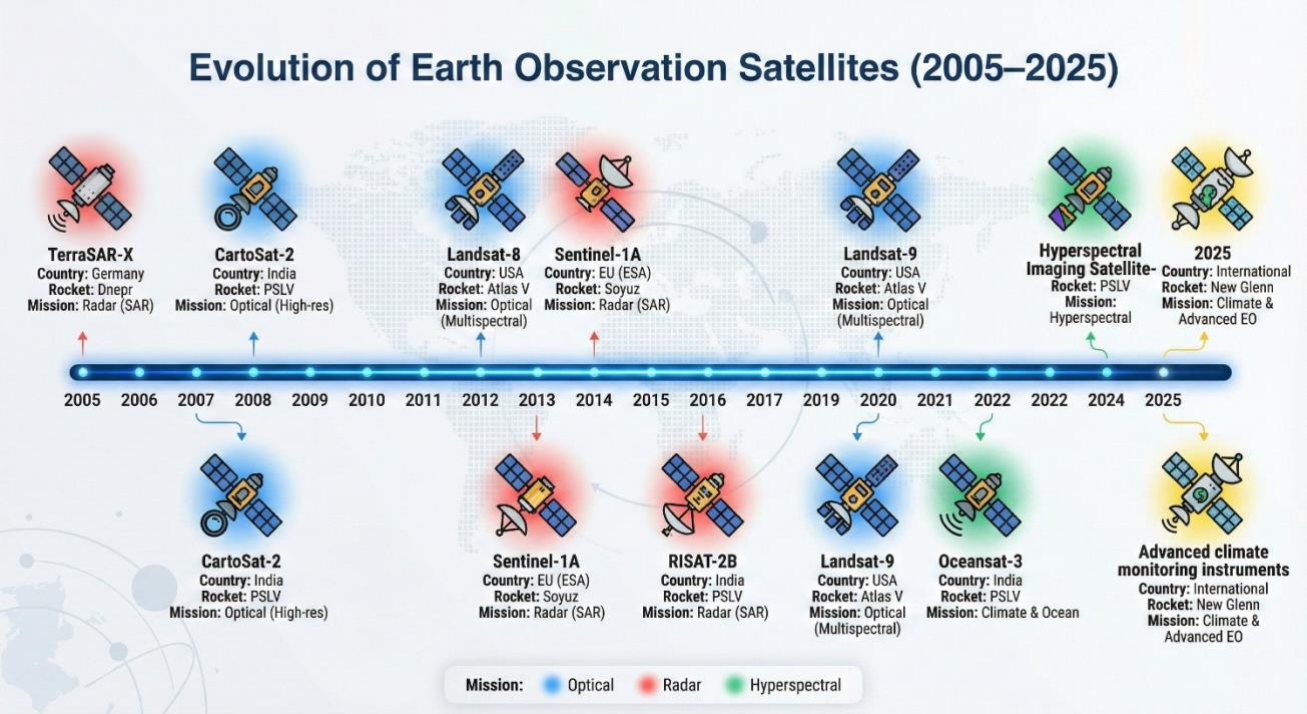
REPORT ON

EARTH OBSERVATION SATELLITES LAUNCHED

(2005 - 2025)



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Earth Observation Satellites Launched (2005–2025)

1. Introduction

Over the past two decades, Earth observation (EO) satellites have become one of the most powerful tools for studying our planet. These satellites provide continuous, high-resolution data on Earth's land, oceans, atmosphere, climate, and environmental changes. From monitoring natural disasters to supporting agriculture, weather forecasting, urban planning, and climate research, EO satellites play an essential role in modern scientific, governmental, and commercial applications.

Between 2005 and 2025, several major space agencies including NASA (USA), ESA (Europe), ISRO (India), JAXA (Japan), CNSA (China), and others have launched advanced Earth monitoring satellites equipped with state of the art sensors. These missions significantly improved our ability to observe Earth with greater clarity, precision, and frequency. The last 20 years also saw major technological advancements such as synthetic aperture radar (SAR), hyperspectral imaging, thermal infrared sensing, and cloud-penetrating microwave instruments.

This report provides a structured overview of notable Earth observation satellites launched during the last two decades. For each satellite, the name, launch vehicle used, and the country associated with the mission are briefly highlighted. This document aims to serve as a concise reference for students, researchers, and professionals interested in the evolution and contributions of EO satellite technology.

2. Executive summary

This report surveys a representative selection of major Earth-observation satellites launched between late 2005 and late 2025. I prioritized widely used public-data missions (civilian science and environmental monitoring), national programs with significant imaging/remote sensing capabilities, and important hyperspectral / SAR missions. For each satellite I give the launch vehicle and the country associated with the launch (where the rocket lifted off / agency operating launch). The references next to each satellite let you follow up for raw launch logs or mission pages.

