



# International Union of Geodesy and Geophysics (IUGG)

## EARTH SYSTEM

- **IUGG encourages research into *Geoscience Discipline* topics to increase our understanding of various Earth processes**
- **Complex *natural & anthropogenic processes* within the solid Earth, ice, atmosphere and oceans**
- **Extensive use of *satellite Earth Observation* missions**
- **Holistic approach treats focuses on “*Earth System*”**
- ***Global cooperation* of governments, institutions, and individual scientists is necessary**
- ***Geoscience knowledge underpins natural hazard research & response, severe anthropogenic impacts, responsible management of the natural environment, and ultimately sustainable development***

## GEOSCIENCE DISCIPLINES

- **International Association of Cryospheric Sciences (IACS)**
- **International Association of Geodesy (IAG)**
- **International Association of Geomagnetism and Aeronomy (IAGA)**
- **International Association of Hydrological Sciences (IAHS)**
- **International Association of Meteorology and Atmospheric Sciences (IAMAS)**
- **International Association for the Physical Sciences of the Oceans (IAPSO)**
- **International Association of Seismology and Physics of the Earth's Interior (IASPEI)**
- **International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI)**

Soil functions	Description	Directly targeted SDGs	Indirectly targeted SDGs
Biomass Production	The sustainable production of plant biomass ensures food, fodder, and renewable energy, which is the basis of human and animal life	2., 12.	1., 7.
Storing, Filtering, Transforming	Healthy soils filter and buffer organic and inorganic components, including contaminants, protect the food chain and the groundwater against contamination	6., 15.	14.
Biodiversity Pool	Soil biodiversity is the largest gene reserve on earth and a main component of the one health concept		
Physical & Cultural Environment	Soil serves as the physical basis for the development of houses, industrial premises, roads and other facilities. When completely sealed, soils lose most of their ecological functions	11., 9.	3.
Source of Raw Material	Soils are source of peat, clay, sand, gravel, and minerals. When completely excavated, soils lose most of their ecological functions		
Acting as Carbon Pool	Soils contain the highest quantity of organic carbon in the earth system after the oceans.	13.	
Geological & Archaeological Archive	Soils are a natural and cultural heritage and a historical memory, allowing for understanding the history of humans and the environment	4.	





# DECADES OF SCIENCE FOR SUSTAINABILITY IN KARST AND SPELEOLOGY



ISC Member: Category 1 since 2024



## WHO WE ARE:

- Global network since 1965, with 57 member countries of scientists and explorers dedicated to understanding and protecting caves and karst systems

## HOW SPELEOLOGY CONTRIBUTES TO FUTURE SUSTAINABILITY AGENDAS:

### 1. Water Sustainability (SDG 6):

- Karst aquifers provide fresh water for 20-25% of the global population.
- Research supports sustainable water resource management and protection of critical reserves.

### 2. Climate Action (SDG 13):

- Archives of paleoclimate data from caves help predict and mitigate extreme climate events like paleofloods.

### 3. Biodiversity (SDG 15):

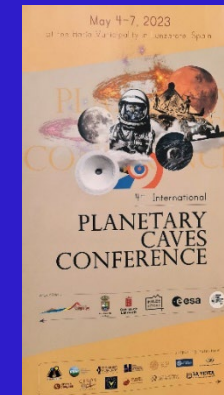
- Speleologists study and protect fragile cave ecosystems that host unique, often endangered species.

### 4. Planetary Exploration:

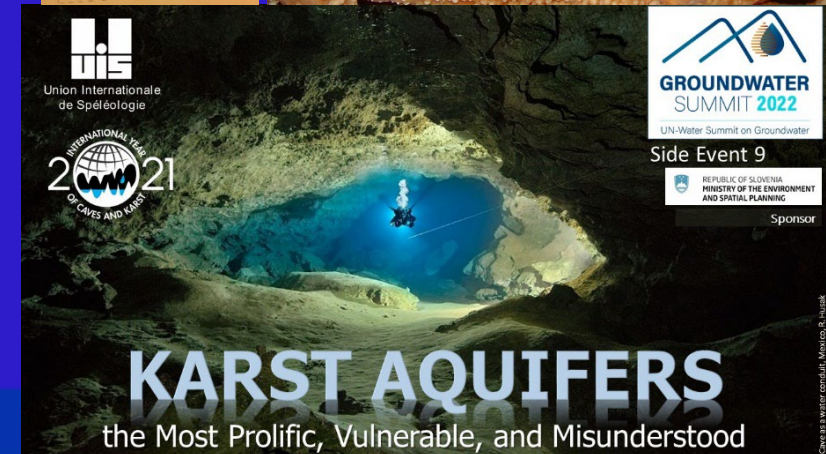
- Earth's caves as analogs for Martian and lunar lava tubes, advancing subsurface exploration for future extraterrestrial missions.

