WP23_25: GEO Citizen Science

1292,205

Basic Information

Full title of the Initiative

GEO Citizen Science

Short Title or Acronym

GEO-CITSCI

Current category in the 2020-2022 GWP

Community Activity

Proposed category in the 2023-2025 GWP

Pilot Initiative

Points of Contact

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Purpose

Objective

Demonstrate the value of citizen science data, facilitate the creation of a linked ecosystem of open citizen science data and increase the use of citizen science in GEO by supporting global coordination and collaboration.

Please provide a short description of the Initiative

The widespread adoption of mobile devices and social media platforms, coupled with the development of low-cost sensors, has made it easier for the public to contribute to and engage in scientific and engineering research and monitoring. This collaborative exchange with the scientific community and professionals in which members of the public actively contribute to the co-creation of new knowledge is known as “citizen science”. It also introduces new challenges in terms of fragmentation, interoperability, and coordination.
Building on these initiatives, this GEO Citizen Science Community Activity (GEO-CITSCI) focuses on the following goals:
Demonstrate the value of citizen science data for advancing the GEOSS priorities in terms of research, informing policy and awareness raising;
Facilitate the creation of a linked ecosystem of open citizen science data and supporting resources under GEOSS and the GEOSS Data Management Principles; and,
Increase the use of citizen science in GEO by supporting global coordination and collaboration within and beyond GEO.

Overcoming institutional barriers, perceptions and technical issues will be addressed and resolved by the GEO Citizen Science Community Activity in terms of heterogeneity in data models, flavours and data formats formed by a long tail of citizen science projects. Furthermore, we will address data accessibility, interoperability, metadata harvesting, data quality documentation, annotation and connectivity with the GEOSS platform.

Why is this Initiative needed?

Citizen science observations, data, and information can complement official and traditional in-situ and remote sensing Earth observation data sources in many application areas relevant to GEO. Governmental entities and organizations around the globe are supporting the development and integration of new sources of in-situ Earth observations data collection at local, regional, and global scales through citizen science observatories and projects.

What evidence is there to support this need?

The citizen-science community has demonstrated its power in many areas including biodiversity and environmental monitoring and in the production of indicators for the SDGs. However, the efforts are not well coordinated and sometimes ignored by the GEO community so this cross-cutting activity is needed.

Is this Initiative open to participation by representatives of any GEO Member, Participating Organization, and GEO Associate?

Yes

Are you aware of other projects or initiatives at a global or regional scale (both in GEO and externally) that provide similar products or services?

Yes

Please describe.

There is nothing equivalent in GEO. The Open Geospatial Consortium leads a Citizen Science Domain Working group focusing on interoperability aspects (https://www.ogc.org/projects/groups/citizenscience). The WeObserve Communities of Practice address topics such as Co-designing citizen observatories and engaging citizens, Impact and value of citizen observatories for governance, Interoperability and standards for citizen observatories and UN Sustainable Development Goals and Citizen Observatories (https://www.weobserve.eu/cops/). However, the WeObserve project finished in March 2022.

How is this Initiative unique?

None of the other initiatives cover the integration of Citizen Science with Earth Observations in the context of GEO.

Please identify the most important actual and/or intended outputs (products, services, etc.) produced by the Initiative, along with their intended and/or actual users. This list does not need to be comprehensive but should identify the outputs which are most used and are expected to have the greatest potential impact.

Output	Status	Users	Additional info
Portfolio of exemplary citizen science projects that can support GEOSS, particularly if citizen science data are combined with EOs	Planned	GEO insitu community	
A technical demonstration on the integration of Citizen Science, Internet of Things and in-situ data.	In development	GEO insitu community	
Sensor Things API plus best practice document	Occasionally updated	Standards community	
Workshop (side event) on the benefits of Citizens Science in GEOSS and the Benefits that GEOSS provides to Citizen Science	Planned	GEO insitu community	
User engagement plan	Planned	GEO insitu community	

If needed, please provide additional comments or explanation to accompany the outputs table

- no answer given -

What kinds of decisions are the outputs of this Initiative primarily intended to support?

Support citizen science community in providing FAIR data that complement official sources

How will these decisions benefit from the outputs of this Initiative?

By providing evidence that integrating citizen science with official sources is possible and feasible.

What kinds of impacts (for example, reduced loss of life, monetary savings, conservation of biodiversity, etc.) are anticipated as a result of the use of the outputs of this Initiative?

Increase the availability with frequencies and coverages not possible with in-situ conventional strategies

Has this Initiative been asked to provide specific information (for example, reports, data, services) on an ongoing basis to an international convention, organization, or other multilateral body?

