



可持续发展大数据国际论坛  
International Forum on Big Data for  
Sustainable Development Goals

# Towards the Atlas of the Russian Flora: e-data are changing our reality

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(Moscow State University, Moscow, Russia)

September 2021  
online meeting

# Special issue of «Science» (2000)



BIOINFORMATICS FOR BIODIVERSITY  
VIEWPOINT

## The Quiet Revolution: Biodiversity Informatics and the Internet

Frank A. Bisby

The massive development of biodiversity-related information systems on the Internet has created much that appears exciting but chaotic, a diversity to match biodiversity itself. This richness and the arrays of new sources are counterbalanced by the maddening difficulty in knowing what is where, or of comparing like with like. But quietly, behind the first waves of exuberance, biologists and computer scientists have started to pull together in a rising tide of coherence and organization. The fledgling field of biodiversity informatics looks set to deliver major advances that could turn the Internet into a giant global biodiversity information system.

There is a resonance between the needs of biodiversity science and the opportunities for globalization and interoperability provided by the Internet. One is that biodiversity workers are distributed all over the globe, literally dotted about in every country and on every island. A second arises from our interdependence. Global events and global syntheses in

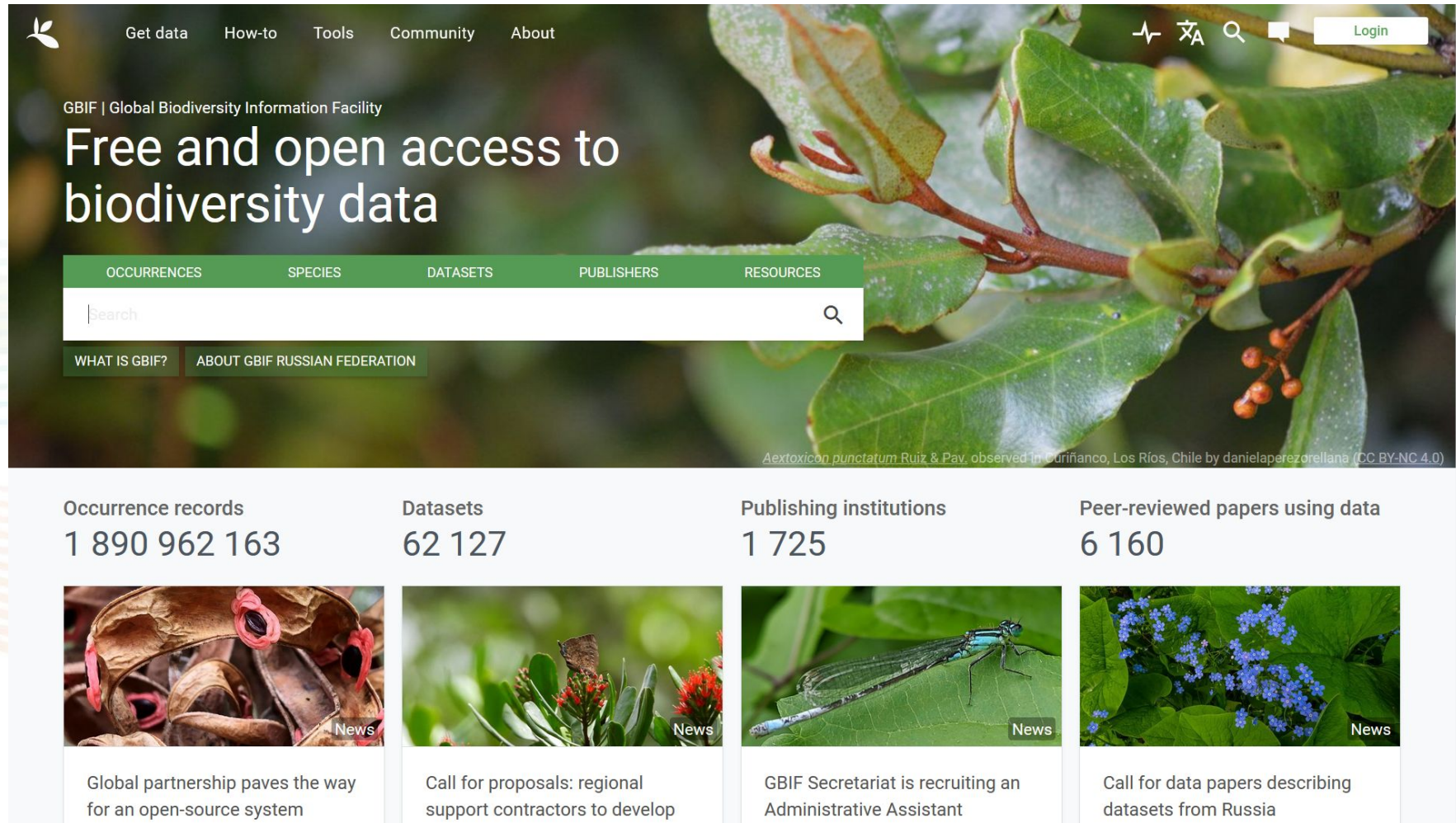
records. ERIN led the way by making the combined data available for Australia-wide Geographic Information System (GIS) analysis and modeling.

A number of interoperative systems are approaching the tasks originally offered by ERIN for its centralized data, but with the powerful possibility of extending to data

Australia (7) and by the European Natural History Specimen Information Network (ENHSIN) team in Europe (8).

A second area for networking and interoperability is the taxonomic framework itself. Again, there are centralized models from the 1990s where organizations bring together taxonomic treatments from authors and institutions to provide a centrally collated system. It now seems agreed that these taxonomic frameworks should be constructed “taxon-by-taxon” as in Species 2000 (1), the Integrated Taxonomic Information System (ITIS) (9), and the UNESCO-IOC Register of Marine Organisms (URMO) (10), thus avoiding the “flora-by-flora” work of integrating systems in which the taxonomies overlap, a contrast illustrated in Fig. 1. Only the International

# GBIF today



The screenshot shows the GBIF website homepage. At the top, there is a navigation menu with links for 'Get data', 'How-to', 'Tools', 'Community', and 'About'. On the right side of the header, there are icons for a home page, a search icon, a magnifying glass, and a 'Login' button. The main heading reads 'Free and open access to biodiversity data'. Below this, there is a green navigation bar with tabs for 'OCCURRENCES', 'SPECIES', 'DATASETS', 'PUBLISHERS', and 'RESOURCES'. A search bar is located below the navigation bar. Underneath the search bar, there are two buttons: 'WHAT IS GBIF?' and 'ABOUT GBIF RUSSIAN FEDERATION'. The background of the header is a close-up photograph of green leaves and small orange berries. At the bottom of the header, there is a small caption: 'Aextoxicon punctatum Ruiz & Pav., observed in Curifianco, Los Ríos, Chile by danielaperezorellana (CC BY-NC 4.0)'. Below the header, there are four statistics cards: 'Occurrence records 1 890 962 163', 'Datasets 62 127', 'Publishing institutions 1 725', and 'Peer-reviewed papers using data 6 160'. Below these cards, there are four news items, each with a small image and a 'News' label: 'Global partnership paves the way for an open-source system', 'Call for proposals: regional support contractors to develop', 'GBIF Secretariat is recruiting an Administrative Assistant', and 'Call for data papers describing datasets from Russia'.

Get data How-to Tools Community About

GBIF | Global Biodiversity Information Facility

## Free and open access to biodiversity data

OCCURRENCES SPECIES DATASETS PUBLISHERS RESOURCES

Search

WHAT IS GBIF? ABOUT GBIF RUSSIAN FEDERATION

Occurrence records  
1 890 962 163

Datasets  
62 127

Publishing institutions  
1 725

Peer-reviewed papers using data  
6 160

Global partnership paves the way for an open-source system

Call for proposals: regional support contractors to develop

GBIF Secretariat is recruiting an Administrative Assistant

Call for data papers describing datasets from Russia


# Diversity of original databases



MUSÉUM  
NATURAL HISTOIRE PARIS

MNHN / Vascular plants (P) / P0074787

*Allium kaschianum* Regel **STRATYLS**



**SPECIMEN**

Herbar: MHH I-P-P0074787  
Sector: ASI (Asia)  
reçu le 30 aout 1890


**TAXONOMY**

Family: Amaryllidaceae  
Genus: *Allium*  
Species: *Allium kaschianum*  
Name: *Allium kaschianum* Regel

**ORIGIN**

Country label: Turkestan  
Verbatim locality: Nilki (Krasch)  
Phenology: set  
Collector's name: A. Regel  
Expedition: Her Turkestanicum  
Collection date: 1879-6-30

Paris



Title: 00247928.jpg

# Filed As:  
Amaryllidaceae  
*Allium stipitatum* Ledeb. (possible type)

All Determinations:  
*Allium stipitatum* Ledeb.

Location:  
China, Songaria chin. ad lacum Salang Her.

Collector(s):  
Collector unspecified s.n., n.d.

New York

Specimen Details

Download Records

Herbarium Catalogue

Family: Alliaceae  
Current Name: *Allium mairei* H.Lév.  
Collector: Forrest, G.  
Collector no.: 914  
Collection Date:  
Country: China  
Location: E. Tibet and S.W. China.  
Lat and Long:  
Data Source:  
Accuracy:  
Altitude:  
Related Specimens:

Type Status: Unknown type material  
Phenology:  
Plant Parts: Leaves, Root, Flowers/inflorescence (with inflorescence axis), Bulb  
Item: Sheet  
Project: Monocot Types, Global Types  
Habitat:  
Plant Description: Note the strongly ribbed blades and the crenulate margins.  
General Comments: Collector for A. K. Bulley of Ness, Neston, Cheshire

Scientific Name: *Allium mairei* H.Lév.  
Determiner:  
Determination Date:  
Type of?:  
Determination Notes: Author citation as on label: Lév.

London

Растения / Коллекции / Гербарий МГУ

Полное изображение




Иллюстрация: *Allium stoliczkae* Regel (L.H.)

