



Co-funded by the
Erasmus+ Programme
of the European Union

Geospatial Data Management &
Geocomputation for Sustainable
Development

11 September 2021

The Environmental
Science Education
for Sustainable Human Health
in commemoration of Professor Armen Saghatelyan
6 – 13 September 2021





GEOSPATIAL DATA MANAGEMENT & GEOCOMPUTATION FOR SUSTAINABLE DEVELOPMENT



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Lecturer at “Environmental Protection and Nature Management” department of ISEC of NAS RA



GEOSPATIAL DATA MANAGEMENT & GEOCOMPUTATION FOR SUSTAINABLE DEVELOPMENT

SPATIAL DATA INFRASTRUCTURE AND MANAGEMENT

*Modernized by Dr. Shushanik Asmaryan based on courses available in
University of Halle (Germany) and University of Tuscia (Italy)
University of Geneva (Switzerland)*

ECTS: 5 Hours: 150

This course aims at introducing the web-GIS spatial data infrastructures, global spatial data repositories. The students will be introduced to

- GIS technologies and the skills, methods and principals of the geospatial data processing, maintaining, analyzing, and producing.*
- the main structural components of web-GIS (spatial data infrastructures), software, global data repositories and the benefits of their application.*
- geospatial standards, the experience of creating the nationally distributed processing capacities for geospatial data in Armenia as well as the benefits of geospatial data and metadata sharing and exchange.*


GEOSPATIAL INFORMATION FOR



Disaster risk management




Natural resource management




Connectivity



Social development



Energy

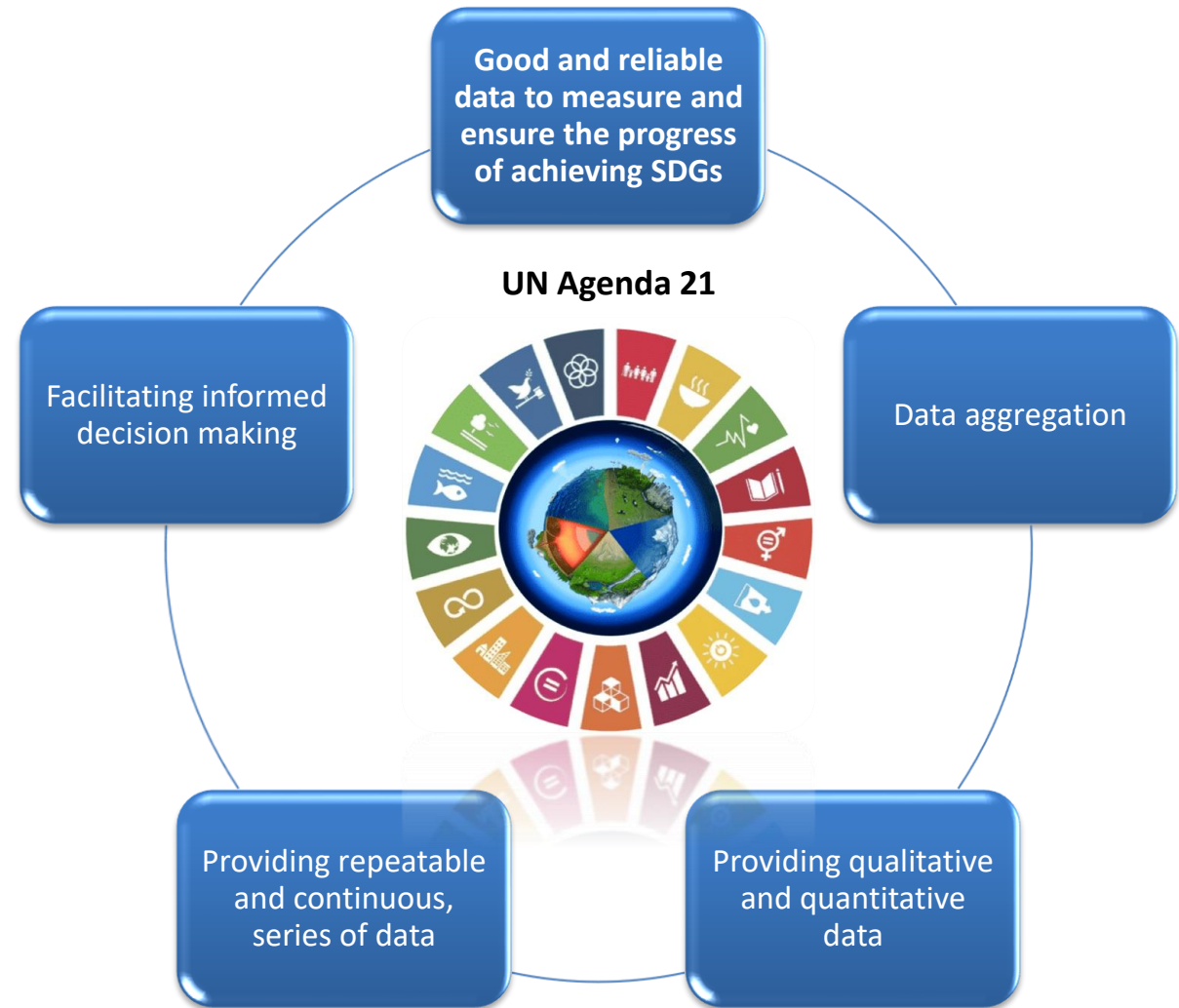
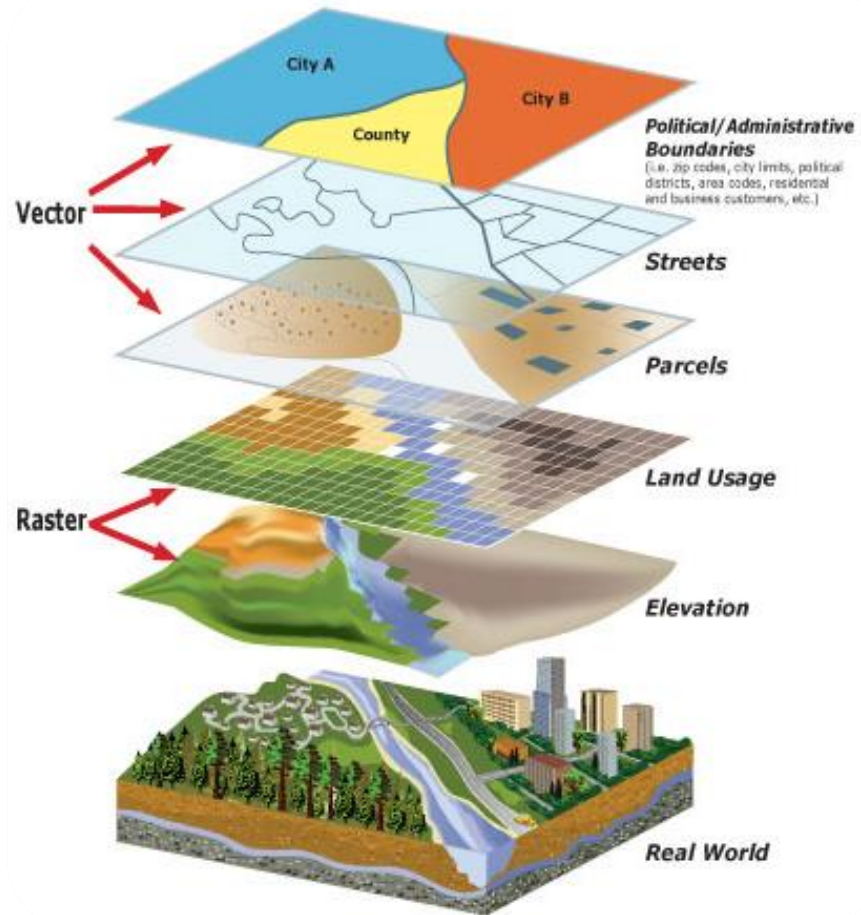


Climate change

etc. ...



Why We Need Geospatial Information for Sustainable Development ?



SDG Implementation Voluntary National Review (VNR) Armenia; Report for the UN High-level Political Forum on Sustainable Development (9–18 July 2018). Yerevan, Armenia, 2018.

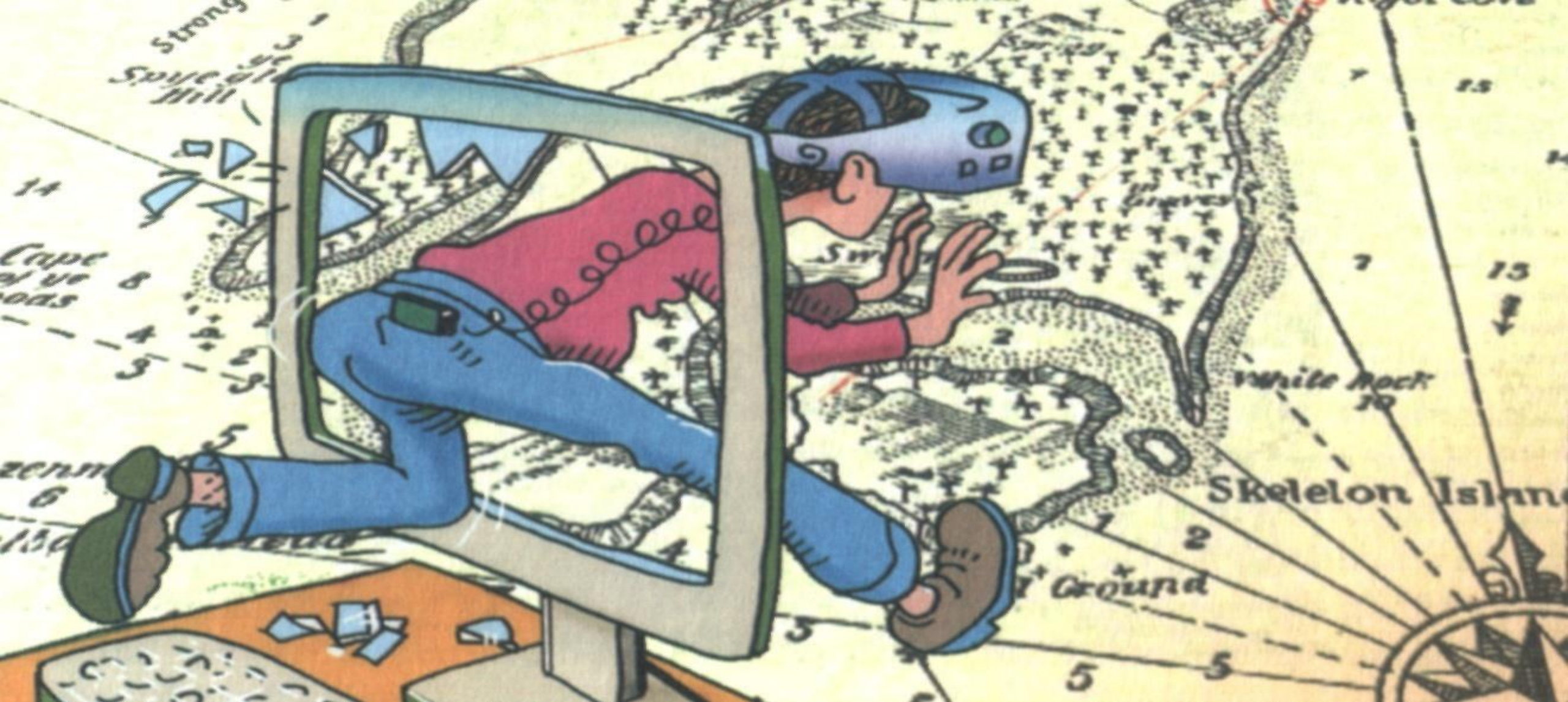
UN in Armenia: News: Armenia's Roadmap for Sustainable Development Goals to Come Forth Soon.

