



DOWNSTREAM GATEWAY
Space for Earth

SPACE FOR CULTURAL HERITAGE

An ESA Earth Observation perspective on Trends, Challenges and Future Prospects
in Cultural Heritage

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24 February 2021

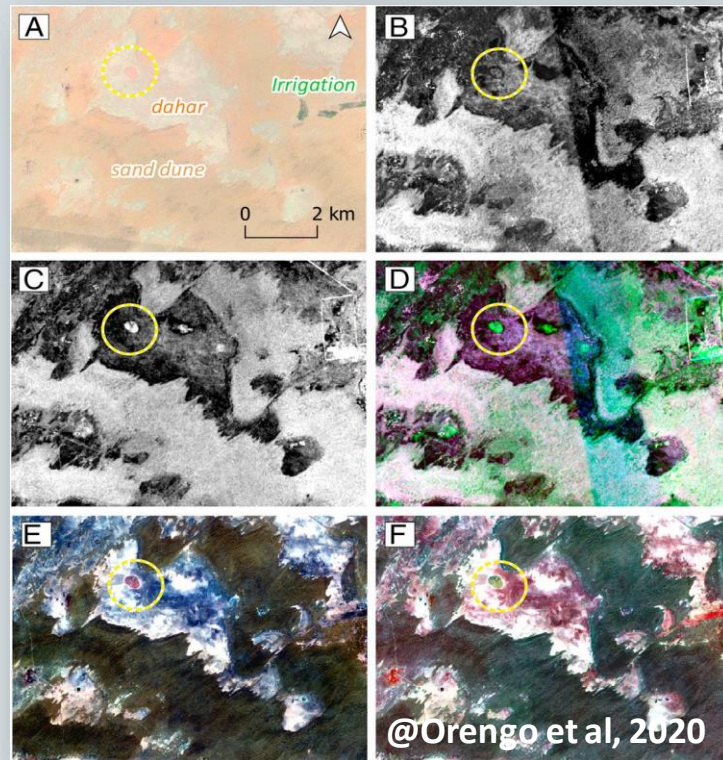
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- EO use to date: which applications
- New applications and techniques
- EO Data : Copernicus and new space assets
- DTE – Cultural Heritage as a new element
- EO to raise awareness during the pandemic
- A larger stakeholders base
- Recommendation for a way forward
- Partnering with ESA

EO use to date: which applications (1)

DISCOVERY AND MAPPING

Identification of new archaeological sites and further exploration of existing ones



ESA and the Vatican Apostolic Library: preservation, management and exploitation of archived information



DATA PRESERVATION

EO use to date: which applications (2)

ANTHROPOGENIC IMPACT

Intentional site destruction
(religious and fundamental reasons)

Indirect site destruction
(side-effect of a local human-made crisis)

Poaching of hidden archaeological artefacts / Looting



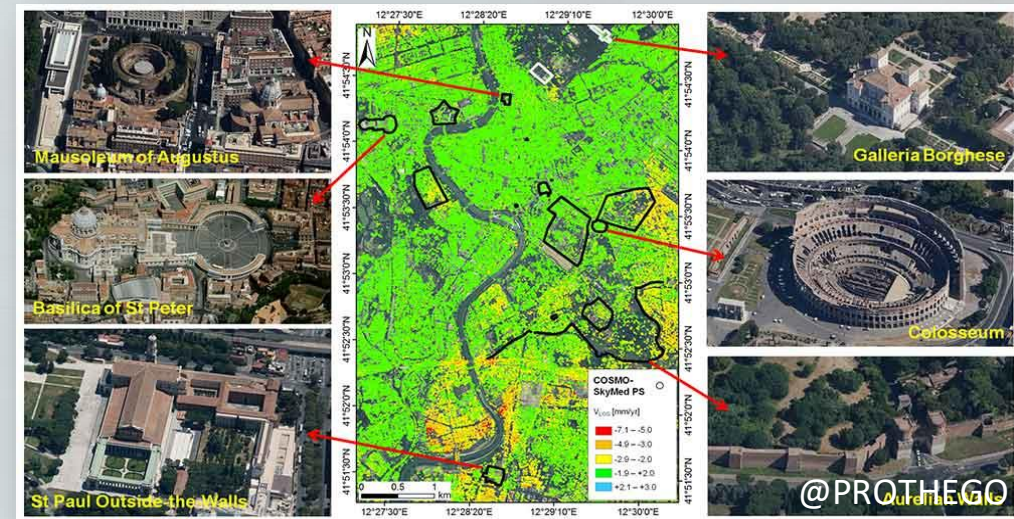
Natural disasters / extreme meteorological
events / climate change

