Earth Observation Satellite Systems Database

An overview of the satellite and payload development of the entire ecosystem related to the Earth Observation manufacturing and launch market.

A Euroconsult Report

November 2023
All estimates, projections, and opinions contained herein are based on information from publicly available sources. Though these sources are generally considered reliable and great care was taken to verify information, Euroconsult does not guarantee the information’s accuracy or completeness. No representation or warranty, expressed or implied, is made by Euroconsult about the accuracy of the estimates, projections, opinions, or information, and nothing contained herein is or should be relied on as a promise, representation, guarantee, or warranty by Euroconsult as to the past or future, or as a recommendation to sell and buy any securities. Euroconsult can in no case be held responsible for the use of the information contained in this report. Euroconsult may from time to time provide advisory services to companies or organizations mentioned in this report.

All part of this publication may be reproduced, distributed, or transmitted, in any form or by any means, without prior permission by Euroconsult. Any copy of this study without the original cover will be considered an unauthorized reproduction and those responsible will be prosecuted.
Discover The Euroconsult digital platform!

Find our proprietary market intelligence and data in an interactive and flexible format allowing for the creation of bespoke analysis using our expertise. Navigate through our market intelligence products to easily find, exploit and customize the data you need. The Euroconsult digital platform will enable you to feed your business intelligence tool and turn information into business insight.

Added value

- Intuitive
- Better data visualization
- Quick search
- Data filtering
- Customized export
- Regular updates

Visit our digital platform
digital-platform.euroconsult-ec.com
# TABLE OF CONTENTS

## 01. Introduction
- 6 Executive Summary
- 7 Scope and Definition
- 9 Acronyms

## 02. Satellite Manufacturing Market Overview
- 11 EO Satellite Launch Status: By Client (Owner) Typology
- 12 EO Satellite Launch Status: By Client (Owner) Status
- 13 EO Satellite Launch Status: By Client (Owner) Region
- 14 Satellite Manufacturing Market: By Prime Integrator
- 16 Satellites In Orbit and In Demand: By Mass Range
- 17 Satellites In Orbit and In Demand: By Main Mission
- 18 Satellites In Orbit and In Demand: Optical Satellites
- 19 Satellites In Orbit and In Demand: SAR Satellites

## 03. Satellite Launch Market Overview
- 21 Satellite Launch Market: By Region
- 22 Satellite Launch Market: By Launch Providers

## 03. Demand Dynamics
- 24 Demand for Civil Government Programs: Global Investment
- 25 Demand for Civil Government Programs: Market Overview
- 26 Demand for Civil Government Programs: Satellite Manufacturing Typology
- 28 Demand for Defense Government Programs: Global Investment
- 29 Demand for Defense Government Programs: Market Overview
- 30 Demand for Defense Government Programs: Satellite Manufacturing Typology
- 32 Demand for Commercial Programs: Market Overview
- 33 Demand for Commercial Programs: Satellite Manufacturing Typology

## 04. Ecosystem overview
- 35 Satellite Manufacturers: Make or Buy Strategies of Selected Commercial Operators
- 39 Satellite Manufacturers: Regional Presence of Key Players
- 40 Payload Suppliers: Regional Presence of Key Players
- 41 Payload Suppliers: Benchmark of Optical Spatial Resolution-Oriented (PAN/VNIR)
- 42 Payload Suppliers: Benchmark of Optical Spectral-Oriented (HSI, SWIR and others)
- 43 Payload Suppliers: Benchmark of SAR Payloads
EO satellites to triple over the next decade

Euroconsult anticipates that about 4,347 EO satellites will be launched over 2023–2032, up from 1,509 over 2013–2022 (+188%). This growth will largely be driven by the miniaturization of technologies enabling the deployment of commercial smallsat constellations, carrying an increasing range of sensors, such as VHR to VVHR Multispectral, SAR, Hyperspectral, GHG monitoring, ELINT/RF, and Meteocean. The EO market is also supported by the growing ecosystem of satellite manufacturers and payload providers, alongside the growth of other space-related sectors, especially in computational technology, and data analytics. These factors have contributed to the development of new low-cost platforms and payloads that can perform operational services at a quality that was once only possible with heavier satellites. China is set to become the world’s largest operator, with 40% of all satellites launched by 2032, ahead of the U.S. (29%) and Europe (12%).

