Urban Heritage Climate Observatory

STRATEGIC IMPLEMENTATION PLAN
2020 – 2022

UHCO - A new Community Activity in the GEO Work Programme

URBAN HERITAGE CLIMATE OBSERVATORY

United Nations Educational, Scientific and Cultural Organization · World Heritage Centre

GEO GROUP ON EARTH OBSERVATIONS

Table of Contents

Points of Contact

Jyoti **HOSAGRAHAR**
UNESCO / World Heritage Centre
j.hosagrahar@unesco.org

Evangelos **GERASOPOULOS**
Greece / Greek GEO Office
egera@noa.gr

Acronyms & Abbreviations

UHCO	Urban Heritage Climate Observatory
EO	Earth Observations
GEO	Group on Earth Observations
UNESCO	United Nations Educational, Scientific and Cultural Organization
ICOMOS	International Council on Monuments and Sites
LDCs	Least Developed Countries
SIDs	Small Islands Developing States
i-Mare Culture	IMmersive serious games and Augmented REality as tools to raise awareness and access to European underwater CULTURal heritagE
e-shape	EuroGEO Showcases: Applications Powered by Europe
5DARE	5 Dimensional space based methodology for Assessing and modeling the Response of Erosion dynamics to land use and climatic changes in Mediterranean watersheds
ED-ARCHMAT	The European Joint Doctorate in Archaeological and Cultural Heritage MATerials Science
EFAS	European Flood Awareness System
SDGs	Sustainable Development Goals
EO4SDG	Earth Observation for Sustainable Development Goals
GUOI	Global Urban Observation and Information
C3S	Copernicus Climate Change Service
CLMS	Copernicus Land Monitoring Service
CAMS	Copernicus Atmosphere Monitoring Service
CLIMATE-OBS	Climate Observation, Simulation and Impacts
EO4EA	Earth Observation for Ecosystem Accounting
EO4DRM	Earth observations for Disaster Risk Management
GEO-Value	Understanding the Impacts and Value of Earth Observations
CC-WG	Climate Change Working Group
GGO	Greek GEO Office
WHC	World Heritage Centre
SC	Steering Committee
WGs	Working Groups
GA	General Assembly
IT	Information Technology
GEOSS	Global Earth Observation System of Systems
DSP	Data Sharing Principles
DMP	Data Management Principles
GKH	GEO Knowledge Hub

1. Executive Summary

1.1 Overview

Climate change is one of the most critical issues of our time and its impacts on World Heritage properties are more evident than ever. Increasing exposure both to slow-onset climatic processes as well as extreme weather events are the most obvious of threats to the existence of cultural and natural heritage properties. In the case of urban heritage, there is an additional critical need to integrate different aspects of the sustainable development agenda, including urban resilience and sustainable urbanization, with the protection of heritage values, especially in World Heritage Cities, considering the centrality of cultural heritage's social, ecological and economic dimensions for sustainable urban development.

Earth observations (EO) hold great potential to shield urban heritage from climate change risks. Especially in World Heritage Cities, EO derived information can facilitate the creation of bridges between climate change and cultural heritage communities and offer a framework for the design of joint, multi-disciplinary and multi-governmental approaches to tackle climate change risks and impacts on cultural heritage. Yet, gaps exist in relation to integration and usability of different EO assets, along with increasing technical capacity.

The Urban Heritage Climate Observatory (UHCO), led by the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Centre (WHC) and the Greek GEO Office (GGO), will provide a forum for relevant partners to share good practices, needs and expertise; match user needs to EO assets to enrich and coordinate processes for the preservation, monitoring, management of urban heritage, as well as communication and advocacy around local, national and international Climate Action; and enable a modernization of practices through co-producing targeted tools and services focusing on climate change risks and impacts to urban heritage.

