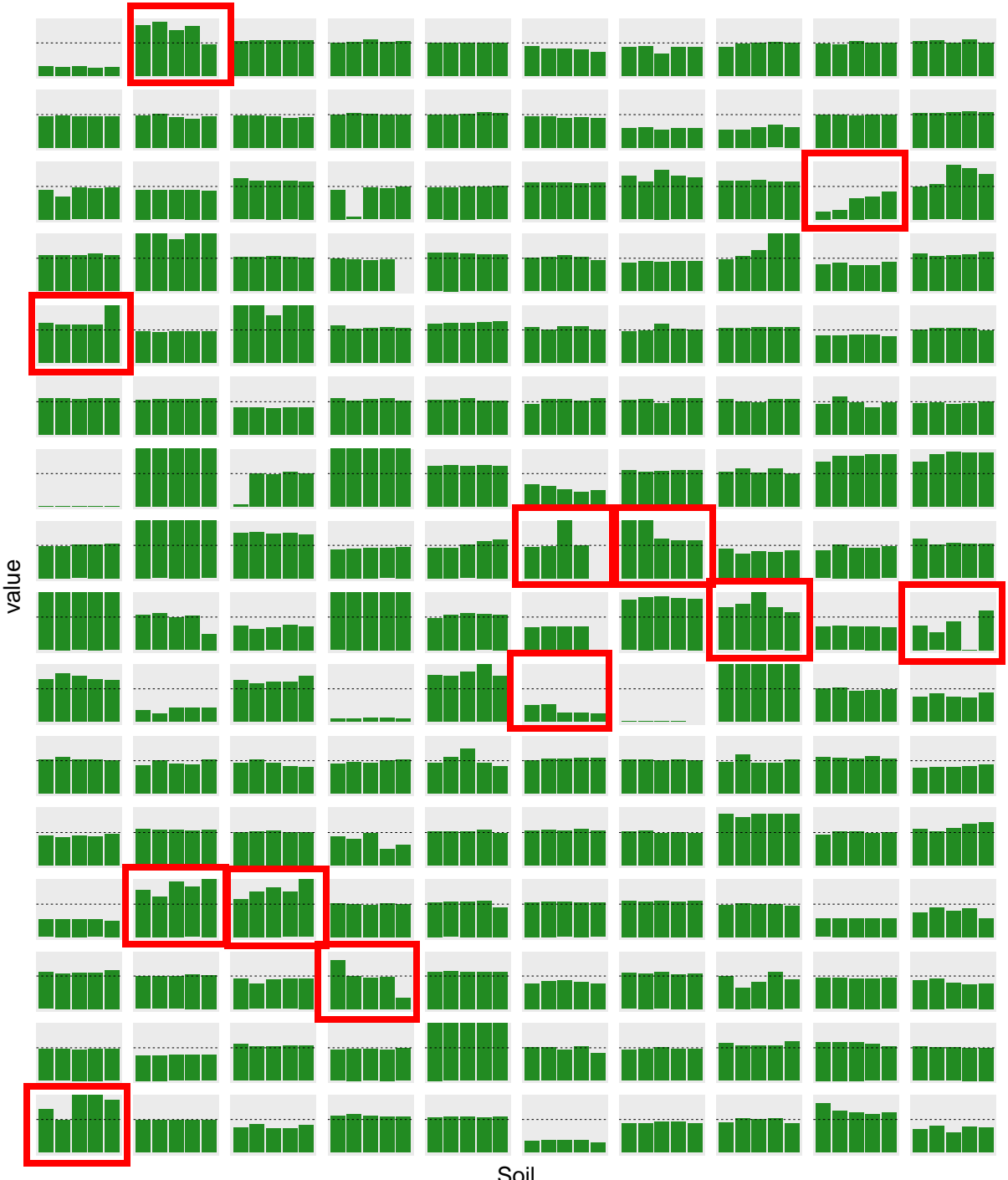
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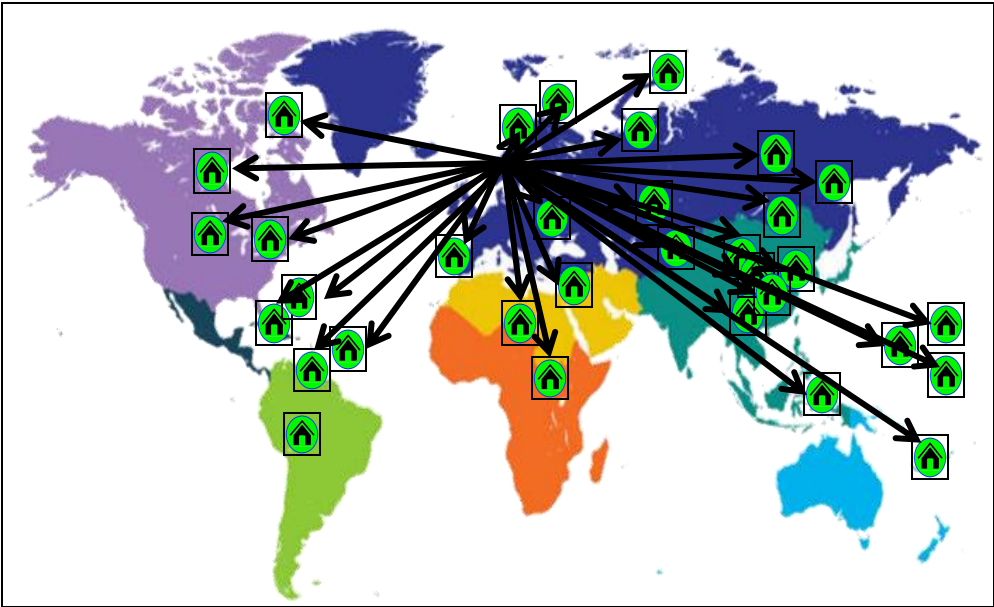
Walckley & Black method
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160 labs

problem 

 ir-relevant decision



What is the worldwide situation?



