Food and Agriculture Organization of the United Nations

Global soil laboratory network (GLOSOLAN) and the example from the Eurasian region (RUSOLAN)

Elena Shamrikova
Institute of Biology of Komi Science Center, RAS
Chair of RUSOLAN

Promoting sustainable soil management for all

GLOBAL SOIL PARTNERSHIP

Presentation Plan

1

GLOSOLAN

2

3

Promoting sustainable soil management for all

Introduction

- ***Soil*** is a vital part of the natural environment and a resource that provides 95% of the world's population with food.
  - ***Agricultural soils*** are a strategic resource for guarantee food security.
- ***Soils*** provide living space, as well as perform ecosystem functions necessary to provide the inhabitants of the planet with clean water, climate regulation, and biodiversity conservation

Introduction

V.V. Dokuchaev
(1846-1903)

1871 – the birth of scientific soil science

Today, world soil science has a number of national schools that *differ in*:

- principles of soil diagnostics,
- approaches (methodology) of study,
- research methods.

The diversity of schools has historically been caused by:

- the independent development of soil science in individual countries,
- a wide variety of soils,
- uneven distribution of soils on the earth's surface.

Food and Agriculture Organization of the United Nations

Global Soil Partnership (2012)

The aggravation of global problems required the consolidation of the efforts of soil scientists of the entire world scientific community.

food insecurity
climate change
acidification
salinization
phisical degradation
desertification
pollution
erosion
.....

Technical networks

GLOSOLAN Global Soil Laboratory Network 2017

INBS International Network of Black Soils

INFA International Network on Fertilizer Analysis

INSAS International Network of Salt-Affected Soils

INSII International Network of Soil Information Institutions

NETSOB International Network on Soil Biodiversity

INSOP International Network On Soil Pollution

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GLOBAL SOIL PARTNERSHIP

Global Soil Laboratory Network (GLOSOLAN)

Established in 2017 to harmonize soil laboratory methods and data, and to build the capacity of laboratories in soil analysis.

Data harmonization is a communication tool that facilitates the interaction of specialists when creating databases on soils at the national, regional and global levels.

Arrays of information are necessary for the purposes of

- inventory and mapping,
- modeling and forecasting,
- monitoring and rational use of soil resources,
- decision making at all levels,
- reporting on the Sustainable Development Goal,
- also other international agreements.

Global Soil Laboratory Network (GLOSOLAN)

Major areas of work:

- Harmonization of Standard Operation Procedures (SOPs)
- Training on the implementation of GLOSOLAN SOPs
- Training on safety and health

- Execution of external quality control (proficiency testing)
- Training on the execution of internal and external quality control

- Training on equipment use, maintenance and purchasing
- Establishment of a donation/bartering system
- Spectroscopy / GLOSOLAN-Spec

INFA
International Network on Fertilizers Analysis

Harmonization of fertilizers analysis procedures

Promoting sustainable soil management for all

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GLOSOLAN
"Soil: if you cannot measure it, you cannot manage it"

Promoting sustainable soil management for all

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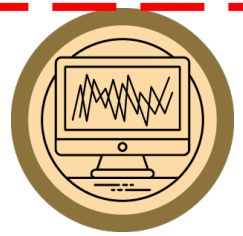

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Promoting sustainable soil management for all

The organization of the GLOSOLAN proficiency test (PT)

Sets of 10 soil samples are being prepared for PT.

Each sample contains 10 g of homogenized soil material.

Laboratories participating to the GLOSOLAN PT 2022 were selected based on:

- geographical balance – at least 1 laboratory in each country,
- a set of parameters (C, N, P) that interested laboratories can measure in they routine,
- method of analysis.

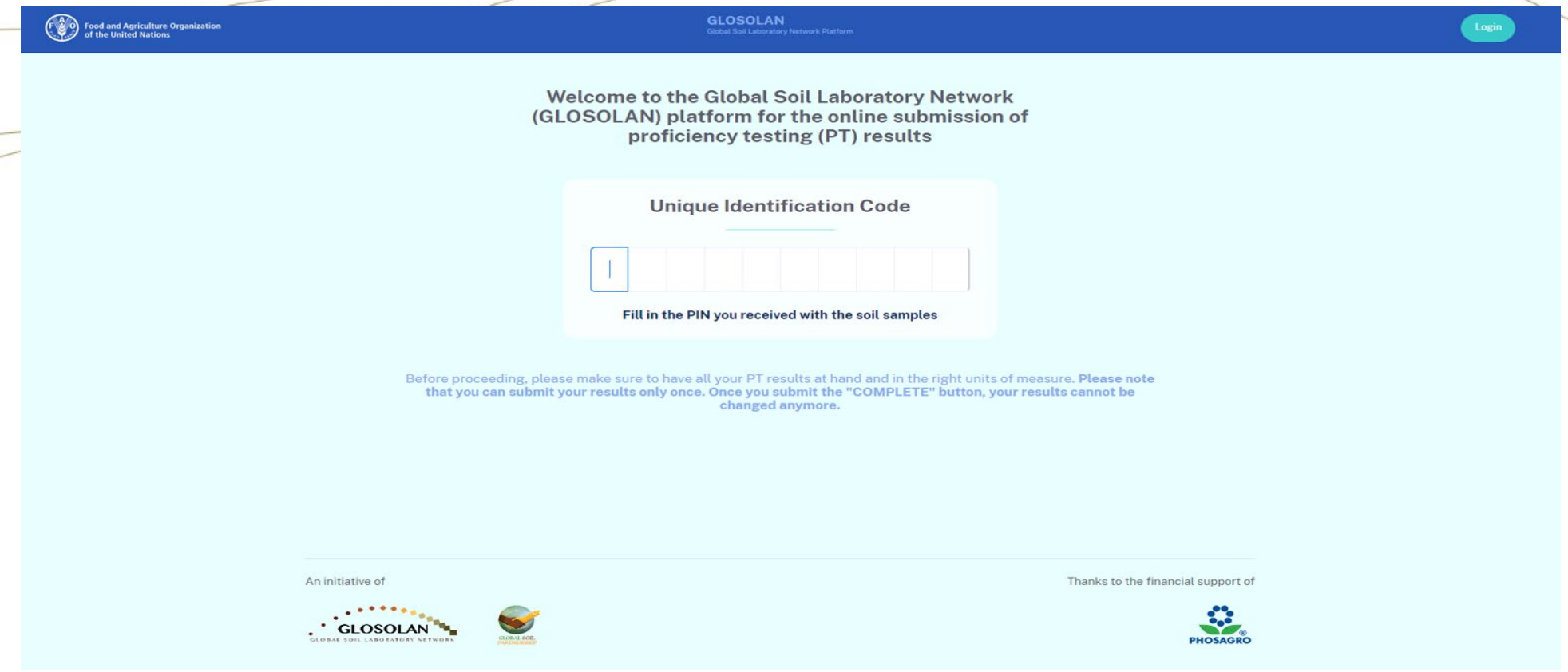
For statistical reasons, GLOSOLAN asked laboratories to analyze soil samples for specific parameters only, using specific methods only.

Participating laboratories are invited to analyze samples for the specified soil parameters.

No replicas, all samples should be analyzed only once.

Laboratories should NOT use all soil materials for just one analysis. Recommendations on the amount of soil used for each analysis were given in the PT instructions

The organization of the GLOSOLAN proficiency test (PT)



Results have been submitted using the GLOSOLAN PT submission platform

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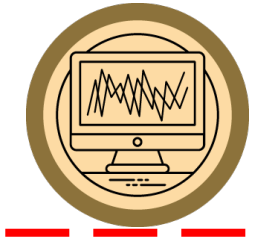

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INFA
International Network on Fertilizers Analysis

Harmonization of fertilizers analysis procedures

Promoting sustainable soil management for all

Updates on the GLOSOLAN procurement

Philippines

Country
Philippines

Laboratory
Bureau of Soils and Water Management Laboratory Services Division

Participation in the GLOSOLAN PT
2019

Address
SRDC Bldg., Elliptical Road cor Visayas Ave., Diliman, Quezon City

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INFA
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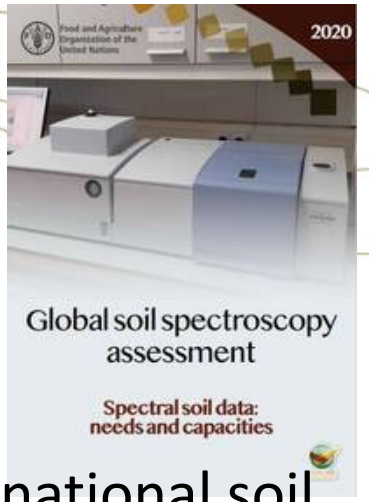
Harmonization of fertilizers analysis procedures

Promoting sustainable soil management for all

With the support of its partners, GLOSOLAN aims:



- To support the development of all types of soil spectroscopy at national, regional, and global levels. *To achieve this objective, this initiative will be supervised by a group of experienced scientists to ensure that all activities are science based.*

- To support countries in establishing their own soil spectral laboratories and national soil spectral libraries with standardized methods and decentralized estimation services. *To achieve this objective, GLOSOLAN will be using a country-driven approach and invest in capacity building activities at the national or regional level.*

- To continuously support the development of the global spectral estimation services by encouraging countries to share part of existing national soil spectral libraries on a voluntary basis.

- To support the development of standards and protocols for soil spectroscopy, including but not limited to soil sample preparation, measurement protocols, quality assurance, and data analysis and modeling.

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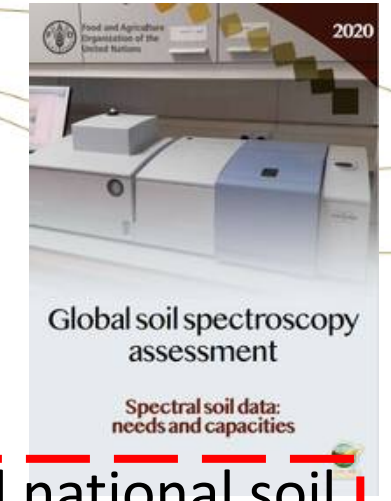

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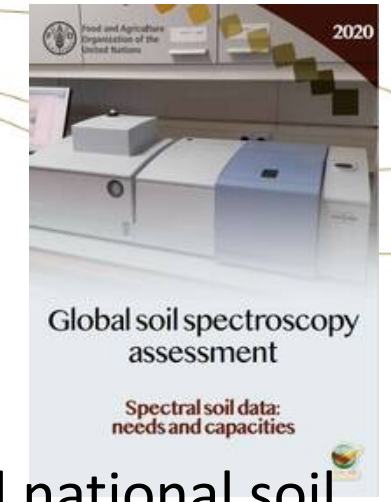

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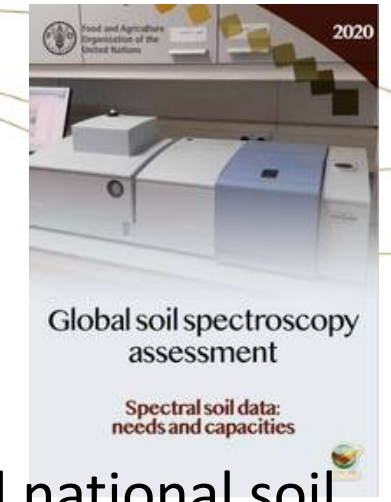