No

Technical Synopsis

Please provide a brief description of the methods used by the Initiative to produce its (actual or planned) outputs.

We will have regular meetings to organize the work and review progress towards the expected outputs

If you would like to provide further details on the technical methods, you may upload one or more documents here.

- no supporting documents provided -

Are there any significant scientific or technical challenges that need to be resolved by the Initiative during the 2023-2025 period?

Yes

Please describe these challenges and the steps being taken to solve them.

Interoperability of citizen science initiatives should be solved by applying international standards (e.g. STA+). The sustainability of citizen sciences initiatives requires a common infrastructure such us EOSC that can host the initiatives and help them to scale up

Does the Initiative expect to complete any key new outputs, improvements to existing outputs, or improvements to the methods of producing outputs, in the 2023-2025 period?

Yes

Please describe these new outputs or improvements.

Outputs from the tasks described below.

Please identify the key tasks that must be implemented to ensure delivery of these changes, with target dates for completion.

Task	Task description	Expected completion (month/year)
Showcasing the use and value of Citizen Science	Support and elevate demonstration projects that showcase the use and value of scalable citizen science for Earth Observation (e.g., citizen observatories such as Landsense, Ground Truth 2.0, SCENT and GROW, Earth Challenge 2020, CSEOL pilot projects), particularly in the provision of in-situ data to train supervised machine learning algorithms (i.e., “human in the loop”), improve calibration/validation of sensors, increase the speed and accuracy of image processing, and/or augment and enhance validation and knowledge extraction; Develop a set of case studies that explore the use, value, and impact of citizen science for Earth observation and GEO; Identify and prioritize gaps in in-situ observations for GEOSS, and then identify existing citizen science projects that could cover these gaps, for example, through the SDG framework.	12/2025
Improving discovery of and access to Citizen Science data	Increase discovery and access of: (1) citizen science data and complementary data sets through the GEOSS platform (e.g., CSEOL pilot projects, Earth Challenge 2020, and the citizen observatories); (2) data collection tools (hardware and software); (3) platforms for data analysis and visualization; (4) educational resources, such as lesson plans or other toolkits; and, (5) publications (via ECSA and EU-Citizen.Science); Showcase best practices for discovery and access of citizen-observed data through GEOSS, and for implementation of the GEOSS Data Management Principles (in collaboration with the GEO Secretariat as appropriate), while providing attribution and respecting the privacy of our users;	12/2025
Advancing and implementing	Provide guidelines for using and	12/2025

relevant standards	managing citizen science projects and data in GEOSS, incorporating existing standards for data collection and management; Working with the Open Geospatial Consortium (OGC), conduct interoperability experiments and recommend how to offer access to citizen science through GEOSS; These interoperability experiments will be about data sharing and access, federating Cit Sci projects by providing a single sign on mechanism for apps and services, definition and vocabularies services, data quality, data annotation and geospatial user feedback; Promote the use of new standards and APIs that facilitate integration with in-situ sources and legacy data systems; Generate “data profiles” and data collection protocols that can serve for scaling up citizen science data within GEOSS;	
Outreach, networking and recommendations	Based on the work described above, develop recommendations and engineering reports for the increased use of citizen science contributions for GEO, and for using products available through GEOSS in citizen science communities; and Working closely with the Citizen Science Global Partnership, leverage GEO’s role as a global convener to help keep track of and coordinate a range of complementary activities led by different communities.	12/2025
Governance and management	Develop & implement governance structures for the GEO CITSCI Community activity, structure and by-laws as well as communication mechanisms (internal & external)	12/2025

Resources

Have all resources required to implement the Initiative's planned work in the 2023-2025 period been secured?

- Gap in financial resources

What is the estimated funding gap for the 2023-2025 period?

30000EUR

What actions is the Initiative taking to obtain the required resources?

Some European Commission projects such us Cos4Cloud, e-shape, Eiffel and OpenGeoHub has secured some funding to support participation in this activities with estimated amount of EUR 20000. A EC COST action was requested twice but was not financed. A new project called CitiObs has been rencently funded (coordinated by Nilu and with participating of a former chair and a current chair of this group. In the CitiObs contributions to GEO inicitives are mentioned several times. The exact amount of finantial contribution is difficult to stimate at this point but I'm sure can be bigger than 50000 USD.

Please list all financial and non-financial contributions to the Initiative (other than in-kind, voluntary participation by individual contributors) having a value of more than USD 50,000.

Contributing Organization	GEO Status	Type of Resource	Value	Currency
European Commision via de CitiObs project	European Commission	Financial	50000	EUR

Lessons from the 2020-2022 Period

Were all planned activities for the 2020-2022 period implemented as expected?