Штрикод: MV0734931  
Название в коллекции: *Allium stoliczkae*  
Принятое название: *Allium przewalskianum* Regel  
Семейство: Amaryllidaceae  
Районирование: Зарубежная Азия (ASIA) (КНР)  
Эпителика: 1.08.1956. Собр. Юнатов А. А.  
Дата ввода эпитета: 2.07.2018  
Полная карточка  
Все образцы этого вида  
Все фото в природе этого вида (plantarium.ru)  
OCR: СИНДЖИНСКОЕ КОЛЛЕКЦИОННОЕ СЕДИЛИЩЕ АКАДЕМИИ НАУК КИТАЙСКОЙ НАРОДНОЙ РЕСПУБЛИКИ 1968 1968-4 Деление желваковой ветви 31.1 км. Коммунальное предприятие. Синьцзян-Уйгурский автономный район. Синьцзян-Уйгурская автономная область. дунь-шань 10.11.1956 г. Л. Юнатов А. А. не бр. ш. ш. 11.11.1956 г. Е. Юнатов А. А. не бр. ш. ш. 11.11.1956 г. Цитировать для публикации

Moscow

# Universality of GBIF standards



| Record                     |                          | Occurrence            |   |
|----------------------------|--------------------------|-----------------------|---|
| Basis of record            | PRESERVED_SPECIMEN       | Catalogue number      | P00747877   |
| Collection code            | P                        | Occurrence ID         | <a href="http://coadb.mnhn.-mnhn.jp/p00747877">http://coadb.mnhn.-mnhn.jp/p00747877</a>                                 |
| Institution code           | MNH-N                    | Occurrence remarks    | requ le 30 aout 1890  |
| <b>Event</b>               |                          | Preparations          | hb  |
| Day                        | 30                       | Recorded by           | Regel, A.   |
| Month                      | 6                        | <b>Identification</b> |   |
| Year                       | 1879                     | Type status           | Synonym   |
| Event date                 | 1879-06-30T00:00:00      | <b>Location</b>       |   |
| <b>Taxon</b>               |                          | Country or area       | unknown or invalid  |
| Kingdom                    | Plantae                  | Country code          | ZZ  |
| Phylum                     | Tracheophyta             | Verbatim locality     | Niki (Kasch)  |
| Class                      | Liliopsida               | <b>Other</b>          |   |
| Order                      | Asparagales              | Identifier            | <a href="http://coadb.mnhn.-mnhn.jp/p00747877">http://coadb.mnhn.-mnhn.jp/p00747877</a>                                 |
| Family                     | Amaryllidaceae           | Record license        | <a href="http://creativecommons.org/licenses/by/4.0/legalcode">http://creativecommons.org/licenses/by/4.0/legalcode</a> |
| Genus                      | Allium                   | Modified              | 2015-09-05T09:21:00.000+0000  |
| Specific epithet           | kaschianum               | <b>Record</b>         |   |
| Scientific name            | Allium kaschianum Regel. | Basis of record       |   |
| Scientific name authorship |                          | Collection code       |   |
| Rank                       | SPECIES                  | Institution code      |   |
| Taxonomic status           | ACCEPTED                 |                       |   |

P00747877

| Record             |   | Occurrence            |   |
|--------------------|---|-----------------------|---|
| Basis of record    | PRESERVED_SPECIMEN  | Catalogue number      | 247926  |
| Collection code    | NY  | Occurrence ID         | c18b3c7a-3f18-4c44-9eb5-e941c294bec   |
| Collection ID      | <a href="http://biocol.org...col.org/col/15556">http://biocol.org...col.org/col/15556</a> | Occurrence remarks    | Herb. Acad. Petrop. sheet   |
| Dataset name       | Vascular plants   | Preparations          | s.n.  |
| Dataset ID         | <a href="http://biocol.org...col.org/col/15556">http://biocol.org...col.org/col/15556</a> | Record number         | Collector unspecified   |
| Institution code   | NY  | <b>Event</b>          |   |
| Institution ID     | <a href="http://biocol.org...col.org/col/15556">http://biocol.org...col.org/col/15556</a> | Verbatim event date   | s.d.  |
| <b>Event</b>       |   | <b>Identification</b> |   |
|                    |   | Type status           | Type  |
| <b>Taxon</b>       |   | <b>Location</b>       |   |
| Kingdom            | Plantae   | Continent             | ASIA  |
| Phylum             | Tracheophyta  | Country or area       | China   |
| Class              | Liliopsida  | Country code          | CN  |
| Order              | Asparagales   | Locality              | Songaria chn. sd lacum tsaisang-Nor   |
| Family             | Amaryllidaceae  | <b>Other</b>          |   |
| Genus              | Allium  | Identifier            | c18b3c7a-3f18-4c44-9eb5-e941c294bec   |
| Specific epithet   | tulipifolium  | Language              | en  |
| Nomenclatural code | ICN   | Record license        | <a href="http://creativecommons.org/licenses/by/4.0/legalcode">http://creativecommons.org/licenses/by/4.0/legalcode</a> |
| Scientific name    | Allium tulipifolium Ledeb.  | Modified              | 2016-10-21T15:56:00.000+0000  |
| Rank               | SPECIES   | References            | <a href="http://sweet">http://sweet</a>   |
| Taxonomic status   | ACCEPTED  |                       |   |

NY00247926

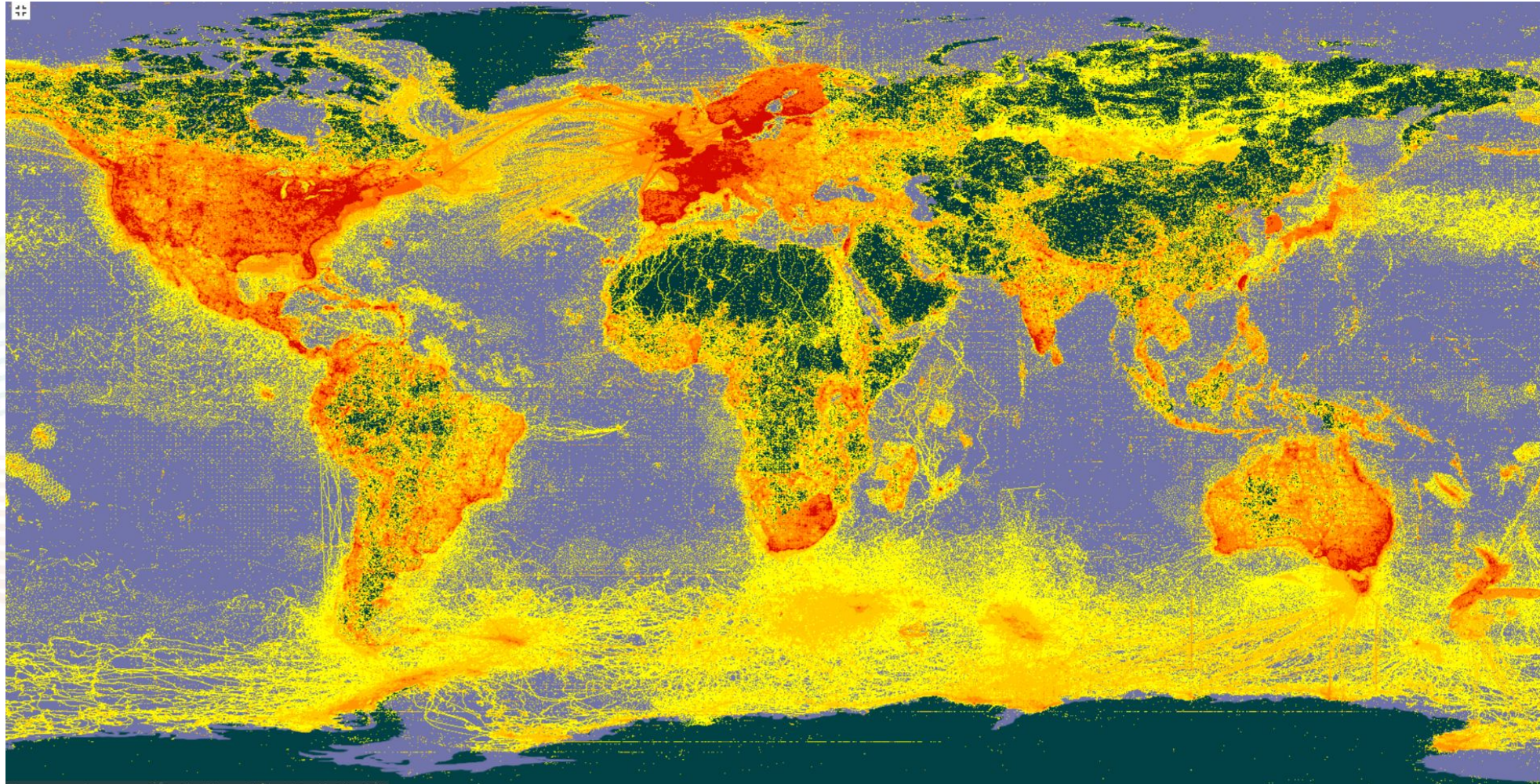
| Record                     |  | Occurrence         |   |
|----------------------------|--|--------------------|---|
| Basis of record            | PRESERVED_SPECIMEN   | Catalogue number   | K000464620  |
| Collection code            | Herbarium  | Occurrence ID      | <a href="http://specimens.banum.ru/K000464620">http://specimens.banum.ru/K000464620</a>                                 |
| Institution code           | K  | Occurrence remarks | Collector for A.K.Bulley of Ness, Weston, Cheshire  |
| <b>Event</b>               |  | Record number      | 914   |
| Event remarks              | Note the strongly ribbed blades and the crenulate margins. | Recorded by        | Forrest, G.   |
| <b>Taxon</b>               |  | <b>Location</b>    |   |
| Kingdom                    | Plantae  | Country or area    | China   |
| Phylum                     | Tracheophyta   | Country code       | CN  |
| Class                      | Liliopsida   | Locality           |   |
| Order                      | Asparagales  | <b>Other</b>       |   |
| Family                     | Amaryllidaceae   | Identifier         | K000464620  |
| Genus                      | Allium   | Record license     | <a href="http://creativecommons.org/licenses/by/4.0/legalcode">http://creativecommons.org/licenses/by/4.0/legalcode</a> |
| Specific epithet           | mairei   | Modified           | 2012-09-07T13:40:36.300+0000  |
| Higher classification      | ALLIACEAE  |                    |   |
| Scientific name            | Allium mairei H.L.   |                    |   |
| Scientific name authorship |  |                    |   |
| Rank                       | SPECIES  |                    |   |
| Taxon remarks              | Author citation as on label: Lévl.                         |                    |   |
| Taxonomic status           | ACCEPTED   |                    |   |

K000464620

| Record                 |   | Occurrence             |   |
|------------------------|---|------------------------|---|
| Basis of record        | PRESERVED_SPECIMEN  | Catalogue number       | MW0734831   |
| Collection code        | MW  | Disposition            | in collection   |
| Collection ID          | <a href="http://unitedbiocol.org/col/15590">unitedbiocol.org/col/15590</a>  | Occurrence ID          | MW0734831   |
| Dataset ID             | <a href="http://unitedbiocol.org/col/15590">unitedbiocol.org/col/15590</a>  | Occurrence status      | present   |
| Dataset name           | Moscow Digital Herbarium  | Preparations           | herbarium specimen  |
| Information withheld   | no label data and provenance  | Recorded by            | Vinator, A. A.  |
| Institution code       | Moscow State University   | Associated media       |   |
| Institution ID         | <a href="http://gbif.org...state-university">http://gbif.org...state-university</a>                                     | <b>Taxon</b>           |   |
| Owner institution code | MSU   | Kingdom                | Plantae   |
| <b>Event</b>           |   | Phylum                 | Tracheophyta  |
| Day                    | 1   | Class                  | Liliopsida  |
| Month                  | 8   | Order                  | Asparagales   |
| Year                   | 1958  | Family                 | Amaryllidaceae  |
| Event date             | 1958-08-01T00:00:00   | Genus                  | Allium  |
| Sampling protocol      | common practice of herbarium collecting   | Specific epithet       | stoliczkae  |
| <b>Other</b>           |   | Accepted name usage ID | 79070519  |
| Identifier             | MW0734831   | Higher classification  | Plantae Tracheophyta Liliopsida Asparagales Amaryllidaceae Allium |
| Record license         | <a href="http://creativecommons.org/licenses/by/4.0/legalcode">http://creativecommons.org/licenses/by/4.0/legalcode</a> | Accepted name usage    | Allium przewalskianum   |
| Modified               | 2012-09-07T13:40:36.300+0000  | Nomenclatural code     | International Code of Nomenclature for algae, fungi, and plants   |
|                        |   | Parent name usage      | Allium  |
|                        |   | Parent name usage ID   | 11472305  |
|                        |   | Scientific name        | Allium stoliczkae Regel   |
|                        |   | Rank                   | SPECIES   |
|                        |   | Taxonomic status       | SYNONYM   |
|                        |   | Vernacular name        | lyx   |

