

29 September - 01 October 2026 ESA-ESRIN | Frascati | Italy

Environmental Crimes joint workshop with ESA-JRC-UNODC

From Earth Observation to Operational Environmental Compliance: Satellite-Based Monitoring of Illegal Waste Disposal in Rome Municipality

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1: e-Geos, Italy; 2: Planetek, It; 3: Latitudo40, It

AGENDA



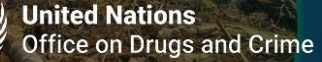
- EO4SECURITY
- Use cases introduction
- Illegal waste disposal
- Key takeaways

Use cases - Introduction

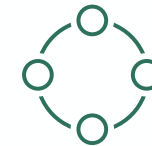
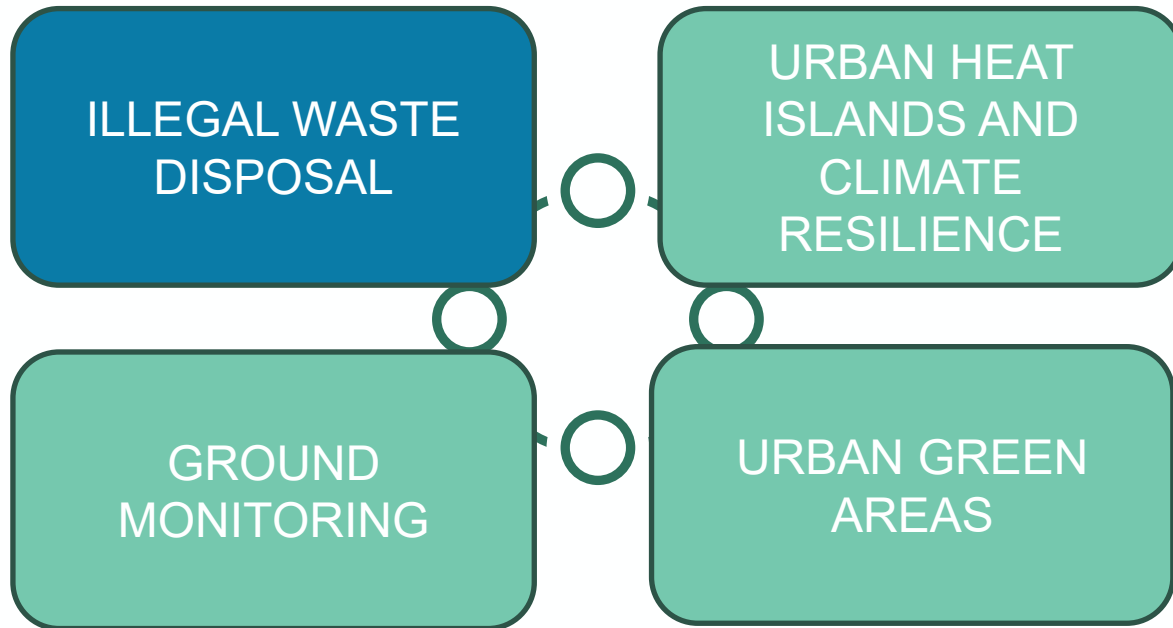
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1. Optimise field operations
2. Supporting urban planning
3. Environmental risk management