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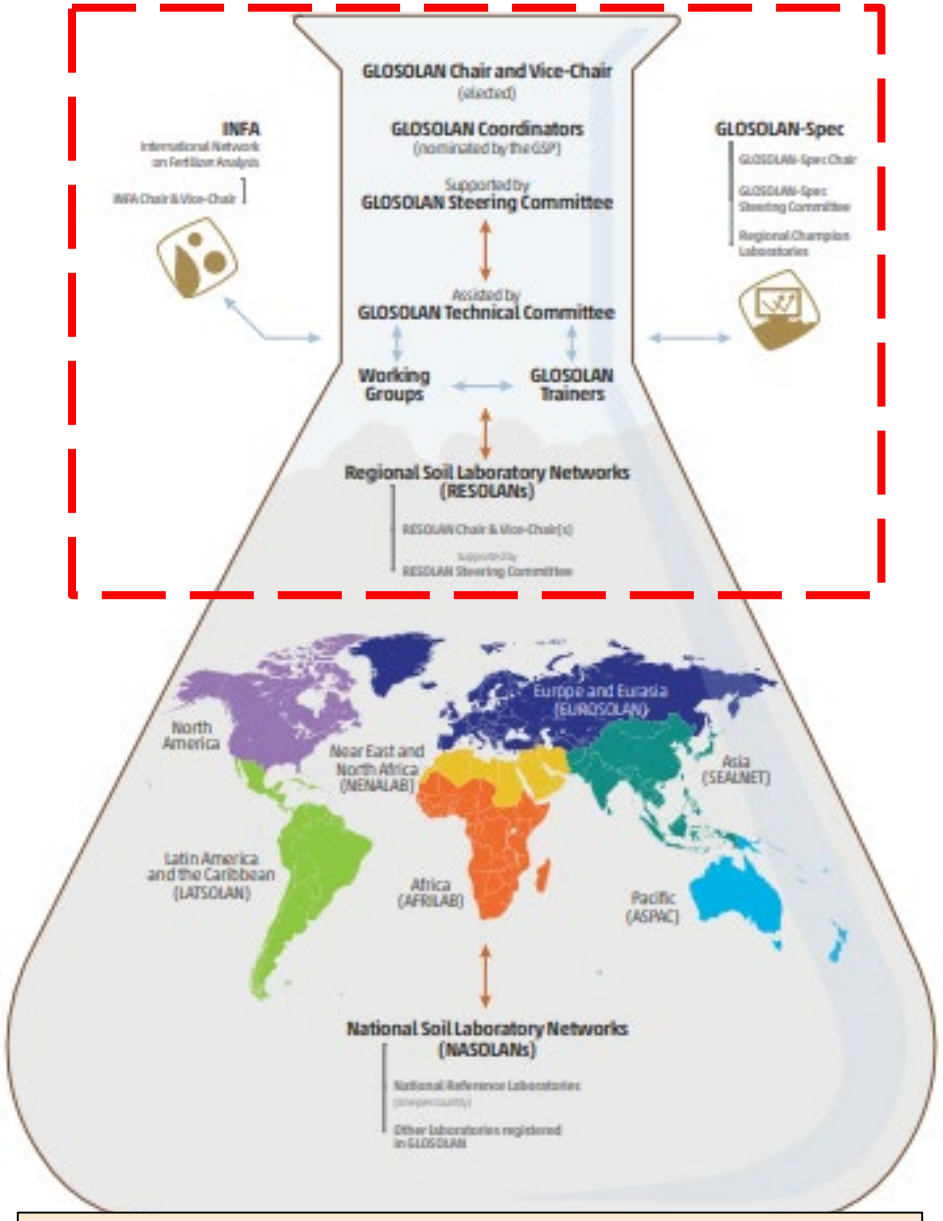
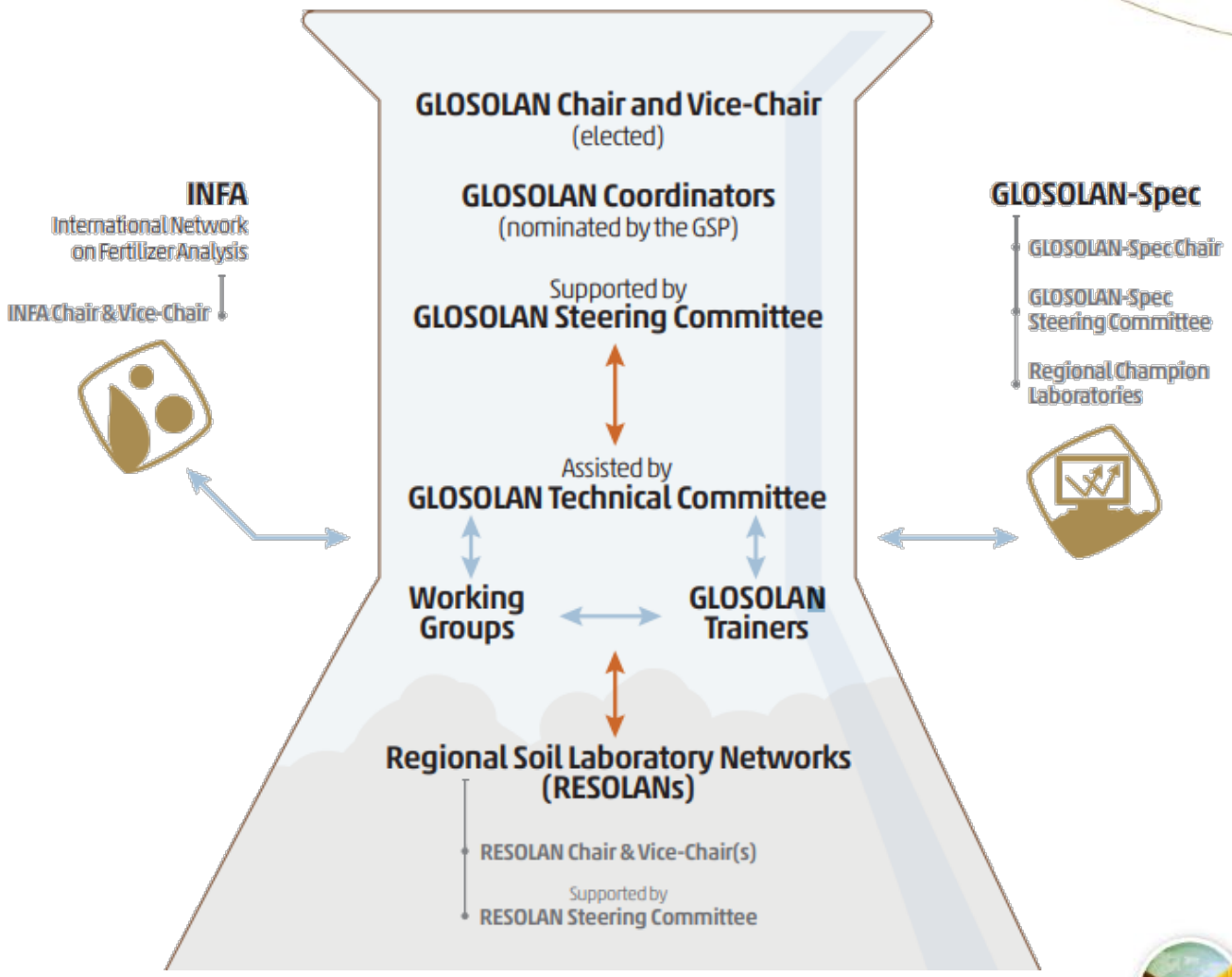
Promoting sustainable soil management for all



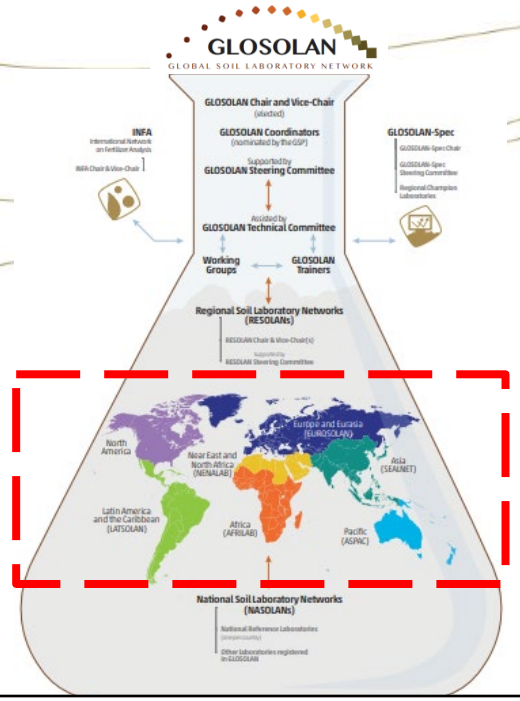
880 laboratories in the world

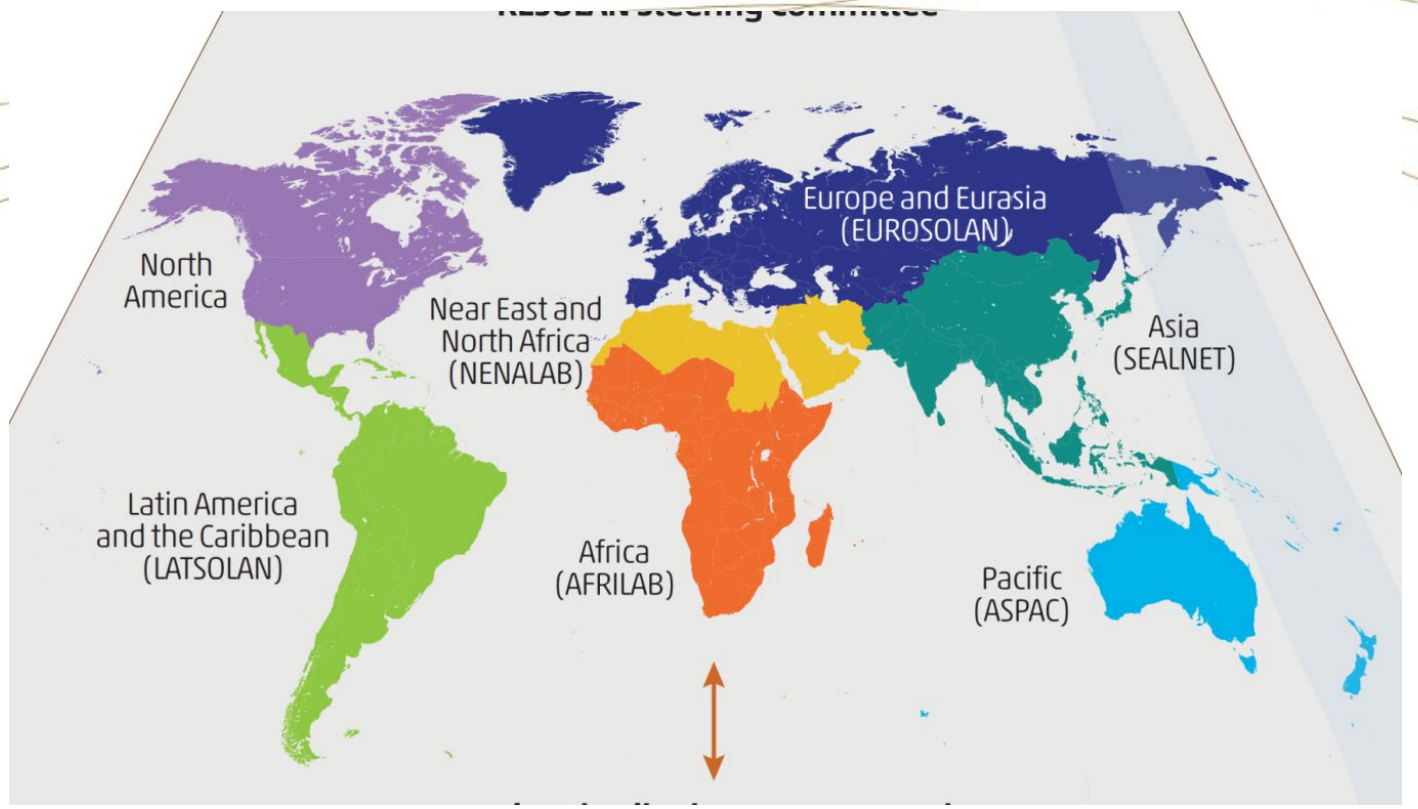
GLOSOLAN

GLOBAL SOIL LABORATORY NETWORK



Promoting sustainable soil management for all





RESOLANS

Africa AFRILAB	Asia SEALNET	Europe & Eurasia EUROSOLAN	Latin America LATSOLAN	Near East & North Africa NENALAB	North America	Pacific ASPAC
156	**124**	**192**	**214**	**99**	**15**	**77**

from **41** countries

Promoting sustainable soil management for all

European and Eurasian Soil Laboratory Network

Food and Agriculture Organization of the United Nations

Launch of the Regional Soil Laboratory Network for Europe and Eurasia

Chişinău, Moldova | 2— 5 October 2019

Established through an inception meeting in October 2019 in Chişinău, Moldovaas the third RESOLAN, following the establishment of the networks for Asia (SEALNET, 2017) and Latin America (LATSOLAN, 2018)

