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## WP23\_25: GEO Human Planet

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1246,246

### Basic Information

#### Full title of the Initiative

Human Planet Initiative

#### Short Title or Acronym

HPI

#### Current category in the 2020-2022 GWP

GEO Initiative

#### Proposed category in the 2023-2025 GWP

GEO Initiative

### Points of Contact

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### Purpose

#### Objective

The HPI aims to measure, monitor and assess human presence on planet Earth and in doing so help to address hazard impact on society, societal demand for resources and societal impact on the environment.

#### Please provide a short description of the Initiative

Human Planet Initiative generates, integrates and compares global datasets related to the built-environment and population and its attributes. Physical size of human settlements (built-up) and population density spatial grids are the foundation variables produced by HPI and available over time dating back to 1975. The two variables are regularly improved using new satellite image collections and population censuses. The physical size of settlements is also partitioned in residential and non residential areas. VIIRS are the new satellite collection available within HPI. The population spatial grids are available at different spatial resolution and generated using different dis-aggregation techniques. Population spatial grids are now also attributed to include age groups, gender and other attributes. HPI also compares population and physical size spatial grids generated outside the HPI and provides an evaluation and fitness for purpose. The integration of the two foundation variables has generated the human settlement model a methodology that outlines cities, towns and rural settlements used also to partition the built-environment in urban and rural areas. Physical size of settlements and population grids

intersected with thematic information has generated new knowledge captured in new spatial grid including global emissions spatial grids, global hazard exposure spatial grids. The outlining of cities was used to generate the Urban Centre database a collection of over 10000 cities that each is attributed with physical and socio-economic information. The Urban Centre Database was also used to generate the functional urban areas an extension of the urban spatial extent based on commuting distances cities HPI contributes to the four engagement priorities of GEO. It contributes to SDG 11, to understand disaster risk by providing global exposure layers. HPI is engaged in capacity building of Regional GEO and contributes to populating the EO4SDG toolkit and the EO Risk Toolkit.

### **Why is this Initiative needed?**

The initiative generates global human settlement information including global population density and built-up over time. The initiative models also past population densities and physical size of settlements dating back to 1975 and it generates population and built-up projections into the 21 century. The Information is used in the Socio-economic pathways, to measure SDG indicators, to compute exposure to hazards information, to estimate emissions and demand for resources and to quantify urbanization globally.

### **What evidence is there to support this need?**

The information is cross sectorial to other GEO activities and essential to address the GEO engagement priorities.

### **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.**

Global Urban Observation and Information (GUOI)

### **How is this Initiative unique?**

It generates globally harmonised societal variables used to assess human (societal) activities and processes at global, regional and local level.

The societal variables are cross sectorial to that of other GEO activities.

**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.**

<b>Output</b>	<b>Status</b>	<b>Users</b>	<b>Additional info</b>
Datasets: Global Built-Up spatial grids	Regularly updated	Disaster Risk, Urban Planners	Crisis Managers
Datasets: Global Population spatial grid	Regularly updated	Disaster Risk Community,	Population spatial grids come with different characteristic and customized to certain use. For example, most EU web based services related to Disaster risk and impact use Global Human Settlement Population Grids (GDACS, Copernicus EMS, INFORM)
Datasets: Population Projections	Regularly updated	UN FCC, EU,	
Dataset: Global Human Settlements	Regularly updated	FAO, UN Habitat, OECD, EU,	The methodology is now tested in a number of Countries
Datasets: Urban Center Database	Regularly updated	EU, UN Habitat, Other international	
Datasets: Functional Urban Areas	Regularly updated	OECD, EU	

**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?**

HPI generates global datasets used to address global issue (urbanization, disaster risk) and regional or local issues.

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

There is an increase uptake of the layers for policy making beyond what is listed above. The largest projected uptake is likely to be from regional organization and national administrations especially to address the Post 2015 Development Agenda

**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?**

The information generated are used within information services that help to make better decisions related also to Crisis Management, and address Development issues including slum upgrading.

**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?**

Yes

### **Please identify the requesting organization.**

The Initiative generates the Built-up and Population spatial grids used to generate the Degree of Urbanization.

The Degree of urbanization was co-developed and produced by European Commission, World Bank, UN Habitat, FAO, OECD, ILO

The Degree of Urbanization is a methodology to delineate cities, urban and rural areas adopted by the United Nations Statistical Commission for international comparison including the SDGs.

### **Describe the nature of the request.**

The Degree of Urbanization is the first standardized methodology to outline cities and settlements globally. The UN Statistical Commission combined the endorsement with the request to support countries in the implementation of the method. Consequently a number data sets, methods, tools and capacity building activities were developed.

### **Please provide supporting documentation of the request.**

- 1\_s20\_s0094119020300838\_main\_2.pdf ([link](#))
- degurba\_un\_stat\_bg\_item3j\_recommendation\_e.pdf ([link](#))

## **Technical Synopsis**

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

The initiative exploits optical and SAR image collection over time to generate. The methodology and documents are in part available from the links provided below.

1. Delineation of human settlements from Landsat Imagery
2. GHSL Data package
- 3, Methods for improving open and free global population grids
4. Applying the degree of urbanization to the world

### **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.**

Improving the detection of built-up and the physical environment from the future satellite image collection using novel information extraction algorithms and artificial intelligence.

Improving the attribution of the physical environment including that of informal settlements.

Updating and improving population disaggregation techniques that include also gender and age.

### **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.**

HP will produce improvements on existing outputs, that include updated Built-up spatial grids, Population spatial grids, Settlements spatial grids, as well as new global datasets including residential and non

residential built-up as well as building height. Some datasets including the built-up spatial grids will be generated operationally by the Copernicus Emergency Mapping Service.