## FUTURE OUTLOOK:

- Promoting global collaboration on exploration, conservation, and sustainable use of karst systems.
- Advocating initiatives like the International Day of Caves and Karst under UNESCO.
- Enhancing the role of speleology and karstology in shaping Earth and planetary sciences.



Homo neanderthalensis, Grotta di Lamalunga, Italy;  
<https://uomodaltamura.it/go/16/luomo-di-altamura.aspx>



Cave as a water conduit, Wawo, R. Huok

# INQUA - International Union for Quaternary Research



INQUA the global representative body for Quaternary science.

INQUA fosters global collaboration in Quaternary Science



photo credit: Julie Loisel, Zicheng Yu

## With our knowledge of the Quaternary past we contribute to a sustainable future

### CONTACT

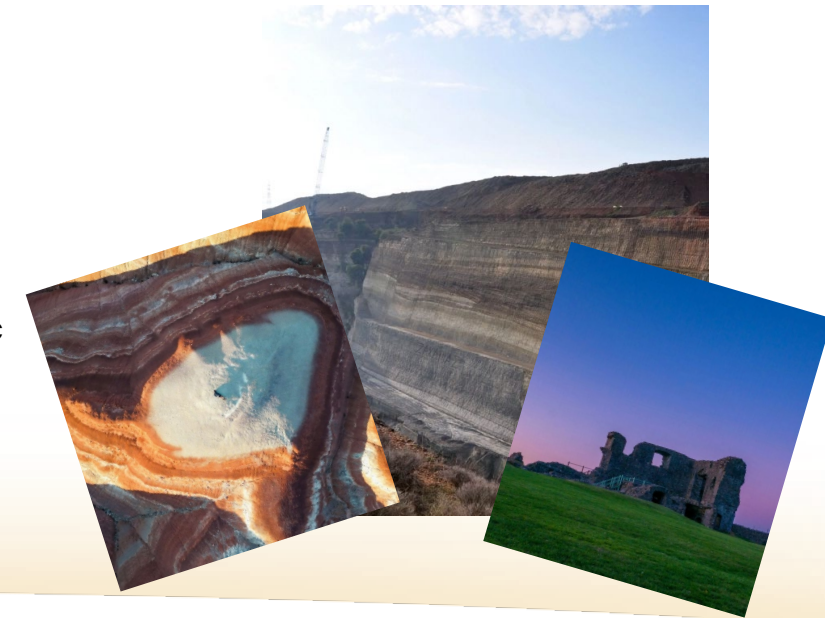
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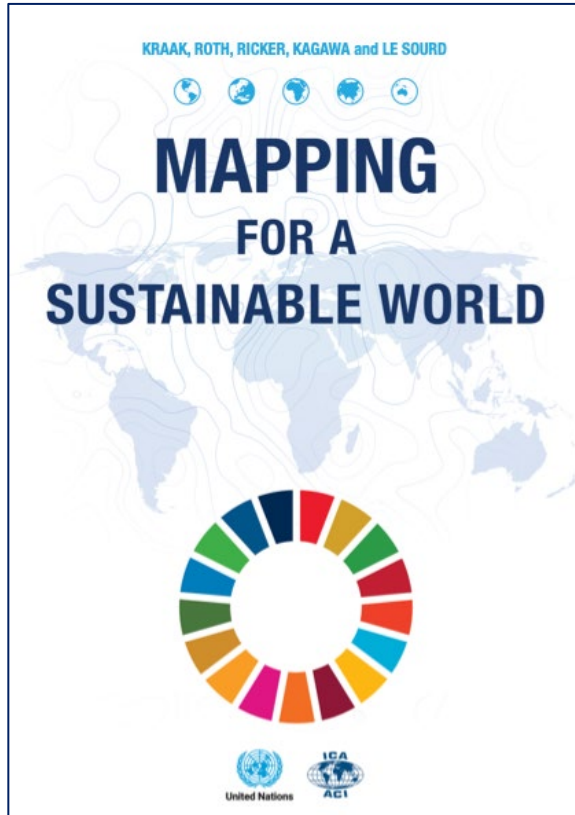
Website: <https://inqua.org/>