MW0734831

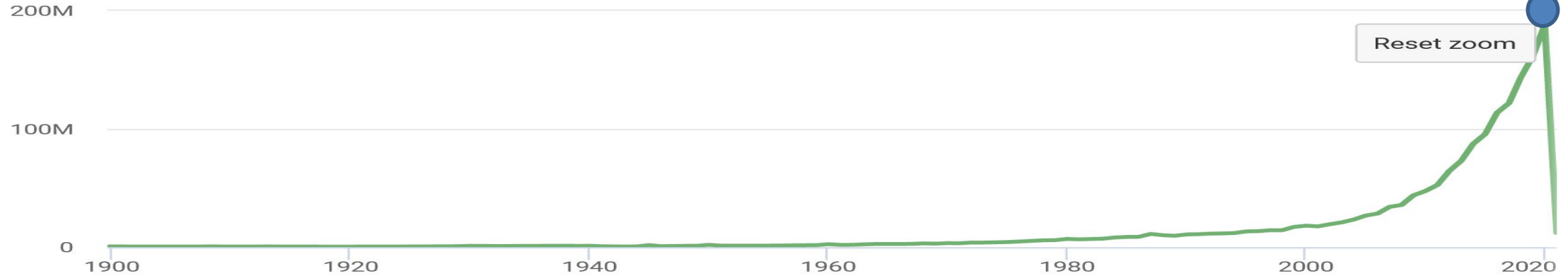
# GBIF geodata



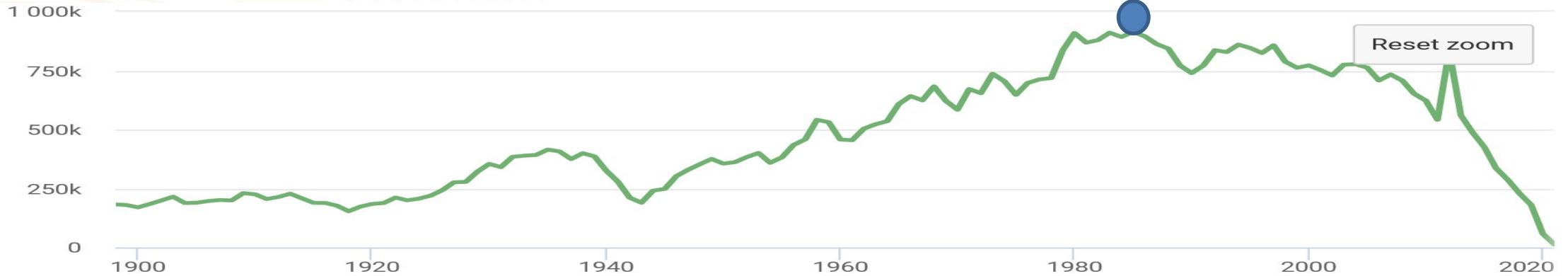
# GBIF data by years



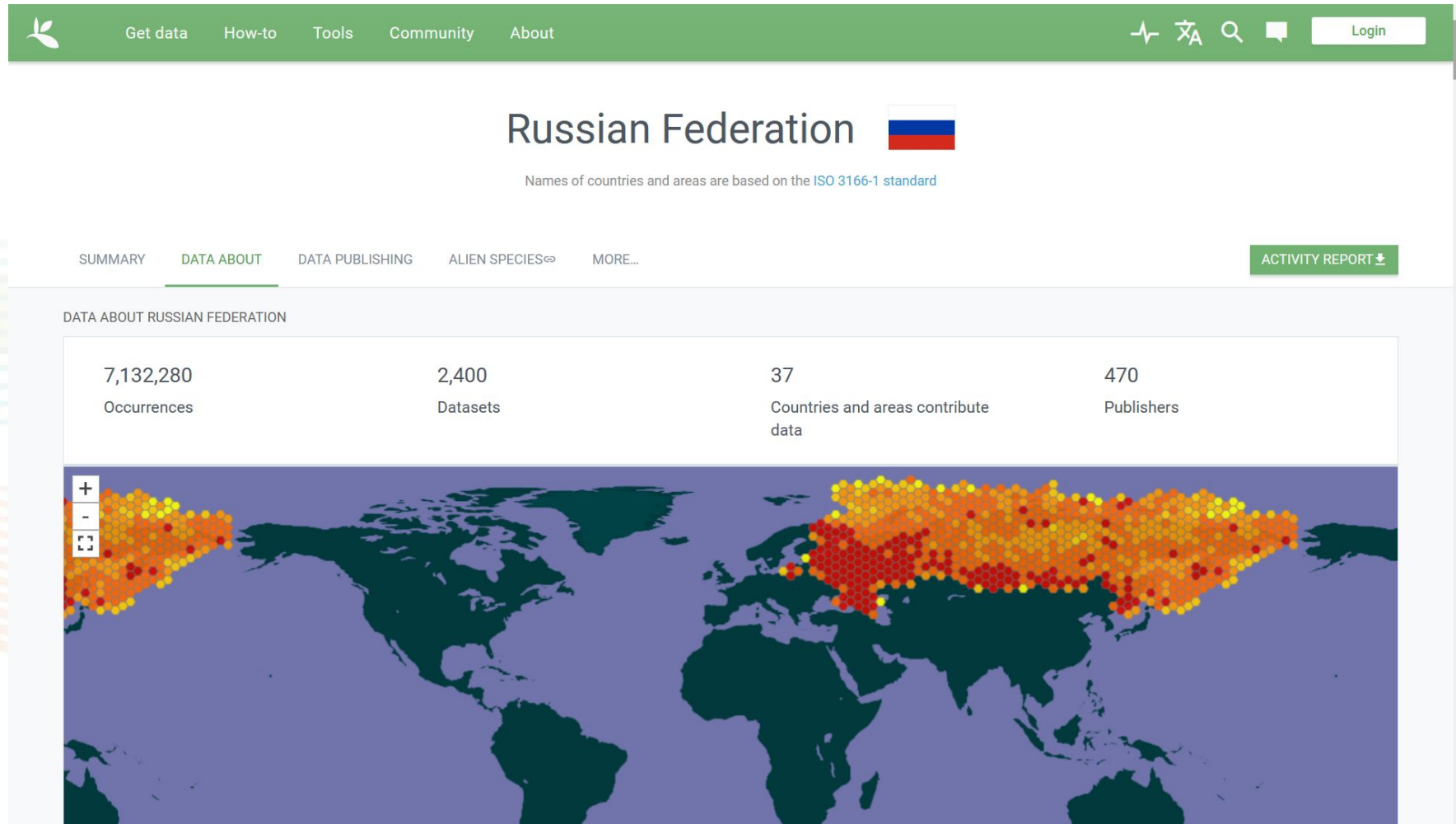
All data: max. 188,197,913 (2020)



Herbarium specimens: max. 913,455 (1985)