1.2 Planned Activities

- *Establishment of a coordination mechanism for the Community Activity;*
- *Engagement with and collection of data and information needs from users;*
- *Matching of needs with available EO assets and provision of a plethora of EO expertise to cultural heritage stakeholders and vice versa;*
- *Identifying key opportunities and challenges for gathering and applying EO data for conservation and management of urban heritage;*
- *Collection of global good practices, assisting in building awareness and networking;*
- *Building on the UNESCO Culture¦2030 Indicators, development of a preliminary set of indicators, and relevant EO-based workflows, to pinpoint climate change impacts on World Heritage Cities, the risk for urban heritage and, in parallel, explore interdependencies with other pressures of urbanization;*
- *Proposal of strategies for local and practical solutions for global policy frameworks and mechanisms to support and assist Member States to implement actions towards sustainable development and adaptation of climate change and towards enhancing resilience and disaster risk reduction integrated with conservation of urban heritage;*
- *Selection and prioritization of urban heritage sites at risk, also ensuring geographical balance and representation;*
- *Development of priorities, principles, and protocols for gathering, assembling, and analysing EO data in the context of climate change in historic cities;*
- *Concretization of synergies among partners, construction of a roadmap for funding and strategic design of short- to long- term activities.*

2. Purpose

2.1 Rationale

Climate change is one of the most critical issues of our time and its impacts on both cultural and natural World Heritage are more evident than ever, with increasing exposure both to slow-onset climatic processes, such as desertification and sea level rise, and extreme weather events[1] including floods, droughts, storms, wildfires and temperature extremes. Such processes and events directly threaten the preservation and existence of cultural heritage sites and their built structure, and also pose an indirect threat to their local communities and the transmission of intangible cultural heritage, as well as to associated tourism and other socio-economic activities. In the case of urban heritage, there is a critical need to identify and address climate change risks and impacts, while also furthering aspects of the sustainable development agenda and building urban resilience focusing on disaster risk, to ensure the preservation of past lessons and safekeeping for future generations.

UNESCO has been at the forefront of exploring and managing the impacts of climate change on World Heritage, defined as "the designation for places on Earth that are of outstanding universal value to humanity and as such, have been inscribed on the World Heritage List to be protected for future generations to appreciate and enjoy". In 2006, under the guidance of the World Heritage Committee, the WHC prepared a report on Predicting and Managing the Effects of Climate Change on World Heritage (2007), followed by a compilation of Case Studies on Climate Change and World Heritage, and a Policy Document on the Impacts of Climate Change on World Heritage Properties in 2008. In 2014, it published a practical guide to Climate Change Adaptation for Natural World Heritage Sites and continues to build the capacity of site managers to deal with climate change. Moreover, the WHC is in the process of updating its Policy Document on the impacts of climate change on World Heritage properties. The International Council on Monuments and Sites (ICOMOS), an Advisory Body to the World Heritage Committee, maintains a Working Group on Climate Change and Heritage, and while their main focus is to bolster the link between cultural heritage and climate change, they have identified a need to adjust and update methodologies surrounding heritage practices. The UNESCO 2011 Recommendation on the Historic Urban Landscape is another important framework to integrate heritage conservation with sustainable development and Climate Action.

While untapped, it is acknowledged that EO can significantly contribute to the above frames and holds great potential to enable and monitor specific mitigation and adaptation strategies to shield urban cultural heritage from climate change risks and impacts. EO in World Heritage Cities can accelerate and improve the provision of documentary evidence of cultural heritage, offer continuous monitoring and a means to standardize practices, engaging multiple disciplines and building upon systems and frameworks already in place. The focus on urban environments includes areas prioritized by UNESCO with limited capacities or facing extreme repercussions to climate change such as in the Least Developed Countries (LDCs), Small Islands Developing States (SIDS) and Africa.

Despite the majority of listed World Heritage Cities being located in Europe, climate change is a global issue, surfacing in different ways and at variable intensity unique to that locale. Any movement aiming to address all those local particularities, within the veil of global climate change, should ensure geographical balance

1 Impacts of climate change include slow onset events and weather extremes, which may both result in loss and damage. Slow onset events refer to the risks and impacts associated with increasing temperatures; changes in precipitation pH and amount; desertification; loss of biodiversity; land and forest degradation; glacial retreat and related impacts; ocean acidification; sea level rise; and salinization. Extreme weather and climate events refer to the risks and impacts associated with events including heatwaves, very cold spells, floods, storms as well as droughts and heavy rain.

and representation. World Heritage properties that are inscribed on the List of World Heritage in Danger, include Coro and its Port in Venezuela, where flooding threatens to deteriorate the architectural and urban coherence and integrity; the Old City of Sana'a in Yemen, which faces decay of the residential neighborhoods due to desertification; Timbuktu in Mali, where mosques are specifically vulnerable to both flooding and desertification, and demand immediate actions that EO could help inform. Other key risks for World Heritage cities are: pollution, material decay due to harsh weather, change in landscape, environmental degradation, storms/hurricanes, vandalism, and war.