the methods of data ... have changed

- access,
- processing and analyzing
- geographical (spatial data) visualization,

Geography
Maps

Geography
Data bases

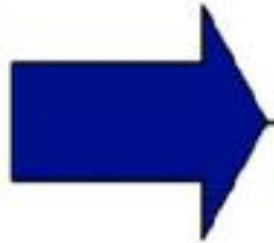
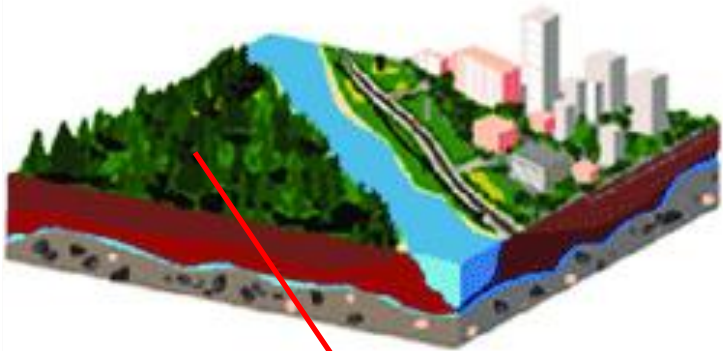


Understanding Earth.

IS Technology Drives a New Relationship Between Humans and the Environment.



The Real World



GIS World Model

Data Slices

Imagery

Elevation

Transportation

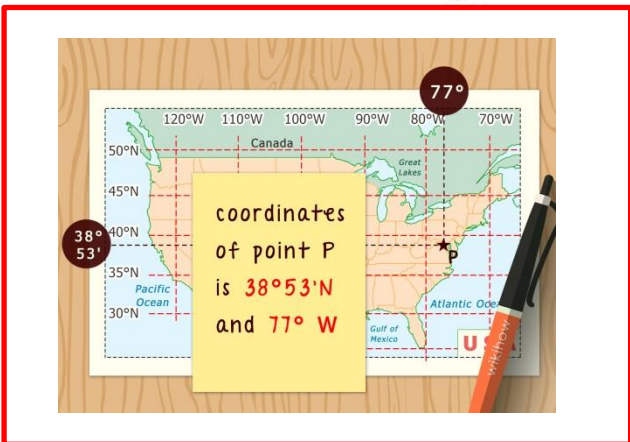
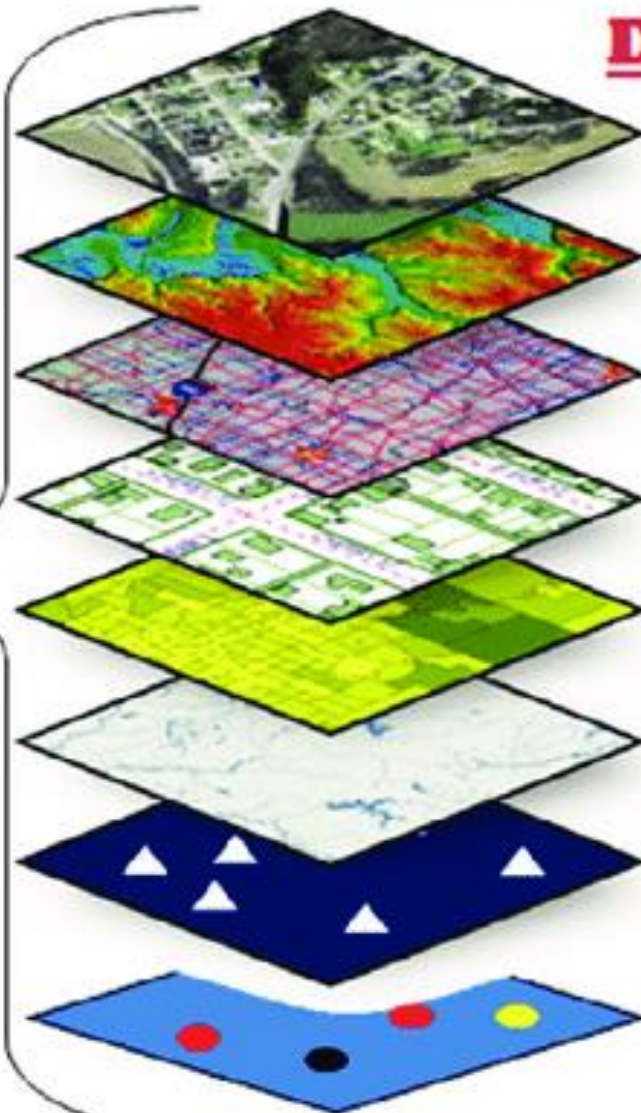
Addresses

Boundaries

Water Features

Survey Control

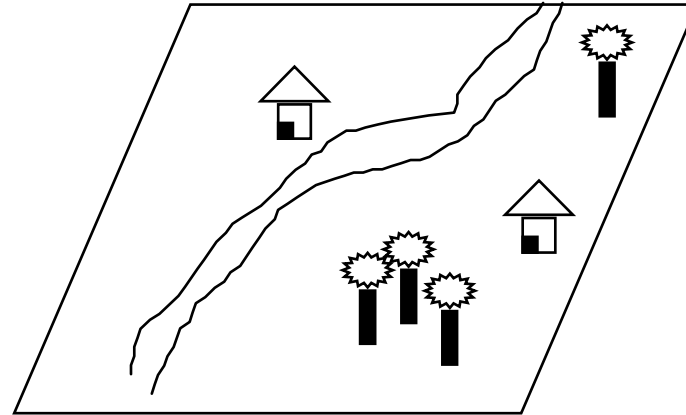
Your Data



GIS COMPONENTS



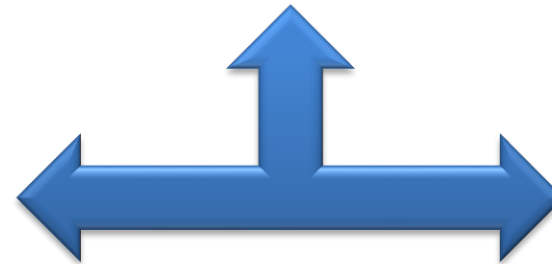
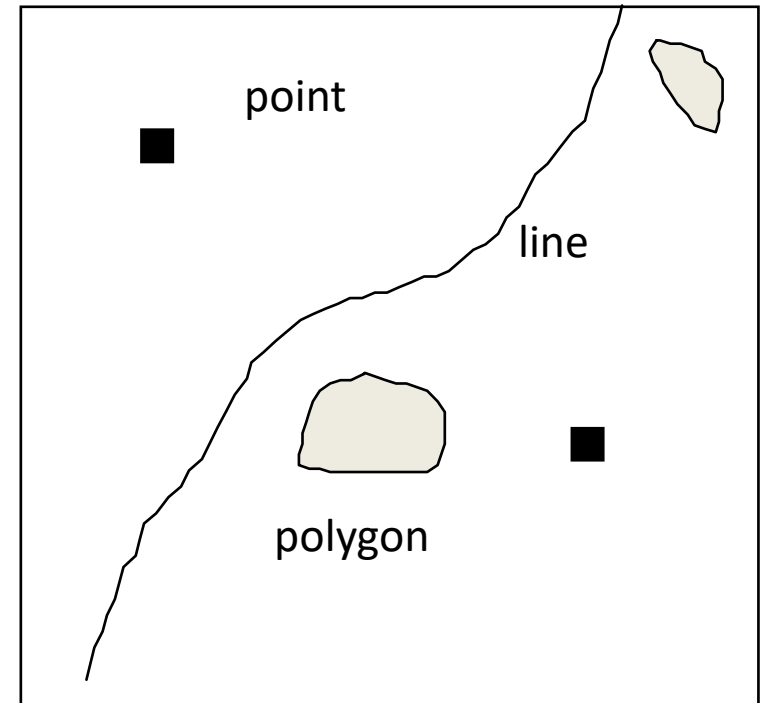
REAL WORLD



GIS RASTER MODEL

	0	1	2	3	4	5	6	7	8	9
0							R	T		
1						R			T	
2	H					R				
3						R				
4				R	R					
5			R							
6			R		T	T		H		
7			R		T	T				
8		R								
9		R								

GIS VECTOR MODEL



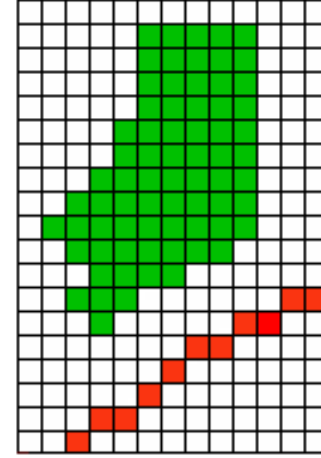
Which data model should we/you use?