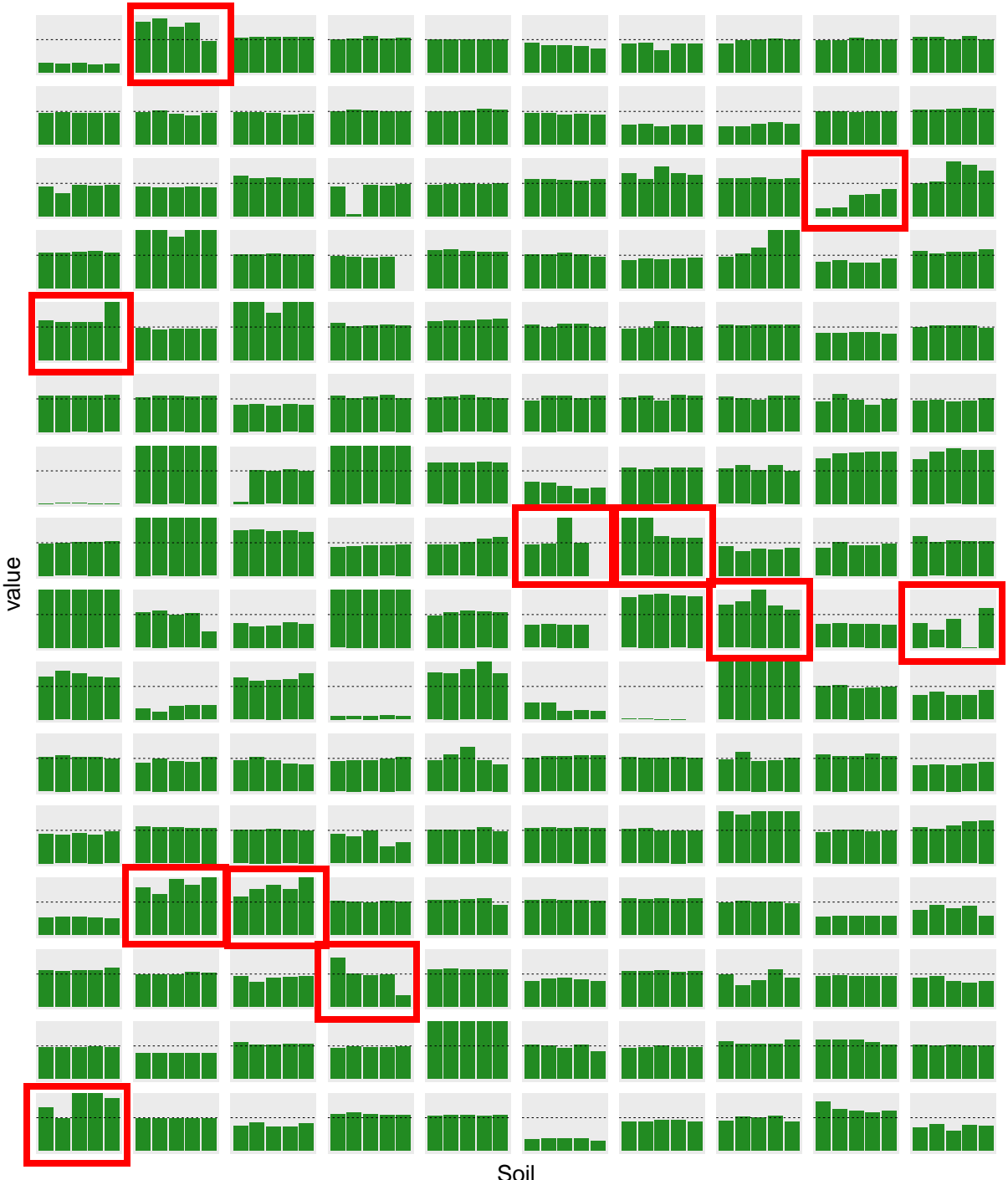
Walckley & Black method

(oxydation = wet chemistry)

160 labs

problem  **40 %**

 **ir-relevant decision**



REPEATABILITY ? (sometimes poor)

REPRODUCIBILITY?

REPEATABILITY ?

REPRODUCIBILITY?

if I send

the same sample to many labs,

can they **PRODUCE** the same result?

what is the dispersion of all the results ?

REPEATABILITY ?

REPRODUCIBILITY?

if I send

the same sample to many labs,
can they **PRODUCE** the same result?

what is the dispersion of all the results ?



UNCERTAINTY ?

(statistical concept)



REPRODUCIBILITY ?

10 soil samples sent to many labs

soil sample n° 1 2 3 4 5 6 7 8 9 10 (statistical evaluation)



REPRODUCIBILITY ?

10 soil samples sent to many labs

soil sample n° 1 2 3 4 5 6 7 8 9 10 (statistical evaluation)

z score

dispersion
(uncertainty)

