

Earth Observation in support of Compliance Assurance across EU policies

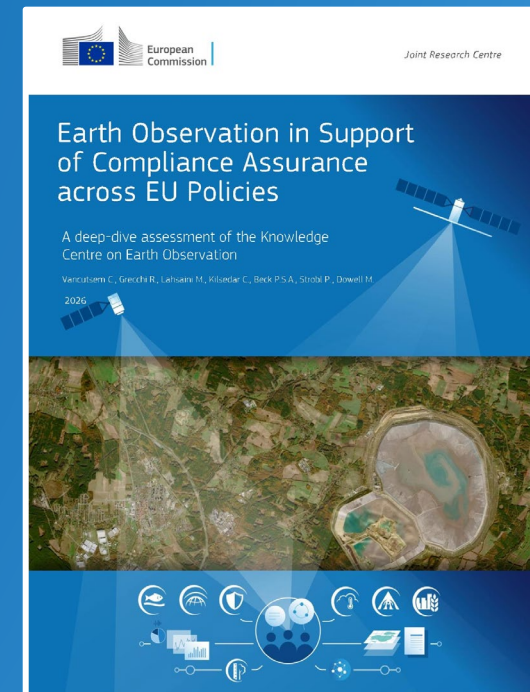
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Knowledge Centre on Earth Observation (KCEO)

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KCEO Activities & this Third Deep Dive

Are you looking for an EO-GLOSSARY?

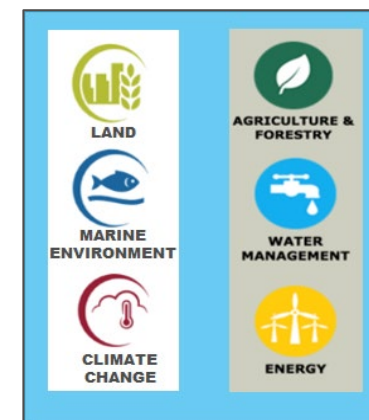


Deep Dive Assessments on Specific Policy Areas: Biodiversity, Urban Climate Adaptation & Compliance Assurance

Support to Global Policy Frameworks (AA EC4GEO)

Prototyping Policy-driven Science service for EO

Copernicus Services



Policy Uptake and Coherence

Enhancing the uptake of EO in EU policy translating needs into technical EO products requirements

Mainstreaming R&I

Analysing & prioritising research needs; Strategy of research investments

KCEO



Survey across 15 EC DGs (66 units)

Focused entry point
Inclusiveness & Transparency
Dialogue with external partners, international organisation and society

Strategic Research and Innovation Agenda for EO (SRIA)

140 contributors across Commission DGs (7 Policy DGs, JRC, DEFIS, RTD) Copernicus Entrusted Entities (EEA, EMSA, SatCen, Mercator Ocean International, ECMWF) and external specialists