Real World



Vector



Raster

X_value
Y_value

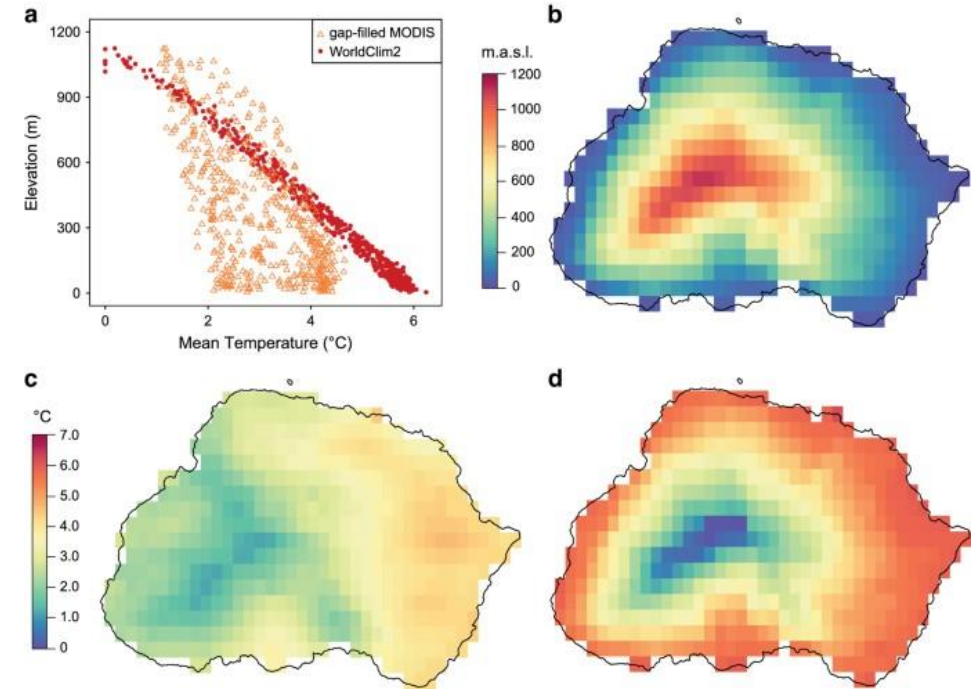
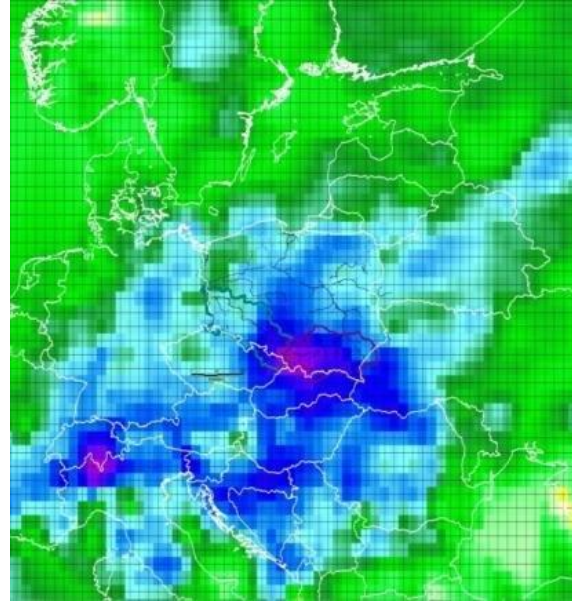
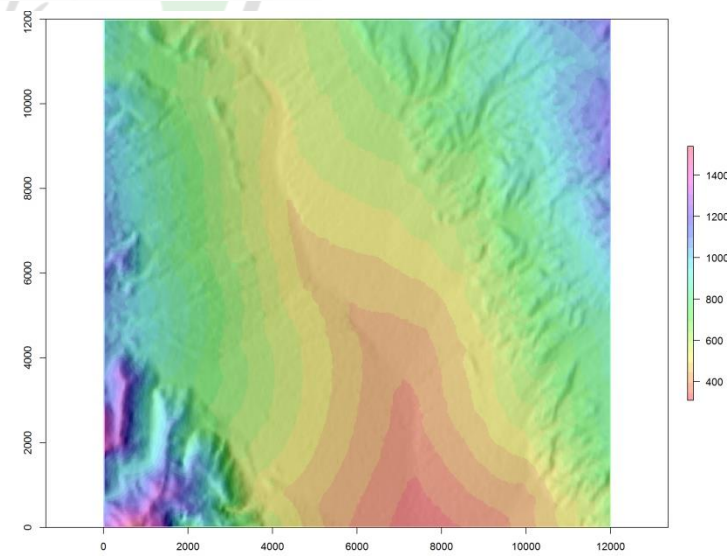
In general, use the ***vector data*** model when you want to represent features that have discrete boundaries.

The ***raster data*** model can be used to represent discrete features as well. However, representing discrete features in the raster data model is less accurate.

The ***vector data*** model represents geographic features with exactly defined boundaries, while the raster data model represents them as cells of the same value.

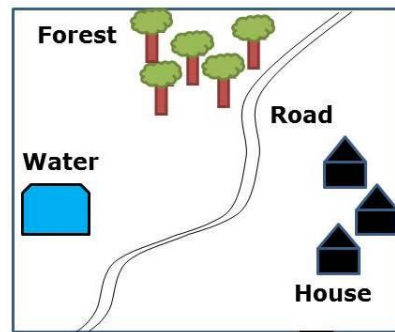


Which data model should you use?

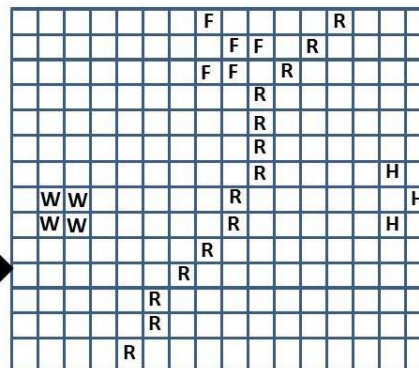


The **raster data** model is very useful for representing continuous geographic data; that is, phenomena such as **elevation**, **precipitation**, and **temperature**, which don't have well-defined boundaries and which usually change gradually across a given area.

The **raster data** model is commonly used for spatial analysis and modeling.



Real World



Raster Data Format



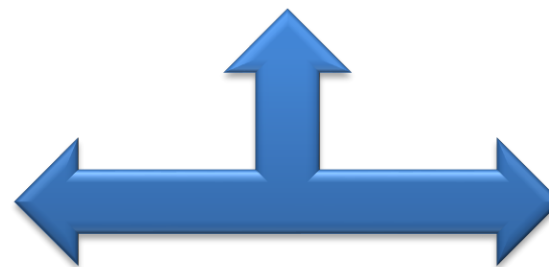
- **Simple data structure**

- **Various kinds of spatial analysis**
Spatial autocorrelation, Spatial interpolation, Spatial interaction, Simulation and modeling, Density mapping etc.)

- **Easy overlay**

- **Uniform size and shape**

- **Cheaper technology**



- **Large amount of data**

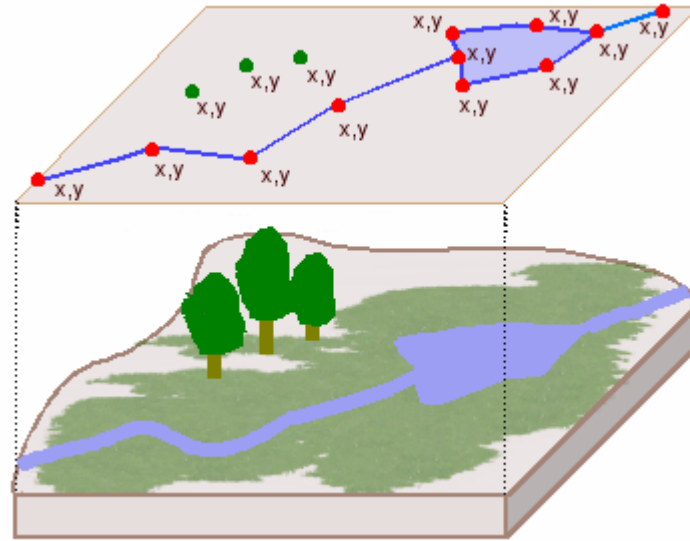
- **Less “pretty”**

- **Projection transformation is difficult**

- **Different scales between layers can be a nightmare!!!**

- **May lose information due to generalization**

GIS VECTOR MODEL



- *Good representation of reality*
- *Compact data structure*
- *Topology can be described in a network*
- *Accurate graphics*



- *Complex data structures*
- *Simulation may be difficult*
- *Some spatial analysis is difficult or impossible to perform*

Popular formats (extensions) of GIS data



GIS Vector Files - Format Support



GIS Raster Files - Format support



GRID



Geospatial and Attribute data

Spatial data (where)