3. Methodology

Selected prominent Earth-observation missions (optical, multispectral, SAR, altimetry, hyperspectral, meteorological) that were launched during the last 20 years.

For each mission I verified official mission/agency sources or reputable launch reports and captured: satellite name, exact launch vehicle, and country associated with the launch (agency / launch site). Citations are provided after each entry.

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4. Selected Satellites(entries)

1. LANDSAT 8

Collects multispectral and thermal images to monitor land, water, and environmental changes. It provides stable, high-quality global data for long-term Earth observation.

Rocket: Atlas V-401 (United Launch Alliance)

Country associated with the launch: United States - Vandenberg (Vandenberg Air Force / Space Force Base), U.S.A.

2. LANDSAT-9

Continues the Landsat data record with improved radiometric accuracy and lower noise.
Works with Landsat-8 for faster global coverage of land surface changes.

Rocket: Atlas V-401 (United Launch Alliance)

Country associated with the launch: United States - Vandenberg Space Force Base, California, U.S.A.

3. SENTINEL-1A

A radar satellite that captures images in all weather and at night.

Used for flood mapping, deformation monitoring, maritime tracking, and disaster response.

Rocket: Soyuz-ST (Soyuz-Fregat) (Arianespace mission VS07)

Country associated with the launch: France (Europe) - launched from Europe's Spaceport, Kourou, French Guiana (Arianespace/Soyuz).

4. SENTINEL-1B

Companion to Sentinel-1A, providing additional C-band radar coverage. Reduces revisit time for faster monitoring of land, oceans, and emergencies.

Rocket: Soyuz (Soyuz-Fregat) via Arianespace (flight VS14)

Country associated with the launch: France (European launch from Kourou, French Guiana).

5. SENTINEL-2A

Twin of Sentinel-2A, ensuring more frequent coverage and global consistency. Enhances monitoring of crops, forests, water bodies, and natural resources.

Rocket: Vega

Country associated with the launch: France (Europe) - launched from Europe's Spaceport, Kourou (Arianespace).

6. SENTINEL-2B

Twin of Sentinel-2A, ensuring more frequent coverage and global consistency. Enhances monitoring of crops, forests, water bodies, and natural resources.

Rocket: Vega

Country associated with the launch: France (European launch from Kourou, French Guiana).

7. SENTINEL-3A

Designed for ocean and land observation using radiometers and altimeters. Monitors sea level, temperature, color, and land surface changes.

Rocket: Rokot (Rockot) / Briz-KM

Country associated with the launch: Russia - Plesetsk Cosmodrome (Eurockot launch services).

8. SENTINEL-3B

Pairs with Sentinel-3A to improve oceanographic and environmental measurements. Strengthens global monitoring of marine ecosystems and climate variables.

Rocket: Rockot (Rokot / Briz-KM)

Country associated with the launch: Russia - Plesetsk Cosmodrome (Eurockot).

9. TERRASAR-X

A high resolution radar satellite used for mapping and surface deformation studies. Provides precise elevation and terrain data in all weather conditions.

Rocket: Dnepr (converted R-36 / SS-18, commercial Dnepr vehicle)

Country associated with the launch: Launched from Baikonur (Kazakhstan) using a Russian/European contract - operator/mission: Germany (DLR/Astrium) but the launch used Dnepr from Baikonur.

10. TanDEM-X

Operates with TerraSAR-X to create a global 3D map of Earth. Measures terrain height with very high accuracy.

Rocket: Dnepr

Country associated with the launch: Launched from Baikonur / Dnepr service (launch site Kazakhstan / Russian vehicle); mission operated by Germany (DLR). Reference: TanDEM-X mission pages.

11. CARTOSAT-2

An Indian high-resolution imaging satellite for mapping and urban planning. Supports resource monitoring, infrastructure development, and defense applications.

Rocket: PSLV-C7 (Polar Satellite Launch Vehicle)

Country associated with the launch: India - Satish Dhawan Space Centre (Sriharikota), ISRO.

12. CARTOSAT-3

An advanced Indian imaging satellite with very high spatial resolution. Enables detailed mapping for urban, environmental, and strategic uses.

Rocket: PSLV (PSLV-C47, XL configuration)

Country associated with the launch: India - Satish Dhawan Space Centre (ISRO).

13. GAOFEN-1

A Chinese optical Earth-observation satellite for environmental and disaster monitoring.
Covers wide areas for land classification, agriculture, and resource surveys.