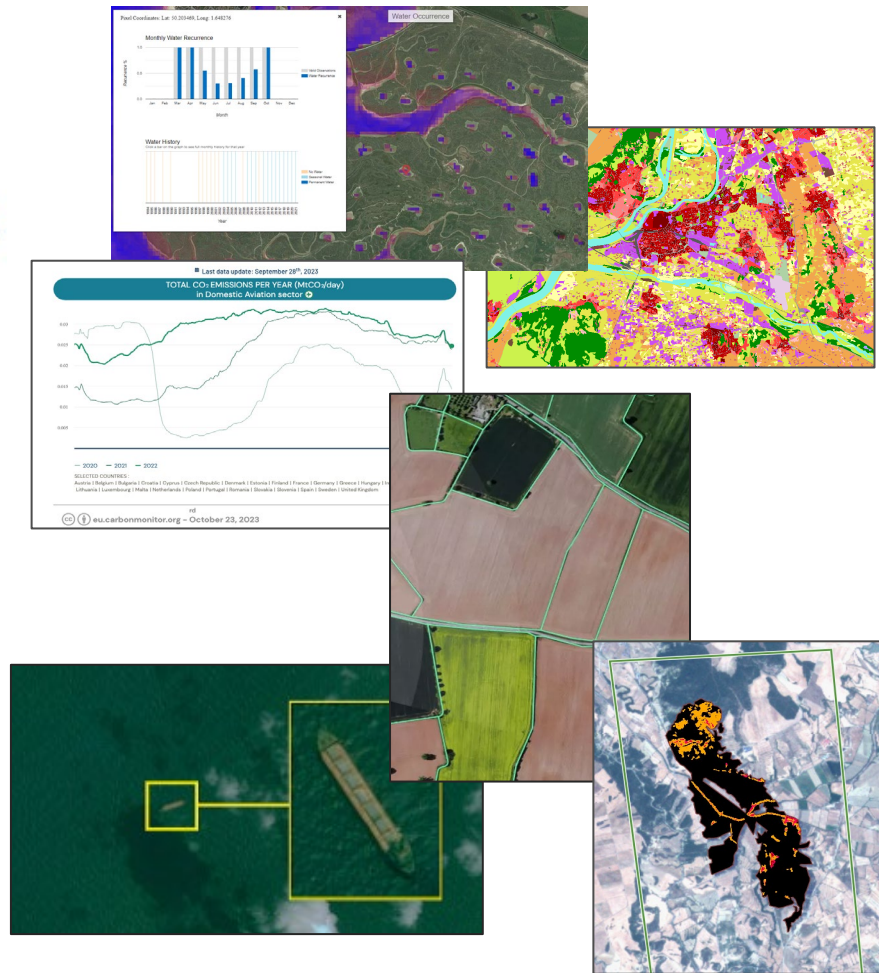
Compliance Assurance & EO's role

A Treaty obligation of the European Commission in overseeing and enforcing EU laws

Compliance Assurance refers to the process and mechanisms designed to ensure adherence to EU laws, regulations, and policies by individuals, organizations, and Member States

EO plays a crucial role across three core components:

- **Compliance promotion:** Free-and-open data fostering awareness, transparency, and stakeholders education
- **Implementation Monitoring:** Broad-scale, continuous monitoring to detect areas at risk of non-compliance and ensure prompt detection of deviations
- **Enforcement:** Rapid response and essential evidence for legal interventions, and assessment of impacts of illegal activities