Promoting sustainable soil management for all

GLOBAL SOIL PARTNERSHIP

EUROSOLAN

EUROPEAN AND EURASIAN SOIL LABORATORY NETWORK

A regional network of **192** laboratories from **41** countries

Albania, Andorra, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Kazakhstan, Kosovo, Kyrgystan, Latvia, Lithuania, Luxembourg, Malta, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, The former Yugoslav Republic of Macedonia, The Republic of Moldova, Turkey, ***Turkmenistan,*** *Ukraine, United Kingdom, Uzbekistan, Vatican City.*

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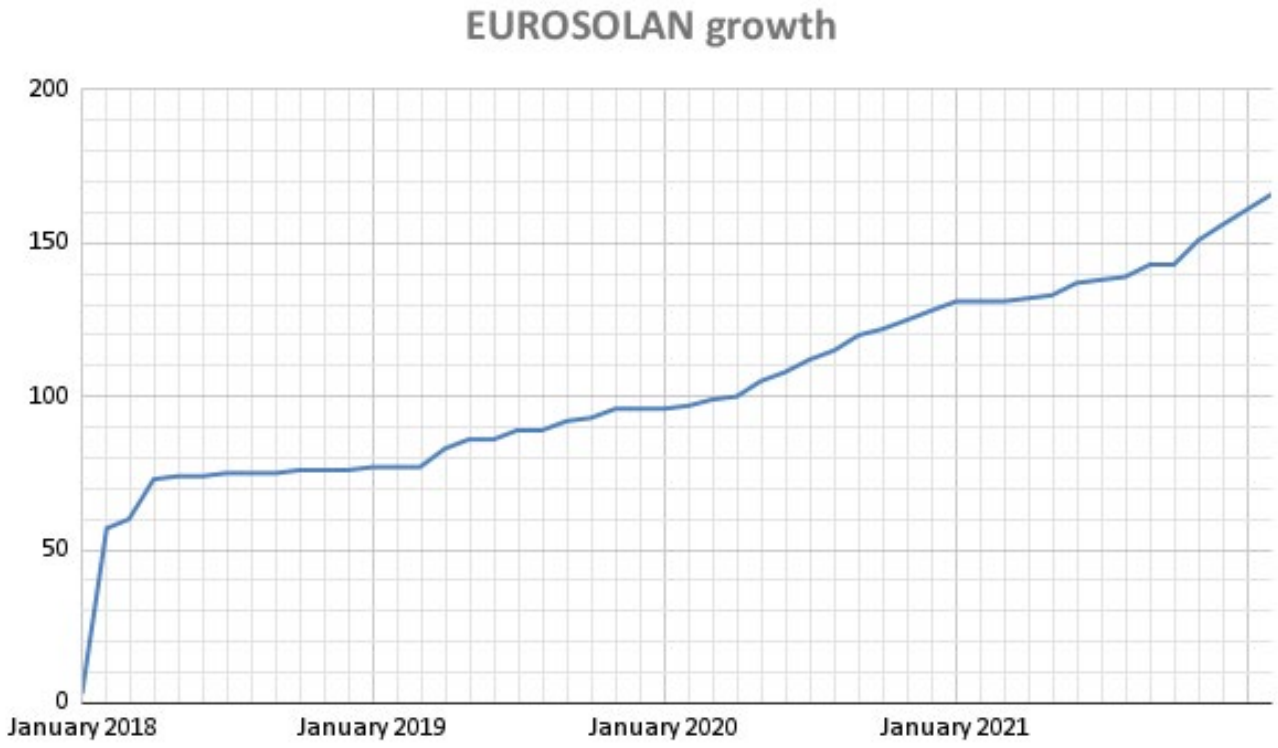
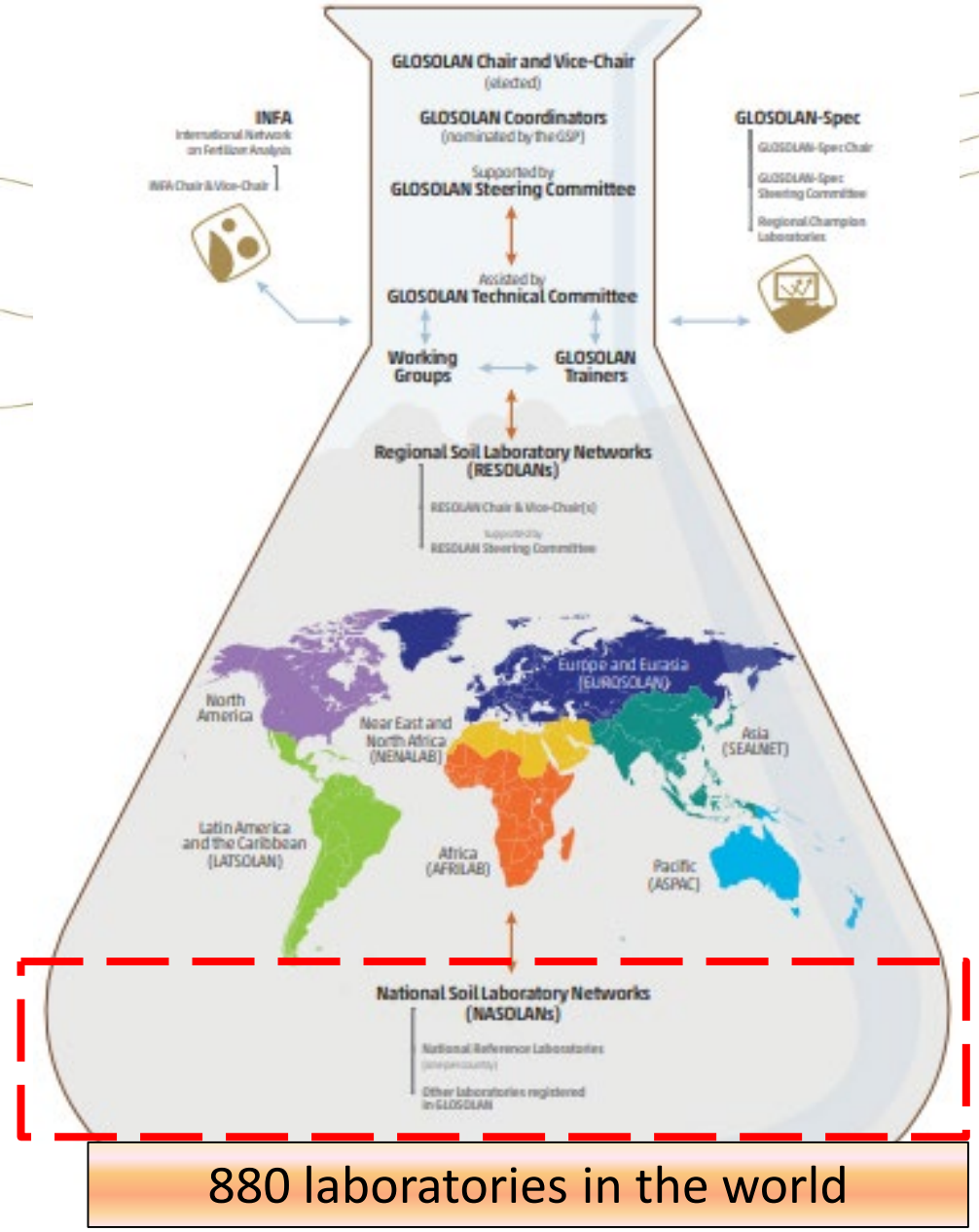


ijan, Belarus, Belgium, Bosnia
s, Czech Republic, Denmark,
ıy, Greece, Hungary, Iceland,
Kyrgystan, Latvia, Lithuania,
Netherlands, Norway, Poland,
an Marino, Serbia, Slovakia,
kistan, The former Yugoslav
ldova, Turkey, ***Turkmenistan,***
istan, Vatican City.

Promoting sustainable soil management for all



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Global (GLOSOLAN)

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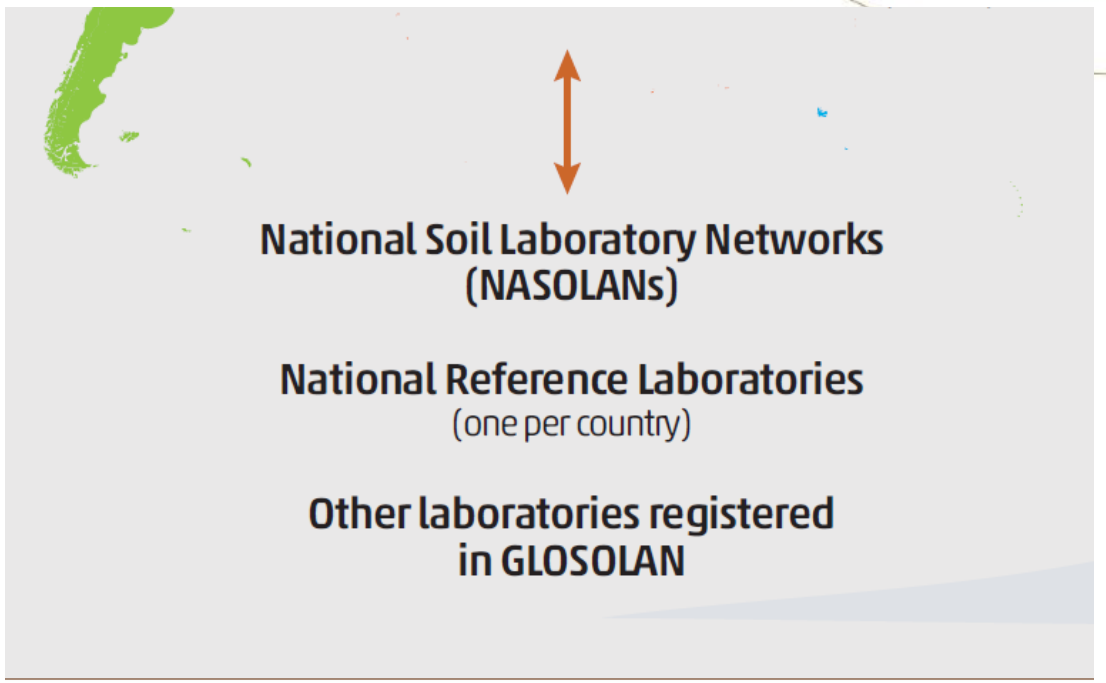
National (NASOLAN)



Operates at the national level through **registered laboratories** and **National Reference Laboratories** especially, which are tasked to establish **National Soil Laboratory Networks**

Promoting sustainable soil management for all

GLOSOLAN is doing its best to keep its webpage updated and available in the 6UN official languages:

English, French, Spanish, Arabic, Russian and Chinese

Food and Agriculture Organization of the United Nations

ENHANCED BY Google

العربية 中文 English Русский Español

Global Soil Partnership

Overview | Partners | Regional partnerships | ITPS | Technical networks | Areas of work | Pillars of action | Resources

Global Soil Laboratory Network

Soils: if you cannot measure it, you cannot manage it

The Global Soil Laboratory Network (GLOSOLAN) was established in 2017 **to build and strengthen the capacity of laboratories in soil analysis and to respond to the need for harmonizing soil analytical data**. Harmonization of methods, units, data and information is critical to (1) provide reliable and comparable information between countries and projects; (2) allow the generation of new harmonized soil data sets; and (3) support evidence-based decision making for sustainable soil management.