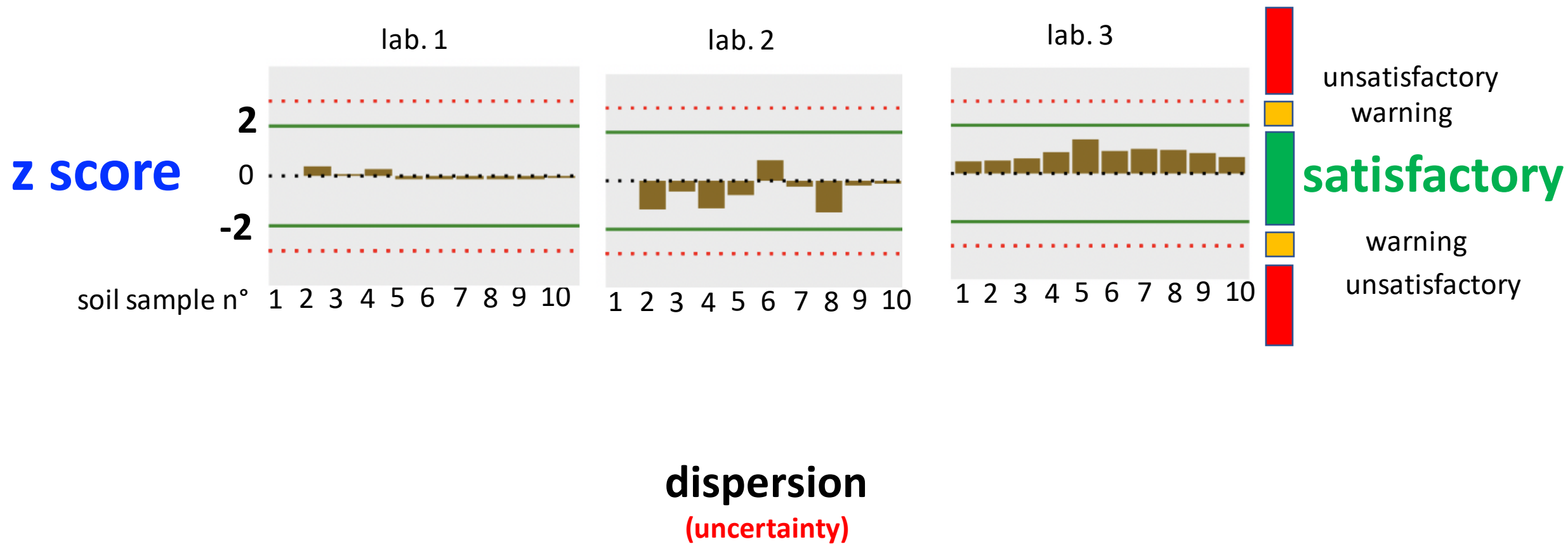




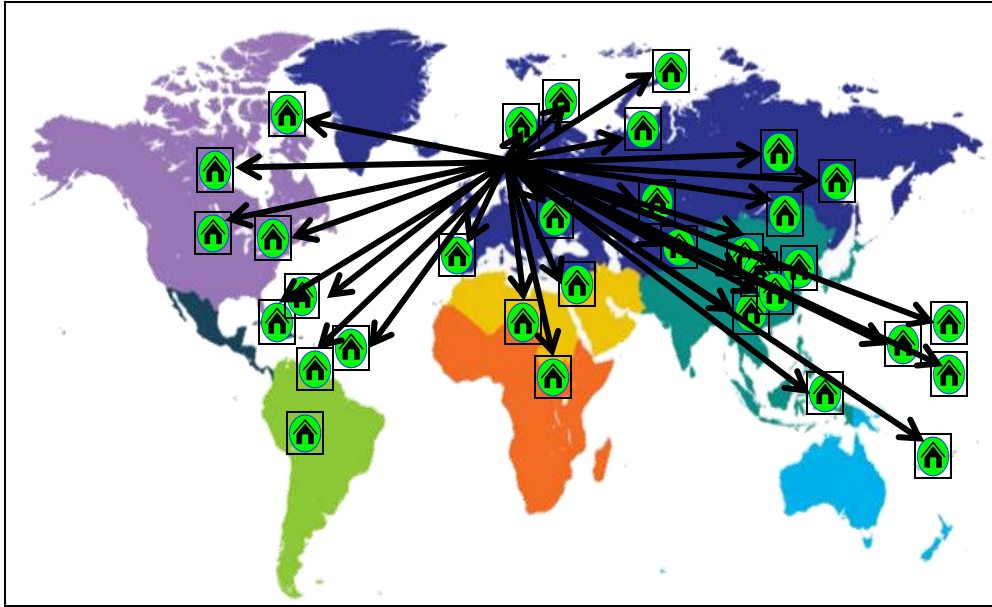
REPRODUCIBILITY ?

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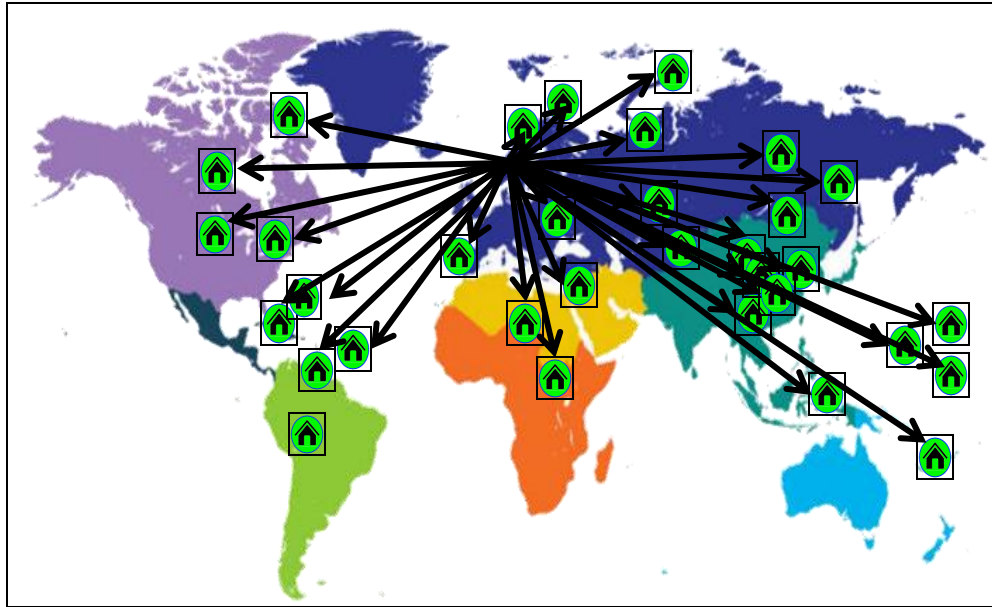


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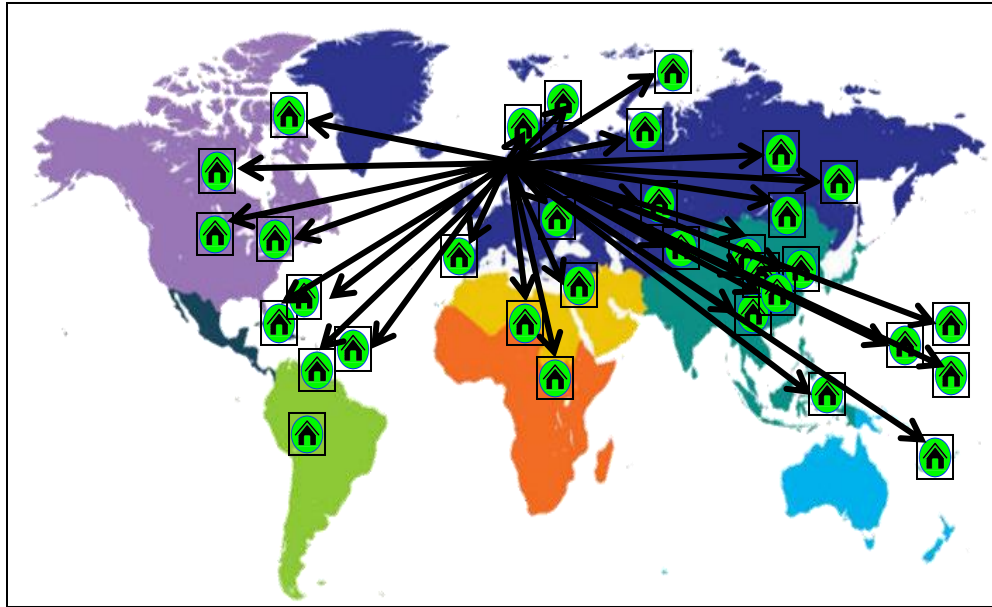
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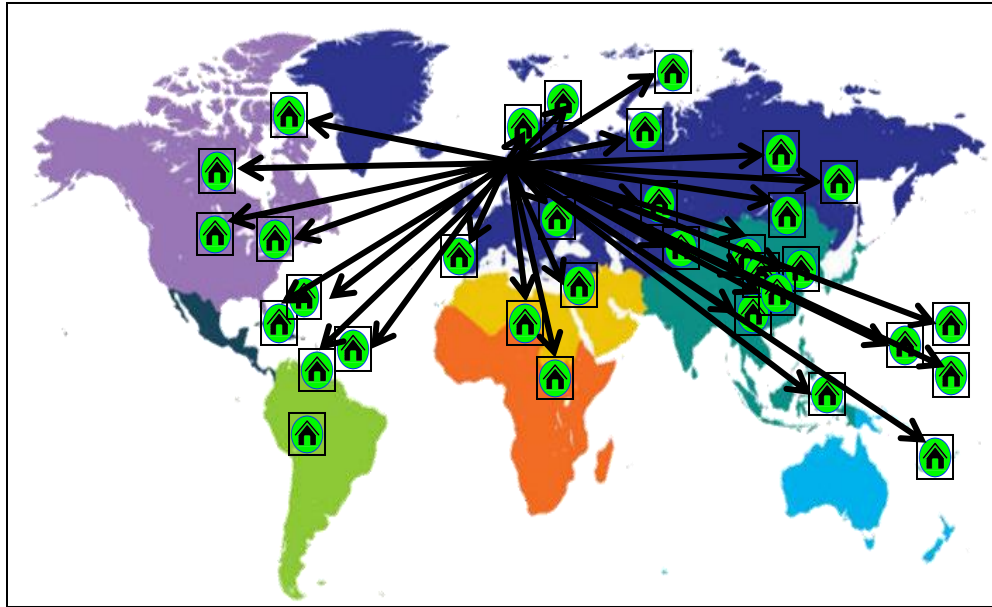
(oxydation = wet chemistry)