With all this in mind, certain gaps arise in relation to assessing and addressing climate change risks and impacts on World Heritage. These gaps exist in policies and regulations, capacities in monitoring, recording, analyzing specific decay process and general impacts, to establish proactive conservation planning. Also, deficiencies are observed in community consultation practices and outreach to create mutually supporting system between formal authorities and informal communities of heritage.

The scope of the proposed Community Activity is to reveal to the cultural heritage community the fast-paced growth of EO technology and information to help address climate change risks and impacts on World Heritage cities, to contribute to innovative strategies for the conservation of cultural heritage where needs exist. It would also support global efforts for conservation of World Heritage properties with the use of EO data, products, and services in the framework of sustainable development including the UN 2030 Agenda for Sustainable Development and the World Heritage Policy for Sustainable Development (2015).The specific objective focuses on delivering a co-created global methodology and the foundation for the use of EO in cultural heritage conservation, as well as its testing and evaluation in different geographical contexts, representing a wide range of climate change impacts and preparedness levels.

2.2 Actual and/or planned outputs of the Community Activity

The Urban Heritage Climate Observatory (UHCO) will create a global platform to gather and integrate EO technology and EO-based data, information and composite indicators to address climate change risks and impacts on urban heritage. The platform will be evaluated through carefully selected pilot cases, meeting the aforementioned geographical criteria, where methodologies and tools will be implemented and tested as a means of fine-tuning the functionality of the global platform to ensure it is fit-for-purpose for its several end-users. In this way, UHCO will pave the path for a wide range of qualitative and quantitative open data sets and propose methodological approaches to confront climate change risks and impacts on World Heritage cities, taking advantage of EO products and services. The goal is to bridge geographical scales, integrating a global EO-based approach into local practices and conversely informing the global platform with local experiences.

2.3 Actual and/or intended users

The outputs will be co-designed with and for an interdisciplinary range of users, from cultural heritage stakeholders, such as UNESCO as well as the national and local governments that are States Parties to the 1972 World Heritage Convention, World Heritage cities engaged in planning for Climate Action, urban planning, reporting, and monitoring for sustainable development among other needs and challenges to inform management, heritage conservation, actions, and policy decisions. Eventually, national and local governments could extend the approach to all historic urban areas and their heritage. Scientists from research centers, universities, and space agencies in the fields of EO, cultural heritage, climate change, environmental policy and urban planning will bring together their individual expertise and assets to amplify outputs which will go beyond the sum of their efforts and resources by exploiting and combining the full range of satellite data with in situ observations and other local information of relevance.

Specific users we intend to target include site managers, urban planners and conservation practitioners who will greatly benefit from EO data and information in terms of identifying site coordinates, the monitoring of sites' state of conservation and threats to their Outstanding Universal Value (such as climate-related bushfires in remote areas), and general mapping needs helping to illustrate the cultural and natural landscape. Adding EO-derived data to complete and update the existing inventory of World Heritage properties would allow for specific risks to be identified and aid in standardization and integrated site management that goes beyond monitoring, conservation, and preservation to also help equip ministries of culture, local authorities and the urban planning community for emergency preparedness (both monitoring and forecasting), climate adaptation planning, and long-term infrastructure and resilience related initiatives. Detection and monitoring of a variety of environmental and spatial indicators through EO, such as air pollution monitoring for the blackening of structures, vegetation evolution, coastal erosion, and much more, can provide knowledge and advise a variety of users within the cultural heritage community, from national to local users, non-profits, governmental and intergovernmental actors, private foundations. Alternatively, EO and geospatial organizations could also tap into a new and meaningful uses of data, build new relationships and integrate cultural heritage into climate change monitoring services.

