PROGRAMME OF THE EUROPEAN UNION

co-founded with esa

COPERNICUS4REGIONS 2025

CHANGE DETECTION ANALYSIS ON WALLOON BROWNFIELD SITES

Sophie Petit, Mattia Stasolla, Coraline Wyard, Gérard Swinnen, Xavier Neyt, Éric Hallot
ISSeP | RMA | Belgium



> Copernicus helps Wallonia efficiently monitor brownfields, offering timely updates to enhance decision-making and support sustainable land management.
>
> **Christophe Rasumny**
> *Attaché (SPW- TLPE, DAOV)*

Bois du Cazier - Former coal mine in Marcinelle, Belgium | Credits: Luc Viatour

Detecting changes in brownfield sites in Wallonia is essential for sustainable urban planning. By using Copernicus satellite data, Wallonia has partially automated the updating of the brownfields inventory, saving time and resources while improving accuracy and decision-making processes.

THE CHALLENGE

Wallonia, a historically industrial region, has over 2,000 “brownfields” and other urban disused sites, resulting from decades of economic decline and deindustrialization. These sites, whether polluted or not, range from small businesses to major industries, and remain abandoned or underused. Brownfield redevelopment helps reduce urban sprawl and soil artificialization, aligning with the European Commission's objectives to limit soil sealing.

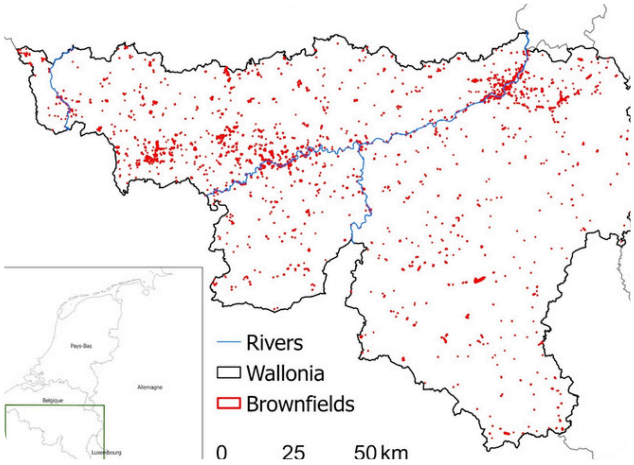
Updating Wallonia's inventory is therefore crucial and requires continuous, day-to-day work. However, traditional methods like field inspections and orthophotos analysis are time-consuming and costly, making it difficult to detect changes promptly. Public authorities face the challenge of monitoring numerous sites while ensuring reliable information for stakeholders, investors, and decision-makers. A faster, scalable, and cost-effective approach was urgently needed to improve the inventory’s usability and prioritize actions.

THE SPACE SOLUTIONS

The Copernicus Sentinel-1 and Sentinel-2 satellites form the foundation of Wallonia’s automated brownfields monitoring tool. Sentinel-1’s radar imagery detects structural changes regardless of weather conditions or daylight, while Sentinel-2’s optical data complements it by capturing vegetation dynamics and surface transformations. Together, these satellites provide comprehensive insights into land-use changes, enabling reliable brownfield monitoring.

The SARSAR project fully automates the processing of this data using the Terrascope platform, Belgium’s contribution to the Sentinel Collaborative Ground Segment. Advanced time-series analyses and change detection techniques, such as the Pruned Exact Linear Time (PELT) method and spectral indices like the Normalized Difference Vegetation Index (NDVI), are employed to identify both abrupt and gradual transformations.

These changes are classified into three main types: vegetation, buildings, and soil, with precise timestamps assigned to each event. This automated workflow generates reports every two months and annually.



Brownfields geographical distribution | Credits: Sophie Petit

THEMATIC AREA

Territorial Management and Urban Planning

REGION OF APPLICATION

Walloon Region

SENTINEL MISSION USED

S1, S2

COPERNICUS SERVICE USED

-

THE BENEFITS AND THE BENEFICIARIES

Managing brownfield sites is a complex challenge. Often associated with risks such as soil contamination, visual degradation, and economic decline, these sites also hold significant potential for transformation and land development. They offer Wallonia an opportunity to address environmental, social, and economic challenges. Their rehabilitation enhances the environment for nearby residents while transforming abandoned spaces into valuable assets that reflect Wallonia's heritage and future ambitions.

