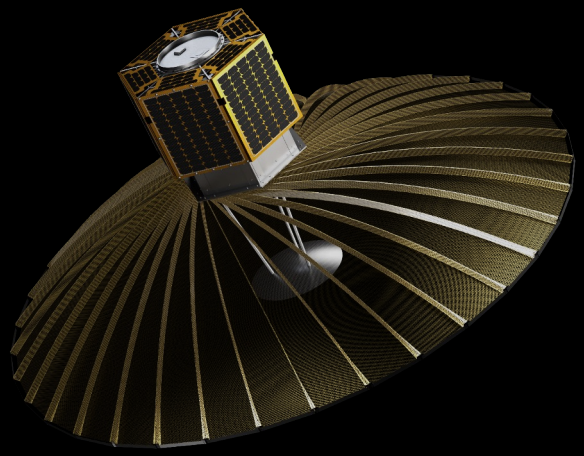


Provision of Near-real-time Observation data from the small SAR satellite constellation

Dr. Shunsuke Onishi, iQPS

Agenda item 5.1

3rd International SAR Workshop
Saga Prefecture, Japan
6-8 November, 2024

Company and self-introduction

Company Profile（as of Aug. 2024）

Company Name	Institute for Q-shu Pioneers of Space, Inc.
Head Office	Rengo Fukuoka Tenjin Building 6F, Tenjin 1-15-35, Chuo-ku, Fukuoka City, Fukuoka Prefecture, Japan
Business Description	‣ Planning, manufacture, and operation of small satellites using SAR systems ‣ Acquisition, analysis, and sale of SAR image data from small SAR satellites operated by iQPS ‣ Technical consulting on the above
Board Members	**President, Representative Director & CEO** — **Shunsuke Onishi** Director — Takayoshi Matsumoto Outside Director — Tatsuhiko Nishimura Director (Full-time Audit & Supervisory Committee Member) — Katsuaki Komura Outside Director (Audit & Supervisory Committee Member) — Kazunori Nakahara Outside Director (Audit & Supervisory Committee Member) — Michishige Hashimoto
Number of Employees	61 staff (as of Nov. 2024) including employees seconded from outside companies
Shares	Total number of shares issued and outstanding：37,003,900 stocks Total number of shares authorized to be issued：100,000,000 stocks



- Ph.D. in Engineering, Kyushu University Department of Aeronautics and Astronautics.
- Directed the satellite development and launching as Student project leader of QSAT-EOS, which is a 50 kg-class small satellite project for Earth observation developed by universities and companies in Kyushu area of Japan from May 2008 to November 2014. Participated in more than 10 satellite projects conducted by universities, companies, and JAXA.
- Joined iQPS as a Senior Researcher in October 2013 hoping to make an impact on the global space industry from Kyushu and In April 2014, took over the position of President and representative director CEO of the company.