Rocket: Long March 2D (Chang Zheng-2D)

Country associated with the launch: China - Jiuquan Satellite Launch Center (China).

14. GAOFEN-1

A Chinese radar satellite that captures images through clouds and at night. Used for maritime surveillance, sea-ice monitoring, and disaster response.

Rocket: Long March-4C (Chang Zheng-4C)

Country associated with the launch: China - Taiyuan Satellite Launch Center (China).

15. KOMPSAT-3

A Korean satellite providing high-resolution optical images for civilian and research use.
Supports mapping, land monitoring, and environmental studies.

Rocket: H-IIA (launched from Tanegashima, Japan) - note: KARI contracted a Japanese launch for KOMPSAT-3

Country associated with the launch: Japan (launch site: Tanegashima) — mission operator: Korea (KARI).

16. KOMPSAT-3A

An improved version with sharper imaging and infrared sensing capability. Supports urban mapping, disaster assessment, and environmental monitoring.

Rocket: Dnepr (launched from Dombarovsky/Jasny)

Country associated with the launch: Russia (launch site/operator) - mission operator: Korea (KARI).

17. SPOT-6

A French commercial imaging satellite offering high-resolution Earth photos. Used for agriculture, mapping, and environmental planning.

Rocket: PSLV (Polar Satellite Launch Vehicle)

Country associated with the launch: India - Satish Dhawan Space Centre (PSLV by ISRO launched SPOT-6 for France).

18. SPOT-7

Twin to SPOT-6, expanding global coverage and revisit frequency. Supports commercial mapping and wide-area monitoring.

Rocket: PSLV (PSLV-C23)

Country associated with the launch: India - Satish Dhawan Space Centre (PSLV by ISRO launched SPOT-7).

19. SUOMI NPP

A U.S. weather and environmental monitoring satellite bridging NASA and NOAA systems.
Tracks climate trends, cloud patterns, oceans, and atmospheric conditions.

- **Rocket:** Delta II (United Launch Alliance)

Country associated with the launch: United States - launched from Vandenberg AFB (ULA/ NASA).

20. NOAA-20

A next-generation U.S. weather satellite for forecasting and climate monitoring. Collects advanced atmospheric, oceanic, and land data for global prediction models.

Rocket: Delta II 7920-10C (United Launch Alliance)

Country associated with the launch: United States - Vandenberg Space Force Base (ULA).

21. ICESAT-2

A laser altimetry satellite measuring ice-sheet elevation and changes in Earth's surface height.
Monitors glaciers, sea ice, forests, and topography with centimeter accuracy.

Rocket: Delta II (United Launch Alliance; final Delta II flight)