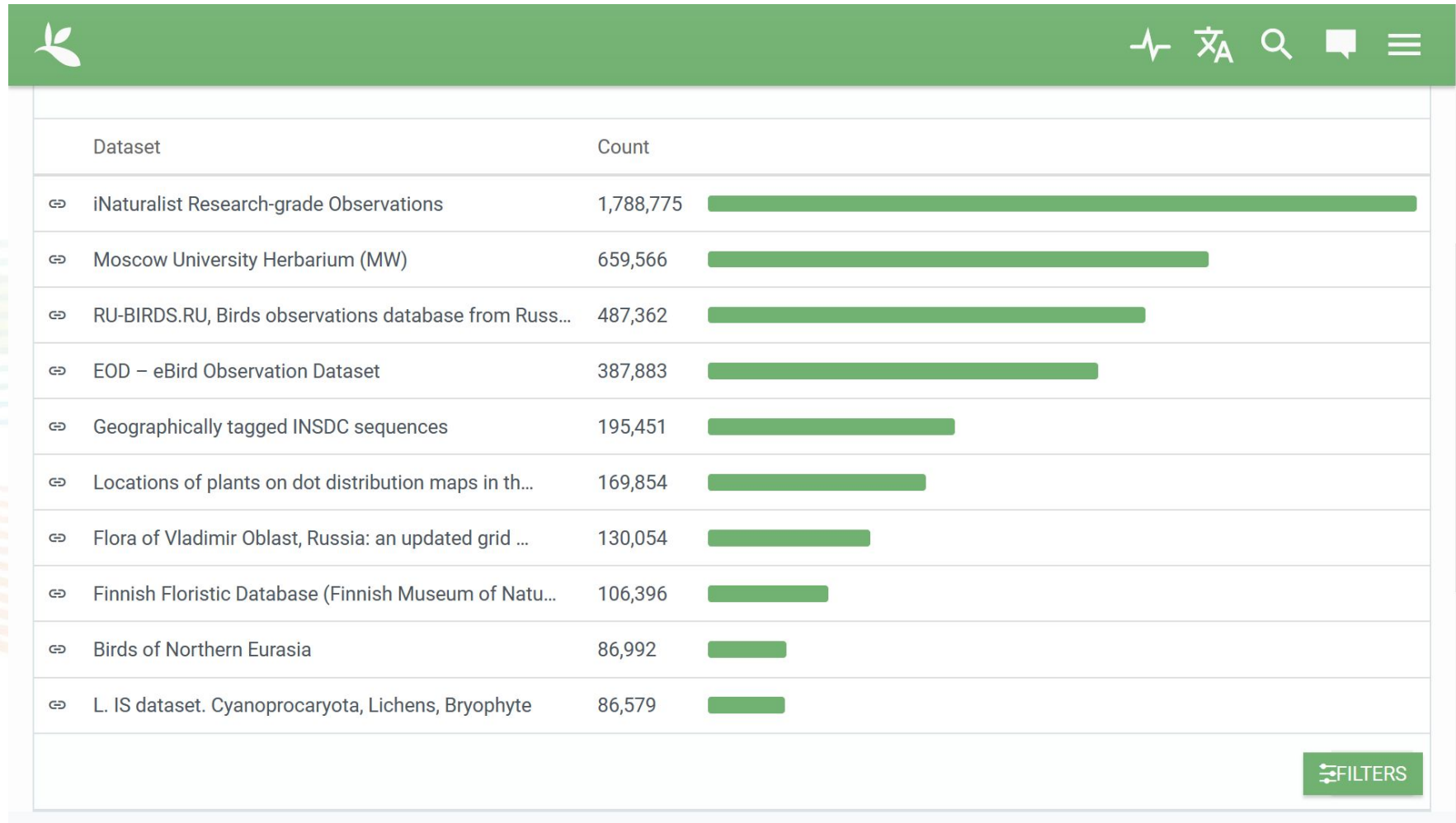


# GBIF data for Russia



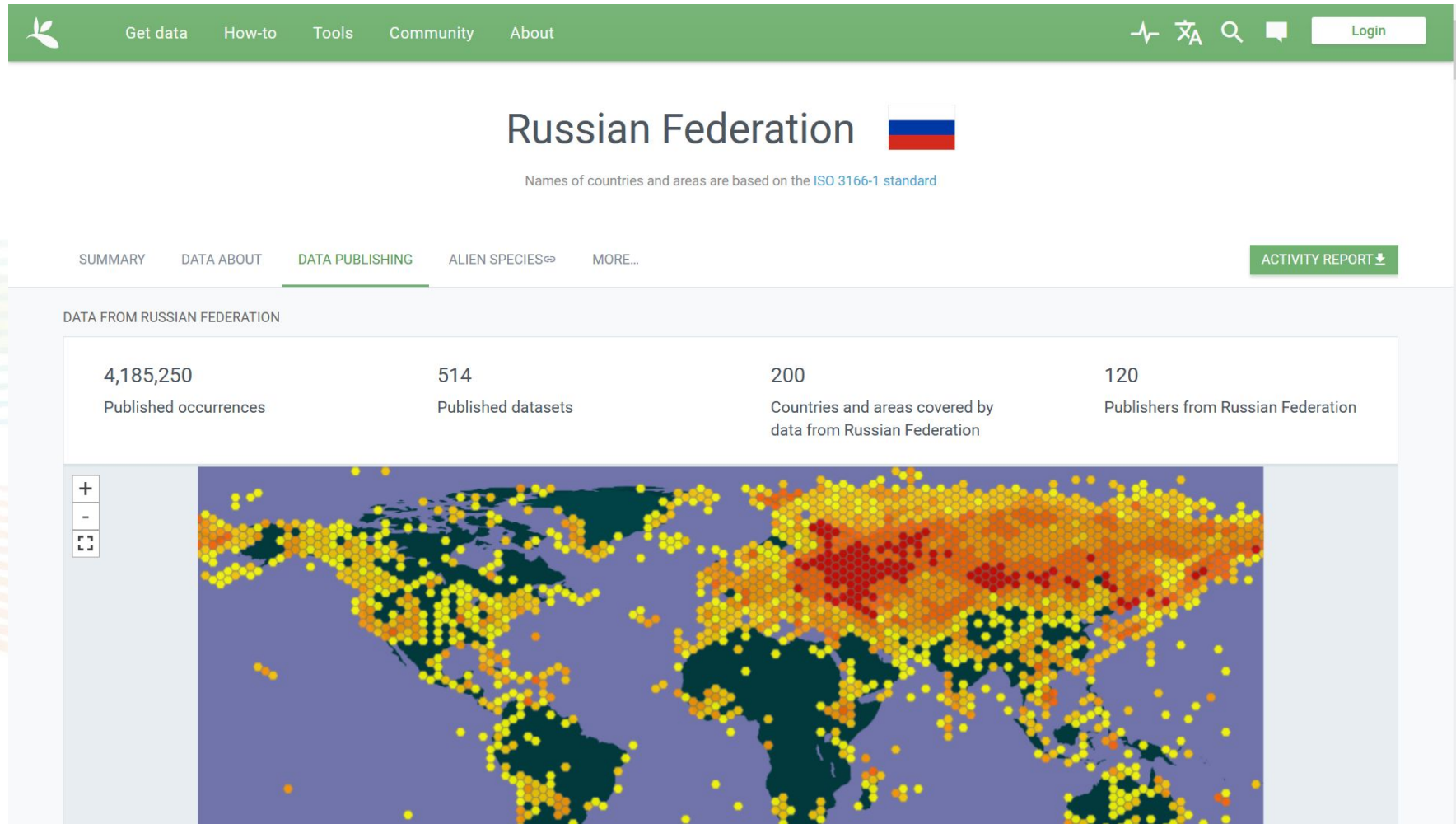


# Top sources for Russia in GBIF

A screenshot of the GBIF data interface showing a table of top sources for Russia. The interface has a green header bar with a leaf icon on the left and navigation icons (heart, text, search, chat, menu) on the right. The table lists datasets with their names, counts, and horizontal bar charts. A 'FILTERS' button is visible in the bottom right corner of the table area.

| Dataset   | Count     |
|---|-----------|
| iNaturalist Research-grade Observations               | 1,788,775 |
| Moscow University Herbarium (MW)                      | 659,566   |
| RU-BIRDS.RU, Birds observations database from Russ... | 487,362   |
| EOD – eBird Observation Dataset                       | 387,883   |
| Geographically tagged INSDC sequences                 | 195,451   |
| Locations of plants on dot distribution maps in th... | 169,854   |
| Flora of Vladimir Oblast, Russia: an updated grid ... | 130,054   |
| Finnish Floristic Database (Finnish Museum of Natu... | 106,396   |
| Birds of Northern Eurasia                             | 86,992    |
| L. IS dataset. Cyanoprocaryota, Lichens, Bryophyte    | 86,579    |