160 labs

ok



What is the worldwide situation?



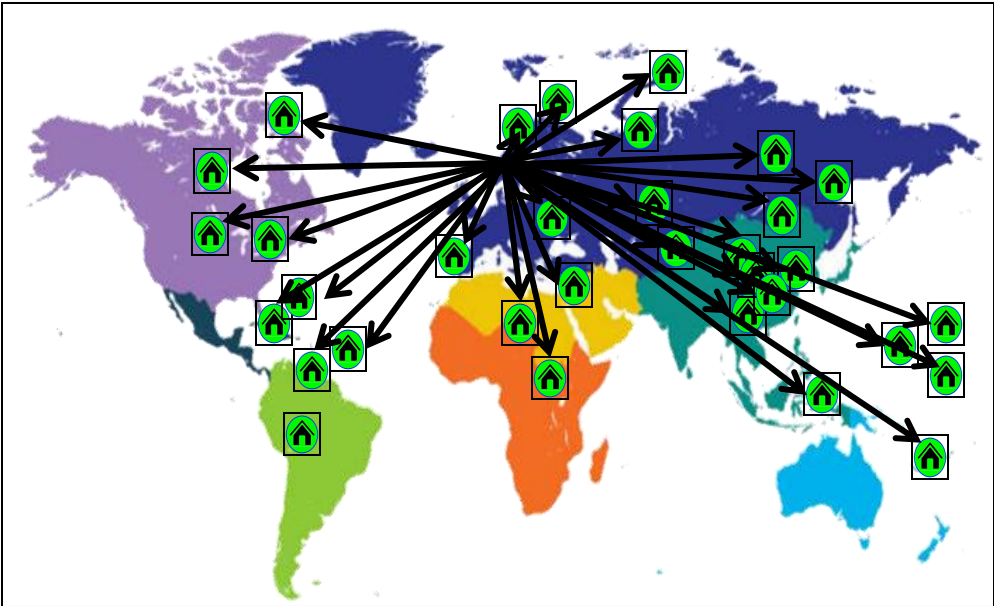
Walckley & Black method

(oxydation = wet chemistry)

160 labs



What is the worldwide situation?



Walckley & Black method

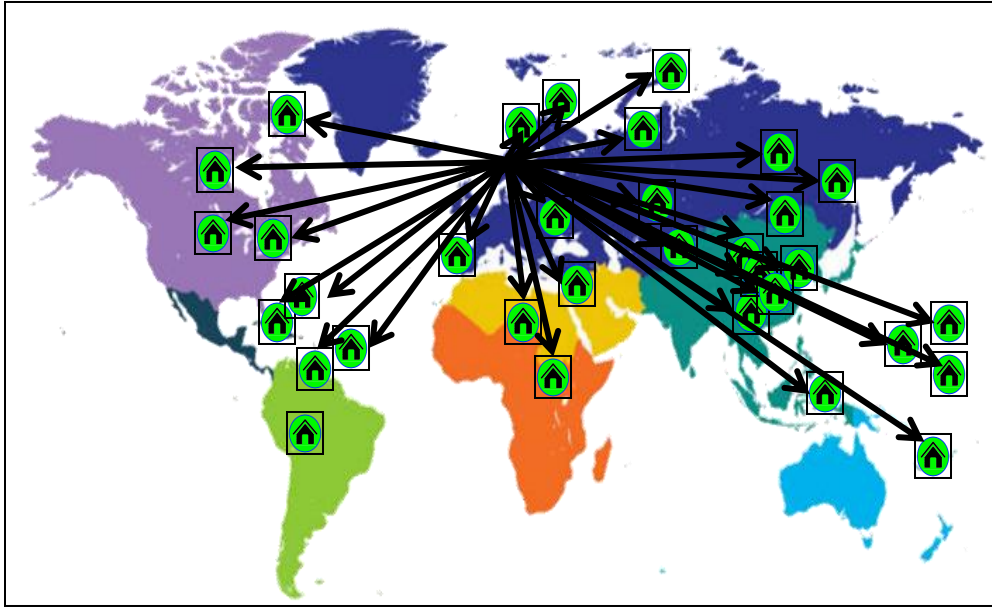
(oxydation = wet chemistry)

160 labs

problem  **50%**
 ir-relevant decision



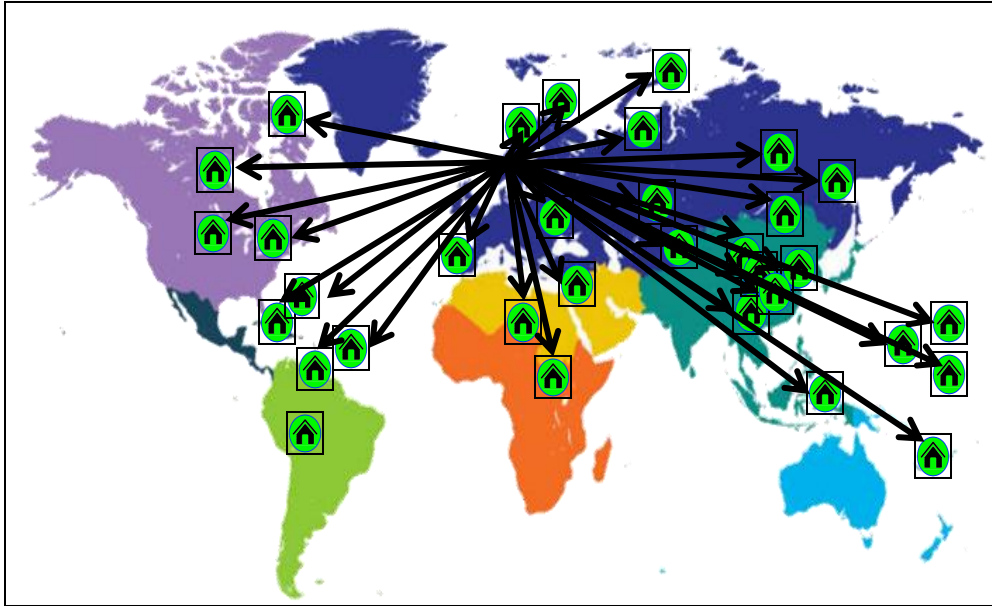
What is the worldwide situation?



