BEeS

The LifeWatch ERIC Biodiversity & Ecosystem eScience Conference

Heraklion, 30 June - 3 July 2025

2 June 2025 | 11: 30-13:00

BEeS Heraklion
30 June - 3 July 2025

LifeWatch ERIC

hcmr ΕΛΚΕΘΕ

iMBBC ΙΘΑΒΒΥΚ

Session: Biodiversity Observatory: Smart Systems for a Living Planet Revolutionising Biodiversity Monitoring with Automation

2 July 2025 | 11:30-13:00

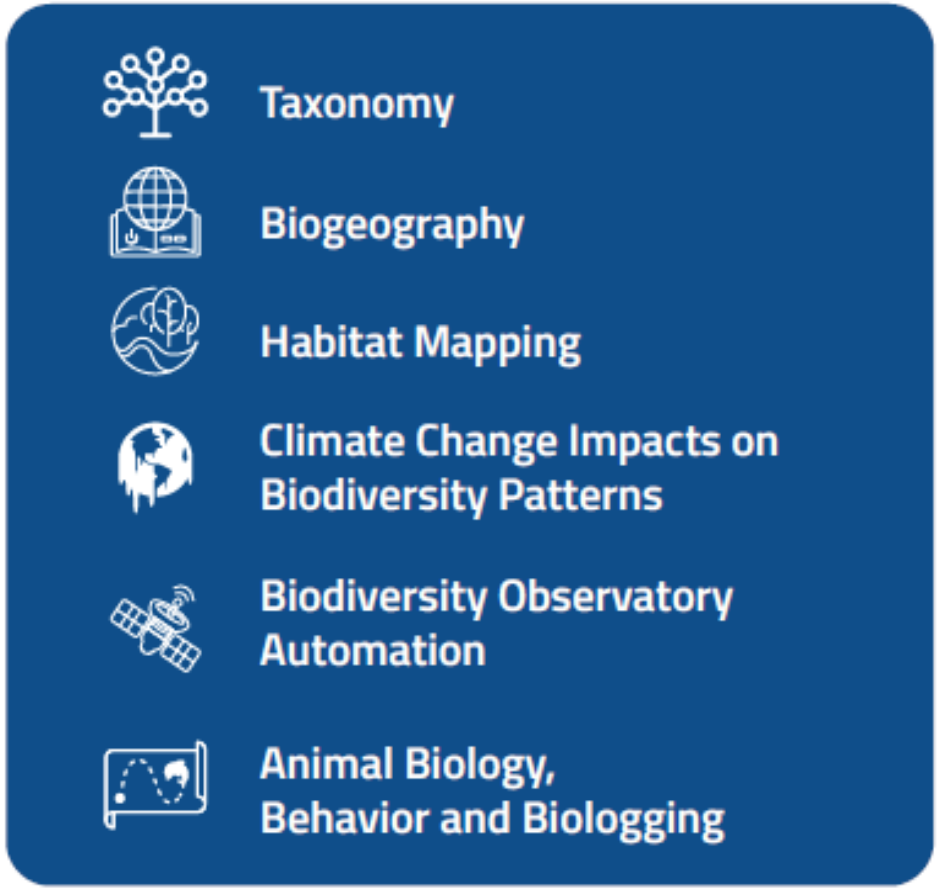
BEeS Heraklion 30 June – 3 July 2025 LifeWatch ERIC

A set-up of Biodiversity Observatory Automation (Thematic Topic under LifeWatch ERIC)

Andreja Ramšak
National Institute of Biology
LifeWatch SI

The LifeWatch ERIC Thematic Services

- represent the key priority areas of eService construction in LifeWatch ERIC proposed by the National Distributed Centres
- co-developed by the LifeWatch ERIC Common Facilities and National Distributed Centres
- a key component of the 2022-2026 Infrastructure Strategic Working Plan (SWP)