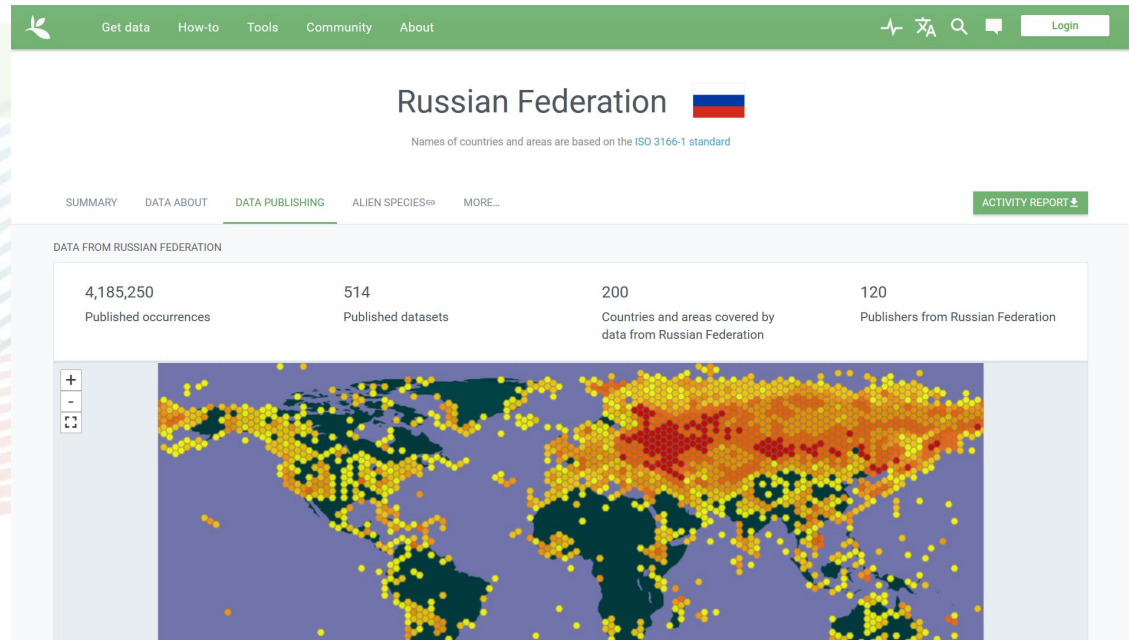
# GBIF data from Russian institutions



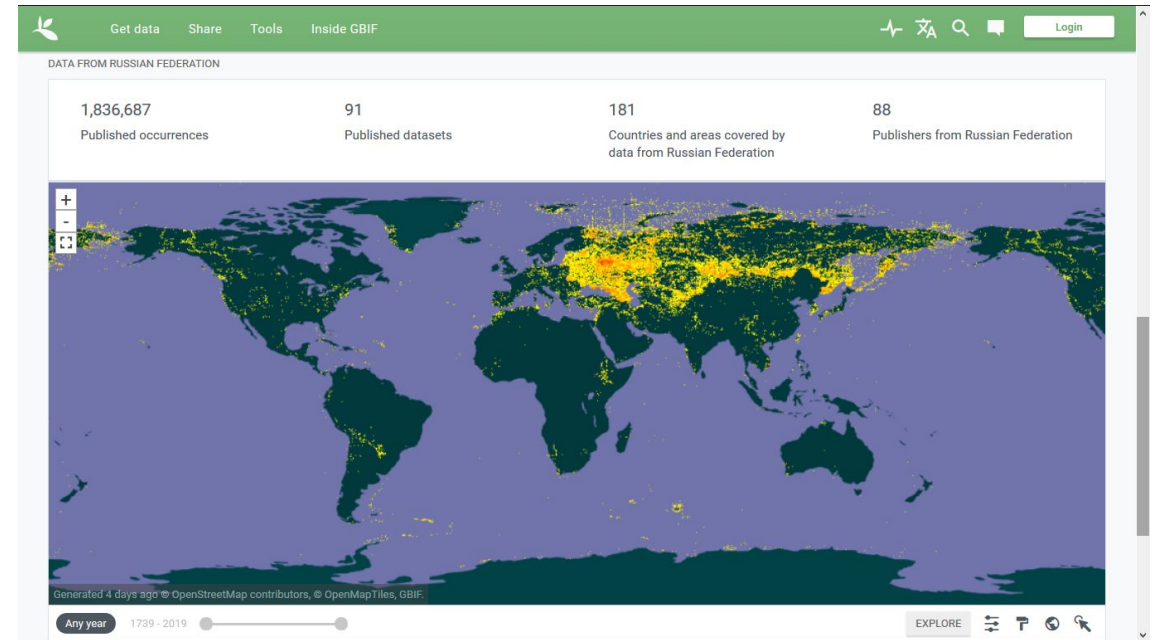
# GBIF data from Russia: 2021 vs. 2019



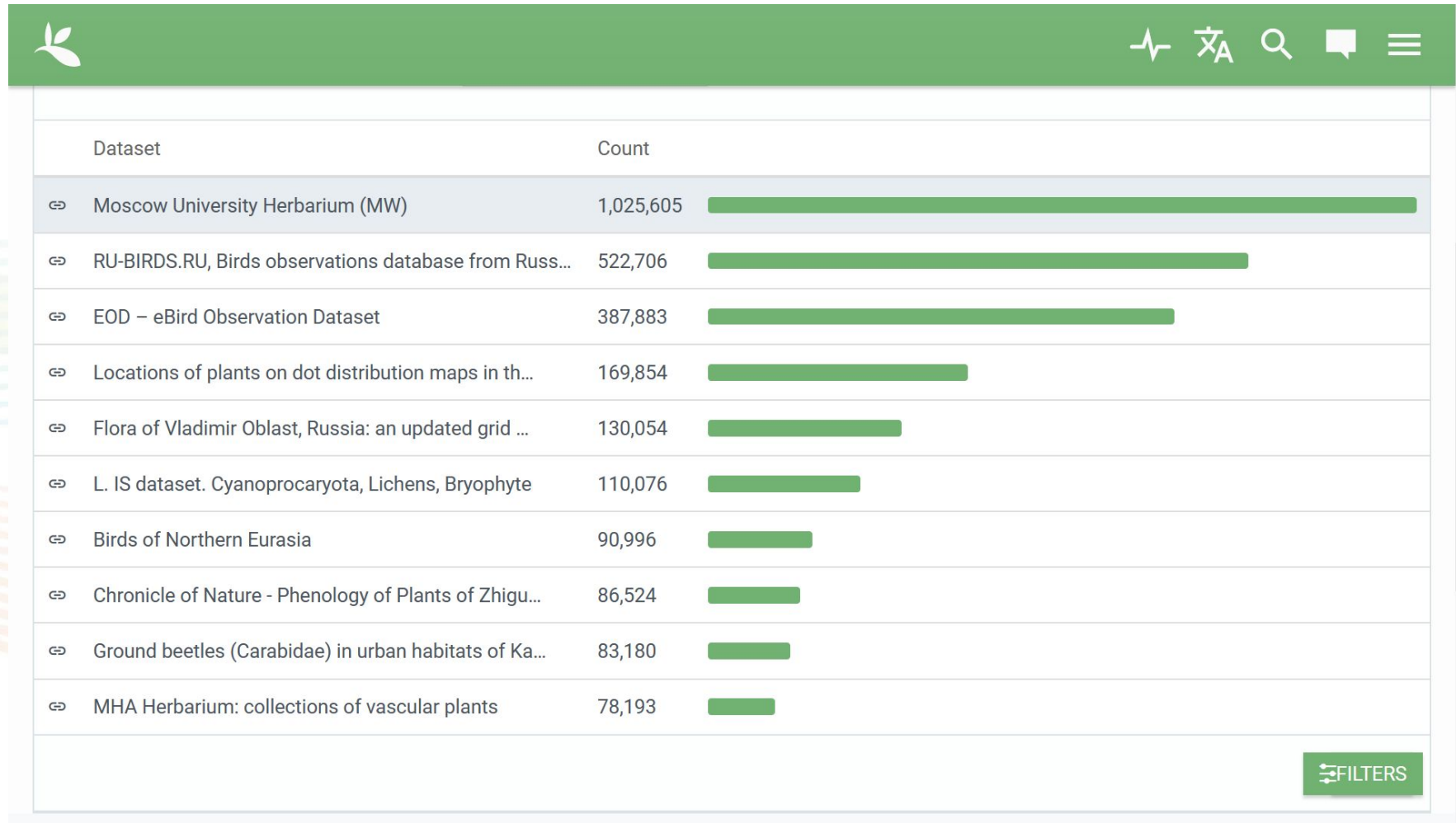
Sep 2021: 4.2M records



Aug 2019: 1.8M records



# Top sources from Russia in GBIF



# Top 20 countries by plant data in GBIF



## Ranks 1 to 10



## Ranks 11 to 20



# Source #1 for the Russian flora: 1.2M



The screenshot shows the iNaturalist Research-grade Observations dataset page. At the top, there is a green navigation bar with links for 'Get data', 'How-to', 'Tools', 'Community', and 'About'. The main header area includes the text 'OCCURRENCE DATASET | REGISTERED FEBRUARY 9, 2012' and 'iNaturalist Research-grade Observations', published by iNaturalist.org and Ueda K. Below this, there are tabs for 'DATASET', 'METRICS', 'ACTIVITY', 'DOWNLOAD', and 'HOME PAGE'. On the right side, there are two buttons: '32,825,022 OCCURRENCES' and '1,491 CITATIONS'. The main content area contains a description of the dataset, the iNaturalist logo, and metadata such as 'Publication date: August 19, 2021' and 'Hosted by: iNaturalist.org'. Below the description, there are four circular progress indicators showing the percentage of data with specific attributes: 32,825,022 Occurrences (100%), 99.9% With taxon match, 99.7% With coordinates, and 99.9% With year. At the bottom, there is a map showing 32,738,186 georeferenced records, with a density of points colored in a gradient from yellow to red.

Get data How-to Tools Community About

OCCURRENCE DATASET | REGISTERED FEBRUARY 9, 2012

## iNaturalist Research-grade Observations

Published by [iNaturalist.org](https://iNaturalist.org)  
Ueda K

DATASET METRICS ACTIVITY DOWNLOAD HOME PAGE

32,825,022 OCCURRENCES 1,491 CITATIONS

Observations from iNaturalist.org, an online social network of people sharing biodiversity information to help each other learn about nature. iNaturalist is a joint initiative of the California Academy of Sciences and the National Geographic Society. Observations included in this archive met the following requirements: \* Published under one of the following licenses or waivers: 1) <http://creativecommons.org/publicdomain/zero/1.0/>, 2) <http://creativecommons.org/licenses/by/4.0/>, 3) <http://creativecommons.org/licenses/by/4.0/>... [More](#)

### iNaturalist




Publication date: August 19, 2021  
Metadata last modified: August 24, 2021  
Hosted by: [iNaturalist.org](https://iNaturalist.org)  
License: [CC BY-NC 4.0](https://creativecommons.org/licenses/by-nc/4.0/)  
[How to cite](#) DOI: [10.15468/ab3s5x](https://doi.org/10.15468/ab3s5x)


32,825,022 Occurrences 99.9% With taxon match 99.7% With coordinates 99.9% With year


32,738,186 GEOREFERENCED RECORDS


# «Flora of Russia» on iNaturalist



iNaturalist  Исследуйте Сообщество  Ещё  Вход или Регистрация





 New Flora of Russia • Новая флора России

**Подробнее** Участники  231

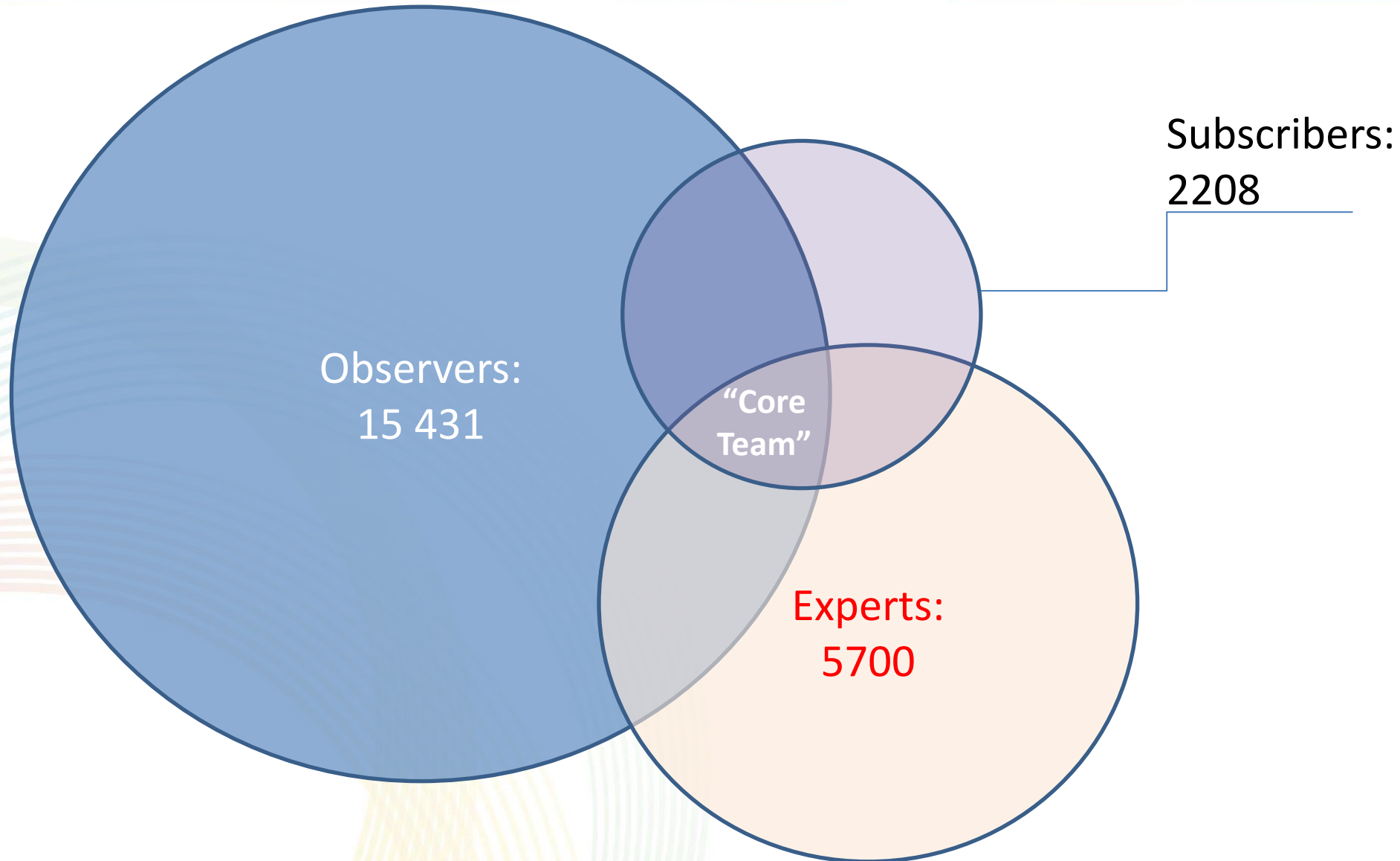
Проект "Флора России | Flora of Russia" достиг технологического потолка платформы iNaturalist: с середины марта 2021 г. главная страница портала перестала загружаться.

[Подробнее >](#)

 Журнал проекта

|                       |                         |                |                    |                       |   |
|-----------------------|-------------------------|----------------|--------------------|-----------------------|---|
| <a href="#">Обзор</a> | 1 326 382<br>НАБЛЮДЕНИЙ | 7 498<br>ВИДОВ | 5 700<br>ЭКСПЕРТОВ | 15 431<br>НАБЛЮДАТЕЛЬ |  <b>Статистика</b> |
|-----------------------|-------------------------|----------------|--------------------|-----------------------|---|