Use cases – Technological approach



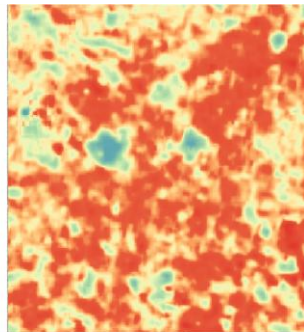
GROUND MOTION

Assets stability monitoring
through SAR interferometry

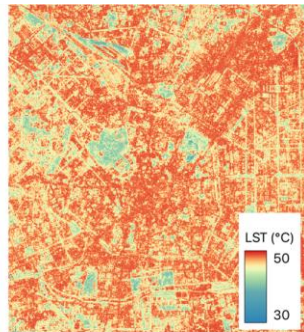


SURFACE URBAN HEAT ISLAND

Exposure related to thermal anomalies



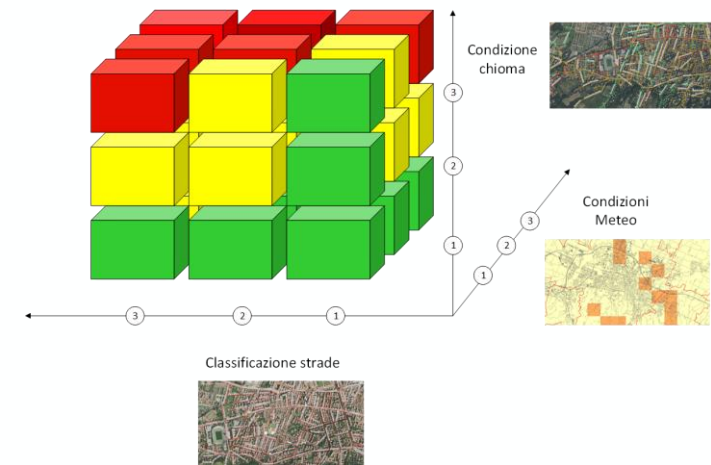
Landsat 8 LST



Daytime LST 10 m

URBAN GREEN AREAS

Combined risk index based on
Weather Forecast, NDVI, Tree
density



Planetek — UC1 Technical Deep Dive



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- I. UC1 – Monitoring Strategy and Areas of Interest
- II. UC1 – EO Processing and Detection Workflow
- III UC1 – From EO Detection to Operational Products
- IV. UC1 – Results: Selected Detection Examples
- V. UC1 – Technical and Operational Findings

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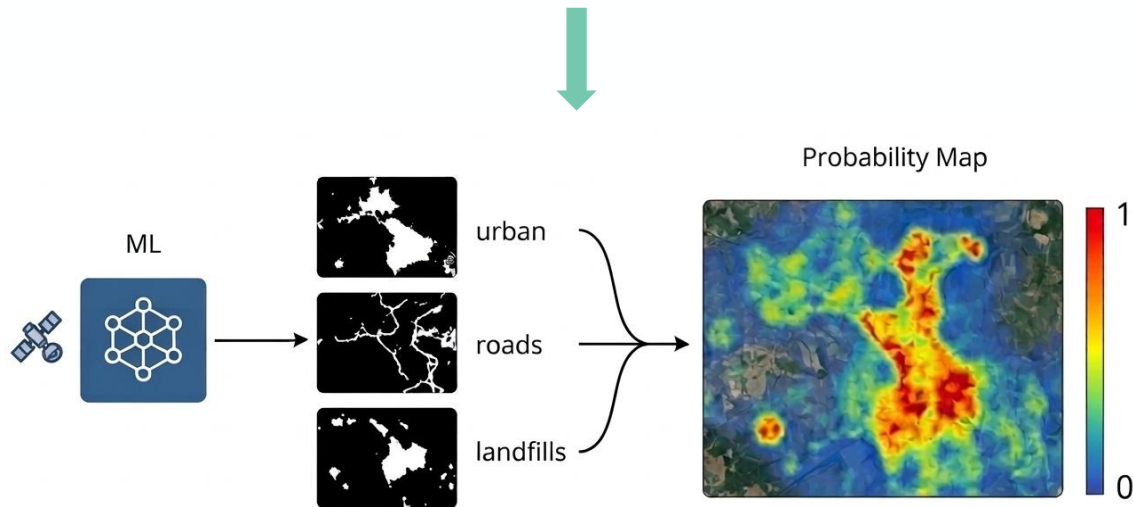
UC1 – EO Processing and Detection Workflow



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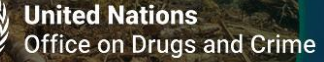
- **Automated processing:** ML and index-based classification to generate probability maps
- **Expert classification:** image interpretation supported by photo-interpretation keys and ancillary data
- **Quality control:** automated QC of generated products