Government customers largely dominate market value

The EO market will generate close to $108 billion in manufacturing revenues and $34 billion in launch revenues, still largely dominated by government customers, who invest in expensive and high-performance satellites that ensure their strategic autonomy and sovereignty, such as for defense or natural resources monitoring applications. In 2023, about 87 countries (incl. ESA, EUMETSAT, EU) made EO government space investments, totaling about $15.4 billion in 2023 (excluding ELINT/RF). The U.S. remains by far the largest investor, with funds channeled through the NASA and NOAA budgets for civil programs and through the NRO for defense. Governments worldwide are investing in economic recovery and innovation, including new constellation programs (e.g., Italy, South Korea, UAE). National programs are also complemented by commercial imagery procurement schemes (e.g., EOCL in the U.S., CCM in Europe), which boost the deployment of commercial constellations and foster the development of downstream services.
**Objective of this report**

The objective of this report is to provide an overview of the market for EO space systems. This report is specific to the assessment of the supply and demand for EO satellites launched and those yet to be built and launched. It focuses on the manufacturing and launch markets and their evolution over the next 10 years regarding the commercial and government (civil and unclassified defense) satellites.

The report covers the global EO satellite supply and demand regardless of the satellites’ mass and type of mission, including optical (Multispectral, Hyperspectral, GHG monitoring), SAR, Meteocean (GNSS-RO and other) and ELINT/RF.

**Methodology**

Euroconsult continuously monitors public announcements and assesses the maturity of all identified satellite projects. For single satellites, assumptions are made to extend or replace existing projects. Also, an assessment is done on regions and operators to validate needs for specific space missions, in which case new projects may emerge in the forecast. Replacement or extension projects are not necessarily similar to the existing ones.

On the constellation side, the flurry of new projects creates uncertainty about future demand because not all have the same maturity level, and many remain at a very early conceptual stage. Out of 252 announced constellation projects, 181 are featured in this report, of which 130 are commercial projects, all with various maturity levels. Other forecasted (not yet reported) constellations are also included, based on the evaluation of the demand potential in emerging space nations. A regular assessment is done on the maturity and advancement of the projects, based on financial, technical, and commercial evaluation. This assessment changes regularly, so the updates seen in this database are relative to the release date.

**Report contents**

1. A database of all EO satellites, regardless of their launch mass, that were launched from 2013 to 2023 (as of October 31, 2023). The database also nominally includes satellites now in development for launch in the coming years and a forecast of those due to be launched by 2032.

2. A combination of primary and secondary research to characterize the changes that have occurred and may occur at two levels: the demand side of the market (i.e., satellite owners and operators) and the supply side of the market (i.e., the industries and companies that develop the systems).

**Region covered in this report**
EO satellites cover a large variety of instruments. The list below provides the sensor segmentations of the EO satellites with their related definitions as defined by Euroconsult in this report and its proprietary database. Satellites are characterized by their main instrument depending on their primary mission. Therefore, secondary payloads are not taken into consideration here.

**Multispectral (MSI)**
Multispectral satellites are dedicated to on-ground Earth imaging from UV to infrared (i.e., 0.1–15 μm), including in the visible spectral bands and in Thermal Infrared (TIR). They carry passive sensors measuring the reflectance of preset wavelengths of the sunlight on Earth’s surface and of artificial lighting.

*Examples: Sentinel-2, WorldView-3, Pléiades NEO, Planetscope*

**Hyperspectral (HSI)**
Hyperspectral satellites can be distinguished by their ability to image across a continuous and contiguous range of wavelengths to obtain the spectrum for each pixel of a scene. They typically employ a spectrometer able to separate light into hundreds or, more recently, tens of bands for low-cost satellites.