Dumas

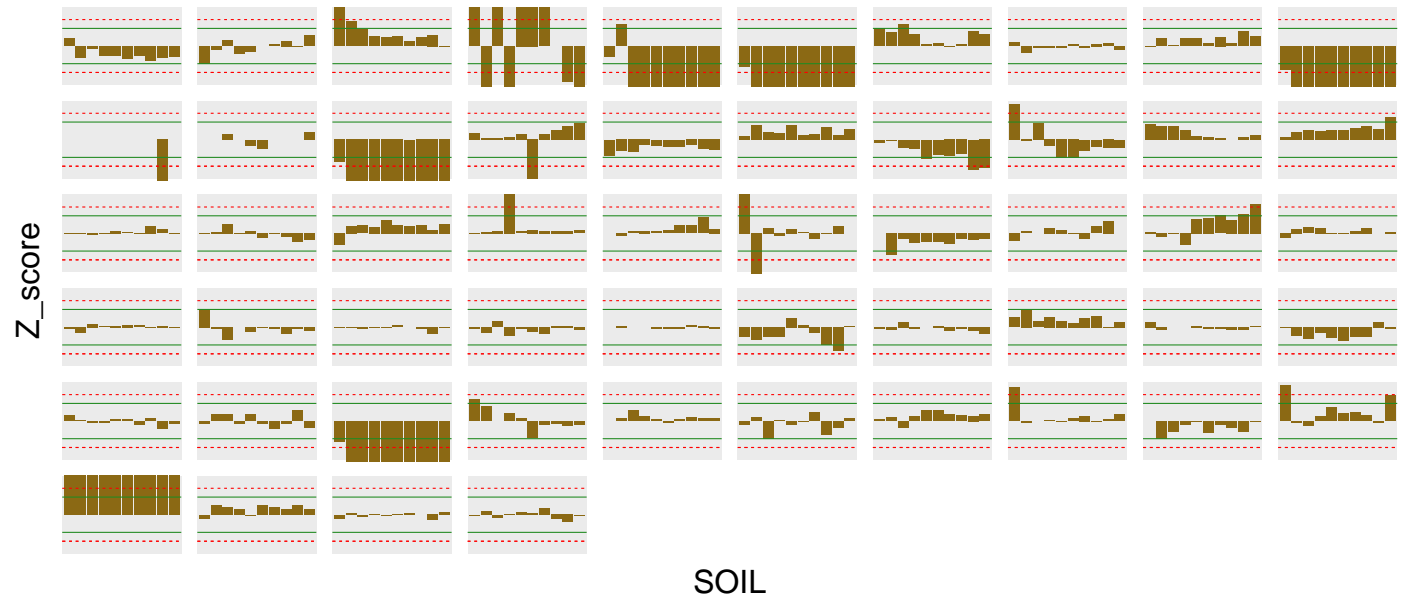
(Dry combustion: high cost
& automatic machines)

What is the worldwide situation?