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QPS-SAR Characteristics

Parabolic Antenna

Patented, **46cm** resolution

Equipped with thruster

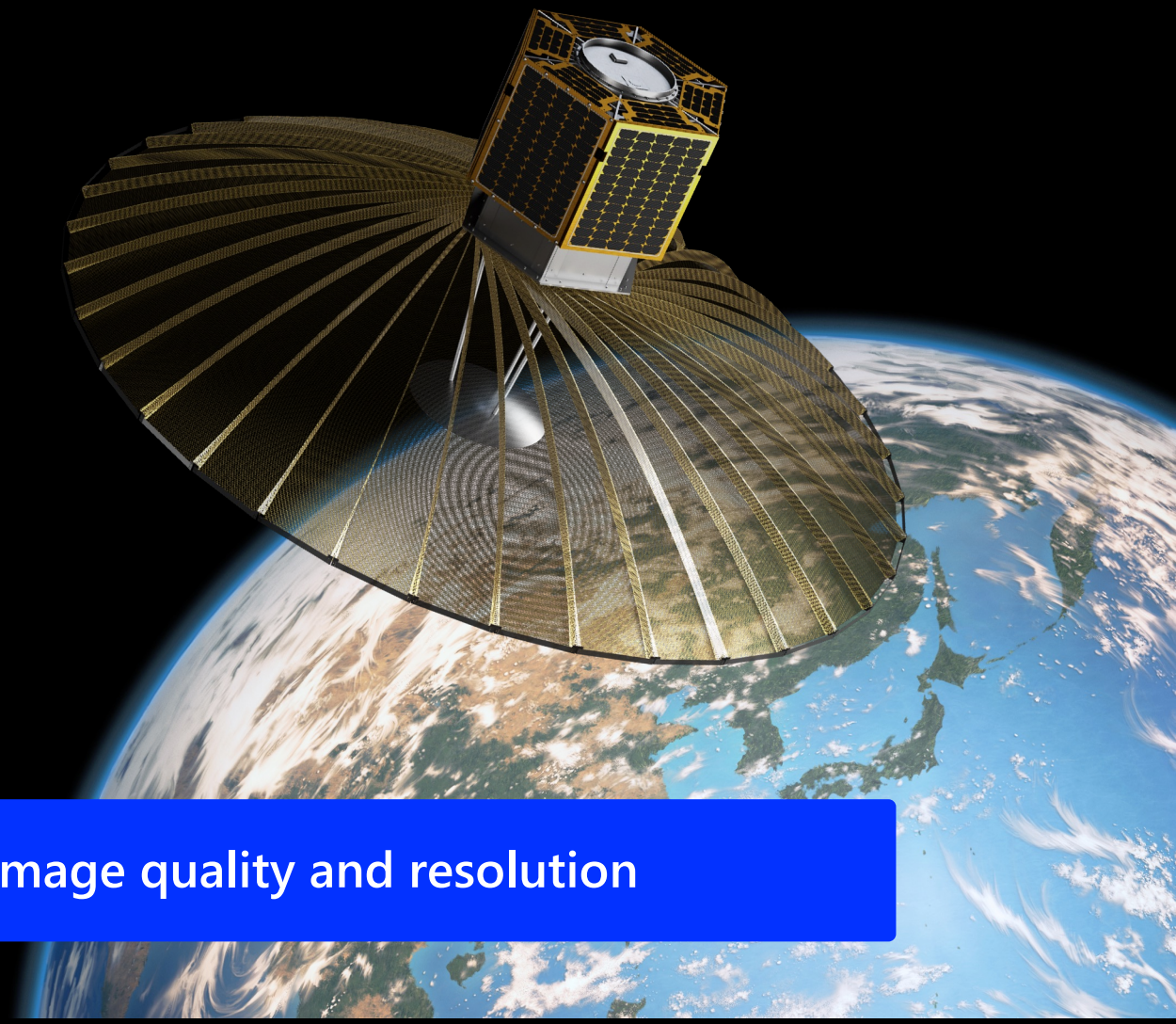
Orbit maintenance,
De-orbit at the end of the mission