No

Please describe which activities were delayed or not implemented and how has this affected plans for 2023-2025.

Some activities as been transferred to the 2023-2025 period.

Were there any key challenges faced by the Initiative in the 2020-2022 period?

Yes

Please describe.

There were several delays on the expected activities due to lack of resources and lack of participation.

Were there any impacts or changes to operations due to COVID-19?

Yes

Please describe.

The acceleration in the number of virtual meetings in the second year of the pandemic created fatigue in many of our participants. The lack of a biannual face-to-face meeting created a lack of feedback from the rest of the community and the feeling of working in isolation.

Please describe the key changes proposed for the 2023-2025 period, for example, new projects, new areas of focus, or adjustments to the activity governance.

Work outlined in the previous period will continue in the next period.

Does the Initiative have outputs (products, services, etc.) available to users now, even if only on a pilot or testing basis?

Yes

Please provide any available information describing this usage (for example, user statistics, results of user testing) and/or feedback from users (for example, user comments, evaluations).

Picture Pile is a citizen science tool for rapid EO image classification. Statistics on usage are available in this paper: https://www.sciencedirect.com/science/article/pii/S1462901121003208. The Picture Pile Platform will be launched end of 2022 and will allow anyone to upload images/photographs to be classified by citizens/network of users.

Please provide supporting documentation if available.

- no supporting documents provided -

Do you have evidence of any impacts that have occurred in part as a result of using the outputs of the Initiative (for example, policy decisions taken, behaviour changes by users, risks mitigated)?

Yes

Please provide examples, with evidence where available.

Several papers demonstrating the impact of Citizen Science have been published including: https://www.nature.com/articles/s41893-019-0390-3. The CS4SDGs project resulted in Ghana being the first country to officially report on SDG 14.1.1b using citizen science data.

Please provide supporting documentation if available.

- no supporting documents provided -

Have there been any internal or external reviews or evaluations of the Initiative since 2019?

No

Please indicate any GEO Work Programme activities with which you have ongoing collaboration.

- AQUAWATCH - AquaWatch
- EUROGEO - European Group on Earth Observations
- GEO BON - GEO Biodiversity Observation Network
- GEO-EV - GEO Essential Variables
- GEOGLAM - GEO Global Agricultural Monitoring
- NEXT-EOS - Next Generation Earth Observation Services

Please indicate any additional GEO Work Programme activities with which you would like to establish new collaborations.

- EO4HEALTH - Earth Observations for Health
- EO4SDG - Earth Observations for the Sustainable Development Goals
- GEO-TREES - Forest Biomass Reference System from Tree-by-Tree Inventory Data
- GEO-ECO - GEO Global Ecosystems
- HUMAN-PLANET - GEO Human Planet
- GEO-LDN - GEO Land Degradation Neutrality
- GEO-VENER - GEO Vision for Energy
- GFOI - Global Forest Observation Initiative
- LAND-COVER - Global Land Cover
- BLUE-PLANET - Oceans and Society: Blue Planet

Stakeholder Engagement and Capacity Building

Are there specific countries or organizations that your Initiative would like to engage?

No

Does your Initiative engage users in the work of the Initiative (for example, consultation, testing, co-design)?

Yes

Please briefly describe the Initiative’s approach to engaging users.

Co-design activities are a common tool in citizen science

Does the Initiative have a user engagement strategy or similar kind of document?

No

Are there categories of users that are not represented at this time, but you would like to engage?

No

Does the Initiative have a documented capacity development strategy?

No

Please describe the approach to capacity development that is being implemented by the Initiative?

- no answer given -

Are there any commercial sector organizations participating in this Initiative?

No

Are there opportunities for commercial sector uptake of the outputs of the Initiative?

No

Are there opportunities for further commercial sector participation in the Initiative?

No

Does the Initiative have a plan for commercial sector engagement?

No

Governance

Please describe the roles of each of the key leadership positions, as well as any team structures involved in day-to-day management.

Membership:

Membership in GEO-CITSCI is open to GEO Members, Participating Organizations, Associates, and others participants outside the GEO community who are interested in citizen science and Earth Observation. As appropriate, the GEO-CITSCI Co-Chairs also may invite other qualified individuals to participate as members in the GEO-CITSCI Community Activity.

Participation is encouraged from individuals having expertise and/or interest in citizen science, community science, crowdsourcing, volunteered geographic information, and other similar approaches, as well as in the integration of these approaches with Earth Observations.
Members must make a request to join GEO-CITSCI via email to the co-chairs or the GeoSecretariat, and are then registered on the email list for GEO-CITSCI.

