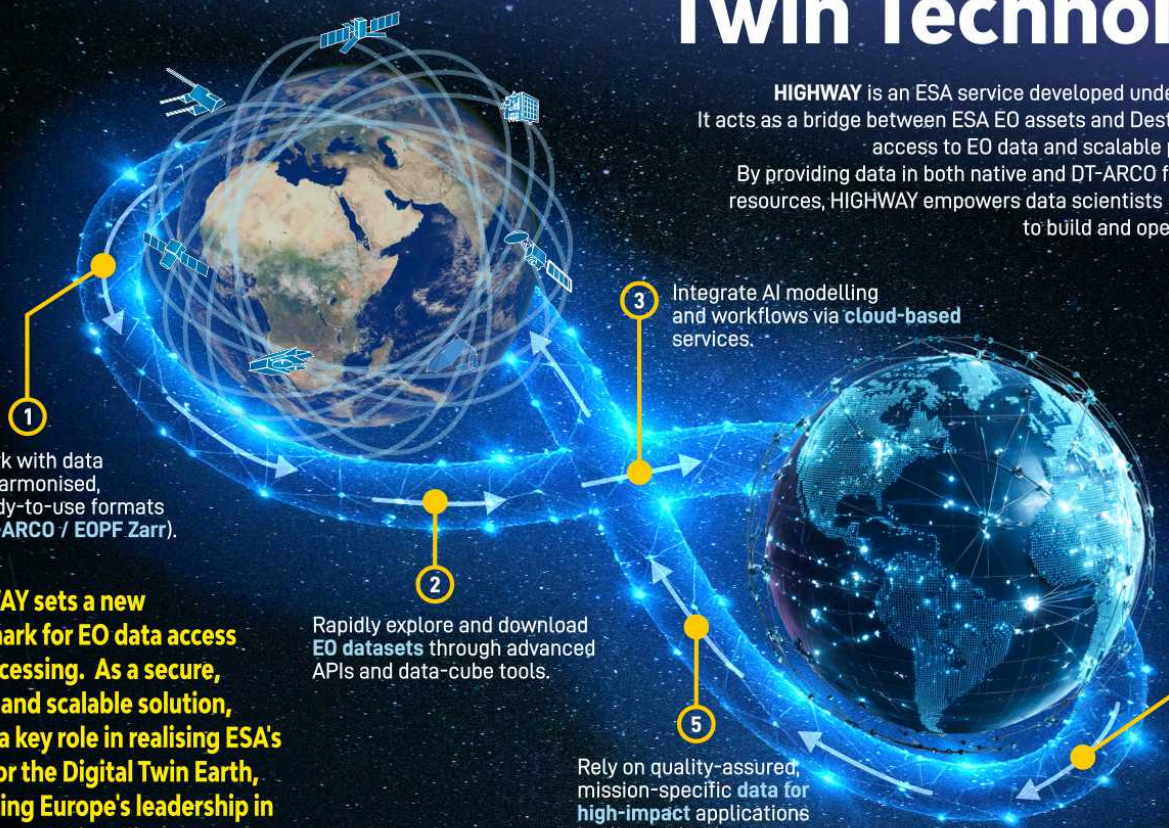
HIGHWAY
EO DATA SPACE

adwäisEO ACRI ST EARTHLAB MEEO

EOPF Zarr STAC

Bridging Earth Observation and Digital Twin Technologies

HIGHWAY is an ESA service developed under ESA DTE programme. It acts as a bridge between ESA EO assets and DestinE, enabling seamless access to EO data and scalable processing capabilities. By providing data in both native and DT-ARCO formats, and integrating resources, HIGHWAY empowers data scientists and service developers to build and operate Digital Twin Earth.



HIGHWAY sets a new benchmark for EO data access and processing. As a secure, flexible and scalable solution, it plays a key role in realising ESA's vision for the Digital Twin Earth, reinforcing Europe's leadership in environmental intelligence and climate innovation.

Data Services

High-Performance EO Data Access

- **DT-ARCO Data Production:** Based on the EOPF data model, using advanced formats such as ZARR and COG.
- **Supported Missions:** SMOS, CryoSat, Proba-V, Aeolus, SWARM, EarthCARE, BIOMASS.
- **Quality Assurance:** Includes pixel-level comparisons and non-regression checks to ensure data reliability.
- **Advanced Access & APIs:** STAC, WMS, WCS, OpenSearch; supports data-cube exploration and downloading.

Processing Services

Cloud and HPC for Scalable EO Workflows

- Data processing platform enabling AI model development and workflow orchestration.
- Supports complex EO tasks with high-performance, distributed processing capabilities.

Integration with **MeluXina HPC** (Luxembourg) via a dedicated HPC broker (in progress).

Enabling Digital Twin Innovation

HIGHWAY is designed to meet the demanding requirements of Digital Twins by delivering high-quality EO data, scalable computing resources, and interoperable services. It empowers scientists, innovators, and policymakers to model Earth systems with precision and drive progress in climate resilience and sustainable development.

Future Roadmap

HIGHWAY will continue to evolve to meet the demands of next-generation Digital Twin applications:

Piloting HPC Integration: High-throughput access to Luxembourg's MeluXina HPC will support large-scale EO simulations and AI pipelines.

MELUXINA

Integration with DestinE Services: HIGHWAY will be progressively integrated with key DestinE service such as the INSULA code and the EDEN and Vizlab visualisation platform, enhancing the end-to-end Digital Twin user experience.

EDEN DestinE Platform Insula - Code VIZLAB

Mission Expansion: New missions, including BIOMASS, will be added to the DT-ARCO portfolio, enriching thematic and spatial coverage.

biomass

Interoperability

Closer coupling with the DestinE Core Services Platform (DESP) and ESA's EOIAM frameworks will enhance workflows and improve data flow automation.

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This roadmap positions **HIGHWAY** as a future-proof service ready to support Europe's Digital Twin ambitions.

LIVING PLANET SYMPOSIUM

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EOF ESA Earth Observation Framework

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