Increase available power and Increased downlink speeds

Supports high-resolution and high-frequency SAR observations

Design Life

5 years

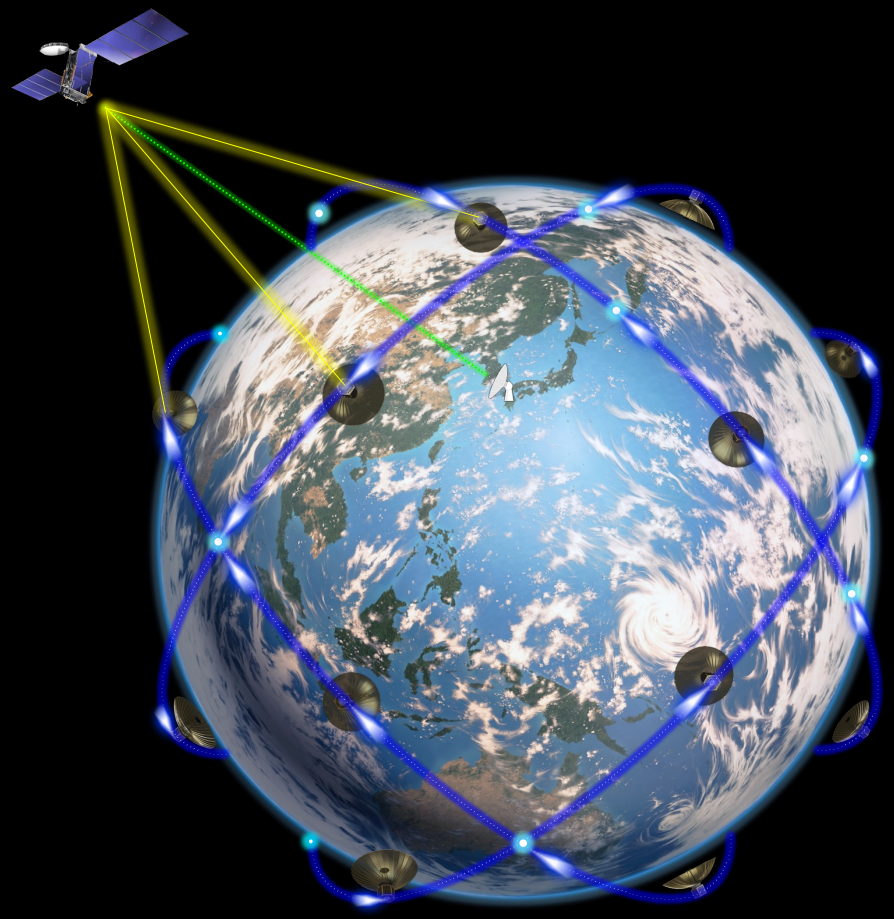


QPS-SAR delivers world-class image quality and resolution

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What will be achieved?



1 High-resolution SAR satellites enable **resolution** 0.5 m

2 By a constellation of 36 satellites **Observation frequency** 10 -minute intervals

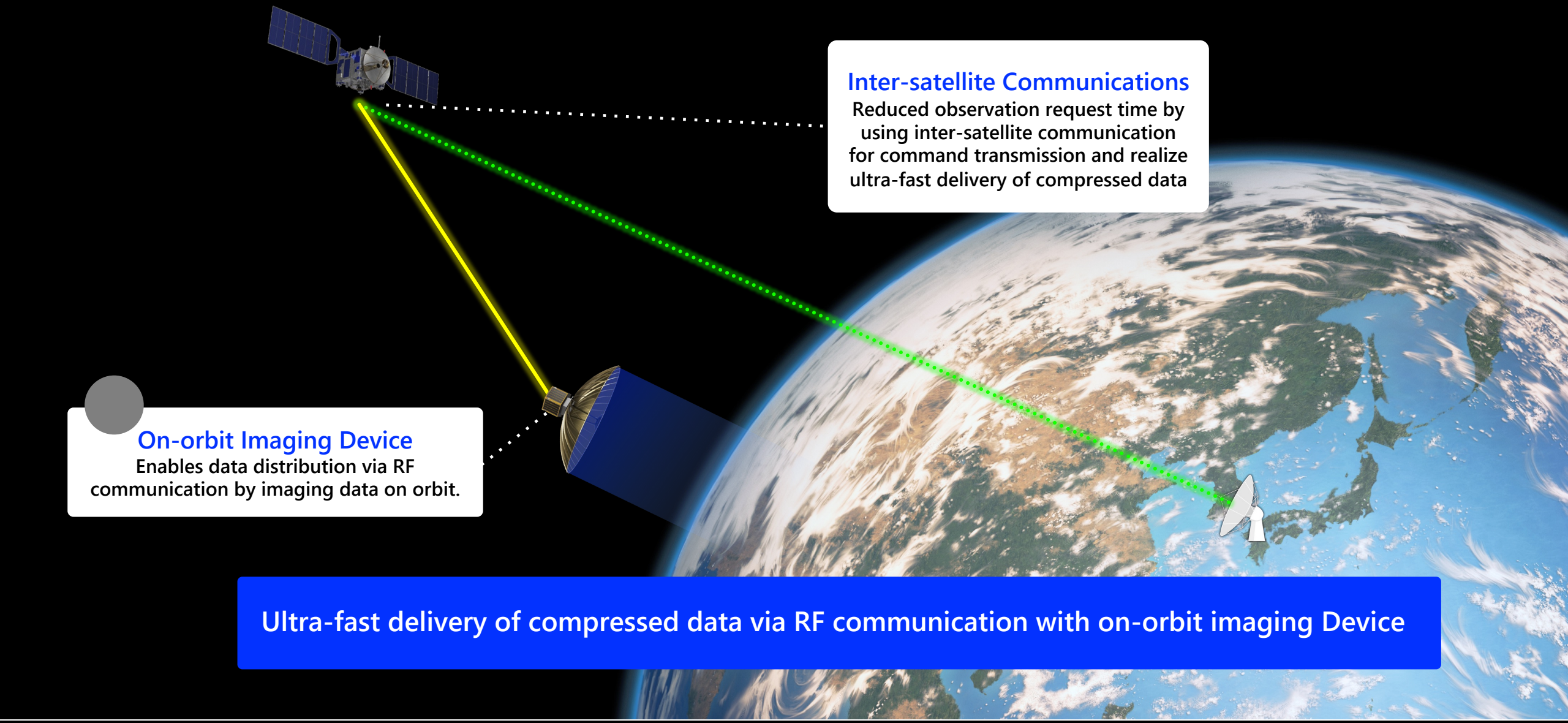
3 By using inter-satellite communications **Delivery** within 10 min.