The work of GLOSOLAN supports the implementation of the Sustainable Development Goals, the Agenda 2030 for Sustainable Development and the mandate of FAO on food security and nutrition. For more information contact Lucrezia.Caon@fao.org

- GLOSOLAN homepage
- Soil Analysis
- Capacity development
- Fertilizers analysis – International Network on Fertilizer Analysis
- Equipment

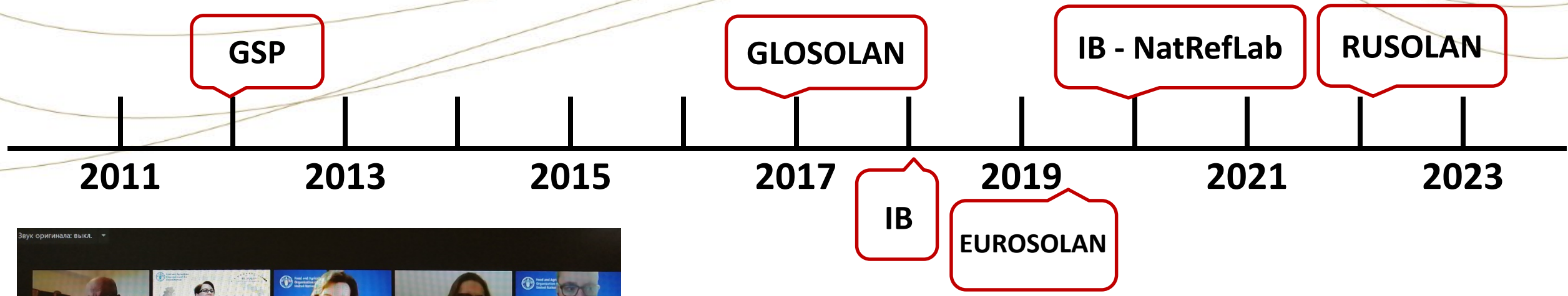
GLOSOLAN FAQs

- [+] **What are GLOSOLAN main areas of work?**
- [+] **How does GLOSOLAN work?**
- [+] **What are the differences between National Reference and other registered soil laboratories?**
- [+] **Why shall I register my laboratory in GLOSOLAN?**
- [+] **How can I register my laboratory in GLOSOLAN?**
- [+] **What laboratories are registered in GLOSOLAN?**

Promoting sustainable soil management for all

GLOBAL SOIL PARTNERSHIP

History Reference



RUSOLAN
RUSSIAN SOIL LABORATORY NETWORK

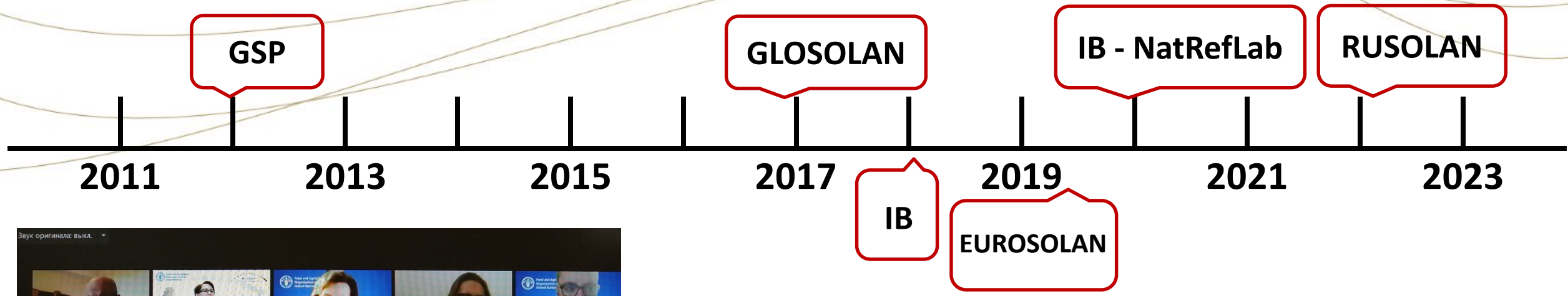
13 laboratories:

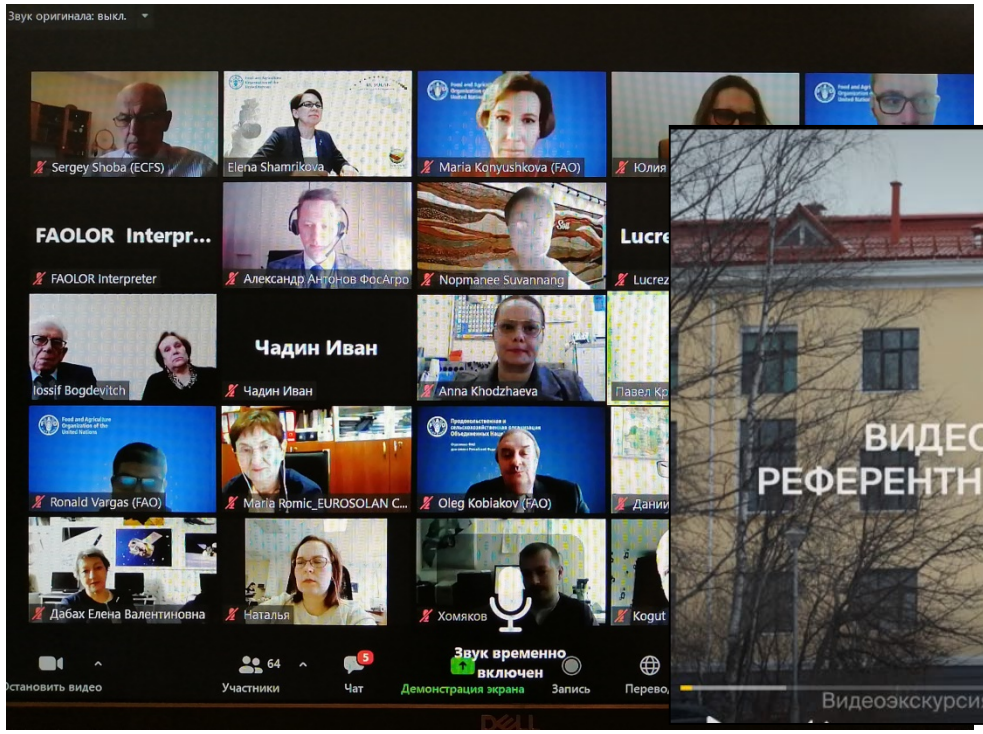
Barnaul, Bryansk, Moscow, Novosibirsk, Perm, Petozavodsk, Pushino, Rostov-on-Don, St. Petersburg, Syktyvkar

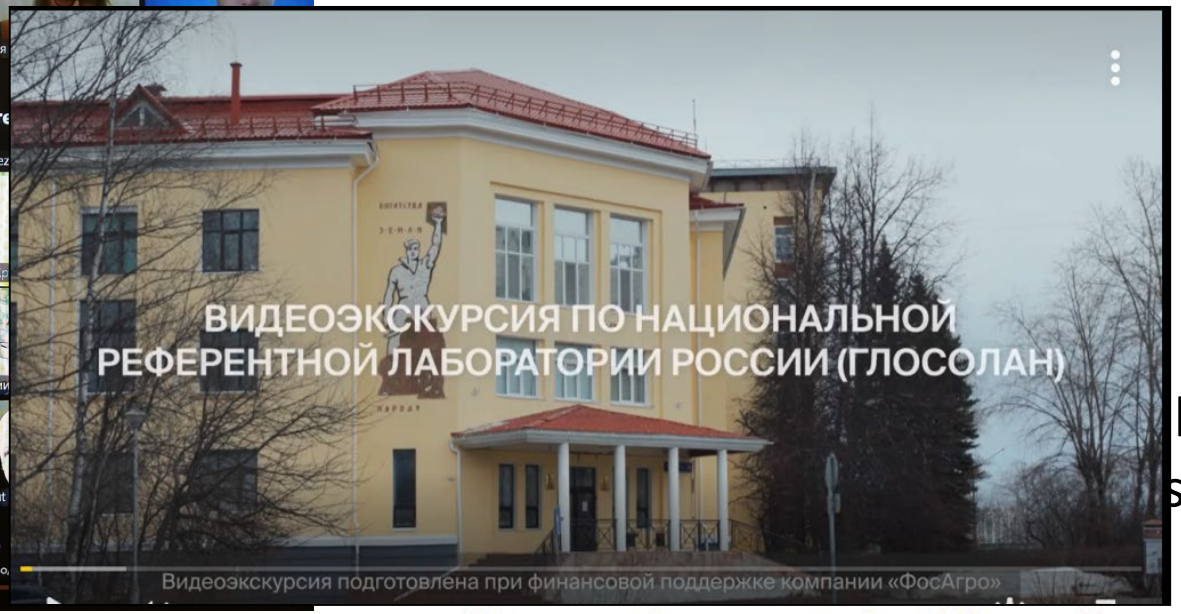
Promoting sustainable soil management for all

GLOBAL SOIL PARTNERSHIP

History Reference







birsk, Perm, Petozavodsk,
sburg, Syktyvkar

Promoting sustainable soil management for all

National Reference Laboratory

Eco-analytical Laboratory

Department of Soil Science

Promoting sustainable soil management for all

National Reference Laboratory

Facilities	
Surface area of the laboratory (in m2)	460
Number of rooms in the laboratory	23

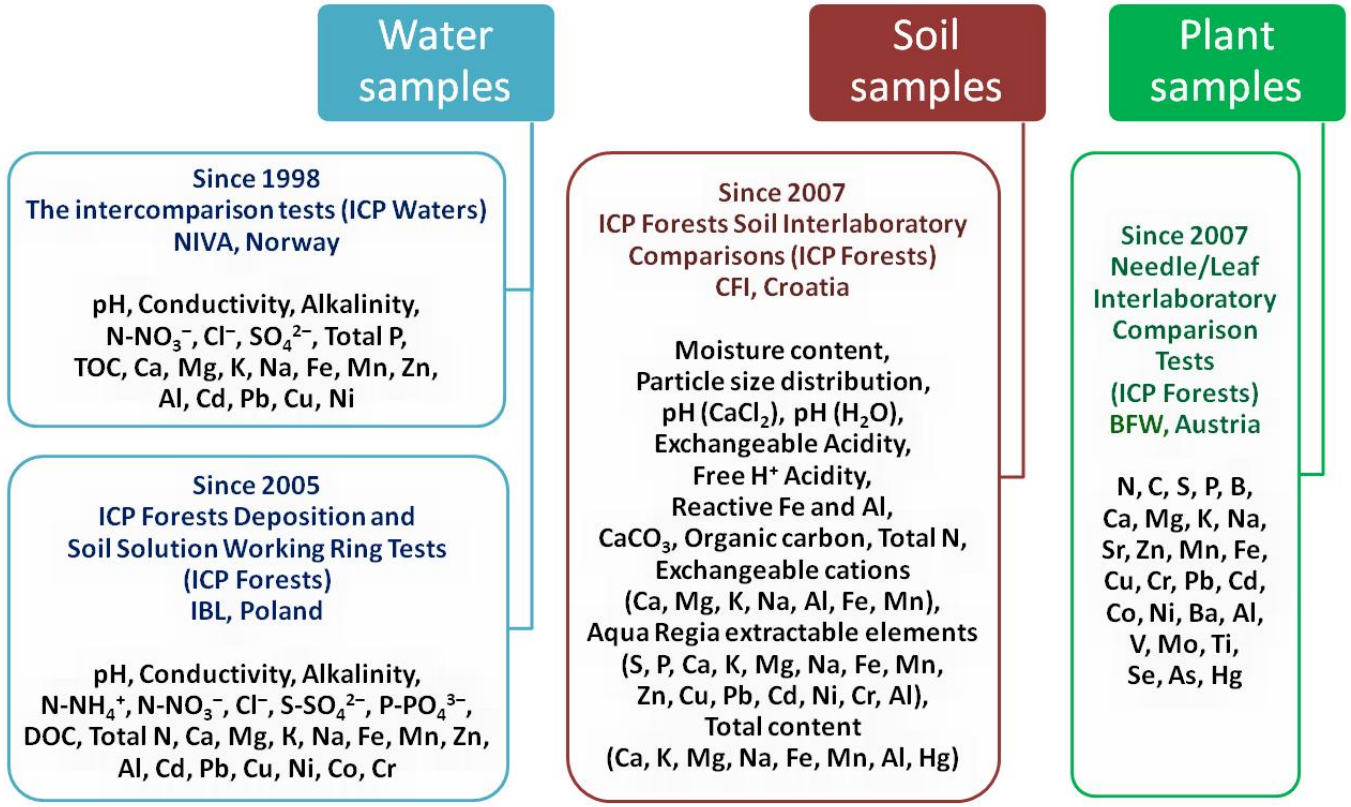
Staff		Notes
Number of laboratory staff	54	
Qualification of laboratory staff (e.g. university degree)	7 - Dr of Sciences, 15 - PhD, 20 - Engineers-chemists of higher qualification	
Is laboratory staff regularly trained? If yes, how often?	yes	1 time/year