Risk mapping

Early warning

Geo-hazard monitoring

Damage assessment



NATURAL IMPACT

APPLICATIONS

Mostly site-based, limited

Survey

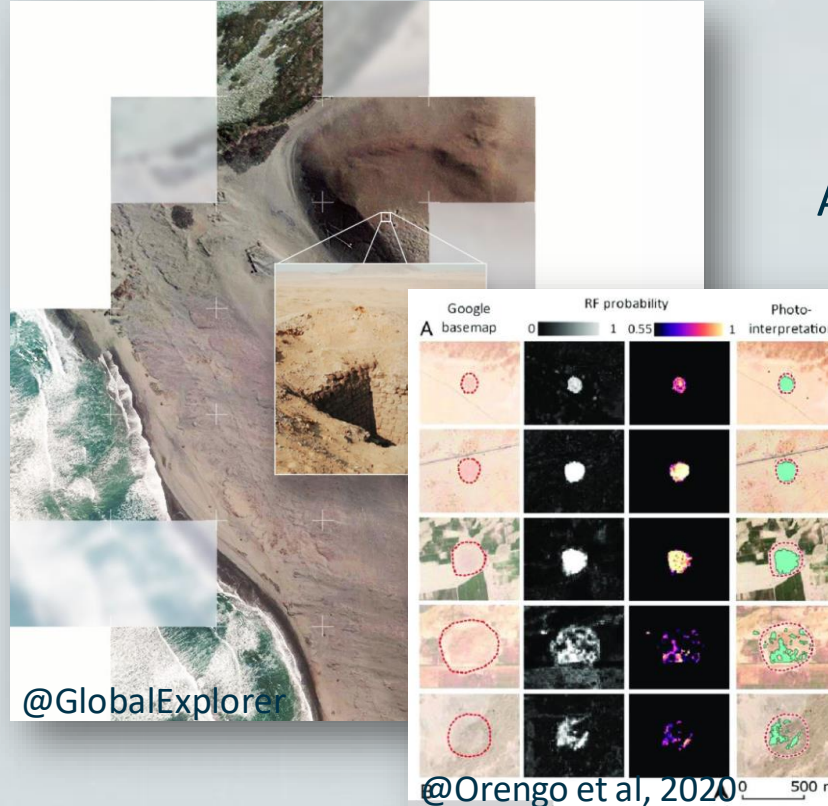
Looting

Features detection

Automation of process:

detection/counting/prospection etc.

Cultural Heritage Fruition



ARTIFICIAL INTELLIGENCE

DEEP LEARNING/CNN

COMPUTER VISION

AR/VR

CROWDSOURCING

CITIZEN SCIENCE

TECHNIQUES



Datasets typically tailored to the research interests of individual projects and dataset heterogeneity



Data aggregation/inter-project comparison challenging even when data are publicly available

Contribution of EO services and products such as those from Copernicus and Contributing Missions