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

- no answer given -

## Resources

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

**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.**

- no answer given -

## Lessons from the 2020-2022 Period

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

Yes

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

Yes

**Please describe.**

Extracting information from satellite imagery requires a constant modification and improvement of information extraction techniques that have to be adapted to the technical characteristics of the new image collections. With higher image spatial resolution two main challenge are the sheer volume of the new image archives and improved spatial detail that need to be accommodated.

The initiative has worked closely with the users community to develop information and knowledge for policy making. We feel we have just started to address challenges imposed by a changing climate, energy restrictions, increase in hazard impact, globalization.

Challenge of engaging with other GEO persist mostly due to a lack of funding for cooperating projects

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

Yes

**Please describe.**

CIESIN implemented the COVID Viewer that provided updates on COVID infections

**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.**

The challenges include improving the spatial detail of current variables, the accuracy of the information layers and including new attributes to the built-up and population. For example, mapping slums, or informal settlements remains a challenge for the initiative. New challenges include generating projections of population and built up into the future. The upcoming challenges will also be related to understanding on the demands of resources at

city, regional and global level - especially energy - and the possible shortcomings, the adaptation strategies required to accommodate to a changing climate, the transition to a greener societies.

**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).**

The initiative provides datasets can be downloaded from dedicated web sites. The initiative also makes technical and scientific documents related to the production and usage of the datasets. Most of the datasets can be downloaded from  
and from

**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.**

- no answer given -

**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.**

- AFRIGEO - African Group on Earth Observations
- EO4SDG - Earth Observations for the Sustainable Development Goals
- EUROGEO - European Group on Earth Observations
- GEO Engagement Priorities Coordination - GEO Engagement Priorities Coordination
- GEO-EV - GEO Essential Variables
- GLOFAS - Global Flood Awareness System
- GEO-MOUNTAINS - Global Network for Observations and Information in Mountain Environments
- GUOI - Global Urban Observation and Information
- GWIS - Global Wildfire Information System
- BLUE-PLANET - Oceans and Society: Blue Planet

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

- ARCTIC-GEOSS - Arctic GEOSS
- CSDR - Chinese High-resolution Satellite Data Resources

- EO4SDG - Earth Observations for the Sustainable Development Goals
- EUROGEO - European Group on Earth Observations
- GEO-EV - GEO Essential Variables
- GEOGLAM - GEO Global Agricultural Monitoring
- GEO-WETLANDS - GEO Wetlands
- GLOFAS - Global Flood Awareness System
- LAND-COVER - Global Land Cover
- GUOI - Global Urban Observation and Information
- GWIS - Global Wildfire Information System
- NIGHT-LIGHT - Night-Time Light Remote Sensing for Sustainable Development Goals
- 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.**

The initiative has co-designed the Global Human Settlement Built-up layer and the Global Human Settlement Population layer with European Commission DG-REGIO and with FAO, UN Habitat, to generate the Degree of Urbanization.

The initiative delivers regional workshops in different part of the world in coordination with UN Habitat to implement the Degree of Urbanization in different countries.

**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?**

There is no capacity development strategy, however a number of activities to support countries is ongoing.

**Are there any commercial sector organizations participating in this Initiative?**

No

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

Yes

**Please describe these opportunities.**

The commercial sector is welcome to use the HPI.

### **Is there already commercial uptake occurring?**

Yes

### **Please describe the nature of this uptake and the relevant commercial sector organizations.**

The commercial sector is for example part of the EO4SDG Toolkit for resilient cities that is produced also with HPI data.

HPI data is widely use also by companies for commercial purposes.

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

Yes

### **Please describe these opportunities.**

The commercial sector will be involved in producing the Global Human Settlement - Built-Up map from 2022 onward in the framework of the European Copernicus Programme.

### **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.**

Martino Pesaresi - Co-lead

Robert Chen - Co-lead

Daniele Ehrlich - Coordination

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

Yes

### **Please describe the roles of each body. If there are multiple governance bodies, please describe the relationships among them (such as through a governance structure diagram).**

Steering Committee - The Working Group (WG) leads make up the steering committee.

The WG Leads will nominate members of the steering committee.

WG\_01: Earth Observation data extraction (JRC)

WG\_02: Information integration (CIESIN, JRC)

WG\_03: Modeling (JRC, CIESIN, CUNY)

WG\_04: Fitness for Purpose (CIESIN, JRC)

WG\_05: Dissemination (CIESIN, JRC)

- no supporting documents provided -

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

- Email / e-newsletters
- Regular conference calls
- Website
- Regular events

**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
Human Resources	Inability to generate updates	Moderate	Very likely	

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

- Informal discussions with users / beneficiaries
- Website statistics

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

- no answer given -

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

We feel that the best indicator on the value of HPI work and dataset is the uptake by scientist, decision makers, and practitioners within and outside the GEO community.

The GEO community is slower in picking up HPI dataset than policy makers, practitioners and scientist from the wider community.

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

No

## **Participants**

**Please list the active individual participants in the Initiative**

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## 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.**

The initiative is supporting a number of GEO activities, including

1. Toolkit for Cities and Settlements - led by EO4SDGs
2. Toolkit for Disaster Risk Reduction - supporting the GEO WG DRR.
3. Actively contributes to the GEO Mountain activities
4. Part of the 2023-2025 activities will be devoted to better integrated with other GEO projects.
5. HP uptake by the policy community and research community is summarized in the Human Planet Atlases series and in particular in the Human Planet Atlas 2020 Open geoinformation for research, policy, and action

- no supporting documents provided -

## Co-Editor Management

### List of co-editors for this initiative

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