# Community of “Flora of Russia”





# Top observers on iNaturalist (Flora of Russia)



Alexey Seregin,  
**Moscow State University**



Nikolay Degtyarev,  
**Central Chernozem Reserve**



Nikolay Panasenko,  
**Bryansk State University**



Ekaterina Kashirina,  
**Moscow State University**



Sergey Appolonov,  
**Independent Res., Shumerlya**



Igor Pospelov,  
**Severtsov Institute, RAS**



Vladimir Teploukhov,  
**Omsk Forest Department**



Marina Gorbunova,  
**Independent Res., Korolyov**

# Top experts on iNaturalist (Flora of Russia)



**Dmitry Bochkov,  
Moscow State University**



**Igor Kuzmin,  
Tyumen State University**



**Sergey Mayorov,  
Moscow State University**



**Julia Shner,  
Moscow State University**



**Alexey Seregin,  
Moscow State University**



**Alexander Khimin,  
Pavlovsk School #2**



**Natalya Gamova,  
Moscow State University**

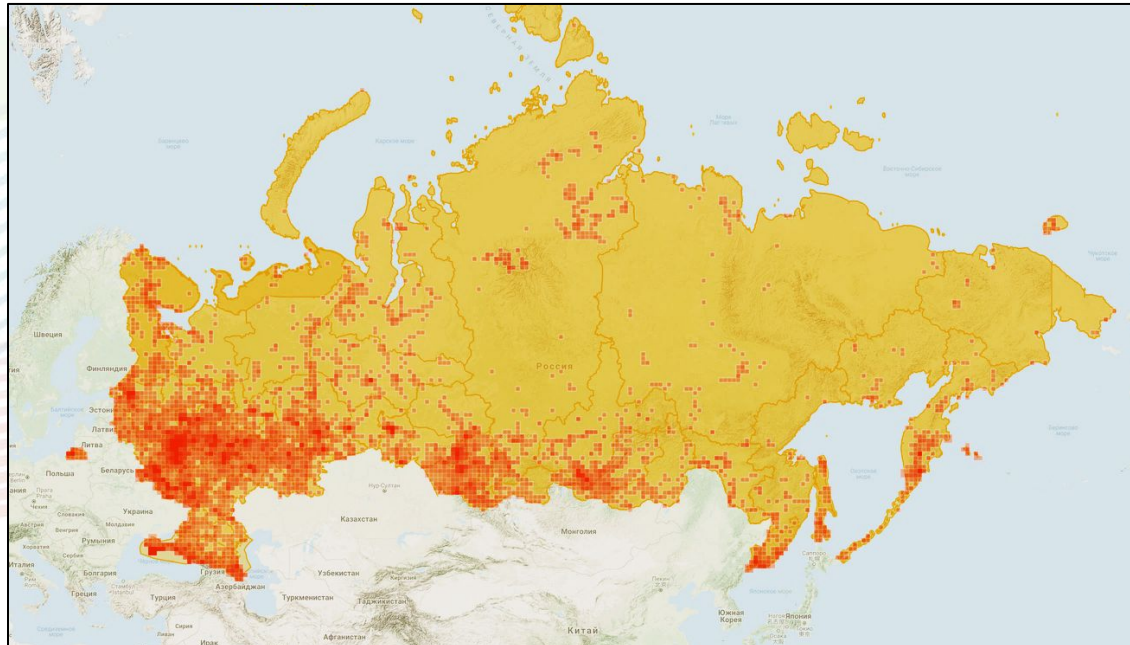


**Sergey Lednev,  
Moscow State University**

# Data density vs. Population density



## Data density on iNaturalist



## Population density of Russia



# Source #2 for the Russian flora: 0.6M



The screenshot shows the GBIF dataset page for the Moscow University Herbarium (MW). The page has a green header with navigation links: Get data, How-to, Tools, Community, and About. On the right side of the header are icons for zooming, a search bar, and a 'Login' button. The main content area is titled 'Moscow University Herbarium (MW)' and includes the text 'OCCURRENCE DATASET | REGISTERED NOVEMBER 2, 2017'. Below the title, it states 'Published by Lomonosov Moscow State University' and 'Seregin A'. A secondary navigation bar contains links for DATASET, PROJECT, METRICS, ACTIVITY, DOWNLOAD, and HOME PAGE. On the right side of this bar, there are two buttons: '1,025,605 OCCURRENCES' and '424 CITATIONS'. The main content area is divided into two columns. The left column contains a descriptive paragraph about the herbarium, mentioning its location at <https://plant.depo.msu.ru/> and its focus on the flora of temperate Eurasia. The right column features the MW logo and a list of metadata: Project ID: 14-50-00029, Russia2019\_14; Publication date: September 1, 2021; Metadata last modified: September 1, 2021; Hosted by: Lomonosov Moscow State University; License: CC BY 4.0. Below the metadata are links for 'How to cite' and 'DOI: 10.15468/cpnhcc'. A metrics section follows, displaying four circular progress indicators: 1,025,605 Occurrences (green), 99.9% With taxon match (green), 58% With coordinates (green), and 87% With year (green). At the bottom, there is a section for '591,860 GEOREFERENCED RECORDS' with a map of Eurasia showing the distribution of records as yellow and orange dots.

# Herbarium collections: top countries



|     |                            |                   |
|-----|----------------------------|-------------------|
| 1.  | USA                        | 78,462,700        |
| 2.  | France                     | 24,046,688        |
| 3.  | UK                         | 23,655,232        |
| 4.  | Germany                    | 22,120,100        |
| 5.  | People's Republic of China | 20,375,136        |
| 6.  | <b>Russia</b>              | <b>16,175,934</b> |
| 7.  | Japan                      | 12,860,724        |
| 8.  | Sweden                     | 12,033,000        |
| 9.  | Switzerland                | 12,027,534        |
| 10. | Italy                      | 11,596,611        |



Source: Thiers (2021)

[http://sweetgum.nybg.org/science/wp-content/uploads/2021/01/The\\_Worlds\\_Herbaria\\_2020.pdf](http://sweetgum.nybg.org/science/wp-content/uploads/2021/01/The_Worlds_Herbaria_2020.pdf)

# Digitization of herbaria in Russia



## Russia:

- 16,176,000 physical specimens
- 1,309,000 imaged
- **7,8% imaged**



## World:

- 396,205,000 physical specimens
- ca. 62,000,000 imaged
- **15,6% imaged**



# Top herbarium collections of Russia



|    | <b>Institution</b>   | <b>Code</b> | <b>Collections</b> |
|----|--|-------------|--------------------|
| 1  | Komarov Botanical Institute, RAS (St Petersburg)             | LE          | 6,000,000          |
| 2  | Moscow State University                                      | MW          | 1,044,751          |
| 3  | Central Siberian Botanical Garden, SB RAS (Novosibirsk)      | NS + NSK    | 800,000            |
| 4  | Saint Petersburg University                                  | LECB        | 800,000            |
| 5  | Main Botanical Garden, RAS (Moscow)                          | MHA         | 610,000            |
| 6  | Institute of Biology and Soil Science, FEB RAS (Vladivostok) | VLA         | 500,000            |
| 7  | Tomsk State University                                       | TK          | 500,000            |
| 8  | Komi Scientific Centre, RAS (Syktyvkar)                      | SYKO        | 407,000            |
| 9  | Vavilov Institute of Plant Genetic Resources (St Petersburg) | WIR         | 376,825            |
| 10 | Southern Federal University (Rostov-on-Don)                  | RV          | 350,000            |

Source: Thiers (2021)

[http://sweetgum.nybg.org/science/wp-content/uploads/2021/01/The\\_Worlds\\_Herbaria\\_2020.pdf](http://sweetgum.nybg.org/science/wp-content/uploads/2021/01/The_Worlds_Herbaria_2020.pdf)

# Top digital herbaria of Russia



|   | Institution  | Code       | Images | Proportion of imaged specimens | Web-portal   |
|---|--|------------|--------|--------------------------------|--|
| 1 | Lomonosov Moscow State University (Moscow)                 | MW         | 1,029K | 94%                            | <a href="https://plant.depo.msu.ru/">https://plant.depo.msu.ru/</a><br><a href="https://www.gbif.org/">https://www.gbif.org/</a> |
| 2 | Main Botanical Garden, RAS (Moscow)                        | MHA        | 78K    | 13%                            | <a href="https://plant.depo.msu.ru/">https://plant.depo.msu.ru/</a><br><a href="https://www.gbif.org/">https://www.gbif.org/</a> |
| 3 | Central Siberian Botanical Garden, RAS (Novosibirsk)       | NS+<br>NSK | 52K    | 7%                             | <a href="http://84.237.85.99:8081/">http://84.237.85.99:8081/</a><br><a href="https://www.gbif.org/">https://www.gbif.org/</a>   |
| 4 | Komarov Botanical Institute, RAS (Saint Petersburg)        | LE         | 44K    | <1%                            | <a href="http://herbariumle.ru/">http://herbariumle.ru/</a>  |
| 5 | Botanical Garden-Institute, RAS (Vladivostok)              | VBGI       | 42K    | 53%                            | <a href="http://botsad.ru/herbarium/">http://botsad.ru/herbarium/</a>  |
| 6 | Institute of Plant and Animal Ecology, RAS (Yekaterinburg) | SVER       | 18K    | 14%                            | <a href="https://herbarium.ipae.uran.ru/">https://herbarium.ipae.uran.ru/</a>  |
| 7 | Altai State University (Barnaul)                           | ALTB       | 17K    | 6%                             | <a href="http://old.ssbg.asu.ru/">http://old.ssbg.asu.ru/</a>  |
| 8 | Tula State Pedagogical University (Tula)                   | TUL        | 9K     | 86%                            | <a href="https://plant.depo.msu.ru/">https://plant.depo.msu.ru/</a><br><a href="https://www.gbif.org/">https://www.gbif.org/</a> |



# Source #3 for the Russian flora: 0.3M



The screenshot shows the GBIF Occurrence Dataset page for the project 'Locations of plants on dot distribution maps in the Flora of Siberia (Flora Sibiraea, 1987–1997)'. The page includes a green navigation bar with links for 'Get data', 'How-to', 'Tools', 'Community', and 'About', along with search and login icons. The main title is 'Locations of plants on dot distribution maps in the Flora of Siberia (Flora Sibiraea, 1987–1997)', published by the Central Siberian Botanical Garden SB RAS, with authors Artemov I. and Egorova A. The dataset is registered as of February 25, 2020. Below the title, there are tabs for 'DATASET', 'PROJECT', 'METRICS', 'ACTIVITY', and 'DOWNLOAD'. The dataset statistics show 169,854 occurrences and 32 citations. A descriptive paragraph explains that the dataset is based on 13 volumes of the Flora of Siberia monograph, containing 4302 native and naturalized alien vascular plant species and 2569 dot distribution maps. The total number of locations is 169,854, geocoded using ArcView GIS. Project metadata includes ID: AAAA-A17-117012610055-3, publication date: April 13, 2021, and license: CC BY 4.0. A progress bar shows 100% occurrences, 100% with taxon match, 99.9% with coordinates, and 100% with year. At the bottom, there is a map of Siberia with 169,772 georeferenced records plotted as yellow and orange dots.

OCCURRENCE DATASET | REGISTERED FEBRUARY 25, 2020

## Locations of plants on dot distribution maps in the Flora of Siberia (Flora Sibiraea, 1987–1997)

Published by [Central Siberian Botanical Garden SB RAS](#)  
Artemov I. • Egorova A.