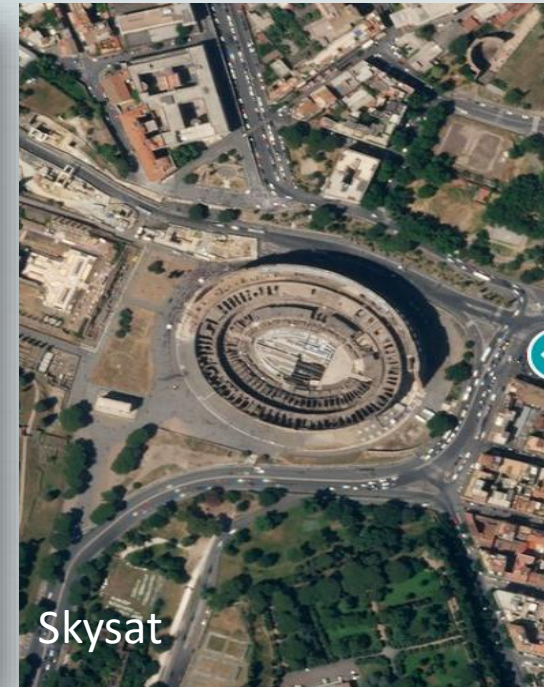
Management of cultural heritage during emergencies (especially in the case of geo-hazards)

Mapping, monitoring, preservation and management of cultural heritage become a daily routine

- ➡ High frequency of observations
- High and very-high resolution imagery
- ➡ Near real time observation



Privilege preventive actions to reactive ones





Predictive decision support capability for sustainable tourism policies and actions

Engagement of multi- and inter-disciplinary communities to fill the gap between experts (remote sensing, CH managers, AI experts, social scientists, civil protection and actors from impact sectors)



Edition ▾

① Updated 0911 GMT (1711 HKT) April 17, 2020

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Written By **Zaini Majnoon**

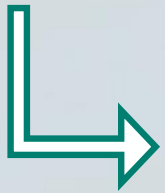


EO to raise awareness during the pandemic



According to UNESCO's World Heritage Committee, as of early April last year:

- 71% of the 1,121 World Heritage sites had been closed
- 18% were only partially open



increased vulnerability to looting

suspension of rehabilitation, conservation and archaeological exploration works



decline in cultural funding

Need to rethink business models for Cultural Heritage in the future

A larger stakeholders base

To date

Mostly research and institutional

Potential for providing services to other actors

- archaeological parks management
- companies providing virtual tours
- environmental organizations
- governmental authorities
- prosecutors
- media
- citizens community



Need to rethink business models for Cultural Heritage in the future

- ➡ Strengthen the communication and the synergies between EO experts and Cultural Heritage management
- ➡ Provide user-ready products (connection between the data providers and the end-users - site managers)
- ➡ Supporting the generation of processes and practices for technology and Cultural Heritage

Cultural Heritage in the Digital Twin Earth

EO uptake in new Cultural Heritage applications

Predictive decision capability for sustainable tourism policies and actions

The missing layer: engagement of multi- and inter-disciplinary communities



Recommendation for a way forward



INCREASE STAKEHOLDER AWARENESS

Ad-hoc activities based on the usage of available Copernicus products in collaboration with the Cultural Heritage community to improve the knowledge about the offering and potential coming from Copernicus and Contributing Missions.

MULTI-SOURCE DATA

EO satellite data
in-situ measurements
GNSS and UAV data
Ground Penetrating Radar (GPR)



INNOVATION

AI4EO
Open data and crowdsourcing
VR/AR experiences
Citizen Science

Partnering with ESA



ESA supports projects that want to leverage EO data in the cloud, with sponsorship initiatives that facilitate the access to European EO Platforms and Data

Euro Data Cube

<https://eurodatacube.com/>

Network of Resources

<https://eo4society.esa.int/sponsorship/>

Innovative projects combining the power of future technologies to preserve and enhance the fruition of Cultural Heritage

<https://eo4society.esa.int/2020/11/26/open-call-for-proposals-2020-future-eo-1-programme/>

Platform services

Platform services provide data analytics, collaboration tools or other supporting functions to scientists or value adders to allow them to achieve their results in the shortest time possible, and in particular without the need to download the data on their own infrastructure. The services rely on the underlying data infrastructure for massive data extraction and processing.



Thank you

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