3. Background & Previous Achievements

Urban Heritage Climate Observatory (UHCO) is a new Community Activity that does not emerge from any previous activity within the GEO. However, it will take up on the experience and the outcomes of the "Earth Observations in Cultural Heritage Documentation," a previous GEO Community Activity which is no longer active within the GEO Work Programme. Apart from the fact that many partners of UHCO are already engaged in existing GEO Flagships, Initiatives, and Community Activities, their individual achievements and expertise in the fields of EO, climate change, world heritage, environmental policy, and urban planning, is of paramount importance to accomplish the planned activities. This is apparent, for example, from the following international and European research projects being undertaken by the Community Activity partners: i-Mare Culture, e-shape, Ecopotential, URBANFLUXES, 5DARE, BIOIONIAN, BEYOND, GEOCLIMATE, ED-ARCHMAT, CultureLabs, HERITAG, ERA-PLANET, EFAS, KULTURisk, GEO4CIVHIC, ProteCHt2Save and several others.

4. Key Activities

As the UHCO Community Activity continues to develop and through sustained and increasing interaction with members, the activities of the Community Activity will be concretized and elaborated upon through a fluid and inclusive co-design process. However, certain activities of UHCO have already been identified, some serving to satisfy needs which provided a basis for creation of this effort.

The tasks of UHCO center around the following typologies: matching of needs, increasing resilience, capacity building, education, dissemination of data, and knowledge transfer. The first category includes the identification and linking of the cultural heritage community's needs with EO capabilities and resources, along with building a bridge between these two communities- both principal activities for the Community Activity. Many activities will fall under building and enhancing the resilience of cultural heritage sites, monuments, practices, and cities. Along the same vein, tasks will further capacity building efforts, especially in regions that face major hurdles in addressing climate change impacts and attend to the maintenance and conservation of cultural heritage, with a focus on ensuring wide geographical coverage and increasing the technical capacity. Through training and educational efforts, the Community Activity will build capacities and facilitate the transfer of knowledge and sharing of best practices to enhance local, national and international efforts of using EO in relation to world and urban heritage. The communication of actions, activities, successes and challenges will support networking

and the attraction of funding.

General activities outlined for UHCO to be included in the 2020-2022 GEO Work Programme are listed below:

- *Matching of data and information needs with available EO assets and provision of a plethora of EO expertise to cultural heritage stakeholders and vice versa;*
- *Identifying key opportunities and challenges for gathering and applying EO data for conservation and management of urban heritage;*
- *Establishing a framework to assess and collect global good practices, assisting in building awareness, knowledge and networking, as an imperative component of the curriculum used in the Community Activity's training efforts;*
- *Building on the UNESCO Culture¦2030 Indicators, development of a preliminary set of indicators, and relevant workflows, to pinpoint climate change impacts on World Heritage cities, the risk for urban heritage and, in parallel, explore interdependencies with other urban dimensions such as pressures of urbanization and the natural environment;*
- *Proposing strategies for local and practical solutions for global policy frameworks and mechanisms to assist Member States to implement actions towards sustainable development, adaptation to climate change, and towards enhancing resilience and disaster risk reduction integrated with conservation of urban heritage. And where feasible and relevant, contribute towards prompting mitigation actions in heavily polluted World Heritage Cities;*
- *Developing priorities, principles, and protocols for gathering, assembling, and analysing EO data in the context of climate change in historic cities;*
- *Concretizing synergies among partners, construction of a plan for funding attraction and strategic design of short- to long- term roadmap of activities.*

Key activities and initial tasks to accomplish by the end of 2021:

- *Establishment of a coordination mechanism to facilitate effective governance and coordination;*
- *Definition of concrete actions for the Community Activity working groups;*
- *Engagement with and collection of needs from users at different levels and within a variety of domains, building off existing work and data available in the arena; and*
- *Mapping of existing/current projects and initiatives in the domain to build a comprehensive base of knowledge and to exchange information, build synergies, and avoid duplication;*
- *Identify some 'laboratory' sites for supporting the development of a framework for collection of EO data and information.*

Key activities and tasks to accomplish by the end of 2022:

- *Definition of indicators for climate risks and impacts on cultural heritage;*
- *Selection and prioritization of sites, also ensuring geographical balance and representation, to facilitate the testing of pilots; and*
- *Initial design of the architecture for the global platform, including the gathering of requirements and data; and*
- *Decision on approaches for building awareness and developing educational activities.*

Long-term activities:

- *Implementation of pilots and refining through testing and local feedback;*
- *Completion of platform development including the pilot and universal aspects; and*
- *Promotion of the inclusion of the created platform as a tool for national and international policy frameworks.*

5. Relationship to GEO Engagement Priorities and to other Work Programme Activities

UHCO operates upon the common ground of climate, heritage, and urban related Sustainable Development Goals (SDGs). It strives for protecting cultural heritage assets from climate change, such as through the UN Sustainable Development Agenda via SDG 13 to "combat climate change in all its aspects", and in particular Targets 13.1 on resilience and adaptive capacity against climate-related hazards, 13.3 on improving awareness-raising with respect to climate change mitigation and adaptation by exploiting the high visibility of heritage sites and 13.b regarding raising capacity for effective climate change-related planning and management in LDCs, SIDS and Africa as a priority. The Community Activity also directly addresses SDG 11, which aims to "make cities and human settlements inclusive, safe, resilient and sustainable" with its Target 11.4 to "strengthen efforts to protect and safeguard the world's cultural and natural heritage", among others. The Community Activity will also explore how it can contribute towards and work in alignment with the UNESCO Culture|2030 Indicators that aim to measure the role of culture as an enabler and a driver of sustainable development (and the SDGs), including contribution of culture in climate adaptation and resilience.

In addition to the UN 2030 Agenda for Sustainable Development, UHCO cuts across and supports the other two GEO priority engagement areas as well. Through advancing climate adaptation and resilience, the Community Activity serves the Paris Agreement, while, climate-aware World Heritage cities will serve as visible and strong advocates for the cause of carbon neutral and resilient cities, also connecting to "urban resilience", the fourth GEO engagement priority under development. Further, the Community Activity may also provide climate adaptation lessons from the past as well as climate analogues of today. By developing indicators and pinpointing climate change impacts on World Heritage cities and the risk for urban heritage due to climate change, the Community Activity serves the Sendai Framework for Disaster Risk Reduction, especially enhancing preparedness but also the other disaster risk management cycles.

The Urban Heritage Climate Observatory Community Activity will take up on the experience of the "Earth Observations in Cultural Heritage Documentation" previous GEO Community Activities regarding bottlenecks, good practices and avoiding any duplication of efforts. It will closely interact with the EO4SDG, Human Planet and GUOI Initiatives as the themes and scopes interplay and opportunities for synergies and added value exist. Other Community Activities of strong relevance to UHCO are the Copernicus Services (C3S, CLMS and CAMS), especially concerning data but also thematic implementations, the "CLIMATE-OBS regarding knowledge exchange and public awareness on climate impacts, the EO4EA with respect to natural capital accounting of World Heritage, EO4DRM towards improving disaster risk management through providing timely risk information relevant to the full cycle of disaster management for the conservation of World Heritage, and finally, the GEO-Value, wherein the value of EO in a yet scarcely addressed domain can be demonstrated.

Other synergies may be identified through the mapping of climate change-relevant activities in the GEO Work Programme being undertaken by the GEO Climate Change Working Group (CC-WG). The UHCO will be represented at the GEO CC-WG to actively participate in defining GEO's support to international and national climate action through the enhanced use of EO, contributing the perspective of urban heritage.

6. Governance

6.1 Description of the Governance Structure

In the context of the established partnership between UNESCO, GEO, and GGO, the Community Activity is coordinated by Greece through GGO and WHC, jointly. A flexible "core group" (no more than 8 participating entities) will be formed, in an attempt to bring together many different and, to the extent possible, thematic and technological expertise including a user perspective, from global to local scales. The "core group" will serve as the Steering Committee (SC) of UHCO, with the duty to design its strategic priorities and overlook the implementation of the decided activities. It will be co-chaired by WHC and GGO, and include the Climate Coordinator from the GEO Secretariat. The administrative/management part and orchestration of the SC decided actions will be facilitated by the GGO jointly with UNESCO, initially and for as long as the SC decides, which, for this purpose, has formed a dedicated department.