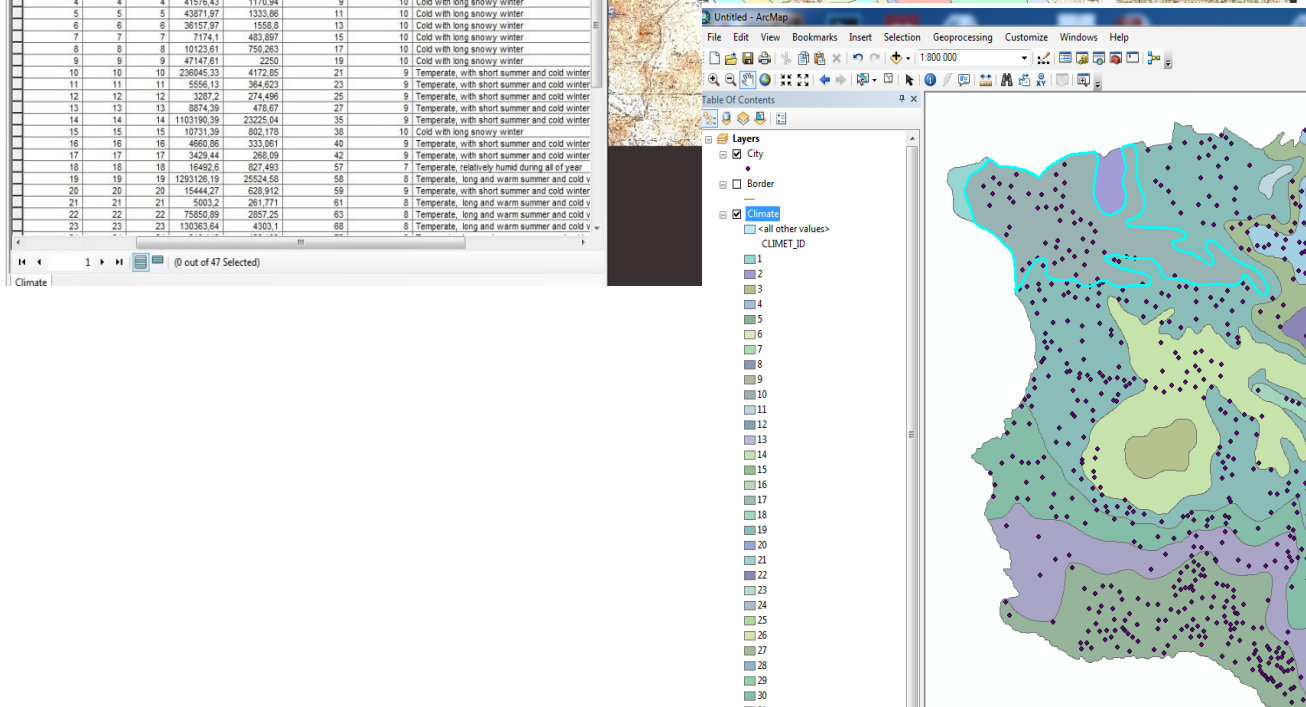
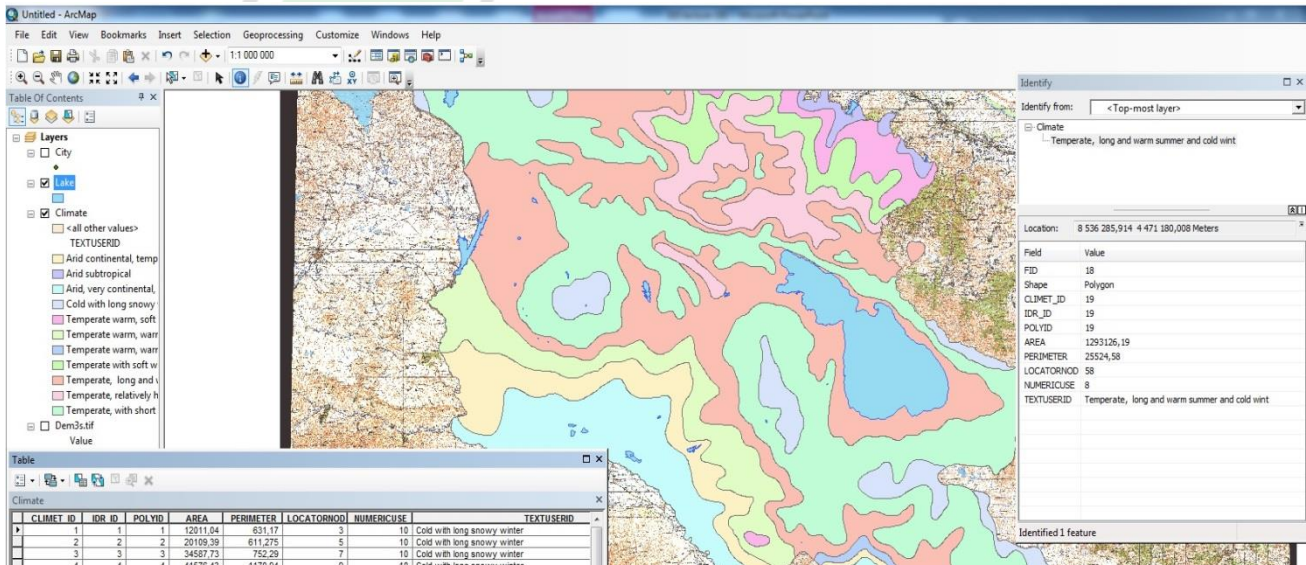
- specifies location
- stored in geodatabase

Attribute data (what, how much, when)

- Specifies characteristics at that location, natural or human-created
- Stored in a database (tables)

columns

rows



ID	Shape	CLIMET_ID	IDR_ID	POLYID	AREA	PERIMETER	LOCATORNOO	NUMERICUSE	TEXTUSERID
0	Polygon	1	1	1	12011.04	631.17	3	10	Cold with long snowy winter
1	Polygon	2	2	2	20109.39	611.275	5	10	Cold with long snowy winter
2	Polygon	3	3	3	34587.73	752.29	7	10	Cold with long snowy winter
3	Polygon	4	4	4	41578.43	1170.94	9	10	Cold with long snowy winter
4	Polygon	5	5	5	43871.97	1333.88	11	10	Cold with long snowy winter
5	Polygon	6	6	6	38157.97	1558.8	13	10	Cold with long snowy winter
6	Polygon	7	7	7	7174.1	483.897	15	10	Cold with long snowy winter
7	Polygon	8	8	8	10123.61	750.283	17	10	Cold with long snowy winter
8	Polygon	9	9	9	47147.61	2250	19	10	Cold with long snowy winter
9	Polygon	10	10	10	228945.38	4172.86	21	9	Temperate, with short summer and cold winter
10	Polygon	11	11	11	5558.13	364.623	23	9	Temperate, with short summer and cold winter
11	Polygon	12	12	12	3287.2	274.496	25	9	Temperate, with short summer and cold winter
12	Polygon	13	13	13	8874.39	478.67	27	9	Temperate, with short summer and cold winter
13	Polygon	14	14	14	1103190.39	23225.04	35	9	Temperate, with short summer and cold winter
14	Polygon	15	15	15	10731.39	802.178	38	10	Cold with long snowy winter
15	Polygon	16	16	16	4680.86	333.061	40	9	Temperate, with short summer and cold winter
16	Polygon	17	17	17	3425.44	268.09	42	9	Temperate, with short summer and cold winter
17	Polygon	18	18	18	16492.6	827.493	57	7	Temperate, relatively humid during all of year
18	Polygon	19	19	19	1293126.19	25524.58	58	8	Temperate, long and warm summer and cold v
19	Polygon	20	20	20	15444.27	628.912	59	9	Temperate, with short summer and cold winter
20	Polygon	21	21	21	5003.2	281.771	61	8	Temperate, long and warm summer and cold v
21	Polygon	22	22	22	75850.89	2857.25	63	8	Temperate, long and warm summer and cold v
22	Polygon	23	23	23	130363.64	4303.1	68	8	Temperate, long and warm summer and cold v
23	Polygon	24	24	24	819.146	122.133	72	8	Temperate, long and warm summer and cold v
24	Polygon	25	25	25	940.128	121.987	73	8	Temperate, long and warm summer and cold v
25	Polygon	26	26	26	480.831	84.0882	74	8	Temperate, long and warm summer and cold v
26	Polygon	27	27	27	226289.26	8183.48	77	7	Temperate, relatively humid during all of year
27	Polygon	28	28	28	126893.68	3791.05	79	7	Temperate, relatively humid during all of year
28	Polygon	29	29	29	4653.58	292.035	85	2	Temperate warm, soft winter
29	Polygon	30	30	30	278195.46	6223.85	86	6	Temperate warm, warm summer, temp, cold wint
30	Polygon	31	31	31	224993.97	5270.06	87	5	Arid continental, temperate cold winter, warm su
31	Polygon	32	32	32	35345.45	2183.90	90	6	Temperate warm, warm summer, temp, cold wint
32	Polygon	33	33	33	16158.15	1293.73	93	5	Arid continental, temperate cold winter, warm su
33	Polygon	34	34	34	308804.17	4043.14	94	4	Arid, very continental, cold winter, warm summe
34	Polygon	35	35	35	11264.55	594.728	95	4	Arid, very continental, cold winter, warm summe



Data are the fuel for scientific analysis and decision-making

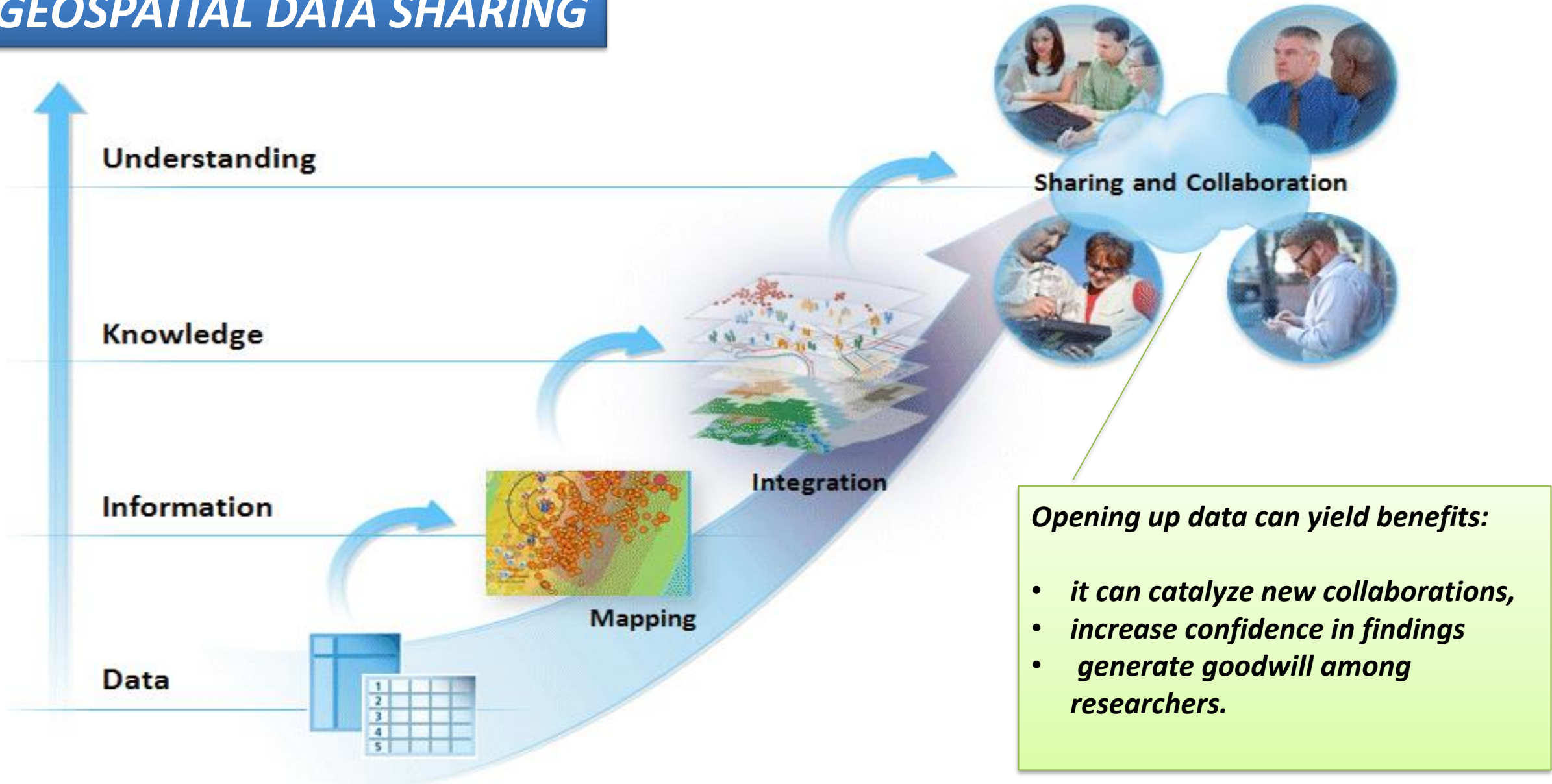
Spatial information affects 60 - 80% of all decisions