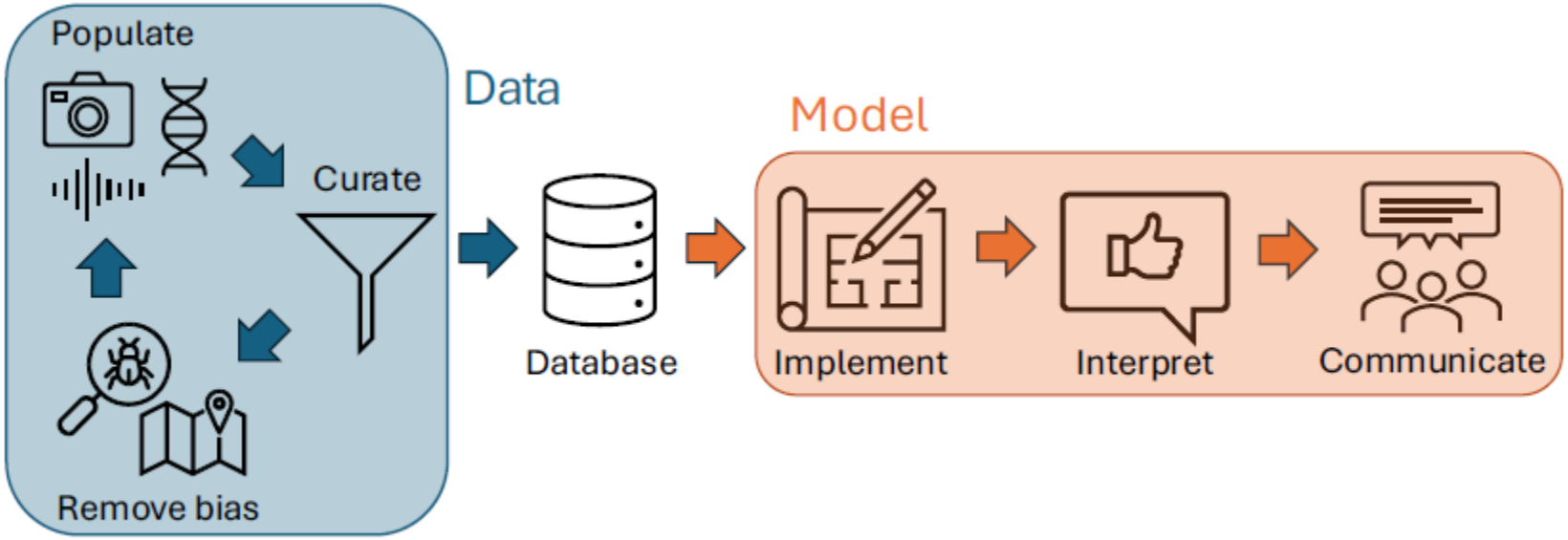


Why Biodiversity Observatory Automation?

- Rapid technological development (sensors, drones, gliders, high-frequency biologgers, camera trap sampling, passive acoustic sampling, automatic species identification via metabarcoding, NGS, digitisation of natural history and other scientific collections, citizen science through apps and social media platforms.

- Integration of large-scale ecological data sets into the development of high-precision simulation models of Earth systems by incorporating RI such as Geo-BON, NEON , eLTER , SAEON, TERN, GBIF and LifeWatch (Koning et al., 2023).