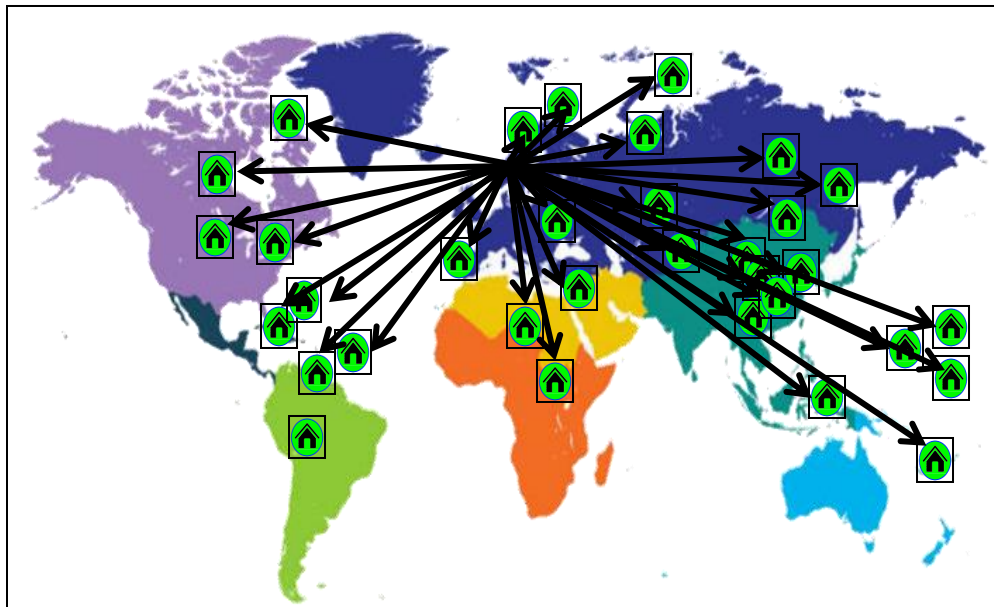


Dumas

54 labs



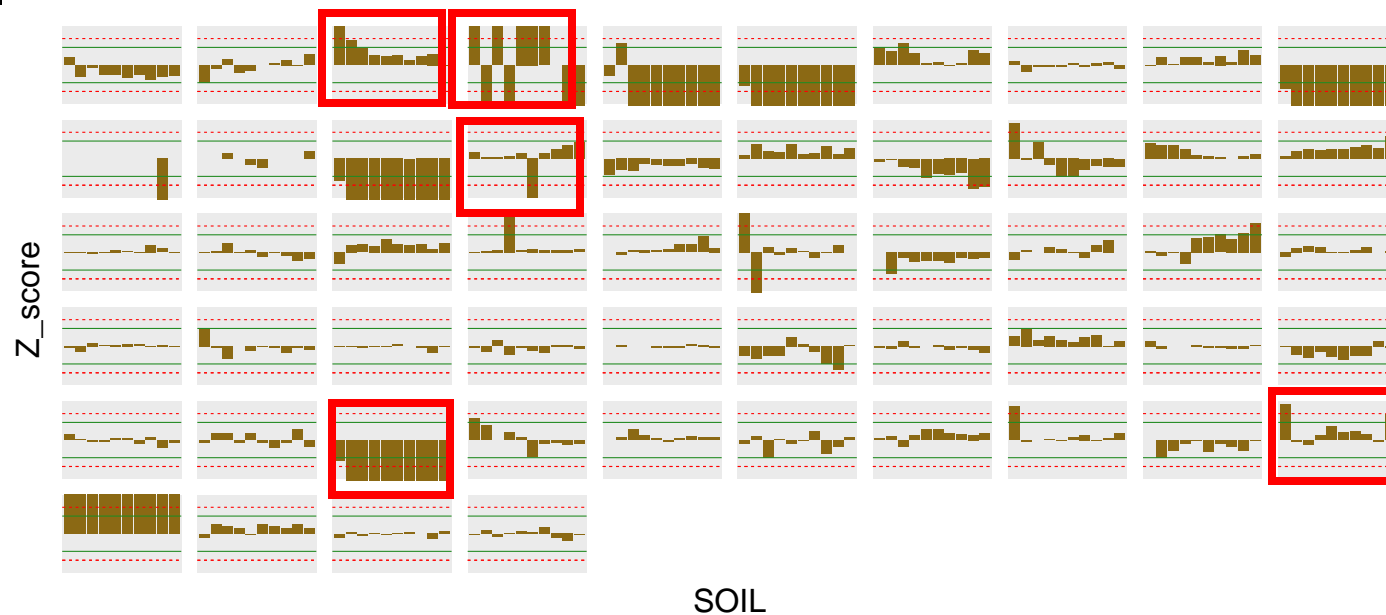
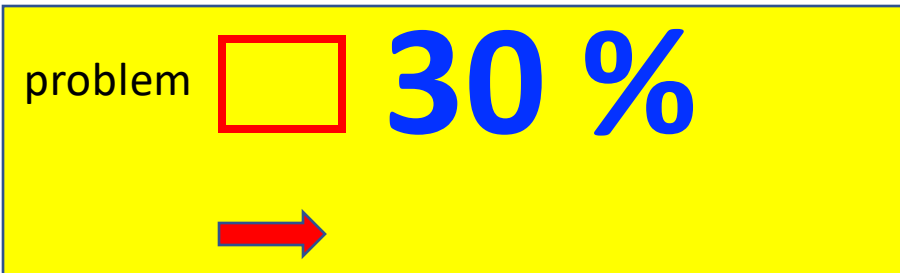
What is the worldwide situation?



Dumas

(Dry combustion: high cost)

54 labs



data
QUALITY ?

answer...

decision
RELEVANCE ?

Low quality data

**=> irrelevant decisions +
wrong scientific conclusion**

exist

in all regions,

for all analytical methods

WHY

**quality certificate
should be quickly implemented...**

now you know that:

'dirty data' are produced on a regular basis



and we should not use them!

But...

now you know that:

'dirty data' are produced on a regular basis



and we should not use them!

But... cannot be extracted after release



now you know that:

'dirty data' are produced on a regular basis



so we are currently using dirty data...



and we should not use them!

But... cannot be extracted after release



now you know that:

'dirty' data are produced on a regular basis



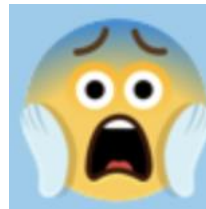
wrong scientific conclusions

wrong decisions

so we are currently using

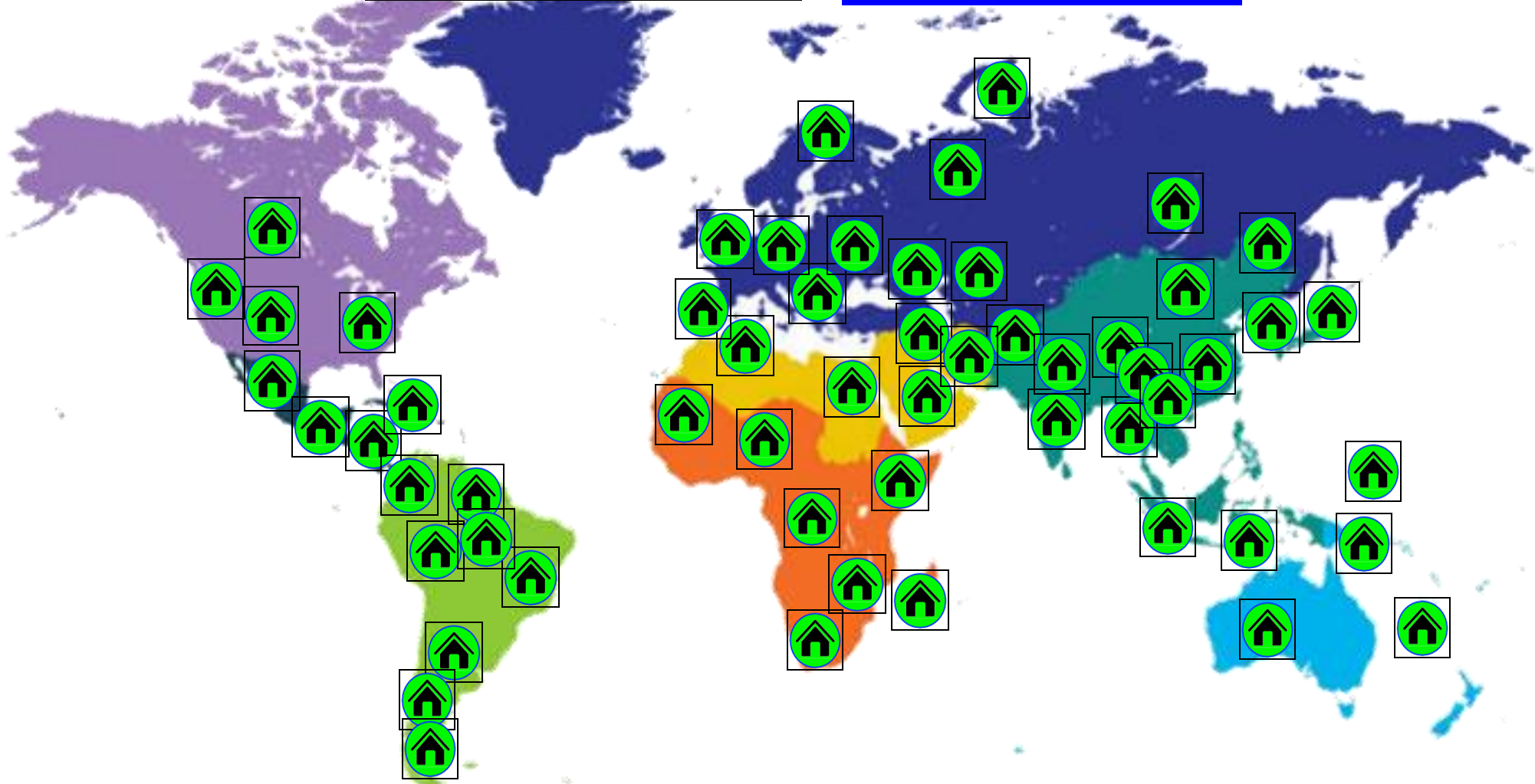
and we should not use them.