DATASET PROJECT METRICS ACTIVITY DOWNLOAD

169,854 OCCURRENCES 32 CITATIONS

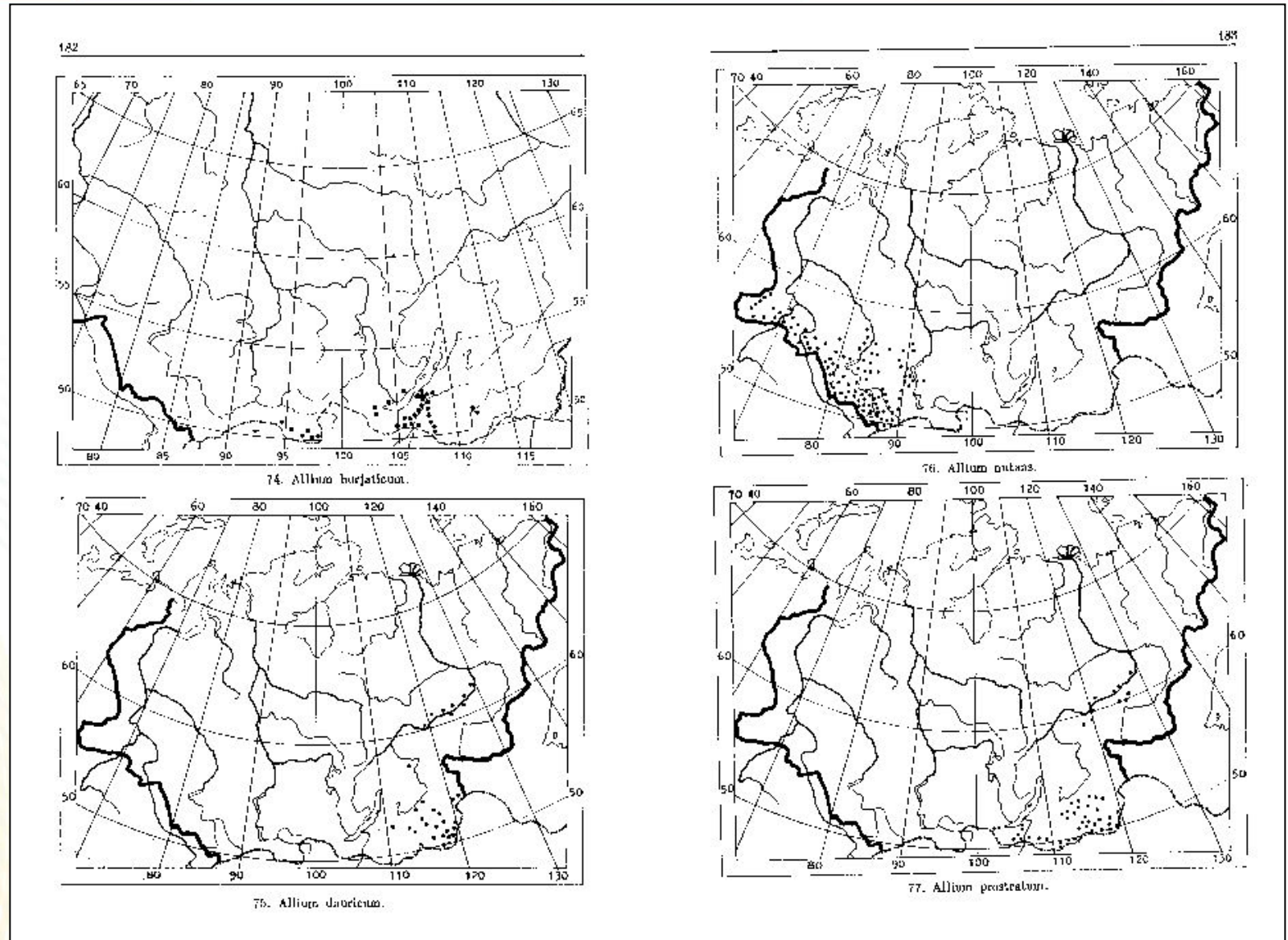
In 1987-1997 the 13 volumed collective monograph Flora of Siberia was published where data on systematics, ecology and distribution of 4302 native and naturalised alien vascular plant species and subspecies were presented (Flora Sibiraea, 1987–1997). Dot distribution maps for 2569 of them were made by authors of the monograph on the base of specimens stored in herbaria of Novosibirsk (NS, NSK), Tomsk (TK), Moskow (MW, MHA) and Saint Petersburg (LE). The total number of locations on the maps are 169854. The resource contains coordinates of the locations which were geocoded by means of the standard ArcView GIS procedures.

**Project ID:** AAAA-A17-117012610055-3  
**Publication date:** April 13, 2021  
**Metadata last modified:** April 13, 2021  
**Hosted by:** [Central Siberian Botanical Garden SB RAS](#)  
**License:** [CC BY 4.0](#)  
[How to cite](#) [DOI](#) [10.15468/jb84wg](#)

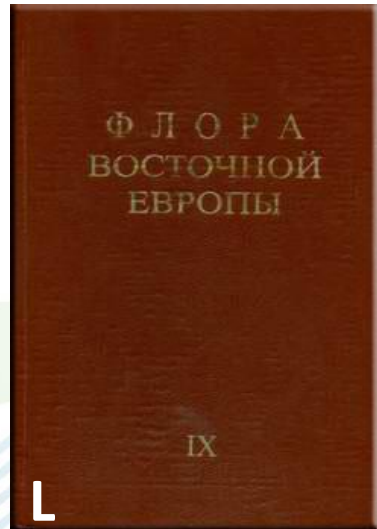
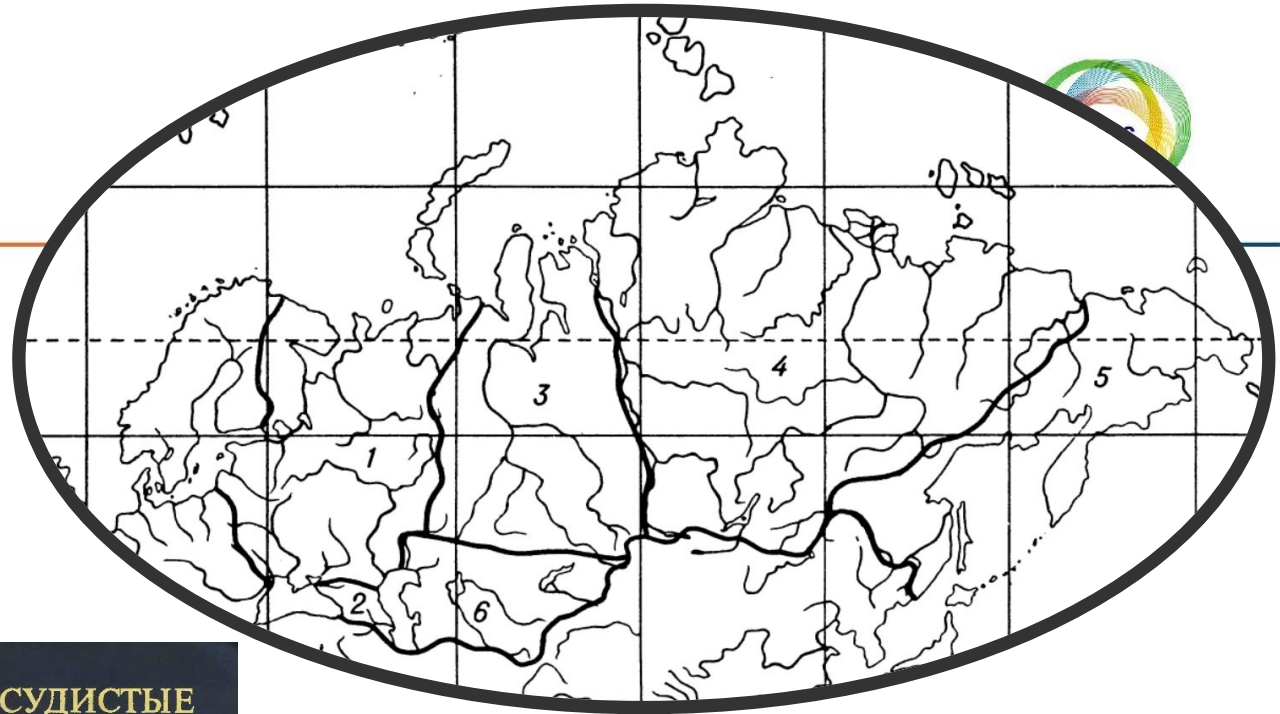
169,854 Occurrences 100% With taxon match 99.9% With coordinates 100% With year

169,772 GEOREFERENCED RECORDS

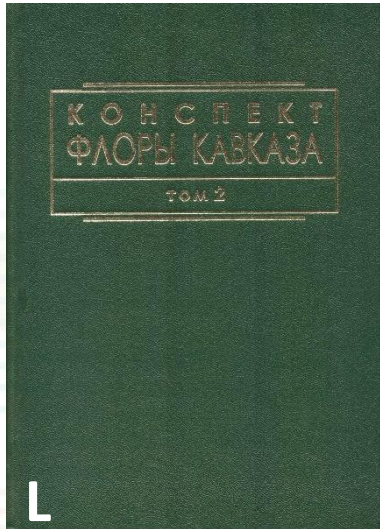
# Published distribution maps



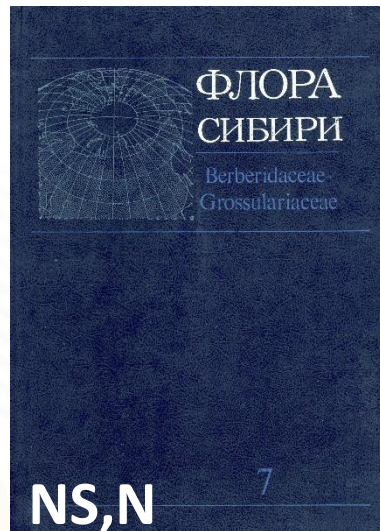
# Five standard floras



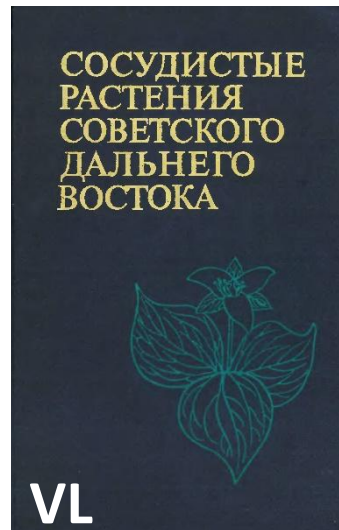
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1974-2004



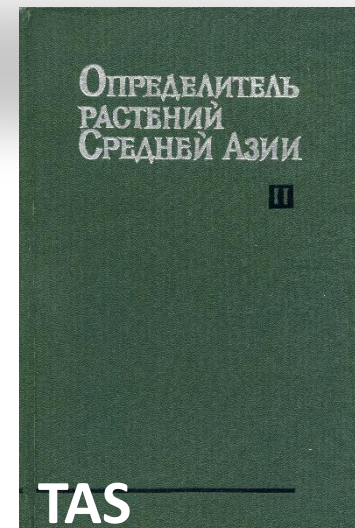
Area 2  
2003-[2021]



Areas 3,4  
1988-2003

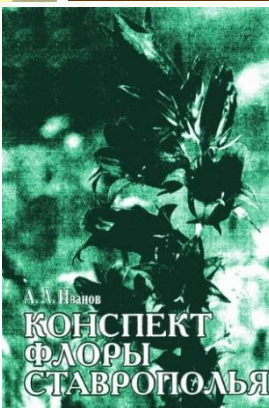
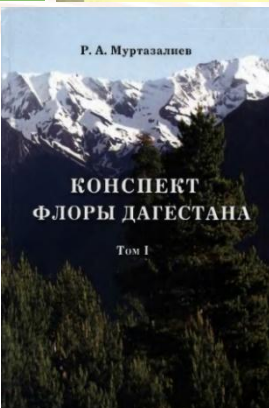
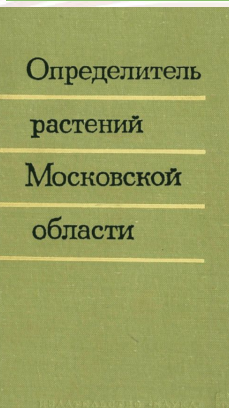
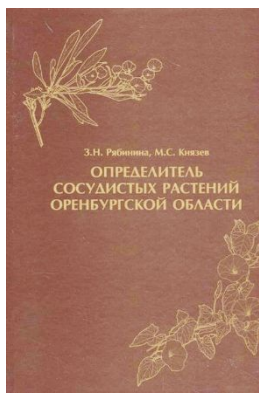
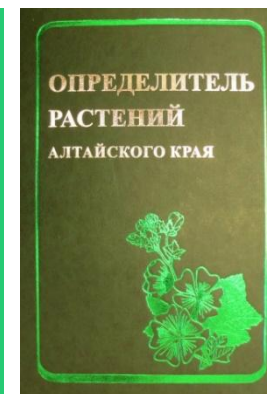
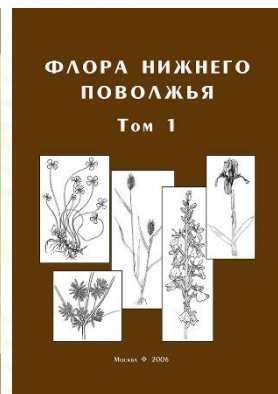
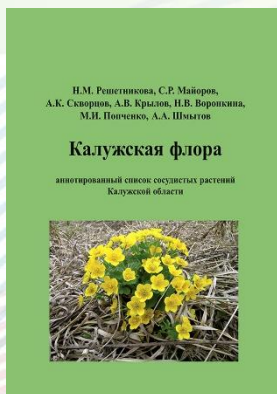
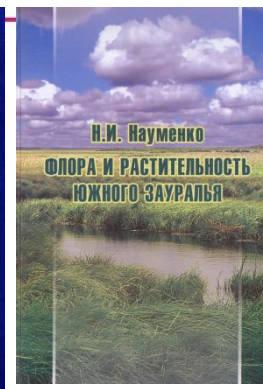
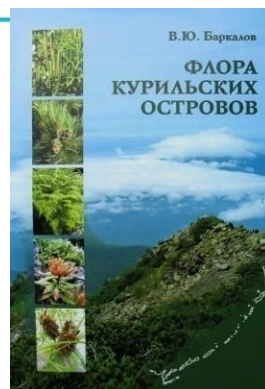
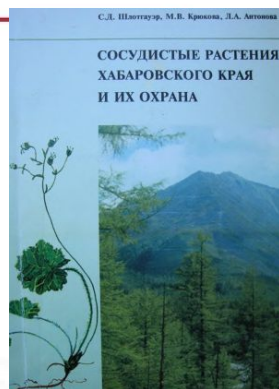