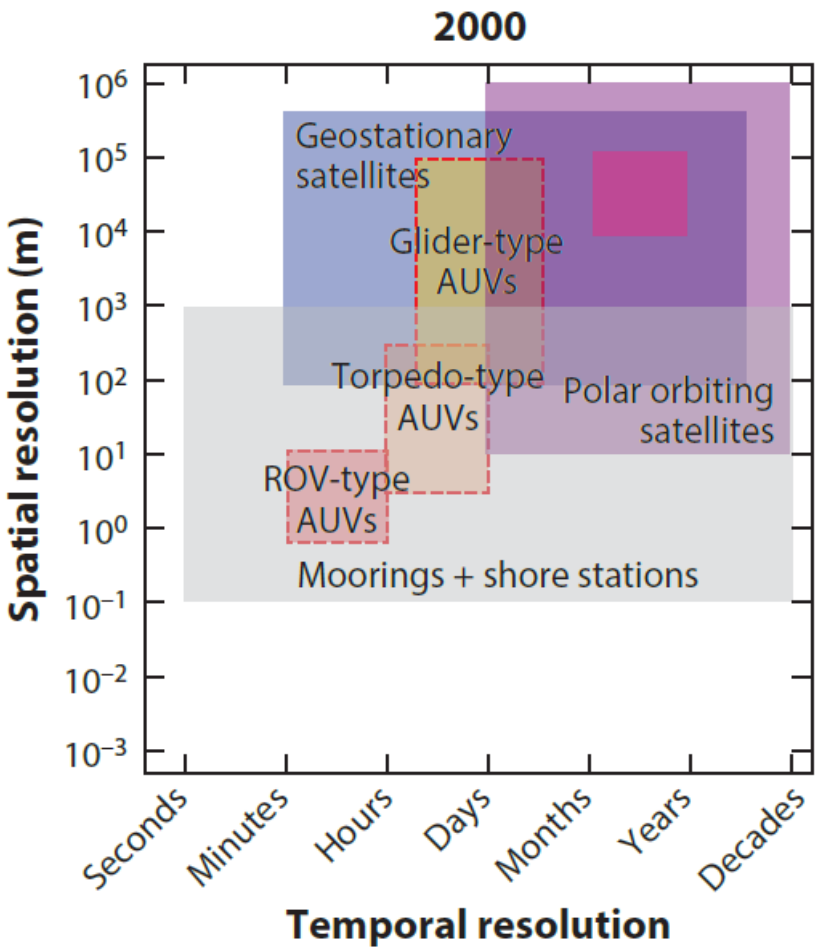
Challenges for automated biodiversity research