UC1 – Operational Products and Service Delivery

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UC1 – Operational Products and Service Delivery



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WASTE DISCHARGE LAND

Validated EO-derived information on detected waste-discharge features



RASTER PRODUCTS

Cloud Optimized GeoTIFF (COG)

- EO-derived detection information (e.g. probability maps, thematic layers)
- Optimized for geospatial access
- Ready for visualization and analysis



WMS

Map visualization and GetFeatureInfo



VECTOR PRODUCTS

ESRI Shapefile

- Validated waste-discharge features (e.g. polygons, attributes)
- Geometry and associated attributes
- Ready for query, filtering and analysis



WFS

Vector data access, filtering and analysis



PUBLICATION & DELIVERY

GeoServer

- Dedicated workspace for UC1 layer organisation and namespace separation
- OGC-compliant services (WMS/WFS)
- Metadata and product organization
- Interoperability and user access



HTTPS

Product access and sharing



OPERATIONAL INTEGRATION

Interoperable EO-derived products accessible within end-user GIS workflows

GeoServer – UC1 Layers (example)

- Web Map Service on iride-services-ogc-unstable.rheticus.eu
 - Web Map Service
 - Reference map - Buildings (OU-S8-07-04)
 - Reference map - Hydrography(OU-S8-07-04)
 - Reference map - LandCover (OU-S8-07-04)
 - Reference map - Places (OU-S8-07-04)
 - Reference map - POIs (OU-S8-07-04)
 - Reference map - Rail network (OU-S8-07-04)
 - Reference map - road_network (OU-S8-07-04)
 - Satellite Input Data Fiumicino 2020-04-05 (OU-S8-07-01)
 - Satellite Input Data Fiumicino 2024-03-05 (OU-S8-07-01)
 - Satellite Input Data PonteMalnome 2026-01-29 (OU-S8-07-01)
 - Satellite Input Data Trigoria 2026-01-29 (OU-S8-07-01)
 - Waste discharge (Land) (OU-S8-07-01)
 - Waste discharge (Land) Ponte Malnome 2026-01-29 (OU-S8-07-01)
 - Waste discharge (Land) Trigoria 2026-01-29 (OU-S8-07-01)
 - Waste Evolution (Land) (OU-S8-07-02p)

Products published via OGC-compliant services using GeoServer

From EO-based detection to standardized and interoperable geospatial products for operational environmental monitoring.



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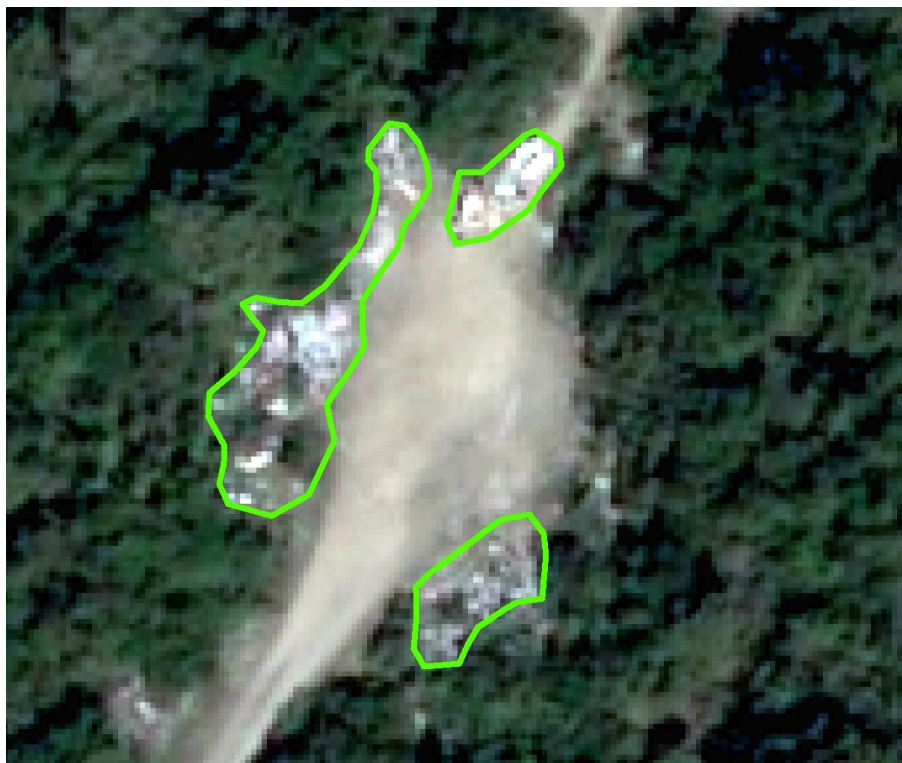