Spatial information affects 60 - 80% of all decisions

Without
data sharing

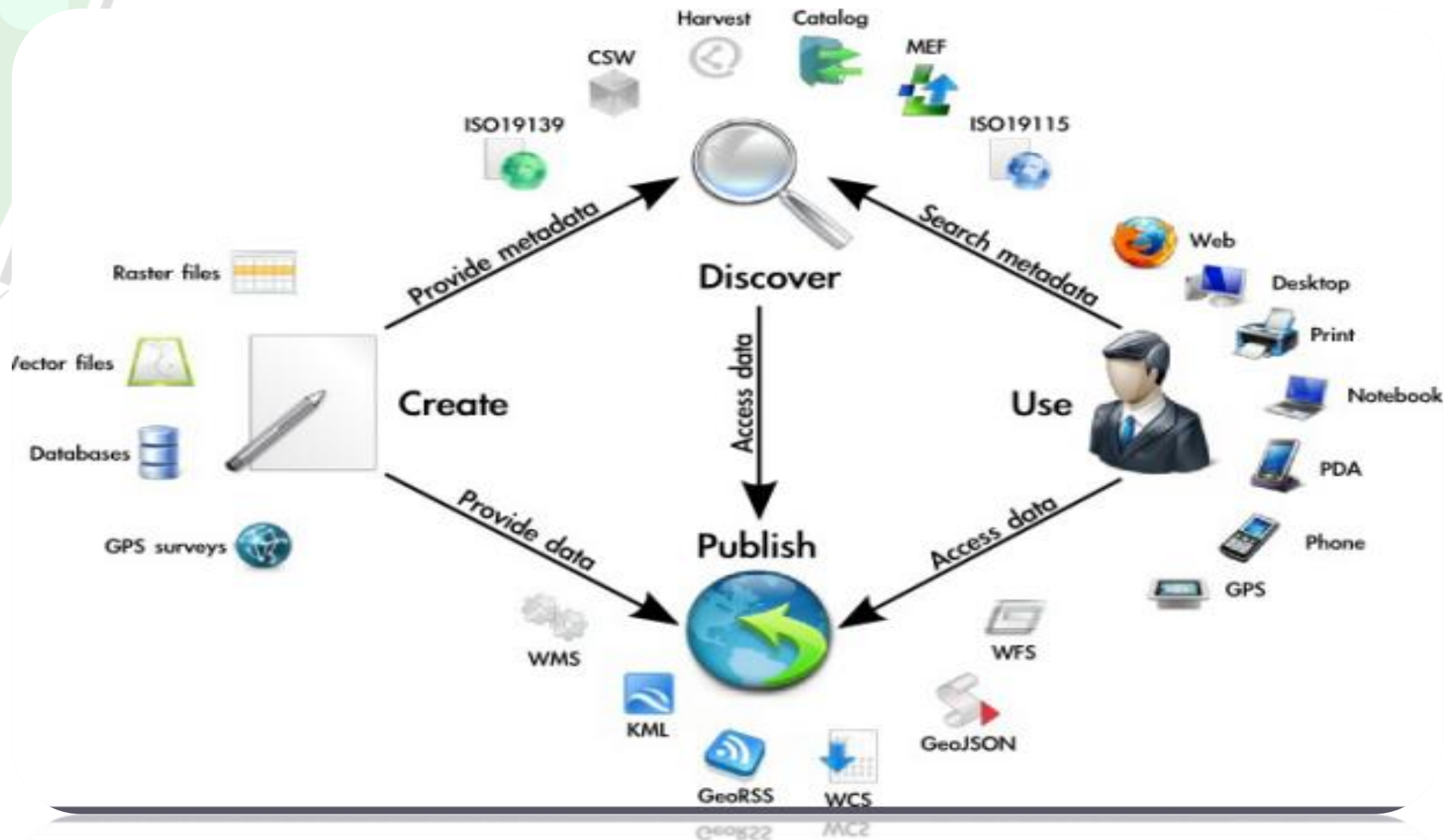
- doing science can be difficult ,
- taking sound decisions can be problematic
- envisioning a sustainable development can be complicated.

GEOSPATIAL DATA SHARING



SPATIAL DATA INFRASTRUCTURES (SDI)

System of systems that facilitates the discovery, access, management, distribution, reuse, and preservation of digital geospatial resources.

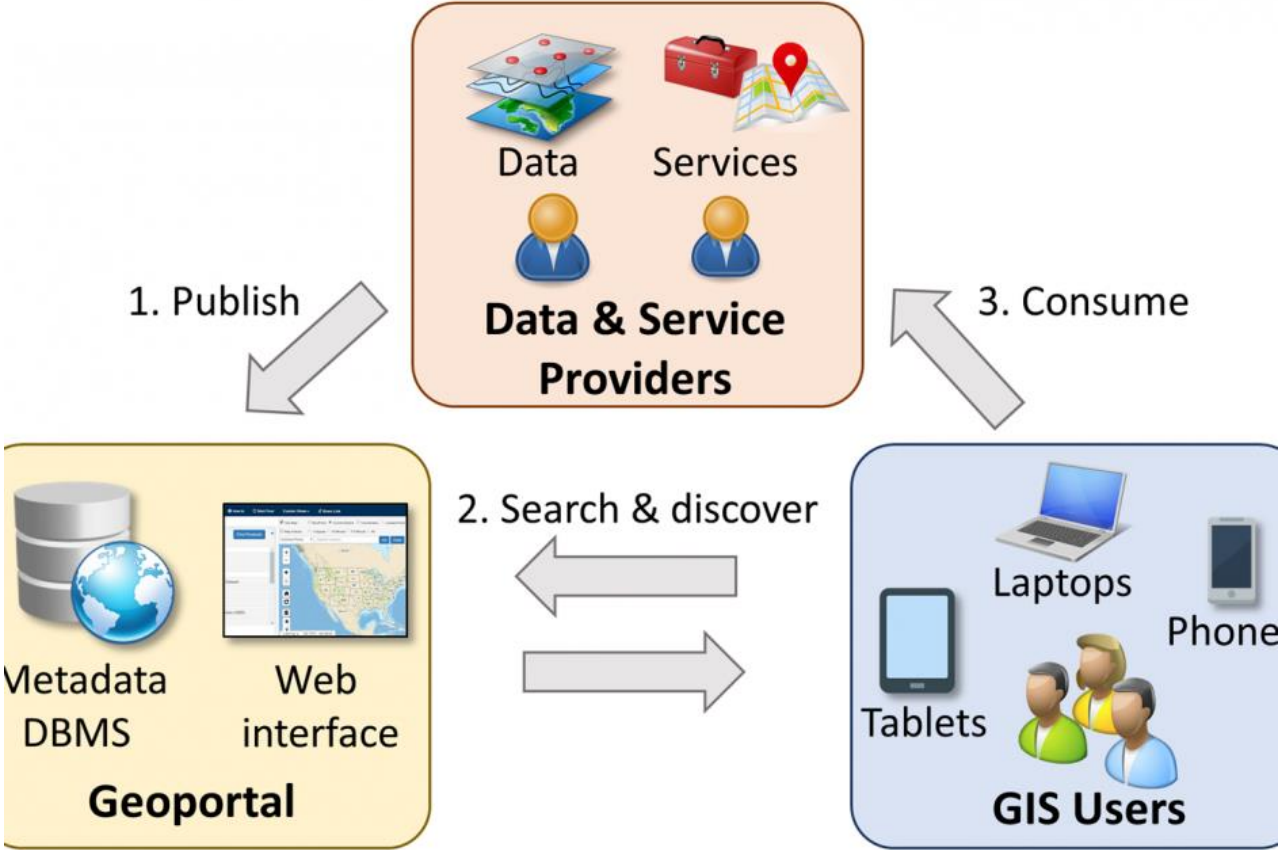


Key components of the SDI

SDI COMPONENTS - FOUR PILARS



INTERACTION BETWEEN THE COMPONENTS



DEFINITIONS

1. **Spatial data infrastructure**: *The technology, policies, standards, and human resources necessary to acquire, process, store, distribute, and improve utilization of geospatial data, services, and other digital resources.*
2. **Geoportal**: *A gateway website through which people can search, discover, access, and visualize the geospatial resources within a SDI.*
3. **Metadata**: *Documentation about who, when, how, what, why, and many other facets of the data and the data production process. Metadata can be used for describing not only data, but also tools, services, and other geospatial resources.*
4. **Data standard**: *A commonly agreed specification on how data should be recorded and described. A technical document designed to use for operating with geospatial data in order to facilitate developing, sharing and using GIS data, GIS software and GIS services.*
5. **Geospatial interoperability**: *The ability of different geographic information systems to share, exchange, and operate (heterogenous) geospatial data and functions.*
6. **Web service**: *A Web application that provides standardized application programming interfaces to allow remote access to data and functions over the Internet.*

<metadata>



A DOCUMENTATION ABOUT **WHO, WHEN, HOW, WHAT, WHY, AND MANY OTHER FACETS OF THE DATA AND THE DATA PRODUCTION PROCESS.**



Data

Filename: Tadzik.jpg
Author: Piotr Kononow
Date: August 15, 2016 6:40:10PM
File: 5,312 × 2,988 JPEG
15.9 megapixels
3,393,448 bytes
(3.2 megabytes)
Camera: Samsung SM-G920F
4.3 mm
Lens: Max aperture f/1.9
(shot wide open)
Auto exposure
Program AE
Exposure: 1/402 sec
f/1.9
ISO 40
Flash: none



Metadata



A DOCUMENTATION ABOUT WHO, WHEN, HOW, WHAT, WHY, AND MANY OTHER FACETS OF THE DATA AND THE DATA PRODUCTION PROCESS.18

Get started

Search over 19 data sets, services and maps, ...

Search ...

Browse by

Latest news Most popular

- River water mineralization Dataset
- Seismotectonics Dataset
- The number of days with mean air temperature height then 10 °C Dataset
- Maximal soil water storage (early spring) Dataset
- Ionic stream Dataset**
- River water turbidity Dataset

About Github Powered by geonetwork 3.0.4.0

The Center for Ecological-Noosphere Studies NAS RA Data Portal

Here you will find data, services and maps and more.