Realization of “Near Real-time Earth Observation” using high quality images

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Inter-satellite communication (Current: RF)



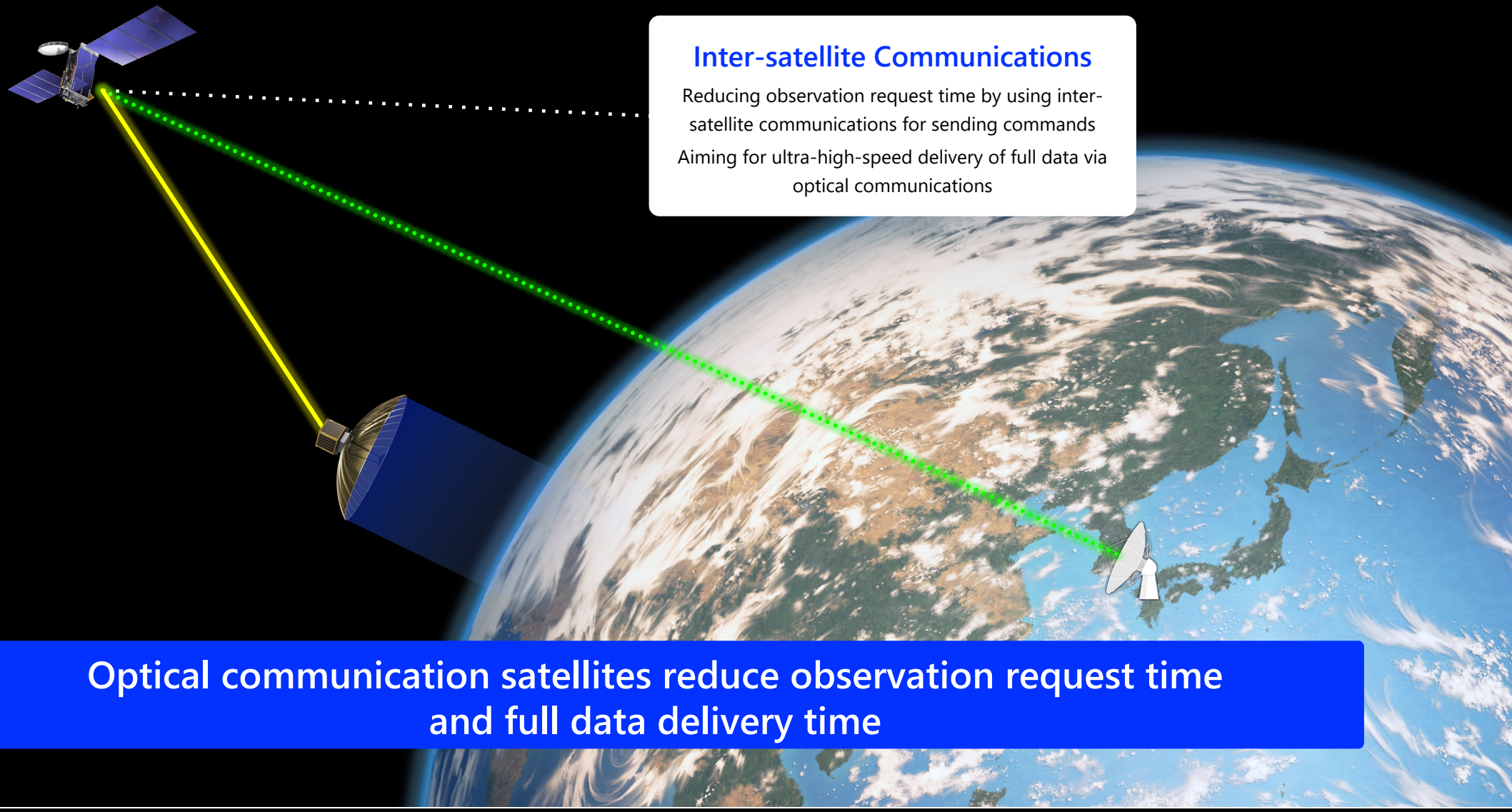
Inter-satellite Communications
Reduced observation request time by using inter-satellite communication for command transmission and realize ultra-fast delivery of compressed data