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Evolution



TEMPORAL MONITORING | OSTIA



06 APR 2026



24 APR 2026

96 → 114 detected accumulations | +18 (~19%)

Multi-temporal VHR imagery captures measurable evolution in waste accumulation between successive acquisitions.



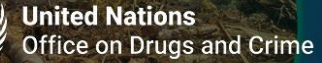
→ THE EUROPEAN SPACE AGENCY

Conclusions

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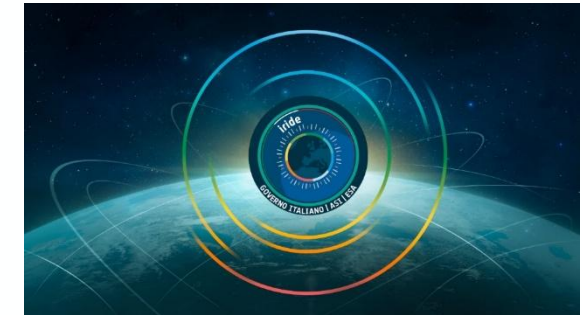
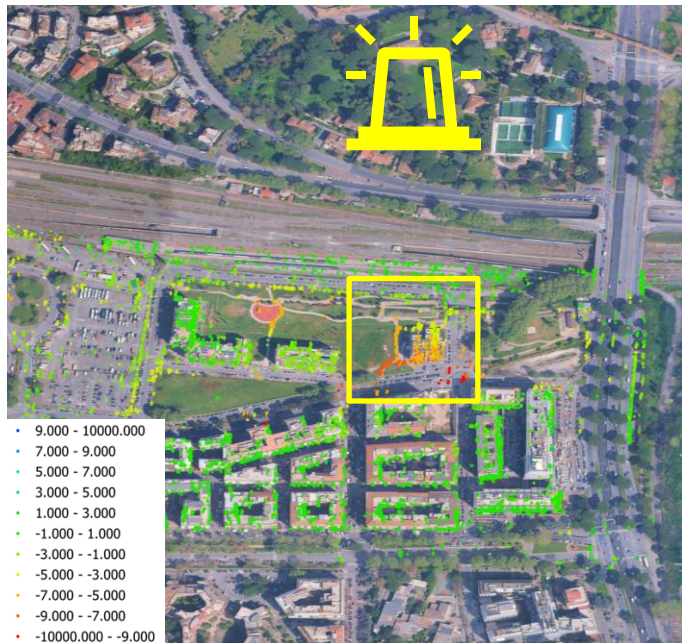
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- Early warning tools from space to enable prompt response

- Seamless Integration of Geospatial Products with User Platforms (**DIGITAL TWIN**)

- Synergies with other institutional programmes

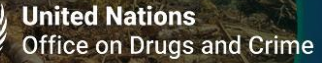


Conclusions

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- On-site validated results from the end user
- User engagement is fundamental for the development and successful outcome of the project !



L2_Label	Notes	AOI_name	src_date	src_name	ID
Municipal Solid Waste (MSW) Landfills		Trigoria	2026-01-29T10:15:45Z	Pleiades imagery	30.



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THANK YOU!

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