National Reference Laboratory

Accreditation/certification

Eco-analytical Laboratory accredited to the ISO/IEC 17025

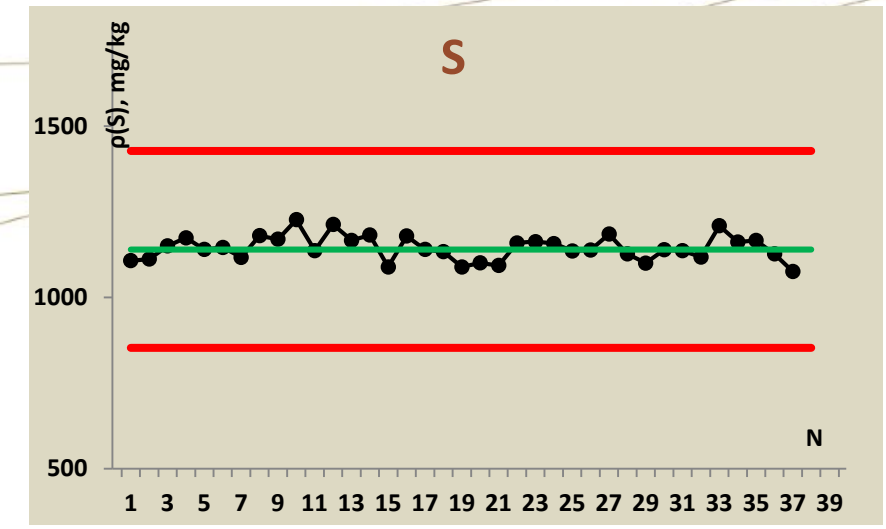
Proficiency testing (PT)

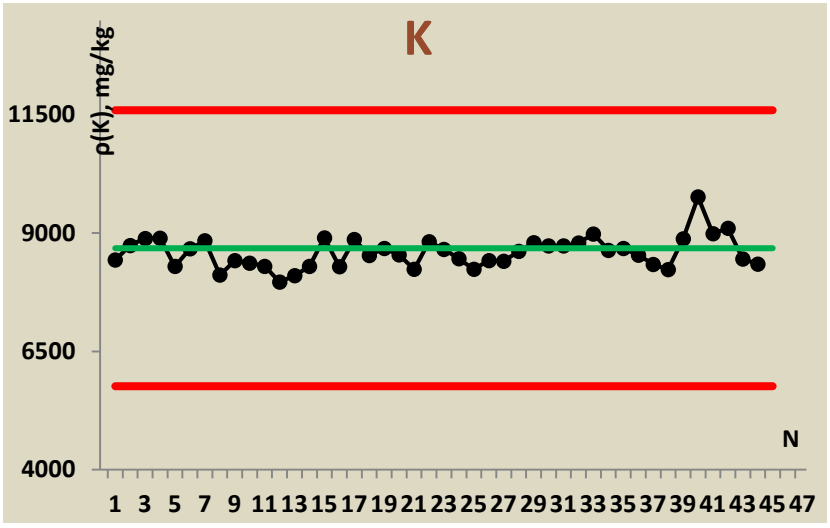


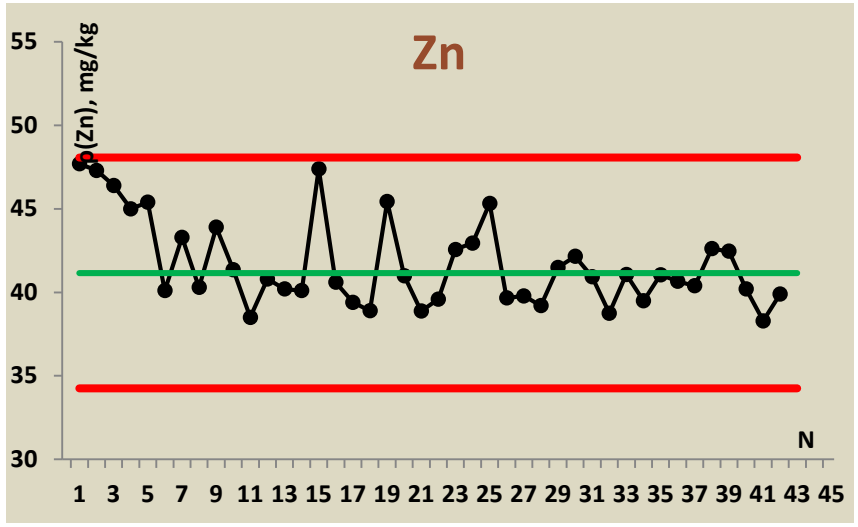
National Reference Laboratory

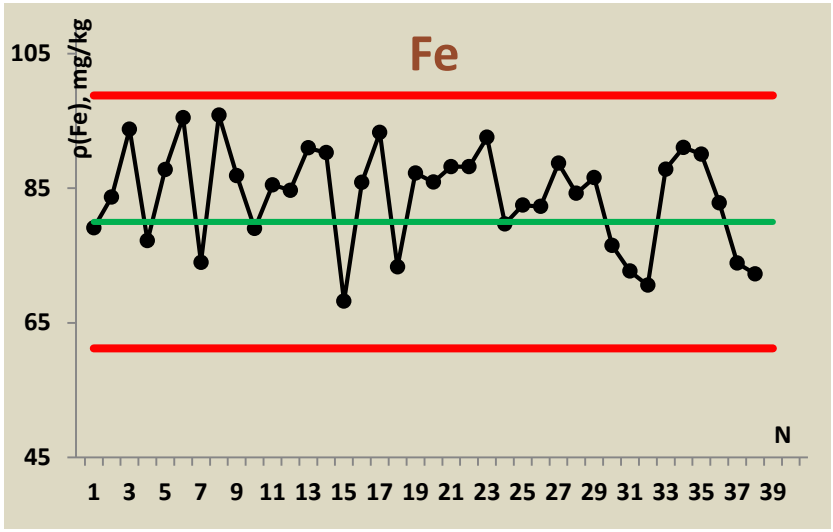
Analysis performed	Number of samples analysed per year	Notes
Chemical	C: Dry combustion – 2200, Tyurin – 1060, Walkley-Black - 70 Agrochemical indicators – 4300 Heavy metals – 1500 Polyaromatic hydrocarbons – 640 Chromato-mass spectroscopy, gas-liquid chromatography – 1460 Related amino acids – 260 Etc	
Physical	particle size distribution – 450	
Biological	3000	

Measurement quality control

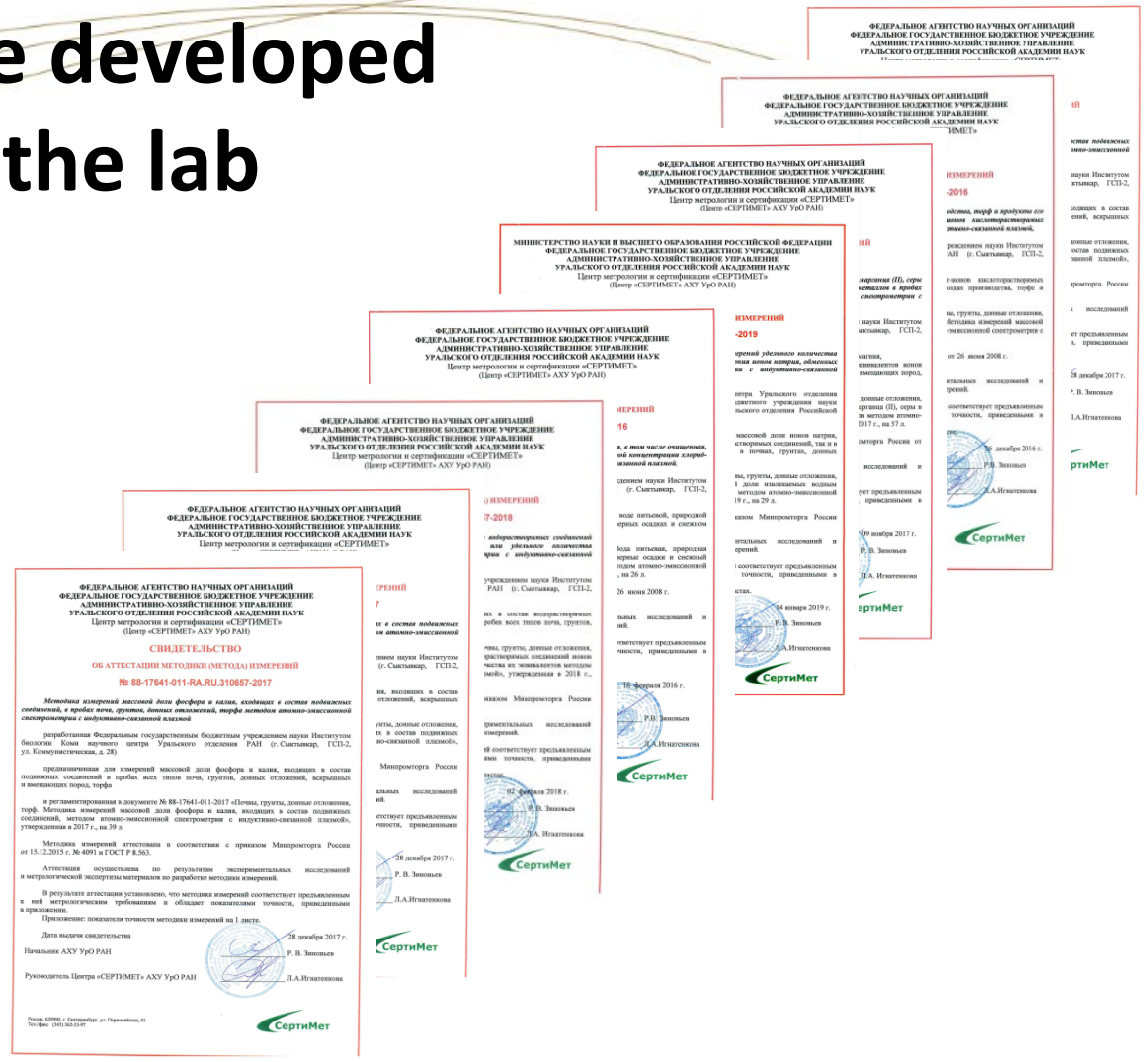








30 measurement procedures were developed and/or metrologically certified in the lab

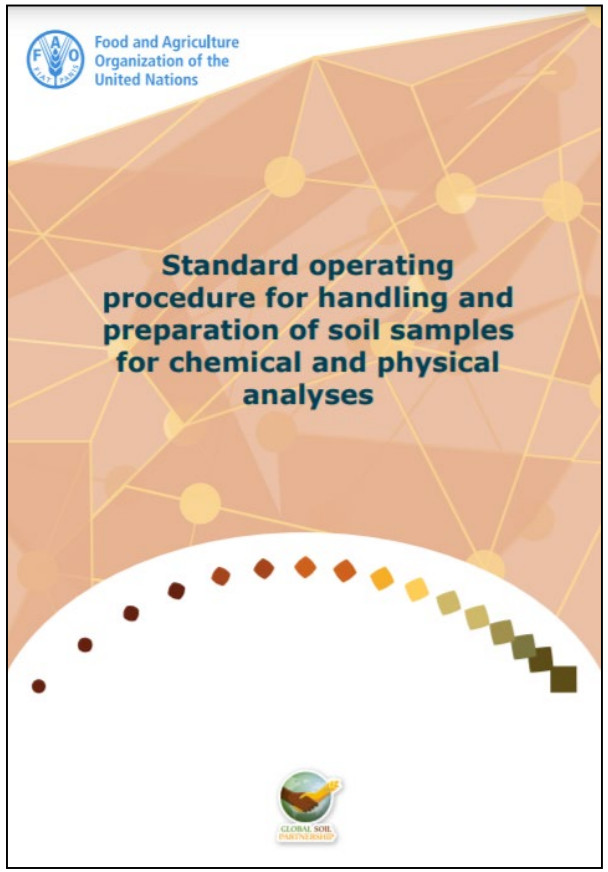


СВИДЕТЕЛЬСТВО

ОБ АТТЕСТАЦИИ МЕТОДИКИ (МЕТОДА) ИЗМЕРЕНИЙ

№ 88-17641-011-RA.RU.310657-2017

Participation in the work on the harmonization of GLOSOLAN Standard Operating Procedures (SOP)



pH

Particle size distribution

Bulk density

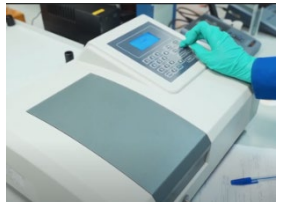
Mineral nitrogen

Organic carbon

https://www.fao.org/global-soil-partnership/glosolan/analiz-pochvy/sops







Modifications of the Tyurin method (Russia)