Ionic stream

Updated: 5 лет назад

Spatial extent

Temporal extent

Publication date: 2016-06-01

Provided by: [Logo]

Share on social sites: [Icons]

Rating: ☆☆☆☆

Completed

Download and links

geoserver.cens.am [Open link]

About this resource

Categories: [Tree icon]

Keywords: Ionic stream, Armenia, Environment

Language: English

Contact for the resource

Point of contact: The Center for Ecological-Noosphere Studies NAS RA, Garik Tepanosyan, Abovyan str., 68, Yerevan, 0025, Armenia

Status: Completed

Technical information

Update frequency: As needed

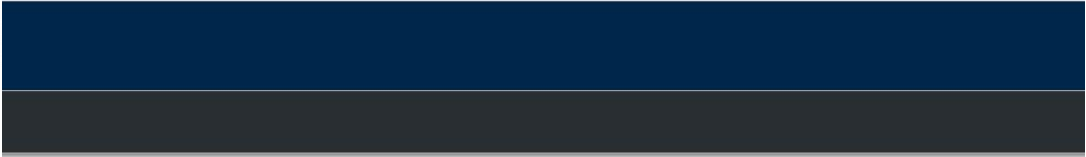
Representation type: Vector

Scale: 500000

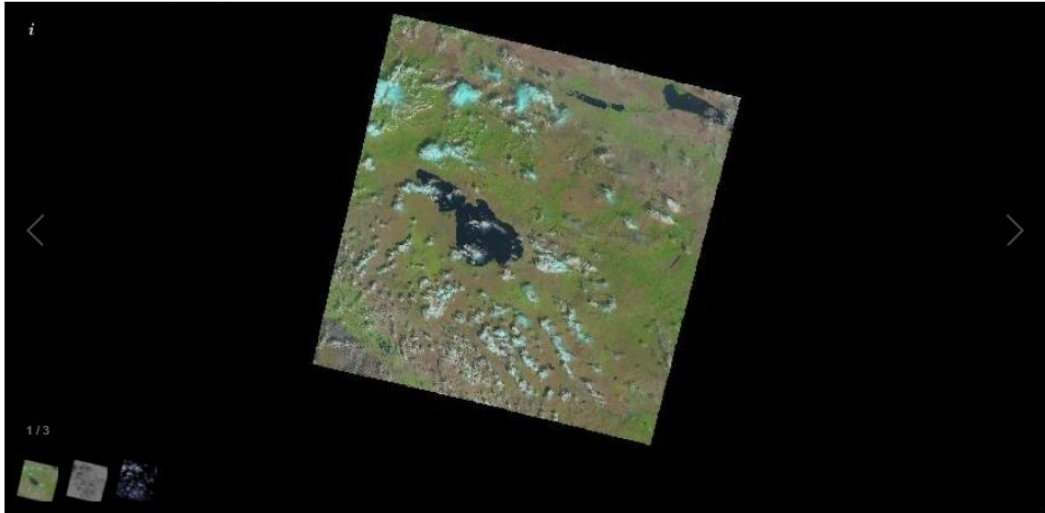
Source: <http://gn.cens.am:8080/geonetwork/srv/rus/catalog.search#/home>



A DOCUMENTATION ABOUT WHO, WHEN, HOW, WHAT, WHY, AND MANY OTHER FACETS OF THE DATA AND THE DATA PRODUCTION PROCESS.18



Full Display of LC08_L1TP_169032_20210824_20210831_01_T1



Data Set Attribute	Attribute Value
Landsat Product Identifier	LC08_L1TP_169032_20210824_20210831_01_T1
Landsat Scene Identifier	LC81690322021236LGN00
Acquisition Date	2021/08/24
Collection Category	T1
Collection Number	1



Data Set Attribute	Attribute Value
Landsat Product Identifier	LC08_L1TP_169032_20210824_20210831_01_T1
Landsat Scene Identifier	LC81690322021236LGN00
Acquisition Date	2021/08/24
Collection Category	T1
Collection Number	1
WRS Path	169
WRS Row	032
Target WRS Path	169
Target WRS Row	032
Nadir/Off Nadir	NADIR
Roll Angle	-0.001
Date L-1 Generated	2021/08/31
Start Time	2021:236:07:37:44.0166520
Stop Time	2021:236:07:38:15.7866510
Station Identifier	LGN
Day/Night Indicator	DAY
Land Cloud Cover	17.92
Scene Cloud Cover	17.92
Ground Control Points Model	267

Geospatial data are difficult to integrate



incompatibilities
(formats, models, ...)



missing documentation
(metadata)



data fragmentation
data replication



data policies

data policies

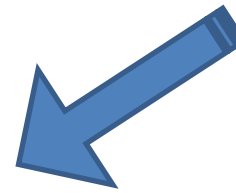
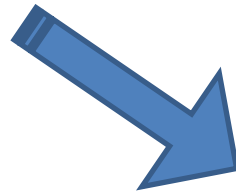
Key Standards Development Organizations for Geospatial Information



International
Organization for
Standardization



Technical committee 211
Geographic
information/Geomatics



Both international standards organizations have representative members from government, industry, research, and academia who arrive at decisions through a consensual process. The organizations develop, maintain and make publicly available open standards that enable the ability to publish, discover, access, manage and use geospatial information across a range of applications, systems and business enterprises. These organizations all employ processes and approaches which ensure the development of international open standards that meet the characteristics described above.



International
Organization for
Standardization

WMS 1.3.0

Web Mapping Service (WMS)

HTTP protocol for publishing a collection of layers as a map (PNG, JPEG)



[ISO 19128:2005 – Web mapping Service](#)

Data

WFS 1.1.0

Web Feature Service (WFS)

HTTP protocol for publishing feature collections that may be queried and updated by clients (features published as GML,...)



[ISO 19142:2010 - Web Feature Service](#)

WCS 1.0

Web Coverage Service (WCS)

HTTP protocol for publishing “coverages” (multi-band raster data) that can be accessed by clients (GeoTiff, HDF)



[ISO 19123:2005 - Schema for coverage geometry and functions](#)

Metadata

CSW 2.0.1

Catalog Services for the Web (CS-W)

Defines several web interfaces for data discovery



[ISO 19115:2003 , ISO/TS 19139:2007 - Geographic information — Metadata](#)

Processing

Web Processing Service (WPS)

Defines an interface to share geoprocessing algorithms

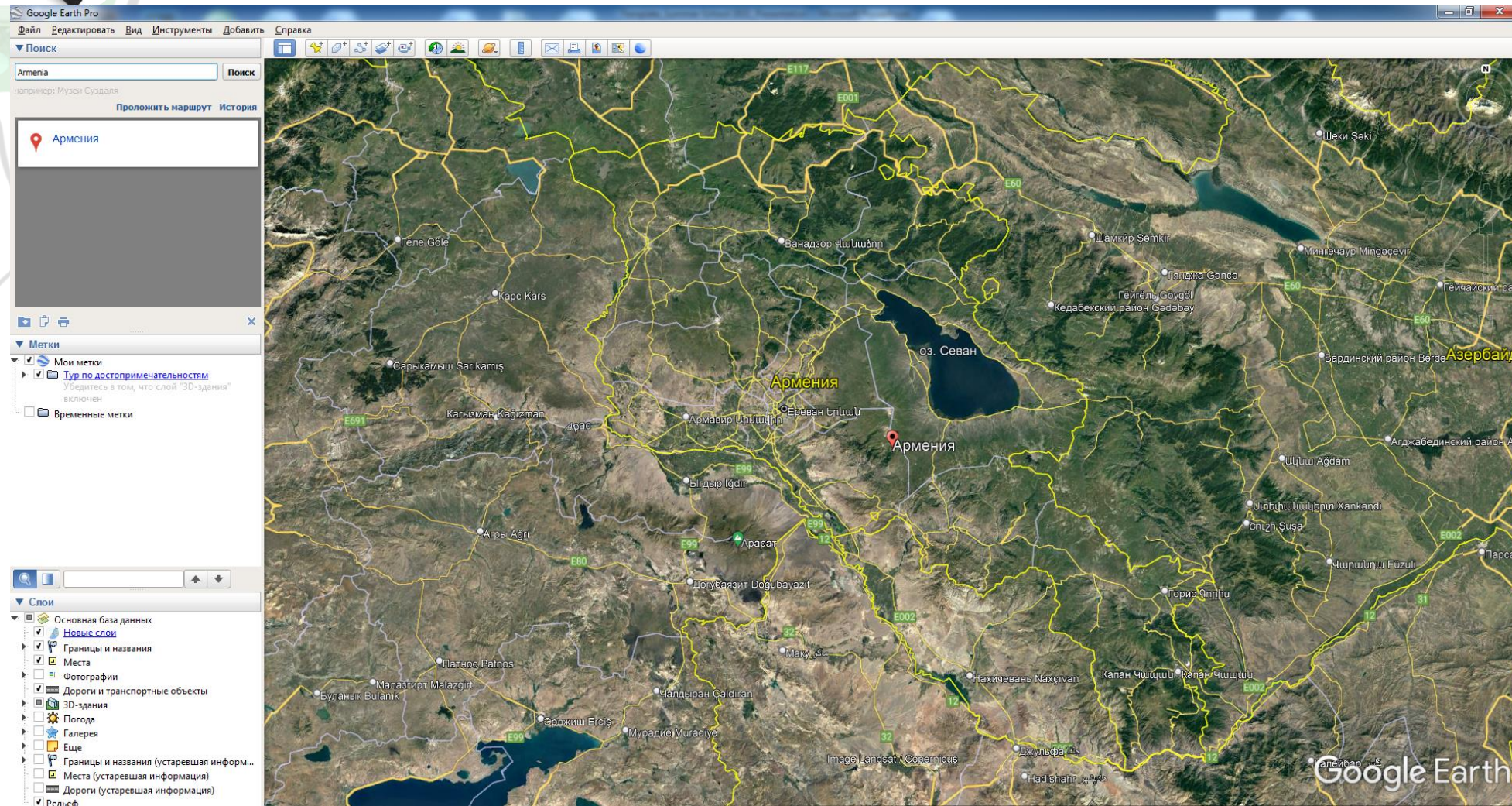


[ISO 19119:2016\(en\), Geographic information — Services](#)



GEOPORTAL

A type of web portals used to find and access geographic information and associated services (display, analysis, editing, etc) via the Internet.



GEOPORTAL

A type of web portals used to find and access geographic information and associated services (display, analysis, editing, etc) via the Internet.



Посмотреть слои

Selected Layers

Add layers through the "checkboxes".