But... cannot be extracted after release





>1000 labs



how to identify which data can be trusted...



>1000 labs



...BEFORE leaving the lab ?



how to identify which data can be trusted?

2 options

bottom-up:

top-down:

how to identify which data can be trusted?

2 options

bottom-up: clients ask the lab to demonstrate its quality

(uncertainty)

top-down:

how to identify which data can be trusted?

2 options

bottom-up: clients ask the lab to demonstrate its quality

(uncertainty)

top-down: ask a 3rd party to implement 'quality certificate'

**what are
you doing in
EVERYDAY LIFE?**

what are
you doing in
EVERYDAY LIFE?



what are
you doing in
EVERYDAY LIFE?

**NO: you do not control
weights/volumes!**



what are you doing in EVERYDAY LIFE?



**ACCURACY
LABEL**



00 Verified: Apr 2021

2100001

**INSTRUMENT
RECONNU CONFORME**

1	LIMITE DE VALIDITE	7
2		8
3	20XX	9
4		10
5		11
6		12

AG 75

**INSTRUMENT
NON CONFORME**



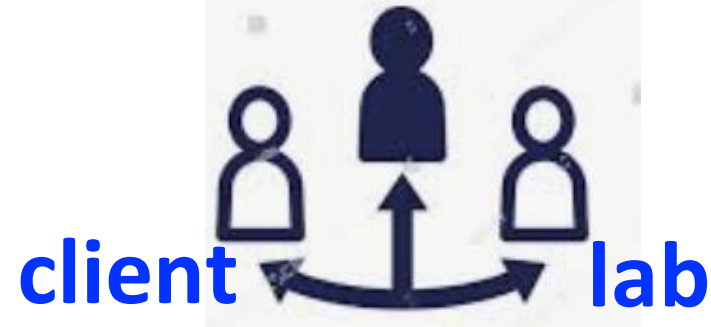
YOU TRUST PROFESSIONALS (THIRD PARTY)



how to identify which labs can be trusted?



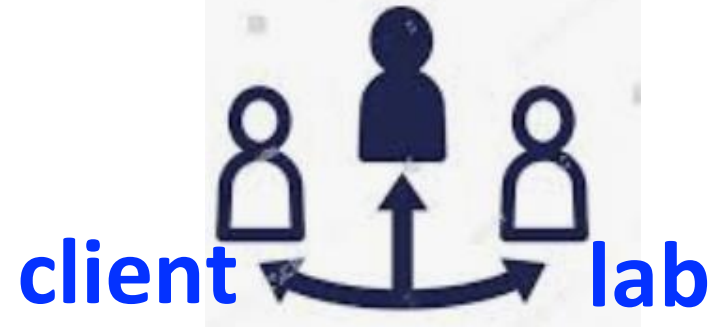
= 3rd party



how to identify which labs can be trusted?



= 3rd party

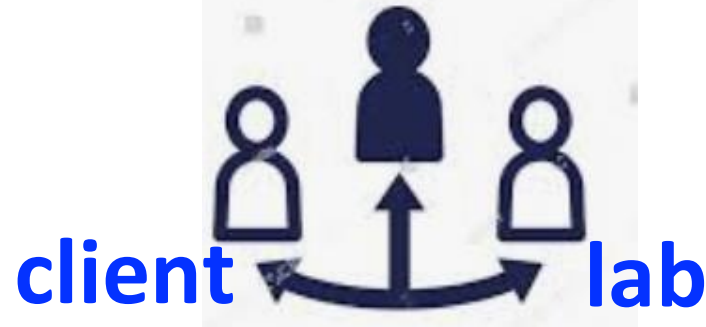


- **INDEPENDANT** (no commercial, no political interest)

how to identify which labs can be trusted?



= 3rd party

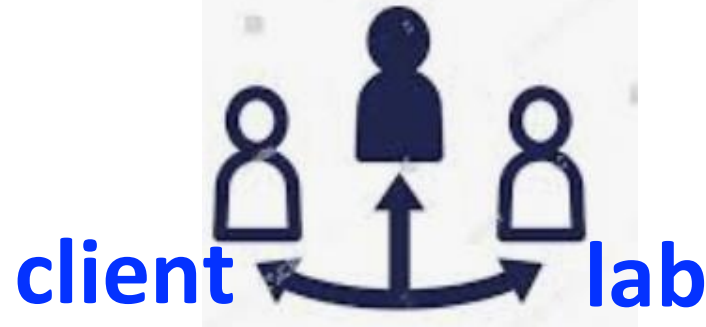


- **INDEPENDANT** (no commercial, no political interest)
- **ONLY GLOBAL INSTITUTION** about soils

how to identify which labs can be trusted?



= 3rd party



- **INDEPENDANT** (no commercial, no political interest)
- **ONLY GLOBAL INSTITUTION** about soils
- **CAN INVOLVE EXPERTS OF ALL COUNTRIES**
(no fee)



Certificate objective: ???

**Certificate objective: all labs must reach
a minimal level of quality,
in all regions and all countries.**



Certificate objective: all labs must reach a minimal level of quality, in all regions and all countries.



High performing labs must help less performing

HOW

quality certificate

could be quickly implemented...



organise annual 'Inter Lab Comparisons'
4 soil samples x 3 times /year

quality evaluation:
inspired by ASPAC

based on a specific statistical analysis



**Australasian Soil and
Plant Analysis Council**

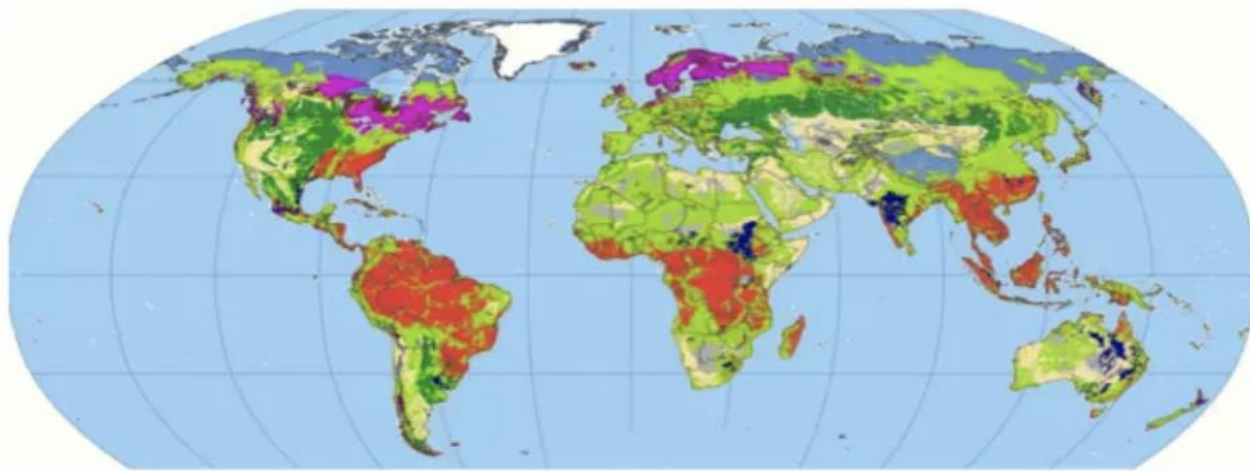
www.aspac-australasia.com/

PRACTICAL ASPECTS (1)