Working Arrangements:
There will be two (or three) co-chairs of GEO-CITSCI, who will be selected by and from among the Working Group members through nominations and election facilitated by the GEO Secretariat:
Co-Chairs will serve staggered terms of two years, with one co-Chair cycling out at the end of each year;
Co-Chairs may serve up to two consecutive terms, if re-elected by the GEO-CITSCI membership;
Self-nominations by GEO-CITSCI members via email to the current Co-Chairs;
Those who are members of GEO-CITSCI (as described above) are eligible to be nominated for Co-Chair.
Nominations will be encouraged from a geographic diversity of GEO Members, Participating Organizations, and Associates;
Current Co-Chairs will announce candidates. If the number of nominations exceeds the agreed target number, an election will be held;
If there are more nominations for co-chair(s) than there are open co-chair positions, then the GEO Secretariat will run an election via a digital platform. Voting will be facilitated by the GEO Secretariat (one week).
Each GEO-CITSCI member on the GEO-CITSCI listserv will get one vote.
Votes should consider increasing and supporting diversity and inclusion, including gender, geography, and expertise.
The current Co-Chairs will announce the results of the vote at the end of the voting period.
New co-Chairs will assume their role at the beginning of the new calendar year.

The two (or three) Co-chairs will:
Prepare meeting agendas.
Rotate chairing and moderating of each of the meetings.
Review documents prior to distribution to GEO-CITSCI members.
Formulate issues for discussion within GEO-CITSCI.
Propose, lead, and/or facilitate development of plans for implementing the activities of the GEO-CITSCI (such as work plans, subgroups, etc.)
Represent GEO-CITSCI to other groups within GEO and to outside organizations.
Ensure collaboration with the GEO Secretariat and other GEO flagships, initiatives, CAs, etc.
Report to the GEO Programme Board, GEO Secretariat, and other GEO governance bodies.
If there should be a lack of consensus between the co-chairs, decisions will be enacted through a simple majority vote of the plenary.
Maintain the shared GDrive of GEO-CITSCI and provide new members with access members

GEO-CITSCI will meet at such times and places as determined by its members and will work mainly through teleconferences and e-mail.
GEO-CITSCI will provide periodic (at least annual) reports on its activities to the Programme Board, as part of GEO Work Programme monitoring. It also may bring specific issues to the Programme Board as needed.
GEO-CITSCI may establish subgroups to assist in fulfilling its duties.
Administrative support is provided by the members themselves!
When deemed necessary, the membership may approve an exception to these guidelines when voted in favor by 2/3 majority of the plenary.

Duration:
These Operating Guidelines will remain in effect for the period of the GEO Work Programme. They may be revised with a simple majority vote of the plenary.

Is there a steering committee or other governance bodies that advise the Initiative but are not involved in day-to-day management?

No

What methods does the Initiative use to communicate with its participants?

- Email / e-newsletters
- Regular conference calls

Please describe the key risks that could delay or obstruct the completion of the planned activities and outputs of the Initiative, along with any actions taken to mitigate these risks.

Description of the hazard	Description of the possible impacts	Scale of impact	Likelihood of occurrence	Mitigation measures
Lack of participation	delay on the outputs	Severe	Possible	Look for newparticipants
Lack of interest form other GEO activities	difficulties in integration	Moderate	Not very likely	Colocate interaction opportuninties

What methods are used by the Initiative to monitor its effectiveness?

- Informal discussions with users / beneficiaries

Would the Initiative be interested in assistance from the GEO Secretariat for developing an impact plan?

No

How are the results of the monitoring and evaluation activities shared with participants and the wider GEO community?

They are not.

Are any monitoring or evaluation activities required by funders/contributors?

No

Participants

Please list the active individual participants in the Initiative

First name	Last name	Email address	Member	Org
Uta	Wehn	u.wehn@un-ihe.org	IHE - IHE Delft Institute for Water Education	IHE - IHE Delft Institute for Water Education
Lea	Shanley	lshanley@renci.org	United States	University of Wisconsin - Madison - University of Wisconsin - Madison
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Sven	Schade	s.schade@ec.europa.eu	European Commission	JRC - Joint Research Center
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Joan	Maso	joan.maso@uab.cat	Spain	CREAF - Centre for Ecological Research and Forestry Applications
Linda	See	see@iiasa.ac.at	Austria	IIASA - International Institute for Applied Systems Analysis

Other information

Please provide any other comments or information that was not included in the previous sections, but you would like to appear in the Implementation Plan.

- no answer given -

- no supporting documents provided -

Co-Editor Management

List of co-editors for this initiative

First name	Last name	Email address
Linda	See	see@iiasa.ac.at
Preetam	Heeramun	psheeramun@gmail.com
Uta	Wehn	u.wehn@un-ihe.org