Создать карту

Filters Очистить

▼ ТЕКСТ

Search by text

▶ КЛЮЧЕВЫЕ СЛОВА

▼ ТИП

Raster Layers 38

Vector Layers 94

Remote Layer 1

▶ КАТЕГОРИИ

▶ OWNERS

▶ ГРУППЫ

▶ GROUP CATEGORIES

▶ ДАТА

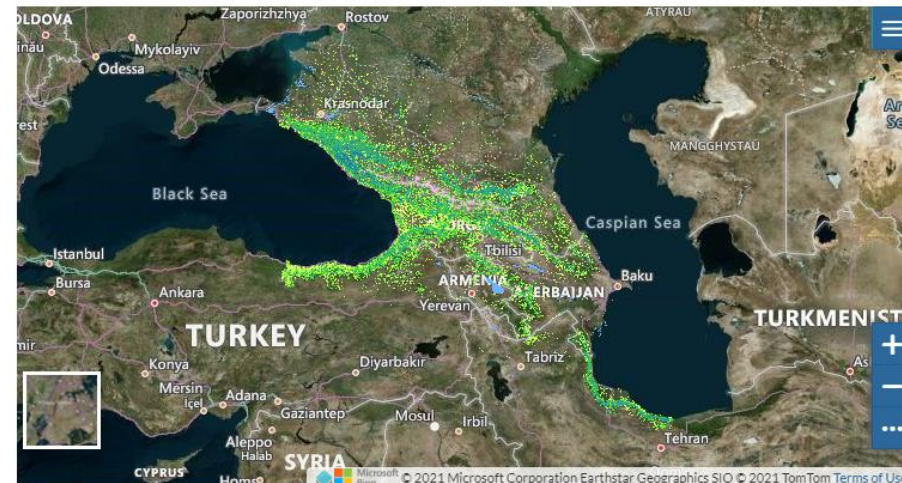
132 Layers found

ENVIRONMI
Glo Ecoregi
Global 30-r integration structure n within Cau
Mamuka

GEOSCIENT
Geo
Georgi na Roadmap o https://driv support of i and Mit...
Mamuka
Создать

GEOSCIENT
Geo

Global forest height 2019 for Caucasus Ecoregion



Скачать слой

Metadata Detail

View Layer

Скачать метаданные



Информация

Атрибуты

Поделиться

Оценки

Комментарии

Заголовок Global forest height 2019 for Caucasus Ecoregion

Лицензия Public Domain (PD)

Аннотация Global 30-m spatial resolution forest canopy height map developed through the integration of the Global Ecosystem Dynamics Investigation (GEDI) lidar forest structure measurements and Landsat analysis-ready data time-series, subsampled within Caucasus Ecoregion boundaries. Pixel values: 0-60 Forest canopy height, meters; 101 Water; 102 Snow/ice; 103 No data. <https://glad.umd.edu/dataset/gedi>

Publication Дата 8 мая 2021 г. 14:27

Тип Raster Data

Ключевые слова Forest_height_2019_NAFR_Caucasus_Ecoregion, GeoTIFF, WCS

Категория Environment

Source: <https://sustainable-caucasus.unepgrid.ch/>

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A type of web portals used to find and access geographic information and associated services (display, analysis, editing, etc) via the Internet.



ace.aua.am/vector-database-armenia-file-overview/

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Vector Database Armenia – File Overview

Home / Vector Database Armenia – File Overview

Folder	File Name	Description	Type	File Size
Administrative		Administrative boundaries of Armenia	Folder	1191kb
	Aragatsotn_Marz	Shape of Aragatsotn marz (federal state) in Armenia	Polygon	11kb
	Ararat_Marz	Shape of Ararat marz (federal state) in Armenia	Polygon	13kb
	Armavir_Marz	Shape of Armavir marz (federal state) in Armenia	Polygon	13kb
	Armenia_Border_line	Borders of the country of Armenia	Line	200kb
	Armenia_Border_poly	Shape of the country of Armenia	Polygon	201kb



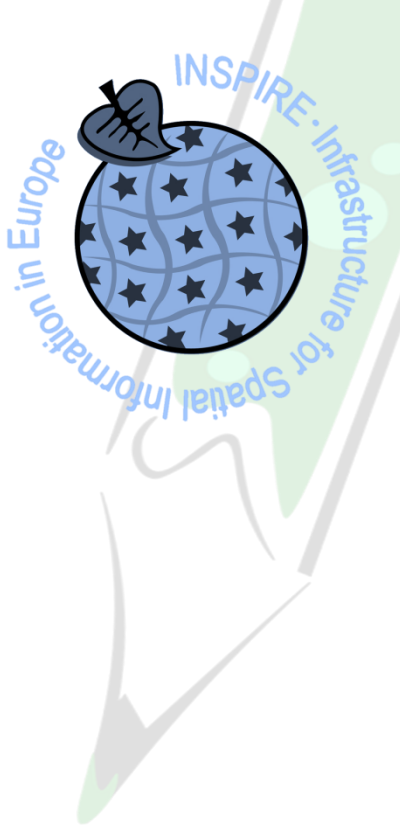
GEOPORTAL

A type of web portals used to find and access geographic information and associated services (display, analysis, editing, etc) via the Internet.

- NSDI of France
<http://www.geoportail.gouv.fr/actualites>
- NSDI of the Poland <http://geoportal.gov.pl/>
- NSDI of Moldova <http://www.geoportal.md/>
- NSDI of Nepal <http://nationalgeoportal.gov.np/#/>



SDI of US Geological Survey
<http://earthexplorer.usgs.gov/>
<http://www.usgs.gov/pubprod/>



INSPIRE

Infrastructure for Spatial Information in the European Community



<https://www.youtube.com/watch?v=xew6ql-6wNk>

Source: <https://inspire-geoportal.ec.europa.eu/>



INSPIRE GEOPORTAL

Enhancing access to European spatial data

European Commission > INSPIRE > Geoportal

Home | Priority Data Sets Viewer | Thematic Viewer | Harvesting status | Find out more about

Data sets by

Theme: **Geology**



INSPIRE Geoportals Data Set Statistics

1197 Metadata records

245 Downloadable Data Sets

310 Viewable Data Sets

Spatial scope coverage: National Regional

Select a COUNTRY

Austria	11 11 11	Finland	9 5 6	Latvia	15 11 12	Portugal	31 17 27
Belgium	39 33 33	France	2 0 2	Liechtenstein	1 0 0	Romania	4 4 4
Bulgaria	1 0 0	Germany	192 52 112	Lithuania	3 3 3	Slovakia	32 10 3
Croatia	0 0 0	Greece	0 0 0	Luxembourg	15 15 14	Slovenia	21 0 1
Cyprus	1 0 1	Hungary	17 6 5	Malta	8 8 8	Spain	2 2 1
Czech Republic	5 0 5	Iceland	15 0 0	Netherlands	8 0 0	Sweden	13 10 12
Denmark	11 7 7	Ireland	3 0 0	Norway	8 0 0	Switzerland	32 0 0
Estonia	7 6 6	Italy	686 44 33	Poland	5 1 4		

The application displays the availability and provides access to the selected priority data sets used for environmental reporting. It allows filtering by environmental domain, environmental legislation

The application displays the availability and provides access to MS data sets falling under the scope of INSPIRE Directive fifth data themes and countries (i.e. Annex I, II and III).

Source: <https://inspire-geoportal.ec.europa.eu/>

INSPIRE GEOPORTAL



INSPIRE GEOPORTAL

Enhancing access to European spatial data

European Commission > INSPIRE > Geoportal

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INSPIRE Data Themes

Explore all Member States' INSPIRE data sets by selecting an INSPIRE data theme.

Annex I

Addresses — Def.: Location of properties based on address identifiers, usually by road name, house number, postal code. 323 41 123	Administrative units — Def.: Units of administration, dividing areas where Member States... 812 92 233	Cadastral parcels — Def.: Areas defined by cadastral registers or equivalent. 7956 66 56	Geographical grid systems — Def.: Harmonised multi resolution grid with a common point of origin... 139 19 10
Geographical names — Def.: Names of areas, regions, localities, cities, suburbs... 1194 74 88	Hydrography — Def.: Hydrographic elements, including marine areas and all other water bodies and items related... 1274 260 224	Protected sites — Def.: Area designated or managed within a framework of international, Community and Member States ... 1248 357 374	Coordinate reference systems — Def.: Systems for uniquely referencing spatial information in... 156 18 11

INSPIRE Thematic Viewer



Transport networks
 — Def.: Road, rail, air and water transport networks and related ...
 1792 | 401 | 562

Elevation
 — Def.: Digital elevation models for land, ice and ocean surface...
 884 | 99 | 233

Annex II

Geology
 — Def.: Geology characterised according to geological position...
 1197 | 245 | 310

Land cover
 — Def.: Physical and biological cover of the earth's surface...
 938 | 200 | 204

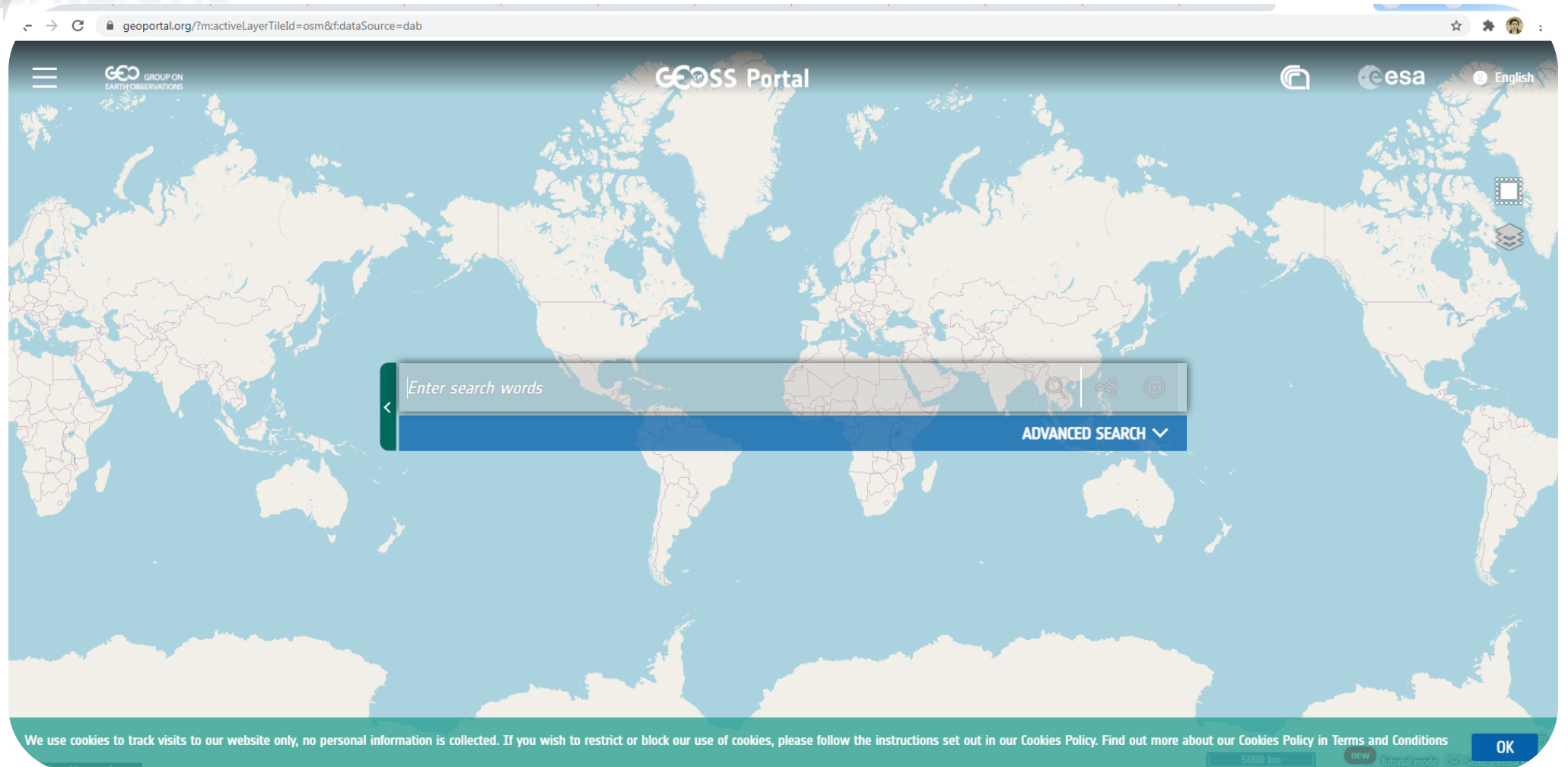
Orthoimagery
 — Def.: Geo-referenced image data of the Earth's surface, from either...
 1154 | 66 | 109

Annex III

Atmospheric	Agricultural and	Area management /	Bio-geographical
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GEO Community

GEO is a partnership of more than 100 national governments and in excess of 100 Participating Organizations that envisions a future where decisions and actions for the benefit of humankind are informed by coordinated, comprehensive and sustained Earth observations.