Conditions for the oxidation		Quantity estimation method		Reference documents
		Cr^{3+}	$Cr_2O_7^{2-}$	
Temperature	Time	Colorimetric	Titrimetric	
100 °C (water bath)	1 hour	λ = 590 nm (Mohr's salt)	-	Turin, 1931; GOST 26213-91
>140 °C (electric stove)	5 min	-	titrant - Mohr's salt solution	Simakov, 1957
>140 °C (electric stove)	5 min	λ = 590 nm (Mohr's salt)	-	Orlov, 1967
20 °C	24 hours	λ = 590 nm (Mohr's salt)	-	Samoilova, Rogiznaya, 2013
>140 °C (water bath)	20 min	λ = 590 nm (sucrose)	-	Simakov, Tsyplakov, 1969
150 °C (drying cabinet)	20 min	λ = 590 nm (sucrose)	titrant - Mohr's salt solution	Nikitin, 1983

Measurement steps

Tyurin method
(Colorimetric Method)

- **20g** $K_2Cr_2O_7$ + 0,5L H_2O, $c(K_2Cr_2O_7)$= 0,136 M
- "Chromium mixture": 1V $K_2Cr_2O_7$+1V $H_2SO_{4\ conc}$

$c(K_2Cr_2O_7)$= 0,068 M

- **Soil+10 mL "Chromium mixture" (5 mL +5 mL)**

added to the sample $n(K_2Cr_2O_7)$= 0,68 mmol

- **Heating in a water bath (t = 100 °C for 60 min)**
- +15 mL H_2O
- Centrifugation 6000 rpm for 10 min
- Measure the optical density λ = 590 nm
- Calculation of %Corg

oxidation correction factor f = 1,0 – traditionally

Walkley-Black method
(Colorimetric Method, GLOSOLAN)

- **50 g** $K_2Cr_2O_7$ +0,5L H_2O, $c(K_2Cr_2O_7)$= 0,34 M
- **Soil+ 2 mL $K_2Cr_2O_7$ +5 mL $H_2SO_{4\ conc}$ = 7 mL**

added to the sample $n(K_2Cr_2O_7)$= 0,68 mmol

- **Standing for 30 min**
- +20 mL H_2O
- Standing for 24 hours **(without external heating)**
- Measure the optical density λ = 590 nm
- Calculation of %Corg

oxidation correction factor f = 1,3

$$3\,[C]^0 + 2\,Cr_2O_7^{2-} + 16\,H^+ = 3\,CO_2 + 4\,Cr^{3+} + 8\,H_2O$$

Tyurin I.V. New modification of the volumetric method for determining humus using chromic acid // Pochvovedenie, 1931. No. 6. P. 36-47.

Walkley A., Black I.A. An examination of the Degtjareff method for determining soil organic matter, and a proposed modification of the chromic acid titration method // Soil Sci., 1934. V. 37. P. 29-38.

Measurement steps

Tyurin method
(Colorimetric Method)

- **20g** K_2Cr
- "Chromi
$c(K_2Cr_2O_7)$= 0,

! In the Walkley-Black method, the amount of $K_2Cr_2O_7$ and H_2SO_4 is equal to the same characteristics as in the Tyurin method, but the concentration of these components of the mixture is 1,5 times higher.

- **Soil+10 mL "Chromium mixture" (5 mL+5 mL)**

added to the sample $n(K_2Cr_2O_7)$=

! Heating of the reaction mixture occurs due to the exothermic effect that occurs when a concentrated solution of H_2SO_4 is mixed with distilled water.

- **Heating in a water bath (*t* =**
- +15 mL H_2O
- Centrifugation 6000 rpm for 10 min
- Measure the optical density λ = 590 nm
- Calculation of %Corg

oxidation correction factor *f* = 1,0 – traditionally

Walkley-Black method
(Colorimetric Method, GLOSOLAN)

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- Measure the optical density λ = 590 nm
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- **Heating in a water bath (*t* =**
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oxidation correction factor *f* = 1,0 – traditionally

Walkley-Black method
(Colorimetric Method, GLOSOLAN)

added to the sample $n(K_2Cr_2O_7)$= 0,68 mmol

t external heating)

- Measure the optical density λ = 590 nm
- Calculation of %Corg

oxidation correction factor *f* = 1,3

! In the Walkley-Black method, the amount of $K_2Cr_2O_7$ and H_2SO_4 is equal to the same characteristics as in the Tyurin method, but the concentration of these components of the mixture is 1,5 times higher.

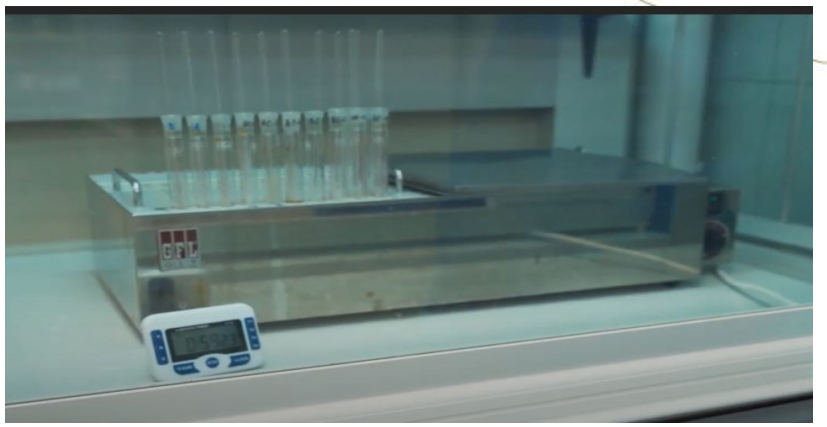
! Heating of the reaction mixture occurs due to the exothermic effect that occurs when a concentrated solution of H_2SO_4 is mixed with distilled water.

With the support of GLOSOLAN, we initiated a comparison of three methods for measuring the content of organic carbon in the soil: Dry combustion, the Walkley-Black method and the Tyurin method.

Tyurin I.V. New mo
humus using chrom
reff method for
odification of the
7. P. 29-38.

Tyurin method (Institute of Biology)

1



2

Tyurin method (Institute of Biology)

1

2

КОНТРОЛЬНЫЙ ЭКЗЕМПЛЯР

МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РОССИЙСКОЙ ФЕДЕРАЦИИ
(Минобрнауки России)

Федеральное государственное бюджетное учреждение науки
Федеральный исследовательский центр
«Коми научный центр Уральского отделения Российской академии наук»
(ФИЦ Коми НЦ УрО РАН)

Институт биологии
Коми научного центра Уральского отделения Российской академии наук
(ИБ ФИЦ Коми НЦ УрО РАН)

УТВЕРЖДАЮ
Директор
ИБ ФИЦ Коми НЦ УрО РАН, д.б.н.
С. В. Дёгтева
«10» сентября 2020 г.

Методика измерений № 88-17641-001-2020

Методика измерений № 88-17641-001-2020 (ФР.1.31.2020.38218)

ПОЧВЫ, ГРУНТЫ, ПОЧВООБРАЗУЮЩИЕ ПОРОДЫ, ДОННЫЕ ОТЛОЖЕНИЯ

МЕТОДИКА ИЗМЕРЕНИЙ
МАССОВОЙ ДОЛИ УГЛЕРОДА
ОРГАНИЧЕСКИХ СОЕДИНЕНИЙ И ОРГАНИЧЕСКОГО ВЕЩЕСТВА
ФОТОМЕТРИЧЕСКИМ МЕТОДОМ
(методы Тюрина и Уолкли-Блэка)

Аттестована
Центром «СЕРТИМЕТ»
АХУ УрО РАН

Настоящая методика внесена в реестр
методик измерений УрО РАН
за № 88-17641-001-2020

Сыктывкар
2020

МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РОССИЙСКОЙ ФЕДЕРАЦИИ
ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ БЮДЖЕТНОЕ УЧРЕЖДЕНИЕ
АДМИНИСТРАТИВНО-ХОЗЯЙСТВЕННОЕ УПРАВЛЕНИЕ
УРАЛЬСКОГО ОТДЕЛЕНИЯ РОССИЙСКОЙ АКАДЕМИИ НАУК
Центр метрологии и сертификации «СЕРТИМЕТ»
(Центр «СЕРТИМЕТ» АХУ УрО РАН)

СВИДЕТЕЛЬСТВО

ОБ АТТЕСТАЦИИ МЕТОДИКИ (МЕТОДА) ИЗМЕРЕНИЙ

№ 88-17641-001-RA.RU.310657-2020

Почвы, грунты, почвообразующие породы, донные отложения. Методики измерений массовой доли углерода органических соединений и органического вещества фотометрическим методом (методы Тюрина и Уолкли-Блэка).

разработанная Институтом биологии Коми научного центра Уральского отделения Российской академии наук Федерального государственного бюджетного учреждения науки Федерального исследовательского центра «Коми научный центр Уральского отделения Российской академии наук» (г. Сыктывкар, ГСП-2, ул. Коммунистическая, д. 28),

предназначенная для измерений массовой доли углерода органических соединений и органического вещества в почвах, грунтах, почвообразующих породах, донных отложениях

и регламентированная в документе № 88-17641-001-2020 «Почвы, грунты, почвообразующие породы, донные отложения. Методика измерений массовой доли углерода органических соединений и органического вещества фотометрическим методом (методы Тюрина и Уолкли-Блэка)», утвержденная в 2020 г., на 51 л.

Методика измерений аттестована в соответствии с приказом Минпромторга России от 15.12.2015 г. № 4091 и ГОСТ Р 8.563.

Аттестация осуществлена по результатам экспериментальных исследований и метрологической экспертизы материалов по разработке методики измерений.

В результате аттестации установлено, что методика измерений соответствует предъявленным к ней метрологическим требованиям и обладает показателями точности, приведенными в приложении.

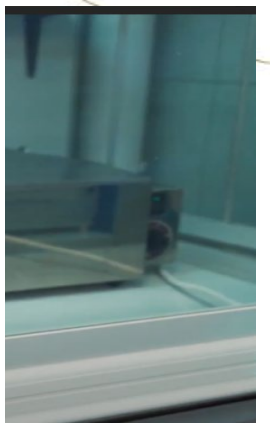
Приложение: показатели точности методики измерений на 1 листе.

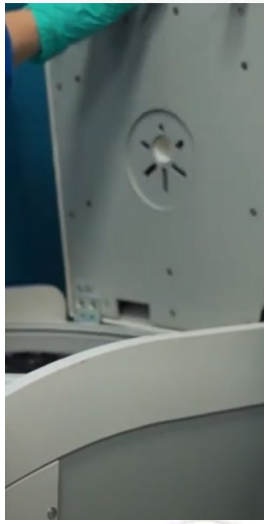
Дата выдачи свидетельства 11 сентября 2020 г.