On-orbit Imaging Device
Enables data distribution via RF communication by imaging data on orbit.

Ultra-fast delivery of compressed data via RF communication with on-orbit imaging Device

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Inter-satellite communications
(After 2025: RF/optical communication)



Inter-satellite Communications

Reducing observation request time by using inter-satellite communications for sending commands

Aiming for ultra-high-speed delivery of full data via optical communications

Optical communication satellites reduce observation request time and full data delivery time

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Satellite Launch Status

2019.12

QPS-SAR-1
Successful launch. However, no imaging was achieved.



2021.1

QPS-SAR-2
Successful launch. In May, the satellite succeeded in acquiring images 70 cm resolution, the highest resolution ever achieved by a domestic commercial SAR satellite at that time.



2022.10

QPS-SAR-3、-4
The rocket failed to launch into orbit.



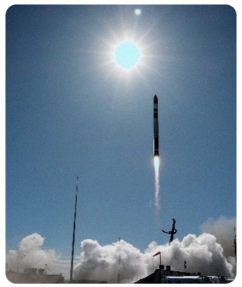
2023.6

QPS-SAR-6
Successfully launched in July and acquired images with a resolution of 46 cm, the highest resolution ever achieved by a Japanese commercial SAR satellite.



2023.12

QPS-SAR-5
Successful launch. In February of the following year, the same as 6, acquired a 46cm resolution image



2024.4

QPS-SA-7
Successful launch. First lights acquisition success one month later.





2024.8

QPS-SA-8
Successful launch. First lights in September.





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Constellation Construction Plan

20xx.. 36-satellite constellation
Observations available approximately every 10 minutes

2028 24-satellite constellation
Observations available approximately every 30 minutes

2022-23 4-satellite constellation
Observations every few hours are possible

2021 QPS-SAR-2
Successful Launch

2019 QPS-SAR-1
Successful Launch



By 2028, there will be a constellation of 24 satellites < 1 hourly near-real-time observation

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Business model

iQPS

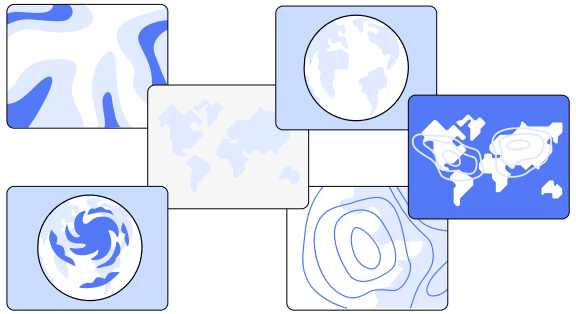
Development and design	Production	Operations
Research	Satellite Production	Satellite operations
Design	Assembly	Orbital management
Test	Integration	Crash avoidance
Trial manufacture	Test run	Data processing
	Supply Chain Management	Storage
		Delivery
		Ground Station Management

Data Sales → **Direct Sales**

Via distributors

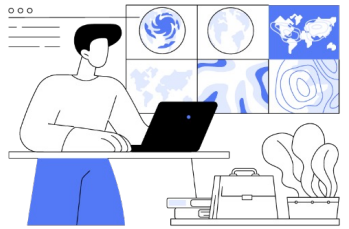
Solution Development Company → **Processing and sales of solutions**

Solution Development
AI Solution
GIS Software
Infrastructure Management
Disaster Preparedness and Response
Resale Services