2024 • 2033  
International Decade of  
Sciences for Sustainable  
Development



# The relevance of Cartography



## Cartography enable human understanding and knowledge by

Spatial Analysis

- Mapping environmental for informed decision-making

Data Visualization

- Presenting sustainability data to support policy and engagement

Geospatial Solutions

- Providing tools for monitoring and planning

Collaborative Mapping

- Facilitating interdisciplinary partnerships

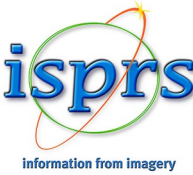
The **International Cartographic Association (ICA)** is engaged through

Book “Mapping for a sustainable world” (with UN, open access)

Commissions

Grassroot Activities

# International Society for Photogrammetry and Remote Sensing



Scientific research based on the following ISPRS main topics:

**Spatial information science**

using **Photogrammetry**

and **Remote Sensing**

together with **data and knowledge** from any **other disciplines**

will allow us **to model the history, presence** and the **future of the Earth and any objects, human health, etc.**

Building the models, i.e., understanding the individual matters of modelling and data quality is a scientific approach to analyse the problems and provide sustainable solutions in cooperation of many scientists.

ISPRS provides the tool for modelling and some data (about the Earth surface).

The process requires definition of individual goal, selection of phenomena which should be involved, their data collection and careful verification process.

These are not straightforward solutions, but complex processes where we still have a lot of tasks to analyse and solve.



## **URSI Mission**

To promote international activity in radio science and its applications, for the benefit of humanity. URSI is responsible for stimulating and co-ordinating, on an international basis, studies, research, applications, scientific exchange, and communication in the fields of radio science

- ✓ *Radio sciences can contribute to technologies for sustainability*
- ✓ *New technologies and engineering systems are devised enabling sustainable innovations, as for example:*
  - *Radar systems (terrestrial, airborne or spaceborne)*
    - *for pollution monitoring*
    - *for meteorological/climatological applications*
  - *Wireless Sensors and Wireless Sensor Networks*
  - *Wireless Power Transfer*
    - *for new strategies of energy distribution*
  - *Analysis of global morphology and modeling of the ionosphere*
    - *to collect information for Disaster Risk Reduction (DRR)*

- ✓ ***Need to promote interdisciplinary research among Unions to foster sustainable development***
- ✓ ***The role of URSI: to provide the support of radio sciences and related technologies in realizing important tools for sustainable development***



**About IGU :** Established: Brussels in 1922  
 IGU work is conducted through its:  
 National Committees (Full Members and observers=107)  
 Executive Committee  
 47 Commissions.  
 Category 1 member of the ISC and of the CIPSH.  
 Official languages: English and French

### What is Geography?

Geography aims to study both natural and human realms and their interactions, focusing on space, places, and regions, addressing and questioning both short-term and longer-term processes and their resultant patterns. Geographers explore how environments emerge by natural processes, how societies produce, organize, use and misuse environments, and how societies themselves are influenced by the environments in which they are located.

### What is the contribution of Geography to sustainability science?

At the interface of the natural and social sciences, Geography lies at the very core of sustainability science. While interacting with other sciences, geographers focus on space, places, regions, cities in which people live; they provide them with better understanding of their living places, at all scales, including the planet at large. It incorporates integrative dimension and holistic perspective to various planning, forecasting and decision making processes.

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#### IGU collaborates with:

- GeoUnions
- GeoDiversity day
- Global-understanding-for-sustainability
- IDSSD Distinguished Lecture Series
- EH-C
- UN-GGIM Geospatial Societies



[https://www.worldmapsonline.com/satellite\\_image\\_maps/planet\\_earth\\_world\\_satellite\\_imagery\\_wall\\_mural.htm](https://www.worldmapsonline.com/satellite_image_maps/planet_earth_world_satellite_imagery_wall_mural.htm)



<https://theroadtochangeindia.files.wordpress.com>



<http://www.theecologist.org/siteimage/scale/0/0/400392.jpg>



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