*Examples: PRISMA, EnMAP, Pixxel, OSK*

**GHG monitoring**
GHG is a subset of optical (MSI and HSI) satellites with a focus on sensor sensitivity for specific wavelengths. Sensors consist of preset bands related to the IR spectral signature of greenhouse gases such as carbon monoxide (CO), carbon dioxide (CO₂), and methane (CH₄).

*Examples: OCO-2/3, MicroCarb, MethaneSAT, GHGSat.*

**SAR**
SAR satellites have an active antenna that emits and receives a radar signal reflected on-ground to generate an image of Earth’s surface. The radar signal is typically in the P, L, S, C or X band and enables observations in any weather and at any time.

*Examples: Sentinel-1, COSMO-SkyMed, ICEYE, ALOS-4*

**ELINT/RF**
These satellites are intended to detect, characterize and/or geolocate the emission of passive electromagnetic signals from the ground. The payload generally consists of various antenna and a software-defined radio (SDR) to receive and tune into a large frequency range.

*Examples: Yaogan, CERES, HawkEye 360, Unseenlabs*

**Meteocean—GNSS-RO**
These satellites measure the refraction of a GNSS signal through the atmosphere for meteorological purposes. This refraction describes the profile of the atmosphere at a given time. A typical instrument consists of antennas tracking dual-frequency signals from GPS, Galileo, GLONASS and/or BeiDou satellites.

*Examples: Main mission onboard Spire, GeoOptics, PlanetIQ, or as secondary on FY-3, or MetOp-SG series (classified in Meteocean—other)*

**Meteocean—other**
Any satellite (excluding GNSS-RO as main mission) that acquires dynamic parameters from the atmosphere and the ocean to contribute to operational meteorology (e.g., weather forecasting and climate change). This excludes Science satellites such as geodesy and magnetic field study. Examples of instruments include interferometers, spectrometers, imagers, radar altimeters, lidars and optical and microwave sounders.

*Examples: FY-2/3 series, GEO-Kompasat-2, Hai-Yang series, JPSS, Meteosat, MetOp-SG or CYGNSS...*
<table>
<thead>
<tr>
<th>MARKET INTELLIGENCE CATALOG - 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOVERNMENT SPACE</td>
</tr>
<tr>
<td>Government Space Programs</td>
</tr>
<tr>
<td>SATELLITE COMMUNICATIONS</td>
</tr>
<tr>
<td>Satellite Connectivity and Video Market</td>
</tr>
<tr>
<td>FSS Capacity Pricing Trends</td>
</tr>
<tr>
<td>SPACE INDUSTRY</td>
</tr>
<tr>
<td>Satellites to be Built and Launched</td>
</tr>
<tr>
<td>Space Market Monitoring</td>
</tr>
<tr>
<td>EARTH OBSERVATION</td>
</tr>
<tr>
<td>Earth Observation Data &amp; Services Market</td>
</tr>
</tbody>
</table>
### EUROCONSULT 2024 EVENTS

Connecting Industry Leaders

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Location</th>
<th>Description</th>
<th>Key Figures</th>
</tr>
</thead>
</table>
| **MUSCAT – Jan 8-10, 2024** | A Global Gathering in the Middle East for Industry Leaders in the Space Sector | | ▪ 350+ key industry players  
▪ 40+ executive and senior government officials  
▪ 20+ countries |
| **PARIS – March 28, 2024** | The unrivalled event for the French & European space sectors | | ▪ 250+ top-level Industrial and institutional players  
▪ 20+ executive speakers |
| **SINGAPORE – May 29-30, 2024** | A Global Gathering in Asia for Industry Leaders in the Space Sector | | ▪ 250+ top-level participants  
▪ 50+ speakers |
| **PARIS – September 16-20, 2024** | The unique executive meeting place for the key decision makers of the satellite enabled ecosystem | | ▪ 1,500 business leaders  
▪ 230+ executive-level speakers  
▪ 520+ public and private organizations  
▪ 50+ countries  
▪ 95% of the global commercial satellite business present  
▪ 70% of C-level in attendance |
| **Space Defense & Security Summit** | First-ever global summit in Europe focusing on space defense and security | | ▪ 250+ top-level participants  
▪ 40+ speakers  
▪ 35+ countries |