End-users

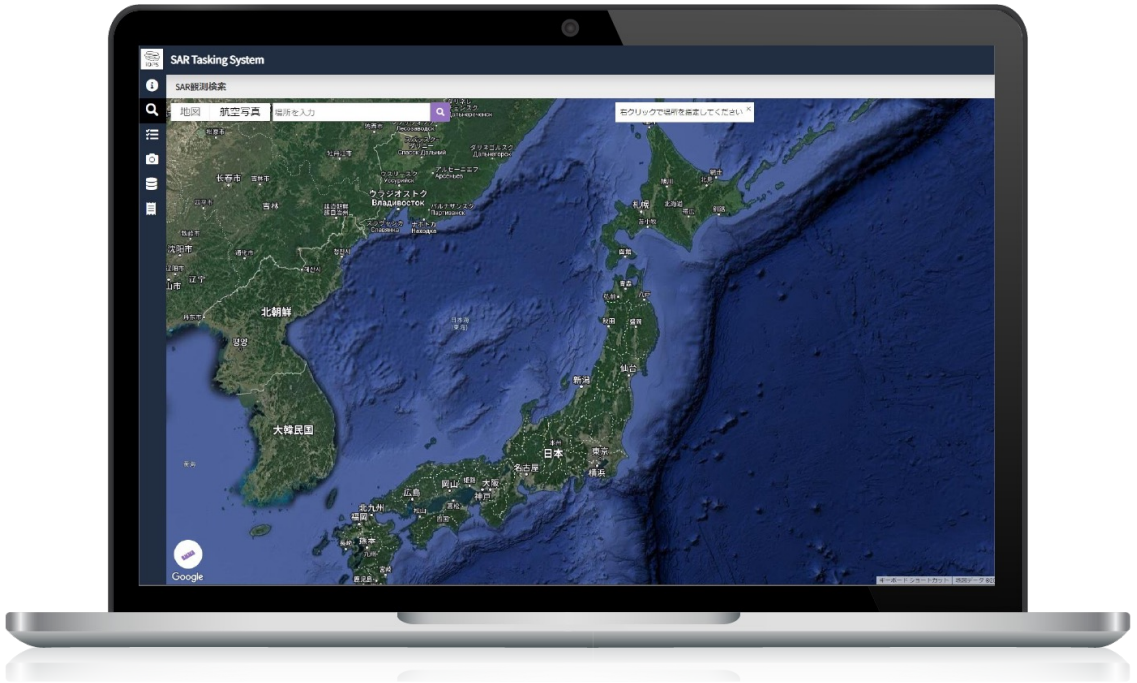
- Resource Development & Management
- Illegal fishing vessels / piracy detection
- Defense and Security
- Prompt confirmation of disaster/accident status



Enables partnering with solution developers and distributors

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Console 1



Tasking System	Observation schedule search / Observation option selection / Tasking execution (new observation order) / New observation data download / API linkage, etc.
Archived Data Sales	Archive data search / Option selection /Archive data download / API linkage, etc.