Начальник АХУ УрО РАН Р. В. Зиновьев

Руководитель Центра «СЕРТИМЕТ» АХУ УрО РАН Л. А. Игнатенкова

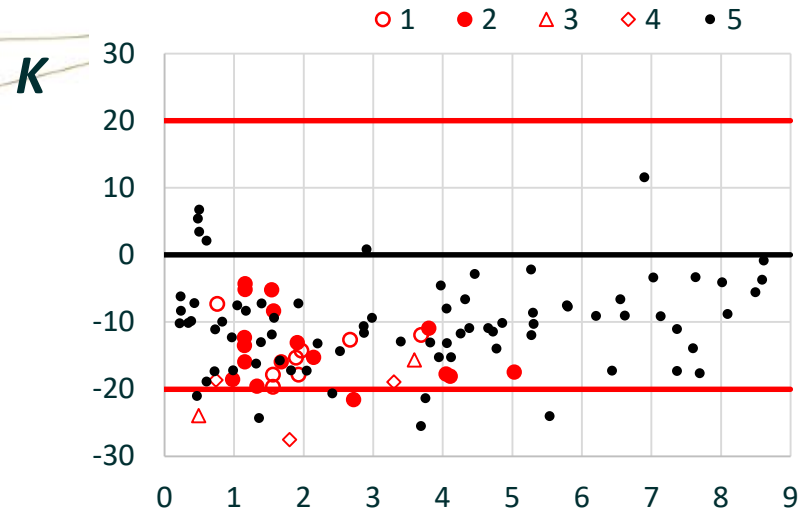
СертиМет



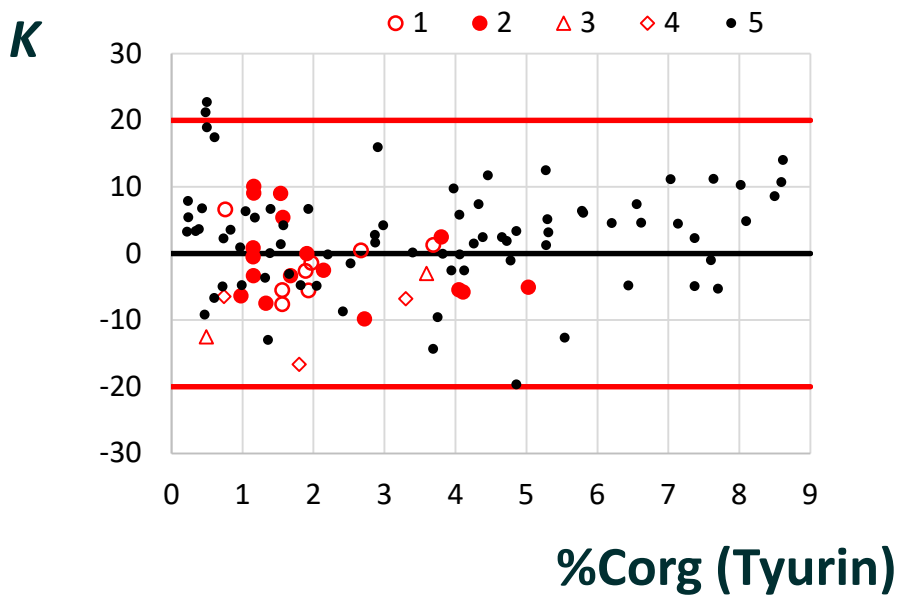


Quality control of measurements %Corg (Tyurin)

without taking into account the *f* = 1,15



taking into account the *f* = 1,15



1 – reference materials of soils (UK)
2, 3 – standard soil samples (Russia)
4 – soil samples from GLOSOLAN
5 – soil samples of various types

more than 120 soil samples in total

%Corg (Tyurin)	*K*, % (*P* = 0,95)
0,170 - 8,7	20

$$K = 100\% * \frac{|\%Corg\ (Tyurin) - \%Corg\ (Dry\ Combusion)|}{\%Corg\ (Dry\ Combusion)}$$

Measurement steps

Tyurin method (Colorimetric Method)

- **20g** K_2Cr
- "Chromi
- $c(K_2Cr_2O_7)$= 0,
- **Soil+10 mL "Chromium mixture" (5 mL**
- **added to the sample $n(K_2Cr_2O_7)$=**
- **Heating in a water bath (*t* =**
- +15 mL H_2O
- Centrifugation 6000 rpm for 10 min
- Measure the optical density λ = 590 nm
- Calculation of %Corg

oxidation correction factor *f* = 1,0 – traditi

! In the Walkley-Black m characteristics as in the T the mixture is 1,5 times l

! Heatin exother solution

Ivan Vladimirovich Tyurin (1892-1962)

***f* = 1.17** (Arinushkina, 1962)

Walkley-Black method (lorimetric Method, GLOSOLAN)

and H_2SO_4 is equal to the same ntration of these components of

e sample $n(K_2Cr_2O_7)$= 0,68 mmol

rs due to the concentrated ed water.

t external heating)

e the optical density λ = 590 nm

tion of %Corg

rrection factor *f* = 1,3

With the support a comparison of three met in the soil: Dry c urin method.

Tyurin I.V. New mo humus using chrom reff method for odification of the 7. P. 29-38.

https://www.fao.org/global-soil-partnership/glosolan/ru/

Organic carbon

Carbon, as soil organic matter, alters the physical (e.g. structure), chemical (e.g. cation exchange capacity), and biological (e.g. microbial activity) properties of soils with impacts on plant growth and yield, biodiversity and the soil water retention capacity. The content of organic carbon of mineral horizons can be used also in soil classification, taking the textural class into account. However, the inferred organic carbon status of a soil should always be locally checked as it is only a rough estimate.

The methods to measure organic carbon are rather easy to run but a special effort should be made by soil analysis laboratories to provide the best possible quality data. This will allow monitoring of changes in SOC at both local and regional scales and also give a better idea of the future scenarios, not only for SOC content but also for atmospheric CO_2 evolution. Did you know that the Global Soil Partnership launched a series of activities on soil organic carbon? For more information click here.

The methods to quantify SOC already harmonized by GLOSOLAN are the following:

SOP Walkley-Black method – titration and colorimetric method (**EN** | **ES** | **RU**)

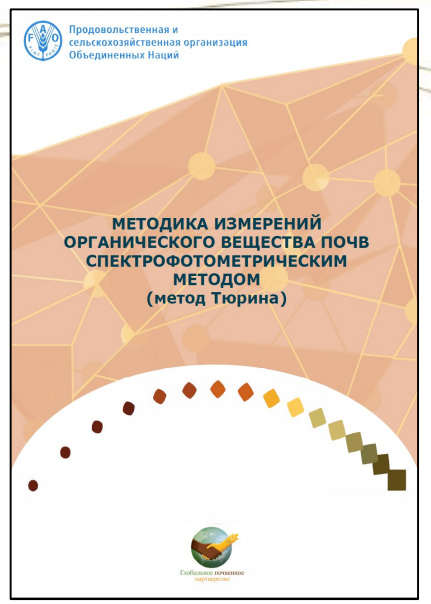
Soil organic carbon – Tyurin spectrophotometric method (**EN** | **RU**)

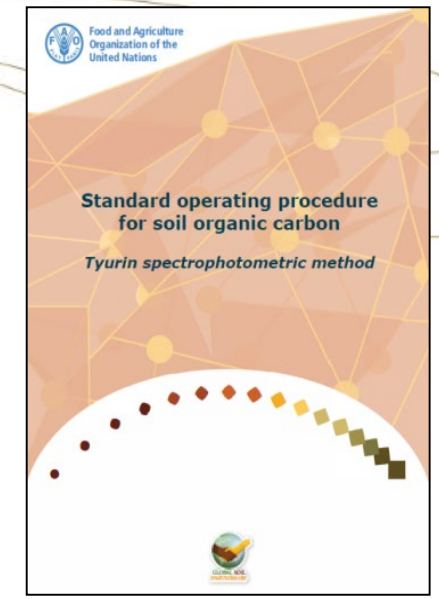
Training video: Walkley and Black - **titration** and **colorimetric** method

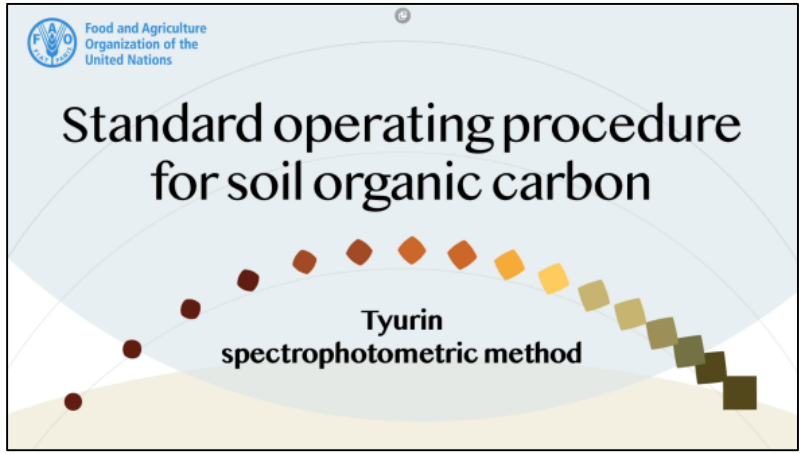
Training video: **Tyurin method**

Soil Organic Carbon methods : Sustainability of methods

Method	Risk for human health related to the use of chemicals and the overall implementation of procedure by staff	Environmental risk (waste disposal)	Level of technology required	Average duration of the analysis	Global median price of the analysis (for the customers)
Walkley & Black	High	High	Low	Up to one working day	6 USD
Tyurin	High	High	Low	Up to one working day	7.6 USD







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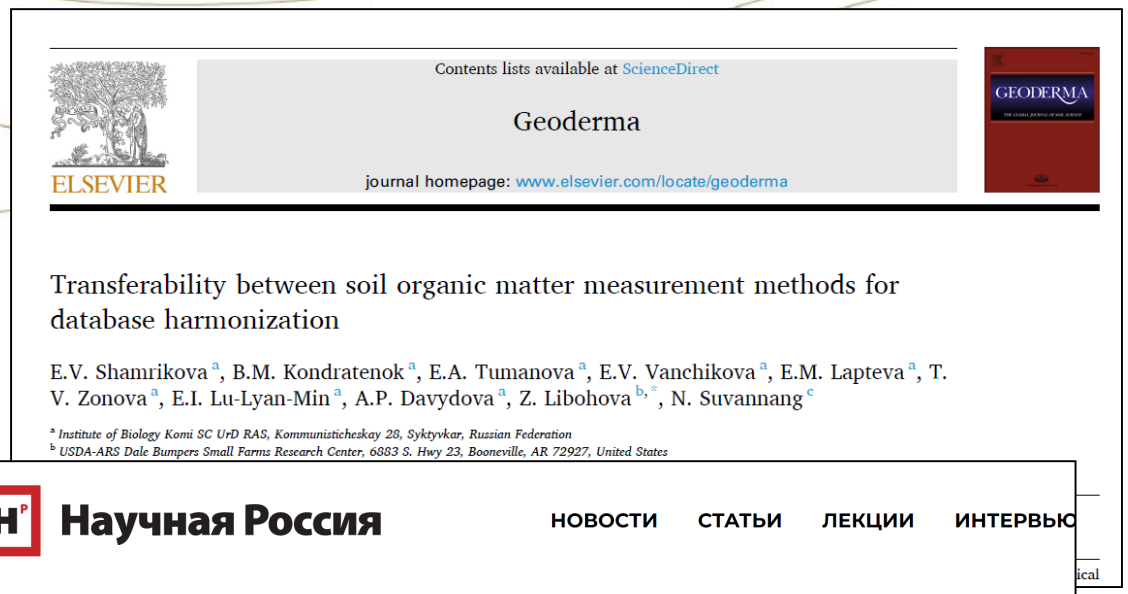
GLOBAL SOIL PARTNERSHIP

Our team opened up a new promising niche of scientific research on the harmonization of soil study methods used in different regions



Contents lists available at ScienceDirect

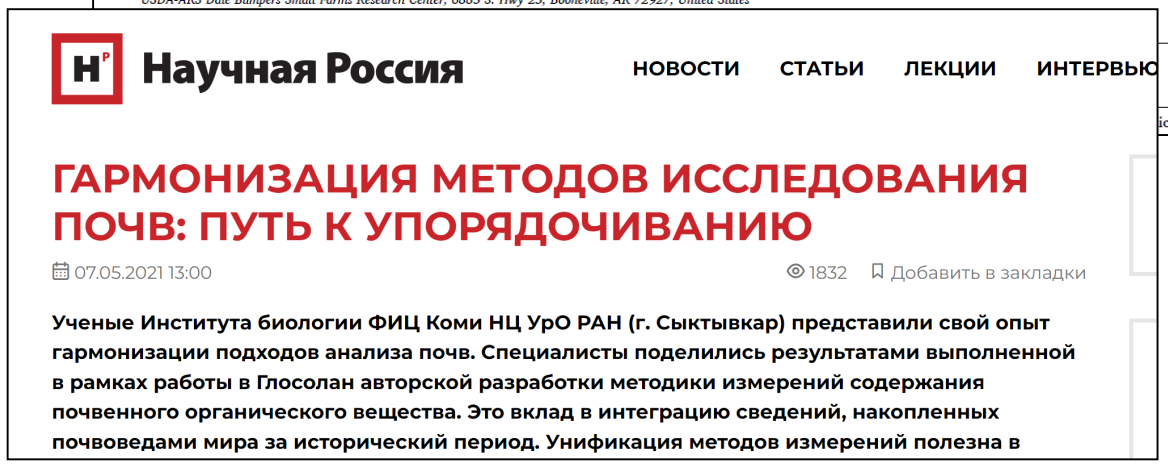
Geoderma

journal homepage: www.elsevier.com/locate/geoderma

Transferability between soil organic matter measurement methods for database harmonization