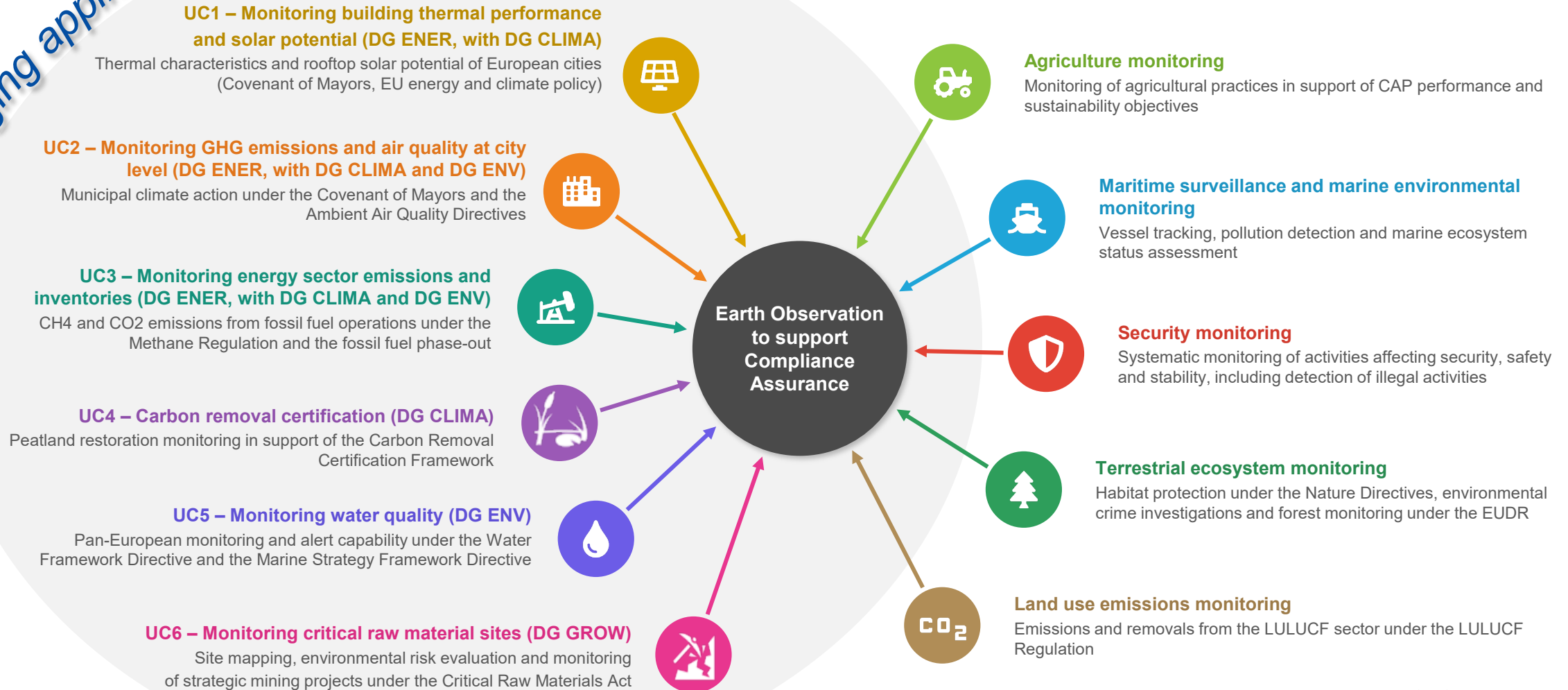
KCEO Deep Dive Approach

- **Policy context & Application needs:** Identification of legislative objectives, policy-cycle stage, links to complementary policies, and identification of EO application needs, co-designed with **policy DGs ENV, CLIMA, ENER and GROW** (six emerging use cases), with **DG AGRI and DG MARE** (established CAP and maritime domains)
- **Translation into technical requirements:** Define specific technical specifications (spatial and temporal resolution, geographic scope and temporal extent, and thematic content)
- **Fitness-for-purpose analysis:** Screen all available products and services against the technical requirements and compile relevant products that could contribute to each application (full, partial, no match)
- **Gap analysis and Recommendations:** Distinguish cross-cutting gaps from domain-specific ones, then target recommendations along three pathways: direct implementation, Copernicus programme evolution and priority research

Scope of the Assessment

Emerging applications

Established applications



Cross-cutting topics

Compliance monitoring → Follow-up and enforcement

CEMS on-demand mapping (JRC, Disaster Risk Management Unit)

- Copernicus Security Service (CSS):** three surveillance components – CMS (EMSA), SESA (SatGen), CBSS (Frontex)

SESA – Support to EU External and Security Actions (SatCen)

-  **Sub-metre VHR imagery**
-  **Illegal mining** detection and characterisation
-  **Unauthorised logging** monitoring
-  **Illegal waste dumping**
-  **Restricted-access products**; since 2025 open to the EU environmental crime community (DG ENV as Requesting Party); DG GROW designated Requesting Party for CRM in May 2026

- Terrestrial ecosystems and environmental crimes
- Maritime surveillance
- Security monitoring
- Critical raw materials (UC6)



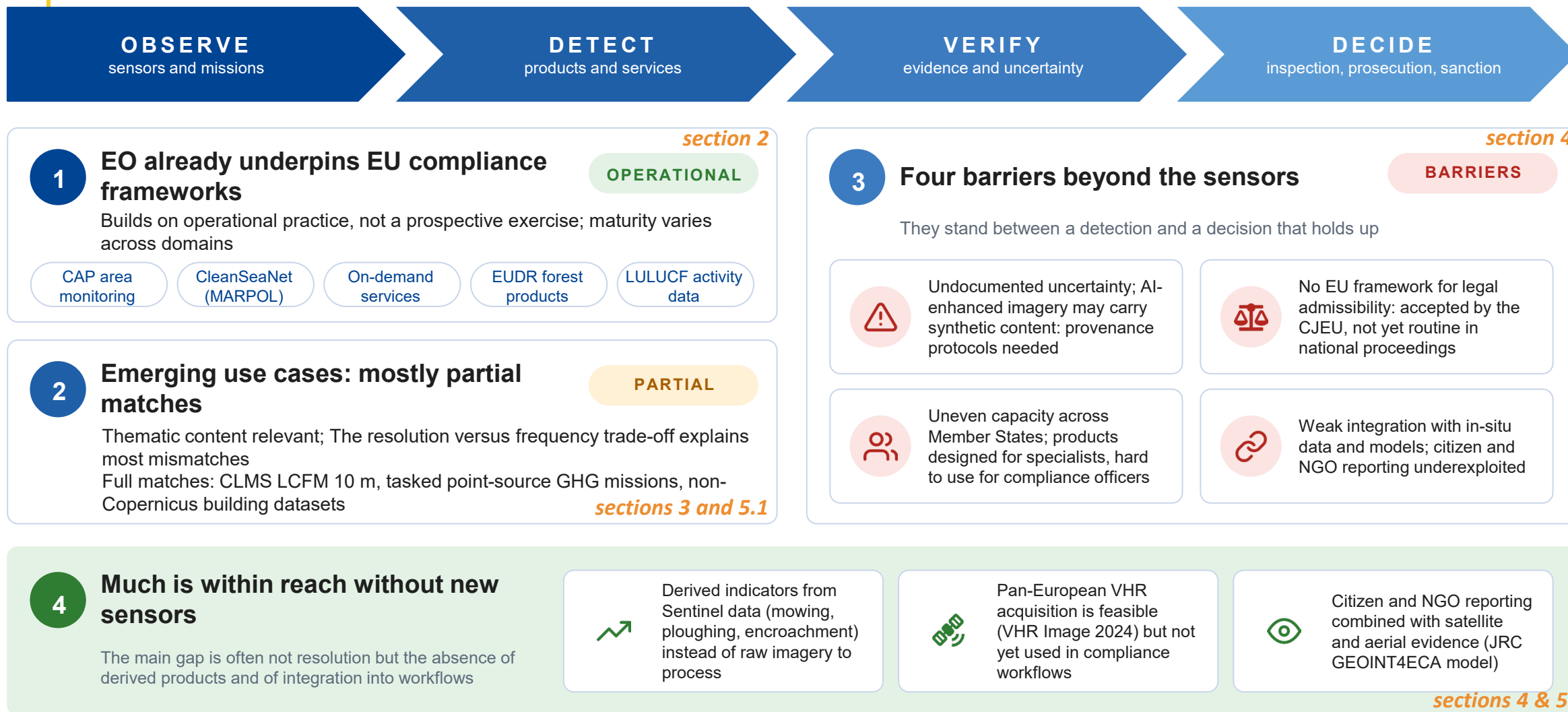
Synthesis of fitness-for-purpose of available products and services (section 5.1)