The Community Activity will mainly operate through Working Groups (WGs) to be established according to strategic priorities identified, avoiding any duplication of efforts within GEO or UNESCO work activities and enable interaction between the different disciplines. The chairs of the WGs will be decided internally and serve for a specified term. Critical decisions will be taken by the General Assembly (GA), where all members will be represented, and which is expected to convene once per year. However, there will be regular, dedicated meetings to facilitate exchange and cross-collaboration between WGs. At a more mature stage, (i.e., after the first year) additional focused committees (e.g., technical/IT, fundraising, private sector engagement) will be formed to provide technology advice and infrastructure support, to pursue funding opportunities, and deliver specific solution design and development, etc.

7. Data Policy

7.1 Policy of the Community Activity regarding data availability, including degree of adherence to the GEOSS Data Sharing Principles and GEOSS Data Management Principles

There is a broad range of EO data to be contributed to this activity, including satellite data, in-situ and other types of datasets, such as socio-economic data.

Most of the datasets are free and with open access. In some cases, in-kind contributions of commercial datasets from satellite providers are subjected to licenses and maybe limited in their use and distribution. In addition, data of cultural heritage relevance might be subject to specific limitations. The inherent expertise of the partners will ensure that the data policy of UHCO will be fully compliant and promote the "culture" of GEOSS (Global Earth Observations System of Systems) Data Sharing Principles (DSP) and Data Management Principles (DMP). Issues surrounding confidentiality and ownership of certain cultural heritage data and information exist, and the Community Activity will ensure that they are approached with the necessary sensitivity and will resolve them on an ad-hoc basis.

The envisioned platform that the Community Activity intends to develop and implement will, where possible, aim to meet GEO's goal of providing open and available data and methods for the community to access and replicate. While the desire is open sharing of data, restrictions will likely be necessary due to the sensitive nature

of cultural heritage data and formalities of data ownership and housing. While technicalities and details of this platform and data restrictions will be determined as the Community Activity intensifies and delineates needs and priorities, the GEOSS portal and GEO Knowledge Hub (GKH) infrastructure will be considered as a means to link and share Community Activity's outputs with the broader GEO community, focusing on providing open science where possible.

7.2 Description of how the outputs of the Community Activity, and the methods used to produce them, will be made accessible, including relevant urls or permanent identifiers

The data, methods, tools, and knowledge resulting from the Community Activity will be openly accessible to the extent possible. Regarding data policy outside GEOSS, the Community Activity will advocate for open data, while at the same time, adhering to GEOSS DSP and DMP for data directly produced under the Community Activity. The GEOSS portal and GKH can serve as the de facto discovery and access point for the data, analysis methods, and services and the Community Activity will provide the appropriate metadata creation and cataloguing. If deemed beneficial for the purposes of the Community Activity, a GEOSS Mirror implementation will also be explored. Lastly, the Community Activity will follow closely the ongoing development of the GKH and it will support the GEO transition from data-centricity to knowledge generation for heightened stakeholder engagement by infusing the knowledge package concept in its activities and community, as well as working to produce potential use cases that would be beneficial for the GKH establishment.

Partners

The UHCO Consortium currently consists of 75 partners representing 24 countries, geographically distributed across Africa (7), Americas (11), Asia-Oceania (12), and Europe (34), also including 11 international organizations. The partners represent a wide variety of entity types (governmental/public, research institutes, academia/universities, space agencies, intergovernmental/international, NGOs, and companies), which cover the interconnected domains of world heritage, climate change, Earth observation, environmental policy, and urban planning.