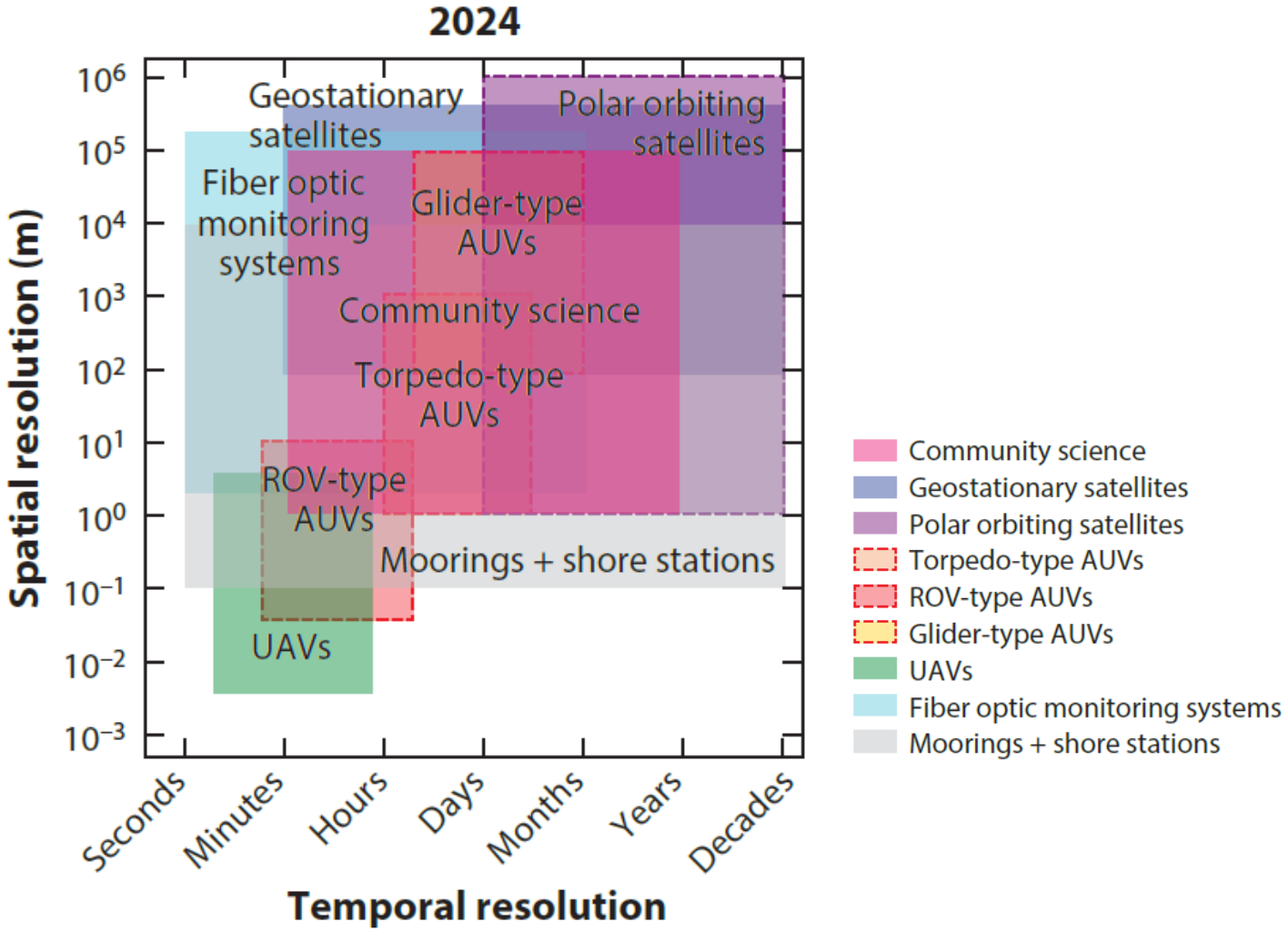


Trends in Ecology & Evolution

Cardoso et al., 2025, TREE

Why Biodiversity Observatory Automation?





Cavanaugh et al., 2025, Annu. Rev.Mar.Sci.17

Biodiversity Observatory Automation

Workshop was dedicated to reviewing and updating the requirements for effective biodiversity assessment in an era of unprecedented environmental change and biodiversity loss.

- 12 lectures presenting monitoring and assessment of biodiversity by various approaches
- a panel discussion on challenges related to biodiversity research
- more than 60 participants on site and online

Biodiversity Observatory Automation at BES2024

12 December at 15:15, Room 11B | **Andreja Ramšak** (National Institute of Biology): “Towards automated biodiversity monitoring -a set-up of Biodiversity Observatory Automation (Thematic Topic under LifeWatch ERIC).” (*S34*).

Biodiversity Observatory Automation

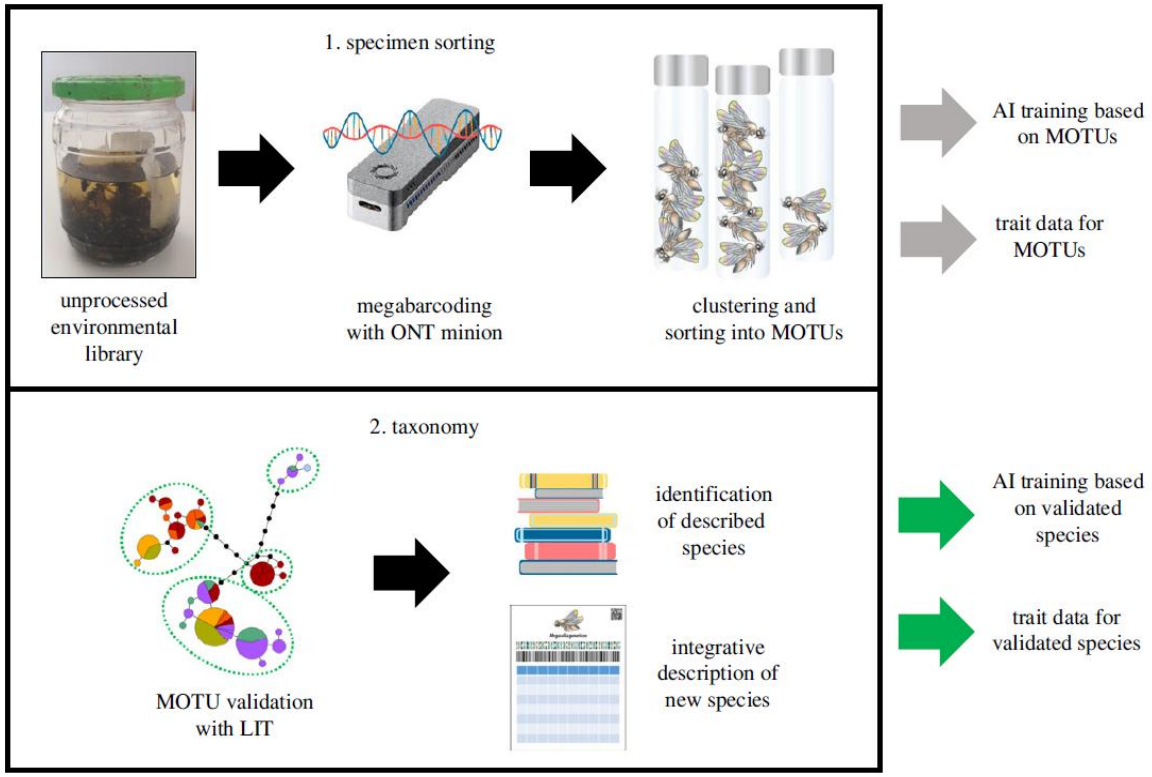
The Workshop (in 2024, Ljubljana) explored various modern approaches to monitor and detect biodiversity:

- Aerial observations (LiDAR, aerial photogrammetry, multispectral and thermal cameras, camera traps…)
- Acoustic and vibrational biodiversity monitoring
- eDNA, barcoding, megabarcoding
- Data collection design
- Curation and exploration of data
- Use of AI to data FAIRfication and digital twins

The workshop outcomes highlighted the current challenges on data collection, curation, standardization and their effective use, emphasizing the need for further development and multidisciplinary collaborations in these areas.

Outcomes from discussion

- Biodiversity Observatory Automation, vaguely defined term, covering diverse techniques of data collection and associated data analysis; incl. citizen science, remote sensing or machine learning.
- Big data science (megabarcoding, eDNA, metabarcoding, visual information, mechanic vibration), problem of data storage, curation, analysing, interoperability, FAIRness.
- Machine learning and AI (process large amount of information and link it with species identities).



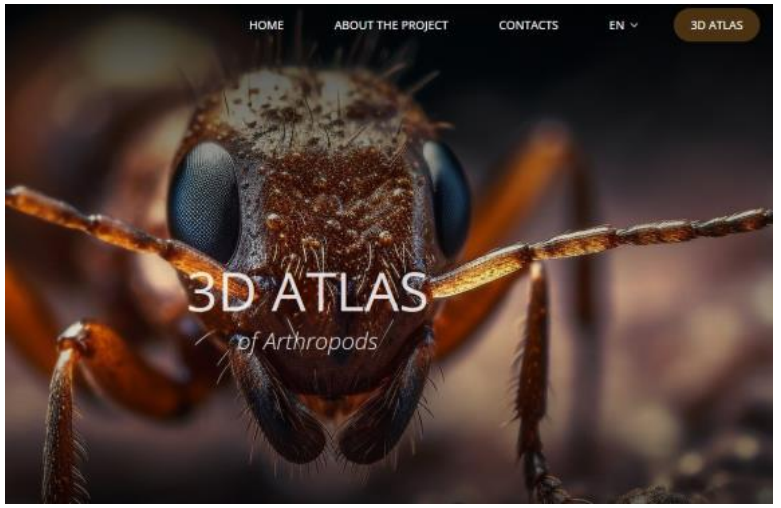
Meier R, Hartop E, Pylatiuk C, Srivathsan A. 2024 Towards holistic insect monitoring: species discovery, description, identification and traits for all insects. Phil.Trans. R. Soc. B 379: 20230120. https://doi.org/10.1098/rstb.2023.0120

