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Press release - April 13th, 2026

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Survey reveals: cultural heritage protection could strongly benefit from space technologies

Two Europe-wide surveys on the qualification requirements of cultural heritage practitioners and geoinformation experts on the use of satellite data for the protection of cultural heritage reveal a high willingness of using space technologies but also serious organisational and financial barriers. For the first time, there is now a reliable data source on how the cultural heritage sector could benefit from space technologies in terms of training.

The European SATCULT project reports the findings of two surveys designed to learn more about the training needs of cultural heritage (CH) practitioners and Earth observation (EO) experts in order to use EO and satellite data for the protection of cultural heritage. A total of 65 heritage practitioners and 19 geoinformation experts participated in the survey adding up to 84 respondents. The implementation was led by the Italian Institute of Heritage Science (ISPC) of the Consiglio Nazionale delle Ricerche (Naples) with contributions of the German media k GmbH (Bad Mergentheim) and the Cypriotic research institute Eratosthenes Center of Excellence (Limassol).

While both sectors show a high willingness to collaborate, successful adoption of satellite data is hindered by organisational and financial barriers rather than a lack of technical capability. CH professionals seek integrated workflows and clear governance rather than just raw data, while geoinformation specialists require a shared terminology and better access to the CH domain.
To address these asymmetries, the analysis of the survey outcomes advocates for a vocational modular training framework. Ultimately, the survey outcomes suggest that the transition from interest to implementation requires open-source tools, flexible support models, and a focus on interdisciplinary communication to protect cultural heritage sites effectively.

Greatest demand in risk management and prevention

The "risk–prevention–protection" framing prevails in the application demands. The priority applications stated are clearly oriented towards risk management and prevention:

- Conservation/protection strategies (76.9%)[1]
- Monitoring of risk phenomena (75.4%)
- Early detection/protection (75.4%)
- Monitoring sites vs looting/vandalism (72.3%)
- Environmental analysis/climate change impact (69.2%)

When it comes to specific use cases, operational and hazard-driven priorities emerge:

- Structural monitoring (sites/historic structures) (73.8%)
- Climate change prevention and protection (72.3%)
- Landscape analysis linked to hazards (69.2%)
- Fire / hail / storms (69.2%) each.

Main barriers for adopting satellite technologies

- Economic Constraints and Procurement: For CH institutions, the high cost of external technologies and missing skills is the most significant barrier. These organisations often have a high perceived need for the technology but low discretionary spending capacity. Furthermore, rigid multi-year contracts often encounter procurement barriers within these institutions.
- Integration with Existing Workflows: A major hurdle is the difficulty of integrating EO output into existing CH workflows, asset management systems, and decision-making processes. CH institutions often struggle to absorb this data without stable internal mechanisms for implementation.
- Skills and Expertise Gaps: There is a significant asymmetry in expertise. CH institutions report limited internal expertise to handle the data, while GI/EO experts find it difficult to deliver services because they lack staff with specific cultural heritage skills.
- Semantic and Communication Barriers: There is a notable lack of shared terminology and interdisciplinary exchange. This "semantic" gap means that technical outputs from satellite data are not always easily translated into management decisions or CH-readable deliverables.
- Organisational and Administrative Risks: CH institutions often hesitate because they bear operational and administrative risks, including concerns regarding reputation, responsibility, and governance. They require greater clarity on requirements and benefits before committing to the technology.

[1] Percentage of responses received

Interesting enough, the main barriers are not primarily technical but are instead organisational, semantic, and economic. These challenges differ slightly depending on whether they are viewed from the perspective of the cultural heritage institutions (the demand side) or the geoinformation experts (the supply side). Obviously, the solution is not "more technology," but rather the creation of interface mechanisms such as common glossaries, standardised reports, and clear governance models to bridge the gap between technical supply and operational demand.

Transfer from data generation to concrete actions

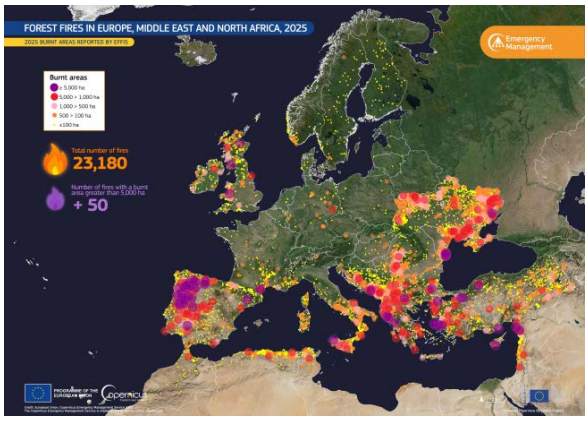
The most 'adoptable' outputs are not generic maps or technical products, but actionable deliverables (indicators, thresholds, triggers, periodic reports and dash-boards) linked to prevention/inspection protocols. There is a high level of awareness, for example regarding the foreseeable damage caused by climate change and a need for tailored solutions that can be implemented cost-effectively. At the same time, the survey outcomes also show, that transfer of existing research findings into practical protective measures is insufficient. In short: the possibilities are known, but implementation is lagging behind.

Next steps

A modular training approach is suggested to bridge the gap between a heterogeneous audience requesting both introductory and advanced analysis and experts who emphasise technical fundamentals and database integration. “The survey results read like guidelines for new work-based training programmes, but also point the way towards academic curricula”, says Karin Drda-Kühn, coordinator of the SATCULT project. This could open a whole new chapter in the training of cultural heritage experts. Due to the challenges posed e.g. by climate change, interdisciplinary collaboration is increasingly becoming a central focus of the academic as well as vocational training of cultural heritage experts. Training and further education programmes have not yet responded adequately to this, but the newly collected data has laid the groundwork for doing so.

Please find the full report of the survey outcomes here: https://satcult.eu/survey/

Picture suggestion for free use:



Caption: This data visualisation from the European Forest Fire Information System (EFFIS), shows the distribution of fires across EU regions in 2025, threatening cultural heritage places. A total of 23,180 fires were recorded across the European Union, other European countries, and the Middle East and North Africa.

Photo credits: European Union, Copernicus Atmosphere Monitoring Service Data