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Console 2



Search, Tasking, and Data Download

API Linkage

User-side Application

Platforms

Services

End-user side system

Direct use of the console with online tools

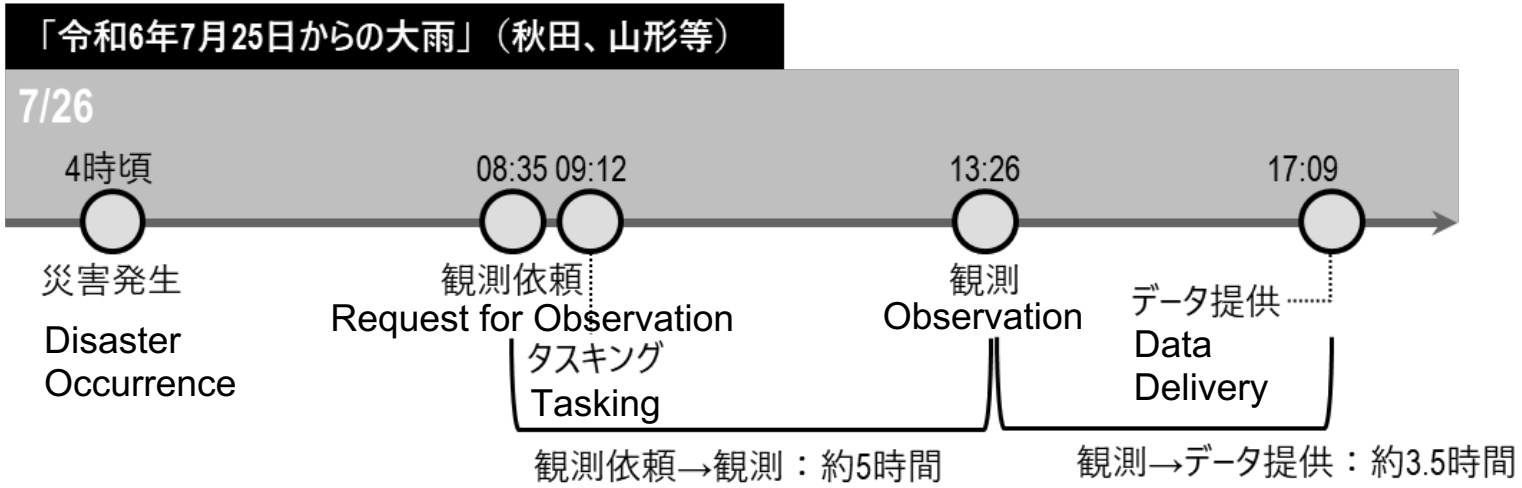
Partners ／End-user

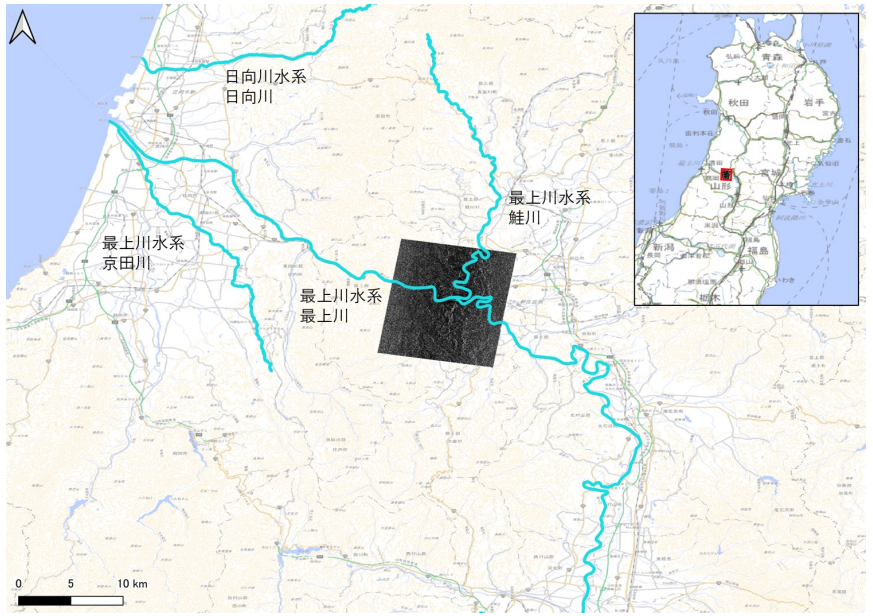
API linkage enables users to use console functions in their applications.

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Example of data provision: Providing images of the Mogami River flooding

Emergency observation of the Mogami River inundated by heavy rain on July 25, 2024,
and provided images to national government agencies.





Requested observation at 08:35 on 7/26, conducted observation at 13:26 on the same day (about 5 hours after the request), and provided data at 17:09 on the same day (about 3.5 hours after the observation).

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Advanced Satellite R&D

L-band small SAR satellite

- In 2022, iQPS signed a research and development agreement with JAXA for the “Examination and Prototype Test of a small L-band SAR Satellite” and is proceeding with the study.
- The purpose of this contract is to study and conduct trial manufacture and testing of a small L-band SAR satellite for the purpose of technological demonstration of cooperative observation by two satellites.

X-band small SAR satellite

- The project has been selected for the “Demonstration of a small SAR satellite system that realizes high-resolution, high-quality, and wide-swath observations” under the “Satellite Remote Sensing Business Enhancement Demonstration” SBIR program to be implemented by METI in 2023, and development is currently underway.

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