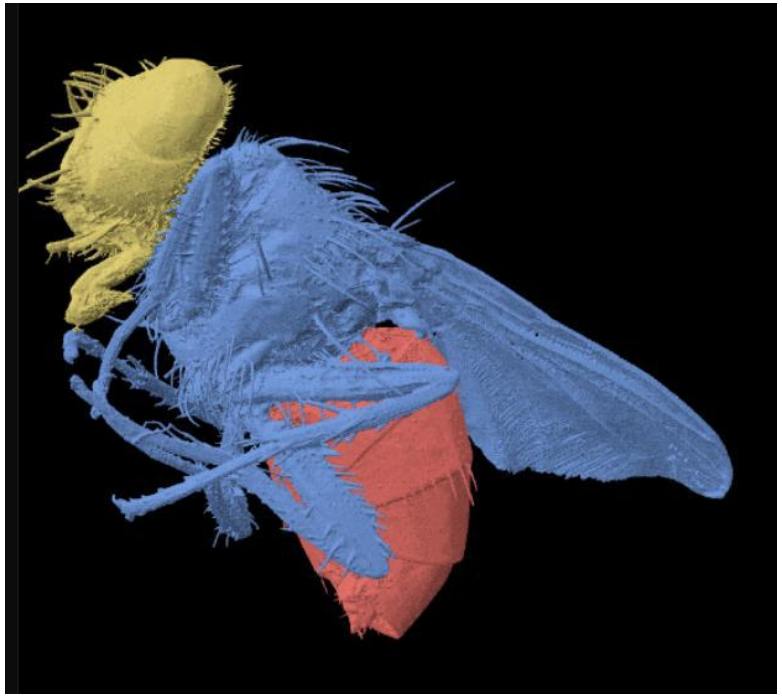
Outcomes from discussion

- Completeness of libraries, applicability of individual techniques depends on the biology of the taxon and the type of habitat. The effectiveness of these methods in species identification depends on completeness of the libraries, which link organismal signals (sequences, images, voices, vibrations..).

- Applicability of Linnean taxonomy within the biodiversity automated observation, discharging the existing names would lead to loss of the past knowledge.

- Biodiversity automated observation depends on adequate data storage, efficient species identification and data retrieval, call for minimal standards applied to biodiversity databasing.





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Biodiversity Observatory Automation

- The working group will explore modern approaches to biodiversity monitoring and detection, ranging from aerial observations to eDNA analysis.
- Efforts will focus on optimising data collection, improving data curation and exploration, using artificial intelligence and applying FAIR data principles to enable the creation of digital twins.
- Through these initiatives, the group aims to improve biodiversity monitoring methods and close current gaps in order to find effective answers to global environmental challenges.

Shape the future of biodiversity assessment with us! Stay engaged with the Biodiversity Observatory Automation Working Group as we explore innovative technologies – from AI-powered analysis to automated data collection – that are transforming biodiversity monitoring. Engage with scientists and experts, access valuable resources and contribute to innovative solutions that improve our understanding of ecosystems in a rapidly changing world.

Join this Working Group

Need help joining? Check our FAQs

https://www.lifewatch.eu/thematic-services-working-groups/working-group-on-biodiversity-observatory-automation/

Biodiversity Observatory Automation

Key Objectives

#1: Explore Biodiversity Monitoring Methods

#2: Optimize Data Collection and Processing

#3: Advance AI and Computational Tools for Biodiversity Assessment

#4: Promote FAIR Data Principles

#5: Foster International Collaboration and Knowledge

#6. Develop and Apply VREs Technology

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Biodiversity Observatory Automation

Timeline

Meetings, Webinars, International Conferences & Networking (2025/2026)

Organising and participating at discussions on emerging technologies...

Read more

Collaborative Research & Case Studies (2025/2026)

Conducting pilot projects to test new monitoring methods. Publishing...

Read more

Data Standardisation & FAIR Principles Implementation (2025/2026)

Developing best practices for data curation and sharing. Ensuring...

Read more

Session: Biodiversity Observatory: Smart Systems for a Living Planet Revolutionising Biodiversity Monitoring with Automation

- 1 selected presentation of project: Advancing Biodiversity Monitoring through FAIR and Interoperable Research Infrastructures: The OSTrails Approach (EU funded OSTrails project)

- 4 project presentations
- 6 oral presentations
- 12 poster presentations

- 7 related to water (marine (4) , Amazon river, fishpond, NIS)
- 6 related terrestrial (soil, agroecology, Karst)

Thank you!

Questions?
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