E.V. Shamrikova [a], B.M. Kondratenok [a], E.A. Tumanova [a], E.V. Vanchikova [a], E.M. Lapteva [a], T. V. Zonova [a], E.I. Lu-Lyan-Min [a], A.P. Davydova [a], Z. Libohova [b,*], N. Suvannang [c]

[a] Institute of Biology Komi SC UrD RAS, Kommunisticheskay 28, Syktyvkar, Russian Federation
[b] USDA-ARS Dale Bumpers Small Farms Research Center, 6883 S. Hwy 23, Booneville, AR 72927, United States



Научная Россия

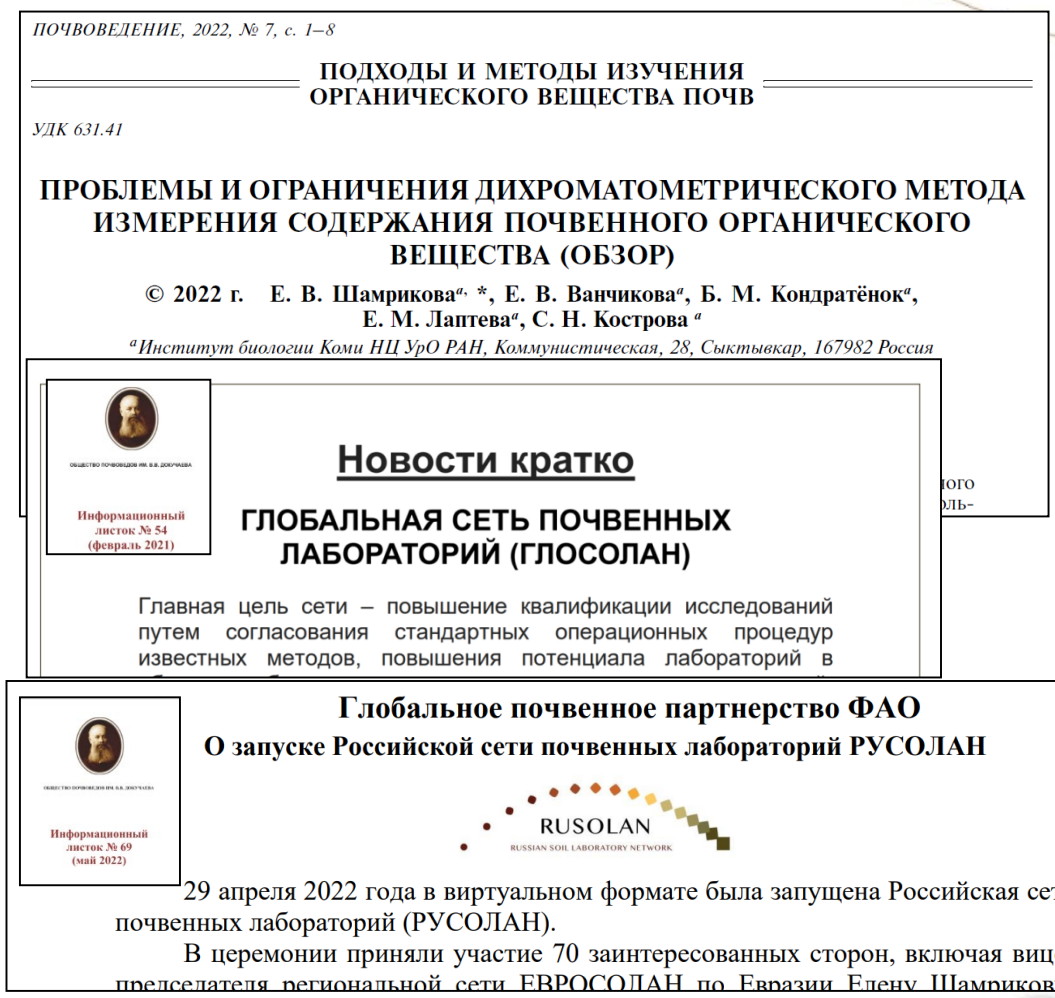
НОВОСТИ СТАТЬИ ЛЕКЦИИ ИНТЕРВЬЮ

ГАРМОНИЗАЦИЯ МЕТОДОВ ИССЛЕДОВАНИЯ ПОЧВ: ПУТЬ К УПОРЯДОЧИВАНИЮ

07.05.2021 13:00 1832 Добавить в закладки

Ученые Института биологии ФИЦ Коми НЦ УрО РАН (г. Сыктывкар) представили свой опыт гармонизации подходов анализа почв. Специалисты поделились результатами выполненной в рамках работы в Глосолан авторской разработки методики измерений содержания почвенного органического вещества. Это вклад в интеграцию сведений, накопленных почвоведами мира за исторический период. Унификация методов измерений полезна в

https://scientificrussia.ru/articles/garmonizatsiya-metodov-issledovaniya-pochv-put-k-uporyadochivaniyu



ПОЧВОВЕДЕНИЕ, 2022, № 7, с. 1–8

ПОДХОДЫ И МЕТОДЫ ИЗУЧЕНИЯ ОРГАНИЧЕСКОГО ВЕЩЕСТВА ПОЧВ

УДК 631.41

ПРОБЛЕМЫ И ОГРАНИЧЕНИЯ ДИХРОМАТОМЕТРИЧЕСКОГО МЕТОДА ИЗМЕРЕНИЯ СОДЕРЖАНИЯ ПОЧВЕННОГО ОРГАНИЧЕСКОГО ВЕЩЕСТВА (ОБЗОР)

© 2022 г. Е. В. Шамрикова[a], *, Е. В. Ванчикова[a], Б. М. Кондратёнок[a], Е. М. Лаптева[a], С. Н. Кострова [a]

[a] Институт биологии Коми НЦ УрО РАН, Коммунистическая, 28, Сыктывкар, 167982 Россия

Информационный листок № 54 (февраль 2021)

Новости кратко

ГЛОБАЛЬНАЯ СЕТЬ ПОЧВЕННЫХ ЛАБОРАТОРИЙ (ГЛОСОЛАН)

Главная цель сети – повышение квалификации исследований путем согласования стандартных операционных процедур известных методов, повышения потенциала лабораторий в

Информационный листок № 69 (май 2022)

Глобальное почвенное партнерство ФАО

О запуске Российской сети почвенных лабораторий РУСОЛАН

RUSOLAN
RUSSIAN SOIL LABORATORY NETWORK

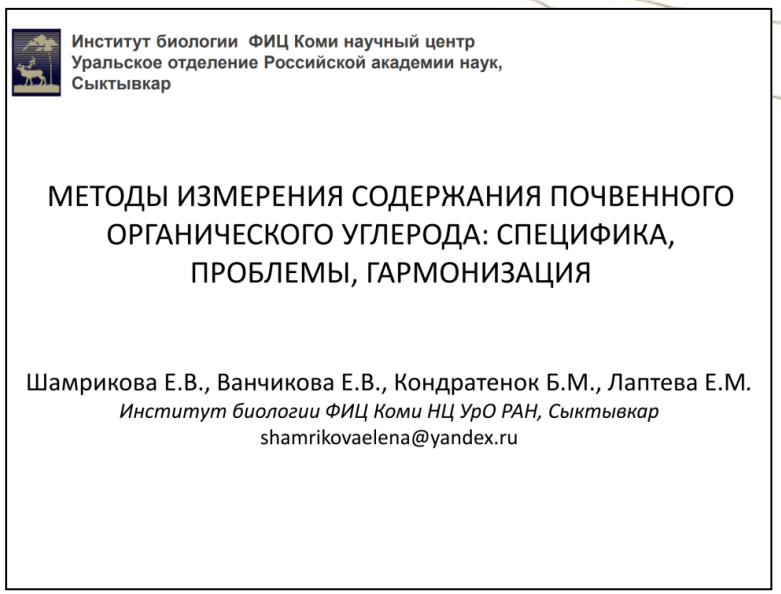
29 апреля 2022 года в виртуальном формате была запущена Российская сеть почвенных лабораторий (РУСОЛАН).

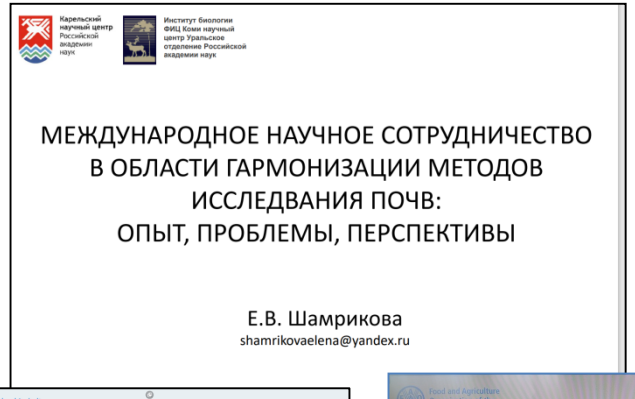
В церемонии приняли участие 70 заинтересованных сторон, включая вице-председателя региональной сети ЕВРОСОЛАН по Евразии Елену Шамрикову

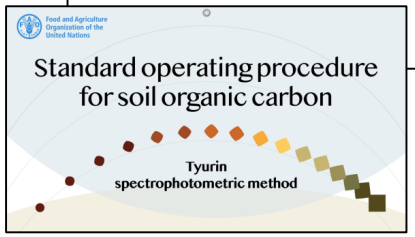
Promoting sustainable soil management for all

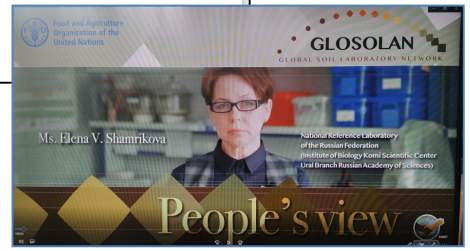
GLOBAL SOIL PARTNERSHIP

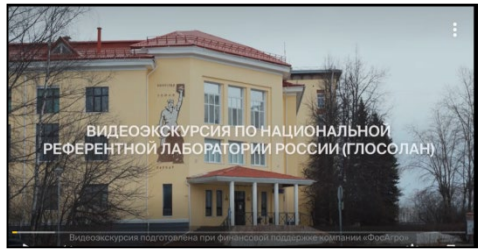
Conferences / Video resources









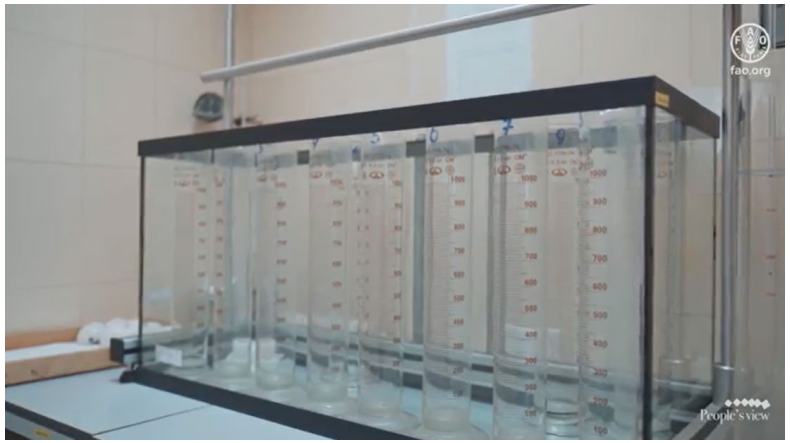


Rome, Italy (2020)
Moscow, Russia (2021)
Petrozavodsk, Russia (2021)
Pushchino, Russia (2022)
Syktyvkar, Russia (2022)
Tashkent, Uzbekistan (2022)

Promoting sustainable soil management for all

RUSOLAN
RUSSIAN SOIL LABORATORY NETWORK

- harmonization of Standard Operation Procedures: Particle size distribution (Kachinsky method, ISO 11277);
- organization of the National proficiency test;
- participation in global initiatives



Conclusion

Thus, the Global Network of Soil Laboratories is indeed an international multi level platform for promoting technologies and knowledge in the field of sustainable land use at the global, regional and ***national*** levels.

All GLOSOLAN members are given the possibility to speak loud about their needs, and to share their experience and knowledge with other. GLOSOLAN values and listens to all its members.

Food and Agriculture Organization of the United Nations

Thanks for your attention!

Promoting sustainable soil management for all

GLOBAL SOIL PARTNERSHIP