Many brownfields are strategically located in urban areas, connected to public transport and infrastructure. Their regeneration supports the development of new housing, industrial zones, recreational areas, and green spaces. Furthermore, repurposing these sites helps Wallonia reduce urban sprawl, limit soil sealing, and mitigate environmental risks such as flash floods.

Thanks to SARSAR's automated bi-monthly and annual change detection reports, the process of updating Wallonia's brownfields inventory has been significantly enhanced, transforming it into a dynamic tool for land-use planning.

The streamlined process ensures the inventory remains accurate and up-to-date, saving time and resources while enabling authorities to identify and prioritize sites more effectively. This is particularly valuable, as the inventory is regularly published and accessible to all stakeholders via an online platform, fostering collaboration among planners, developers, and local communities to effectively guide redevelopment decisions.

	TIER 1 SERVICE PROVIDER	TIER 2 PRIMARY USER	TIER 3 SECONDARY USER	TIER 4 END USER BENEFICIARIES
SERVICES AND BENEFITS	Sentinel-1 Sentinel-2	Decision-making tool for a more efficient updating of the brownfields' inventory	Facilitated rehabilitation of brownfields	Limitation of urban sprawl Development of residential, industrial or recreational areas
BENEFICIARIES	Institut Scientifique de Service Public (ISSeP) Royal Military Academy (RMA)	Wallonia Region: Public service of Wallonia Land, housing, heritage and energy (SPW–TLPE), Operational Planning and Urban Development Directorate (DAOV)	Wallonia Region Local decision-making administration	Citizens and society

EU POLICY / DIRECTIVE

Other

TYPE OF SERVICE PROVIDER

Public Service

TYPE OF FUNDING SOURCE

National Space Programmes

USAGE MATURITY LEVEL

5



A FUTURE WITH COPERNICUS

The upcoming Sentinel-1C and Sentinel-2C missions, with their technological improvements, will enhance the SARSAR tool's ability to detect changes in brownfields. The aim is to integrate these new satellites into the SARSAR tool's workflows, further streamlining inventory updates and ensuring that stakeholders receive reliable, long-term data.



DID YOU KNOW?

Wallonia leverages Copernicus Sentinel-1 and Sentinel-2 imagery, combined with orthophotos analysis, to significantly reduce the effort and resources required for brownfield monitoring. This innovative approach minimizes fieldwork, enabling authorities to prioritize key sites and allocate resources more effectively, benefiting both planners and local communities.

Acknowledgements

This research was funded by BELSPO (Belgian Science Policy Office) in the frame of the STEREO III programme—project SR/00/372. The continuation was financed by a grant from the Public service of Wallonia Land, housing, heritage and energy (SPW–TLPE), Operational Planning and Urban Development Directorate (DAOV).

Contacts

Sophie Petit | s.petit@issep.be
Mattia Stasolla | Mattia.Stasolla@mil.be
Coraline Wyard | c.wyard@issep.be
Gérard Swinnen | g.swinnen@issep.be
Xavier Neyt | xavier.neyt@mil.be
Éric Hallot | e.hallot@issep.be

ABOUT COPERNICUS4REGIONS

This user story is part of the Copernicus4Regions collection, which is managed by NEREUS under an assignment from ESA. The views expressed in the Copernicus User Stories are those of the Authors and can in no way be taken to reflect the official opinion of the European Space Agency or of the European Commission. Copernicus4Regions is funded by the European Union, in collaboration with NEREUS. Paging, printing and distribution funded by the European Space Agency. Graphical design by the ESA EO Graphics Bureau.

IPR Provisions apply. Copernicus4Regions material may be used exclusively for non commercial purposes and provided that suitable acknowledgment is given.