Area 5  
1985-2006

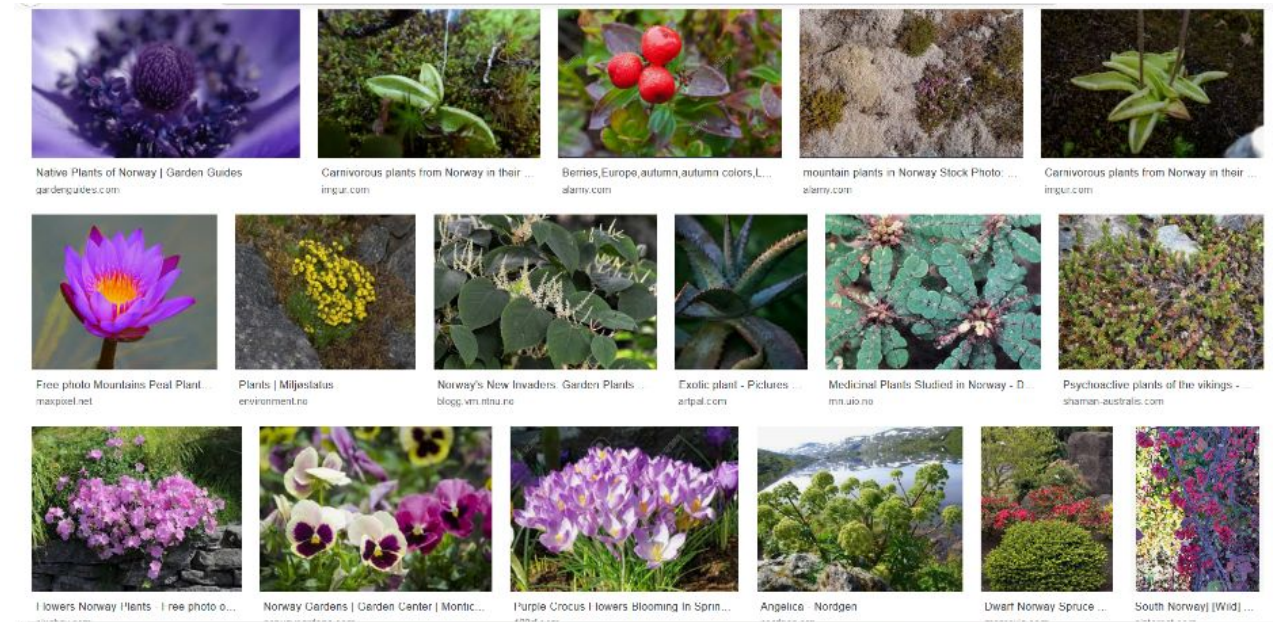
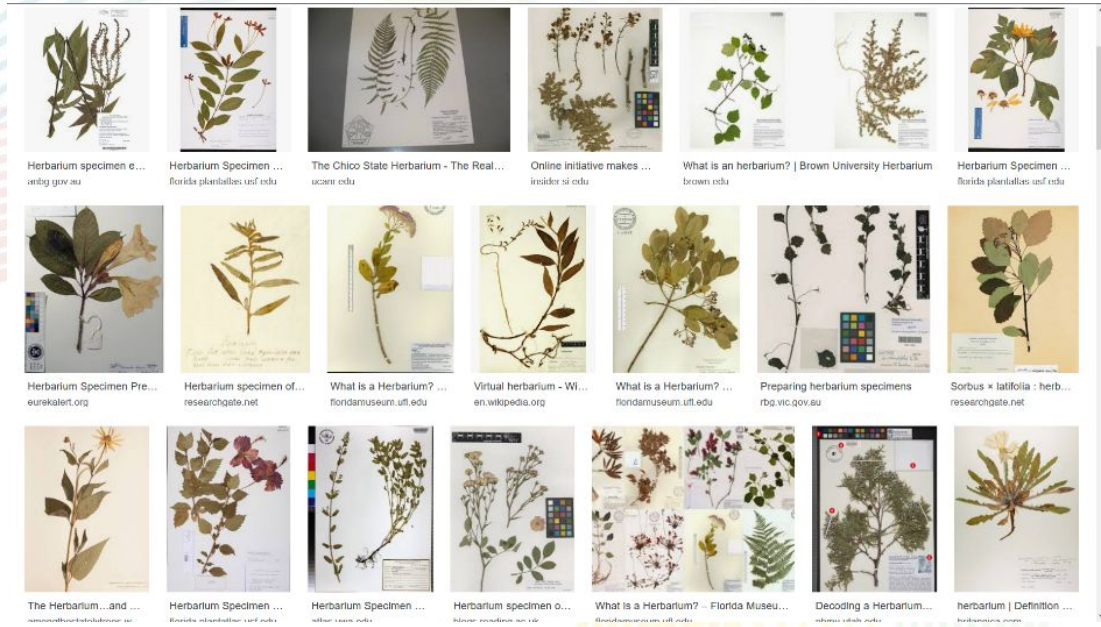
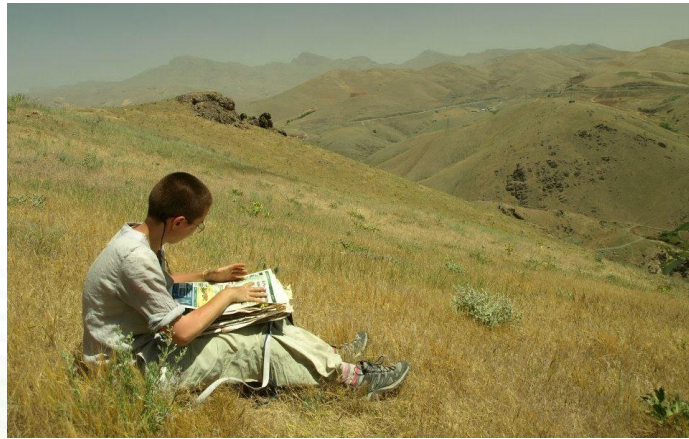


Area 6  
1968-19

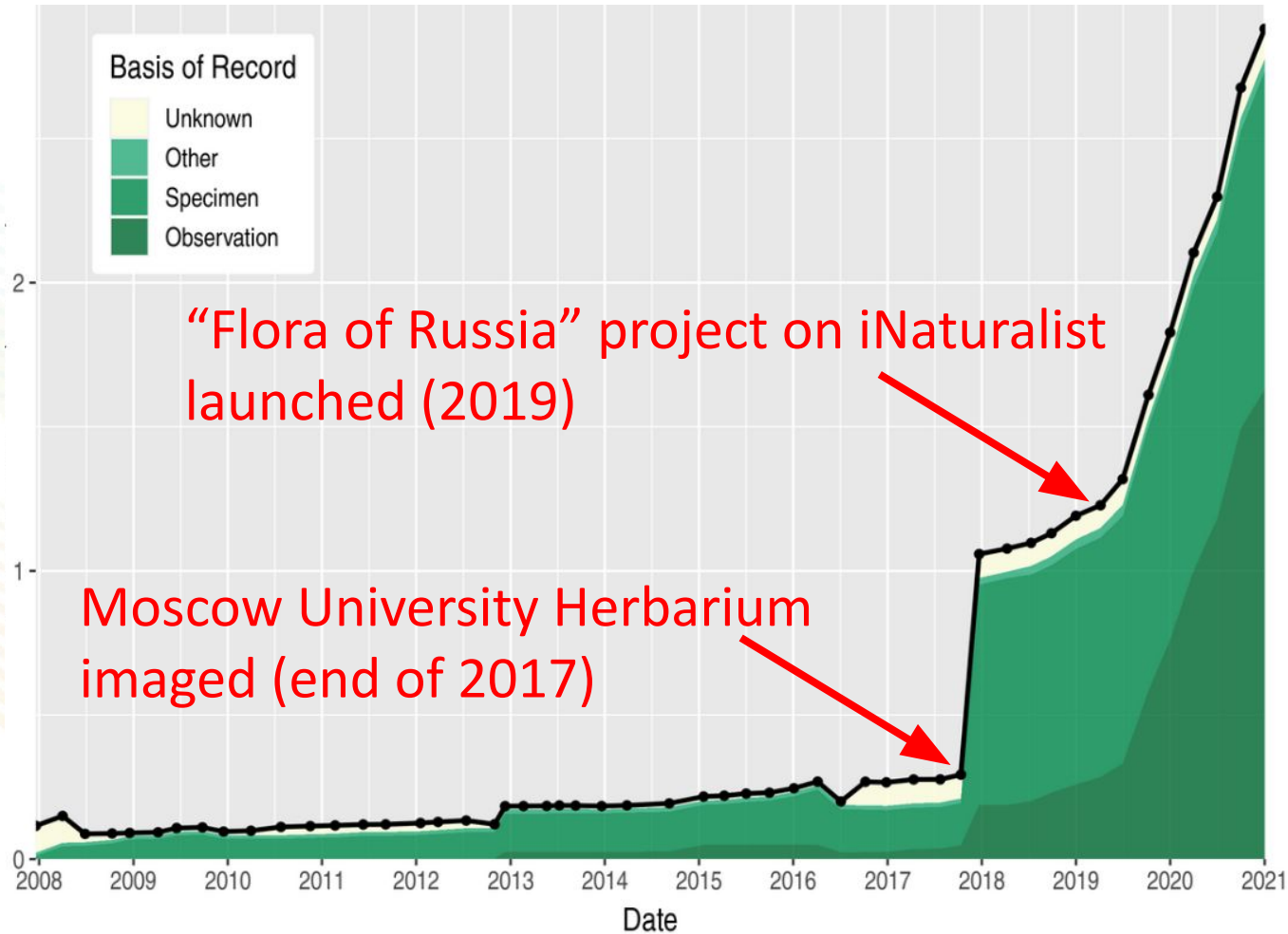
# Regional floras, guides, checklists



# Specimens vs. Citizen Science



# Data growth on Russian plants in GBIF





可持续发展大数据国际论坛  
International Forum on Big Data for  
Sustainable Development Goals

# Thanks

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