Table 18. Synthesis of relevant **Copernicus** and **non-Copernicus** products for EU compliance assurance. Fitness-for-purpose categories (Full Match / Partial Match) follow the methodology defined in 3.1.2 and apply to the six emerging use cases (UC1–UC6) only. Parameters shown in grey background indicate the limiting criteria, e.g. those between the minimum and optimum (Partial Match). The rightmost column flags products that are also relevant to the established application domains assessed in section 2 (CAP – 2.2; MAR – 2.3; SEC – 2.4; TER – 2.5; LULUCF – 2.6); these flags are qualitative cross-references and do not constitute a formal fitness assessment for those domains.

Parameter	Product / Service	Spatial resolution	Temporal resolution	Temporal extent	Spatial extent	Fitness for UC1-UC6	Cross-cutting relevance
Building characteristics (footprint, height, type)							
Building footprint and height	CEMS GHSL BUILT-S CEMS EMC BUILT-S CEMS GHS BUILT-S	100 m historical; 10 m (from 2018 for GHSL BUILT-S)	5 years	1975–2030 2022 2017, 2022	Global	UC1, UC2, UC5, UC6: Partial Match (footprint)	LUL (settlement extent)
	CLMS HRL Impervious Built-up	10 m	Every 3 years	2018–2021 (2024 pending)	EEA38+UK	UC1: Partial Match (footprint)	LUL (settlement extent)
	JRC DBSM R2025	Building-level	Annual	2024–2025	EU27	UC1, UC2: Full Match (footprint)	LUL (settlement extent), SEC
	EUBUCCO	Building-level	Annual	Recent period	EU27 + CH	UC1, UC2: Full Match (footprint, height, type)	LUL (settlement extent), SEC
	Overture Maps	Building-level	Every few years	Recent period (last 2 yrs)	Global	UC1, UC2: Full Match (footprint); Partial Match (height, type)	LUL (settlement extent)
	OpenStreetMap (buildings)	Building-level	Regular updates	2004+ (monthly updates)	Global	UC1, UC2: Full Match (footprint)	MAR (port infrastructure context), SEC
	World Settlement Footprint (WSF)	10 m (footprint); 90 m (height)	Two periods	2015, 2019	Global	UC1, UC2: Partial Match (footprint)	LUL (settlement extent)
	Global Building Atlas (TUM)	Building-level / ~10 m raster	Single period	2018–2019	Global	UC1: Partial Match (footprint)	LUL (settlement extent)
	AW3D30 public	30 m	Regular updates	Recent	Global	UC1: Partial Match (height)	TER, CAP (terrain baseline)
Building type	CEMS GHS-BUILT-C	10 m	Single period	2018	Global	UC1: Partial Match	LUL (settlement morphology)

Key messages

Key findings, placed along the chain from observation to decision



Recommendations along three pathways

NOW

NEXT

BEYOND

Direct implementation

and last-mile applications: turn existing products into operational tools



Monitoring and alert systems built from existing products, with an explicit uncertainty estimate, to prioritise inspections



Thematic hubs combining Copernicus outputs with in-situ data, models, infrastructure data and commercial VHR



Capacity building, guidance and a helpdesk for Member State authorities and enforcement bodies

Copernicus programme evolution

fill the layer underneath the annual 10 m land cover



Consistent 10 m time series: vegetation indices and sub-annual thematic products (forest, wetland, grassland, cropland, water), CEOS-ARD aligned



Systematic Contributing Mission VHR coverage, extending the VHR Image 2024 model to more frequent and timelier delivery



Next Generation missions (S2NG, LSTM, CHIME, CO2M) close observation gaps, with caveats on point-source attribution and the 1990 baseline

Priority research

make results explainable, quantified and admissible



Change and anomaly detection with explainability, trained and validated on standardised shared datasets



Uncertainty quantification frameworks, from the pixel to the compliance threshold



Legal admissibility and evidentiary standards for EO in environmental enforcement

Upcoming missions will close many observation gaps. Operational compliance monitoring also requires:

Service evolution

Methodological
standardisation

Institutional capacity

Legal framework
adaptation

Thank you



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