12 soil samples/year

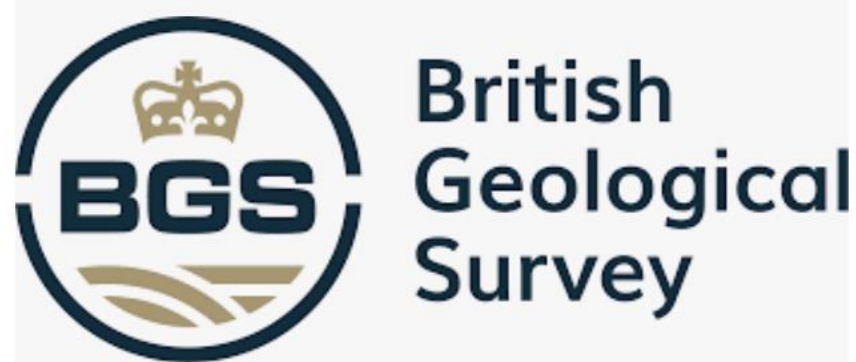
⇒ **need soil providers**

(wide range of matrix characteristics + C content)
at least 20 kg/sample)



PRACTICAL ASPECTS (2)

soil preparation, homogeneisation, irradiation, storage



PRACTICAL ASPECTS (3)

**FAO-GSP Rome: receives soils for ILC
sends to worldwide laboratories**

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FAO-GSP website
dedicated web page to up-load the data
confidential data storage

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**FAO-GSP Rome: receives soils for ILC
sends to worldwide laboratories**

FAO-GSP website
dedicated web page to up-load the data
confidential data storage

GSP expert group (metrology + SOC)
statistical analysis
annual report

PROVIDE CERTIFICATE

WHY & HOW

quality certificate

could be quickly implemented...

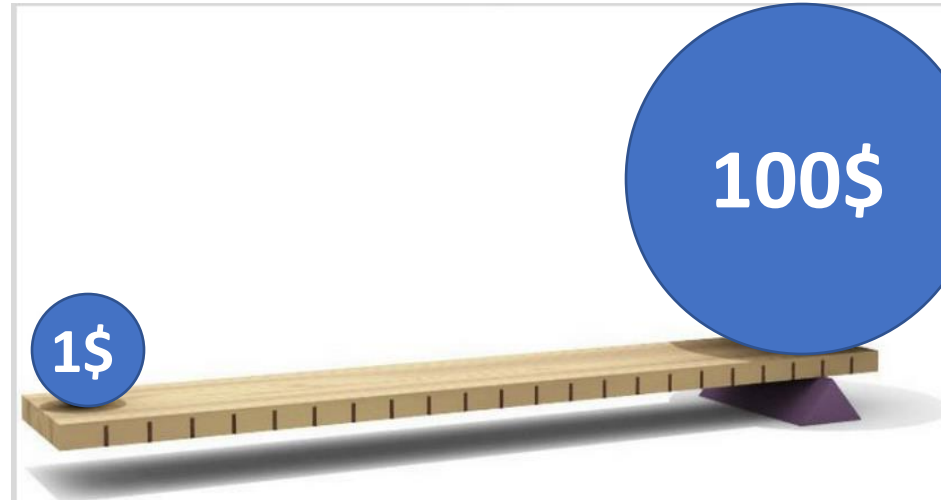
Costs / Benefits

Costs / Benefits

Soil preparation
storage/sending.

Data base.

Working group meetings.

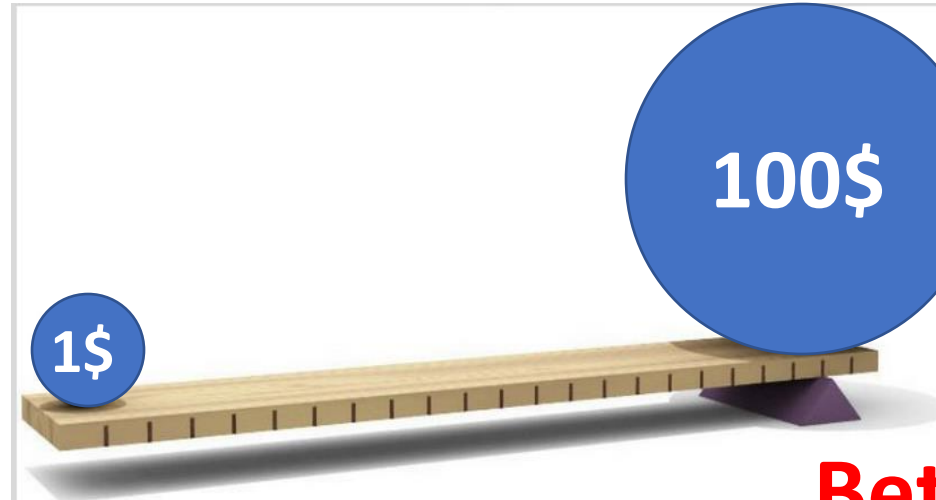


Costs / Benefits

Soil preparation
storage/sending.

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Working group meetings.



Less wastings

**Better decisions =>
better soil management**

(non renewable ressource)

Costs / Benefits

Soil preparation
storage/sending.

Data base.

Working group meetings.



Less wastings

Better decisions =>
better soil management

(non renewable ressource)

set up a BANK OF SOIL REFERENCE MATERIAL

Costs / Benefits

anyway... the cost of inaction will be higher than the cost of action



tentative AGENDA

- Today: get suggestions from GSP participants**
- Sept 2024: get suggestions from 'Global Symposium on Soil Information and Data' participants**
- Nov 2024: submission to GLOSOLAN plenary assembly**
- June 2025: submission to GSP plenary assembly**
- Nov 2025: finalise the process**
- 2026: launching of certification process**

Final comment:



**wants laboratories to improve
and it is giving them the means to change**



**Open access multi lingual documents,
webinars, face to face trainings , many more**



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Thank you very much for your attention