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GEO Secretariat Directors



Dr. Barbara Rian

1st Director of the GEO Secretariat
Leading years (...)



Dr. Gilberto Camara

2nd Director of the GEO Secretariat
Leading years (...)



Mrs. Yana Gevorgyan

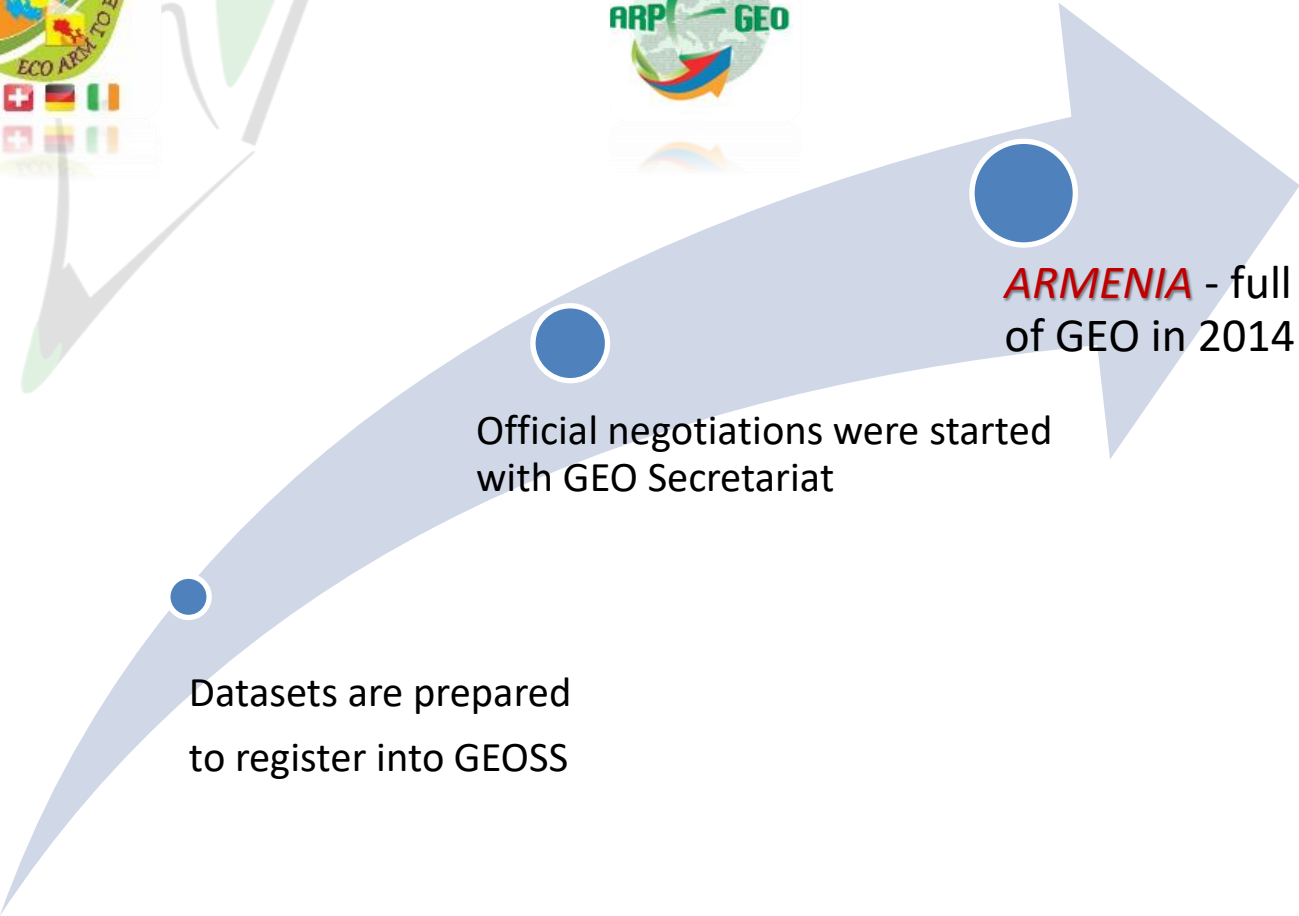
3rd new appointed
Director of the GEO Secretariat

ARMENIA's engagement to GEO

EU FP7 EcoArm2ERA



SNSF SCOPES 2009-2012
International cooperation



Datasets are prepared
to register into GEOSS

Official negotiations were started
with GEO Secretariat

ARMENIA - full member
of GEO in 2014

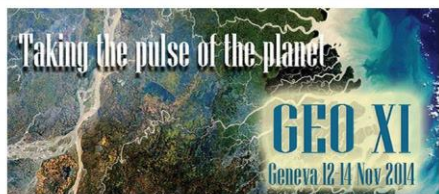


ARMENIA's engagement to GEO



earthzine

Fostering Earth Observation
& Global Awareness



The final day of the GEO XI Plenary gets underway with statements from member nations. We'll publish the country written statements when they're available.



GEO XI Plenary session, 14 Nov. 2014, WHO-QTW, Geneva, Switzerland. Image Credit: Dasha Gray Davidson.

14 November

Representatives from each member nation made statements at today's final plenary session. I obtained a copy of the statement read by a delegate from Armenia, Dr. Shushanik Asmeryan. This was Dr. Asmeryan's first address to GEO. It was also Armenia's inaugural statement, not coincidentally since that country became an official member of the international body only yesterday.

Asmeryan is the head of the GIS and Remote Sensing Department at the Center for Ecological-Neosphere Studies (CENS), National Academy of Sciences, in Yerevan, Armenia.

Ladies and Gentlemen,

In the context of GEO activities, since 2011 Armenia has been undertaking national and international initiatives in order to use the mechanisms and tools of data processing, storage and sharing provided by e-infrastructure:



Dr. Shushanik Asmeryan, addressing the GEO plenary, 14 Nov. 2014, in Armenia's first appearance as a member nation.

A well-established institution in Armenia – the Center for Ecological-Neosphere Studies CENS – was instrumental in allowing the development of a Spatial Data Infrastructure to share many important environmental data and information. Data sets from the Center are now discoverable and accessible through the GEOS.

A number of projects (Swiss-Armenian ARPEGO and FP7 EcoArmCERA projects) have been implemented by CENS to build capacities in Armenia for efficient environmental data management and data sharing adopting international standards.

Here, I would like to stress the facilitating role and coordination of the University of Geneva (UNIGE). Due to their efforts, Armenia became an associative member of EU/FP7 EnviroGR2Ds and EPOWEP projects coordinated by them and promoting the GEO/GEOS framework among the Black Sea basin countries, including the two South Caucasian republics: Armenia and Georgia.

In 2014 in the framework of the EPOWEP project and under strong support of University of Geneva, a set of practices and guidelines – the so-called EGDA methodology – was applied to contribute to institutional capacity building at CENS to optimally use Earth Observation resources towards sustainable development in Armenia.

Presently, we are developing a number of joint projects in partnership with different countries. Protection of pastures, urban planning, desertification, are some of the important issues we are investigating and in this context we are looking forward participating to the GEO communities of practices.

At the national level, we plan to establish a single coordination mechanism for data sharing, cooperating in an integrated manner with other agencies, organizations and levels of governance concerned with GEO Social Benefit Areas. To that end, we are committed to endorse and act in the spirit of the GEOS 10-Year Implementation Plan and others to follow. In the end I would like to express our gratitude to GEO Secretariat for a well-organized meeting.

Thank you.





ARMENIA in GEO



***Stephen Volz,
Lead GEO Co-Chair
Head of the US National Oceanic and
Atmospheric Administration (NOAA) Satellite
and Information Service,***

“From large member governments like the US, China and the European Commission, to smaller economies like Uganda, Ecuador and Armenia, GEO really is a place where all organizations involved in making or using Earth observations can come together on a level playing field.

It really helps to have the perspective of countries with smaller economies, because they have a different view of what is needed, what the urgency is, and what the solution space might be. It helps keep us grounded, as we need to be responsive to all countries - not just the big ones.

Armenia is a great example of a country that comes in and contributes both financially and programatically to the collective success of GEO.

Their voice is important to the community, and they get a lot out of it because they are heard on a peer basis that might not happen for them in another organization.”

Dr. Stephen Volz

LITERATURE

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<http://www.intergraph.com/global/uk/government/INSPIRE.aspx>.
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- Arnold BREGT and Joep CROMPVOETS Spatial Data Infrastructures: Hype or Hit?
http://www.fig.net/pub/cairo/papers/ts_36/ts36_01_bregt_crompvoets.pdf.
- Steiniger, S., and Hunter, A.J.S. (2012) preprint "Free and open source GIS software for building a spatial data infrastructure". In E. Bocher and M. Neteler (eds): *Geospatial Free and Open Source Software in the 21st Century: Proceedings of the first Open-Source Geospatial Research Symposium*, 2009, LNG&C, Springer, Heidelberg, pp. 247-261.
- Global Spatial Data Infrastructure Organisation - The SDI Cookbook.



Thank you for your kind attention!

Dr. Shushanik Asmaryan

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Lecturer at “Environmental Protection and Nature
Management” department of ISEC

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