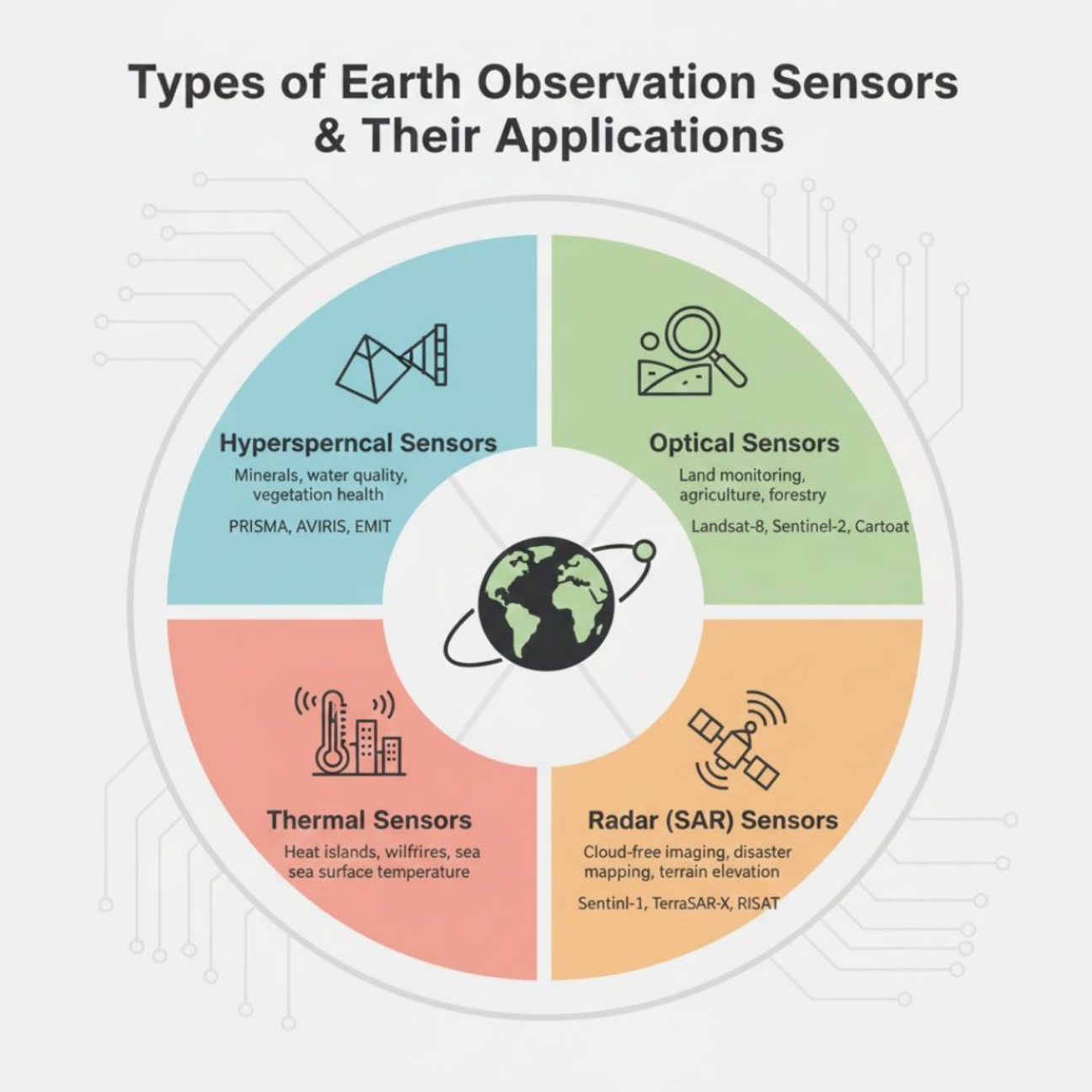
Country associated with the launch: United States - Vandenberg Space Force Base (NASA / ULA).

22. PRISMA

An Italian hyperspectral satellite used for material identification and environmental studies.
Combines hyperspectral imaging with high-resolution panchromatic data.

Rocket: Vega (Arianespace)

Country associated with the launch: France (European Spaceport, Kourou) - launcher: Vega (AVIO/Arianespace); mission operator: Italy (ASI / OHB Italia).



5. Observations and trends (2005 - 2025)

1. Diversity of launch providers: the period shows broad use of U.S. (Atlas, Delta II), European (Ariane/Soyuz/Vega), Russian vehicles (Dnepr, Rockot), Chinese Long March family, and India's PSLV. My selection shows many missions used non-domestic launchers when needed

   e.g., KOMPSAT launched from Japan.

2. Rise of Earth-observation constellations and smallsats: although this report focuses on flagship missions, the past 20 years saw explosive growth of commercial smallsat constellations (Planet Labs, etc.), increasing revisit and daily global coverage.

   e.g., Cartosat rideshare with Planet Doves on PSLV-C47.

3. Growth in SAR & hyperspectral capability: multiple SAR missions (Sentinel-1, TerraSAR-X/TanDEM-X, Gaofen-3) and hyperspectral demonstrators (PRISMA) show a move beyond multispectral into active and highly spectral sensing, enabling elevation models, day/night imaging, and material identification.

4. Launch geography: Europe heavily uses Kourou (Arianespace Vega/Soyuz), Russia uses Plesetsk/Baikonur for multiple Euro missions (Rockot, Dnepr), China uses Jiuquan/Taiyuan for Long March family, and India's PSLV is widely used for international payloads (SPOT, SPOT-6/7, Cartosat launches).

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6. Conclusion

Over the past two decades, Earth observation satellites have transformed the way we understand and monitor our planet. With advancements in optical, radar, hyperspectral, and thermal sensing technologies, these satellites now provide high-resolution, continuous, and reliable data essential for environmental management, climate research, disaster response, agriculture, urban planning, and national security. The satellites launched between 2005 and 2025 represent a major technological leap in imaging precision, revisit time, and global coverage, enabling scientists and governments to make informed, data-driven decisions.

The variety of platforms-from missions like Landsat-8 and Landsat-9 to the Sentinel series, CartoSat series, Oceansat, TerraSAR-X, and many others-highlights the collaborative efforts of agencies around the world. Each mission contributes uniquely to Earth system monitoring, demonstrating the importance of sustained investment in space-based observation. As we move forward, the integration of satellite data with artificial intelligence, cloud

computing, and real-time processing will further enhance the impact of Earth observation on humanity.

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