Austria: Zentralanstalt für Meteorologie und Geodynamik, Austria GEO; AIT Austrian Institute of Technology GmbH; University of Applied Arts Vienna, Institute for Conservation. Canada: Canadian Space Agency; Global Affairs Canada, Non-Proliferation and Disarmament Division, Space Policy and Regulatory Affairs; Environment and Climate Change, Science & Technology Branch; University of Waterloo; Parks Canada Agency. Cyprus: Eratosthenes Centre of Excellence, Cyprus University of Technology; The Cyprus Institute. Ecuador: National Institute of Cultural Heritage (NICH) appointed by Ministry of External Relations and Human Mobility (Permanent Mission to UN); Military Geographic Institute of Ecuador; Escuela Superior Politecnica del Litoral. Germany: University of Bayreuth, Biogeography; CGI Deutschland B.V. & Co. KG; DLR, German Space Agency, Earth Observation Centre; Justus Liebig University Giessen, Geography Department. Ghana: Center for Environmental Governance. Greece: FORTH (Remote Sensing Lab, Institute of Applied & Computational Mathematics, and GeoSAT Lab, Institute for Mediterranean Studies); National Observatory of Athens (NOA, IERSD, IAASARS, GI, BEYOND - Centre of Excellence); Greek GEO Office; DRAXIS Environmental SA; Planetek Hellas; Dipylon Society for the Study of Ancient Topography; Hellenic National Meteorological Service (HNMS); Institute of Communication and Computer Systems (ICCS); Aristotle University of Thessaloniki, Laboratory of Photogrammetry & Remote Sensing. India: Wildlife Institute of India, Category 2 Centre for World Natural Heritage Management and Training for the Asia and Pacific Region; ICOMOS India. Israel: Ben-Gurion University of the Negev, Jacob Blaustein Institutes for Desert Research, Remote Sensing Laboratory; Geological Survey, Ministry of Natural Infrastructures; Israel Nature and Parks Authority; Israeli Antiquities Authority; Dead Sea Drainage Authority. Italy: PIBINKO; Institute of Atmosperic Sciences and Climate, National Research Council of Italy (ISAC-CNR); Italian Institute for Environmental Protection and Research (ISPRA); Politecnico di Torino, Department of Architecture and Design; Italian Institute for Technology (IIT). Lithuania: Lithuanian Geological Survey, Ministry of Environment. Nigeria: African Climate Change Research Centre (ACCREC); Nigeria GEO. Norway: NILU, Norwegian Institute for Air Research. Pakistan: Pakistan Office of the International Union for Conservation of Nature (IUCN). Rwanda: Rwanda National Commision for UNESCO (RNCU). South Africa: South African National Space Agency; South African National Parks. Spain: Geological Survey of Spain; Universidad Politecnica de Madrid, Department of Urban and Spatial Planning; Iberoamerican Institute of Air and Space Law; Earthlab AI Systems Inc. Tanzania: Institute of Rural Development Planning (IRDP) of Dodoma; University of Dodoma. The Netherlands: Leiden University, Archaeological Sciences Department, Digital Archaeology Group. Turkey: Istanbul Technical University, Faculty of Civil Engineering, Department of Geomatics Engineering. United Kingdom: Environment Systems; Nottingham Geospatial Institute; Deimos Space UK; Edinburgh World Heritage. United States of America: United States National Committee of the International Council on Monuments and Sites; Chapman University; NASA/UL Lafayette Regional Application Center; America View Programme. Vietnam: Vietnam National University, Institute of Vietnamese Studies and Development Science. Zimbabwe: University of Zimbabwe YouthMappers. International: EURISY, France; European Centre for Medium-Range Weather Forecast (ECMWF), UK/Italy; GEO Secretariat; iMMAP, France; International Council on Monuments and Sites (ICOMOS), France; International Society for Digital Earth; International Centre on Space Technologies for Natural and Cultural Heritage (HIST), China; International Programme Office of Integrated Research on Disaster Risk (IRDR), China; UNESCO World Heritage Centre (WHC); United Nations University, Institute for Environment and Human Security (UNU-EHS) Global Mountain Safeguard Research Programme (GLOMOS), Germany; World Meteorological Organization (WMO incl. SC-MINT, INFCOM).

URBAN HERITAGE CLIMATE OBSERVATORY

UHCO Implementation Plan - April 2021

We would like to acknowledge all that played a part in the conceptualization, synthesis and reviewing of the current implementation plan. Contributors: Jennifer Bailey & Nefta Votsi (editing), Fatimah Khan (formatting), Eleni Christia & team (graphics).