Tsukuba Space Center

Leading space development in Japan

The Tsukuba Space Center was built in 1972 as part of Tsukuba Science City. It covers about 530,000 square meters, and is a comprehensive office with the latest test facilities and an environment full of greenery suited to a “Science City.”
The Center undertakes the following activities promoted by JAXA.

- Development and operation of satellites that act as our eyes in space, and analysis of observed data and images from them.
- Utilization of the space environment with the Japanese Experiment Module "Kibo" on the ISS, and training astronauts and promoting their activities.
- Development of launch vehicles and space transportation systems, and advancing technical research for establishing technological foundations.

Through the above activities, the center plays a core role in Japan’s space development.

Real H-II Launch Vehicle display

A flight model of the H-II Launch Vehicle, which is about 50 meters in length, is exhibited at the Rocket Plaza near the center’s main gate. The H-II is a 100 percent domestically manufactured launch vehicle that was developed over roughly 10 years, and, at the time it was completed, had world-class launch capability and performance. Japan established its independent technology for large-scale launch vehicles through developing and launching H-IIs. The H-II has been upgraded to become its successors H-IIA and H-IIB with even higher capability and performance.

Exhibition Hall “Space Dome”

“Space Dome” is an exhibition hall where you can feel and experience genuine space development by looking at test models of various satellites, rocket engines used in firing tests, and a full-scale model of the Japanese Experiment Module "Kibo."

Dream Port
Here, you are greeted by a beautiful 1:1,000,000 scale model of the Earth.

Utilization for Earth and Environment Observation
Introducing the purpose and result of each project mainly through the display of test model satellites (nearly identical to the actual satellite).

Satellites Opening up the Future
Introducing recently launched satellites, and those attracting lots of attention.

Human Space Activities / Space Environment Utilization
Introducing space environment utilization mainly through the display of a full-scale model of the Japanese Experiment Module "Kibo" and a test model of the H-II Transfer Vehicle (HTV) "KOUNOTORI" a cargo transporter to the ISS.

Space Transportation Systems
You can enjoy a display of the actual LE-7A and LE-5 engines used in firing tests, and learn the history of Japanese launch vehicles through 1:20 scale models.

Space Science and Solar System Exploration
An introduction to space science and lunar and planetary missions through a test model of "KAGUYA" (SELENE) and "HAYABUSA" (MUSES-C).

- Open from 10:00 a.m. to 5:00 p.m. (“Space Dome” opens from 9:30)
- Admission is free of charge.
- Closed on Mondays (irregular), New Years’ holidays, and facility maintenance date.

Guided tour information

Guided tour
You can look around part of Japan’s largest space development center with a tour guide.
Reservation required.
Tour fee is *500 yen (tax included) per person excluding high school students (including students of specialty schools)
Those who are under 18 years old are free of admission. (High school students are required to show their school ID cards.)

Tour office Tel: +81-29-868-2023 (from overseas, or 029-868-2023 in Japan)

Location

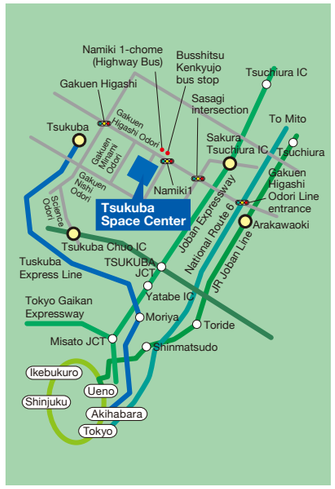
Access

By train
1. Take the JR Joban Line to Arakawaoki Station.
   Take the Kantetsu Bus going to Tsukuba Daigaku Chuo (Tsukuba University Chuo).
   Get off at Busshitsu Kenkyujo stop and walk 1 minute.
2. Take the Tsukuba Express Line to Tsukuba Station Take the Kantetsu Bus to Arakawaoki Station.
   Get off at Busshitsu Kenkyujo stop and walk 1 minute.

By car
1. Take the Joban Expressway.
   Exit at the Sakura Tsuchiura Interchange.
   The center is about a 7-minute drive from the interchange. (3.5 km)
2. Take National Route 6.
   Exit at the Gakuen Higashi Odori line entrance, 10-minute drive to the center (5 km).
3. Take the Ken-O Road Exit at the Tsukuba-Chuo Interchange.
   The center is about a 12-minute drive from the interchange via Science Odori/ National Route 19. (3.5 km)

By bus
Take the highway bus from Tokyo Station (Yaesu South Exit) bound for the Tsukuba Center.
Get off at Namiki 1-Chome and walk 1 minute.

By taxi
20 minutes from Tsuchiura Station.
15 minutes from Arakawaoki Station.
10 minutes from Tsukuba Station.



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http://global.jaxa.jp/about/centers/tksc/

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JAXA Website
http://global.jaxa.jp/

JSF180310T

JAXA Explore to Realize

Tsukuba Space Center

Uncovering new values For people, nations and the Earth

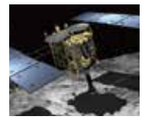
The environment surrounding the use and development of space is now dramatically changing. JAXA is expected to play a far greater role, not only in pioneering the frontiers of space science, but also in contributing to national security, disaster prevention, and industrial development.
The agency has committed to enhancing its existing efforts centering on technology development and tests for broadening the range of the aerospace industry by collaborating with private companies and universities. Our mission is to respond to ever-changing social needs with technologies to open up a new era.

Activities of Japan Aerospace Exploration Agency (JAXA)

Space Utilization with Satellites
Achieve a more prosperous society by observing the Earth's environment, monitoring disasters, and developing communications and positioning technologies.

Development and Operation Transport Systems Linking Ground and Space
Enhancing rocket technology nurtured in Japan to maintain and further improve technological foundations while reducing costs to contribute to space development.

Research on space science
Exploring the mysteries of the origin and evolution of space and the beginning of life. Paving the way for the future of mankind through the results of our experiments and advanced engineering research in the space environment.



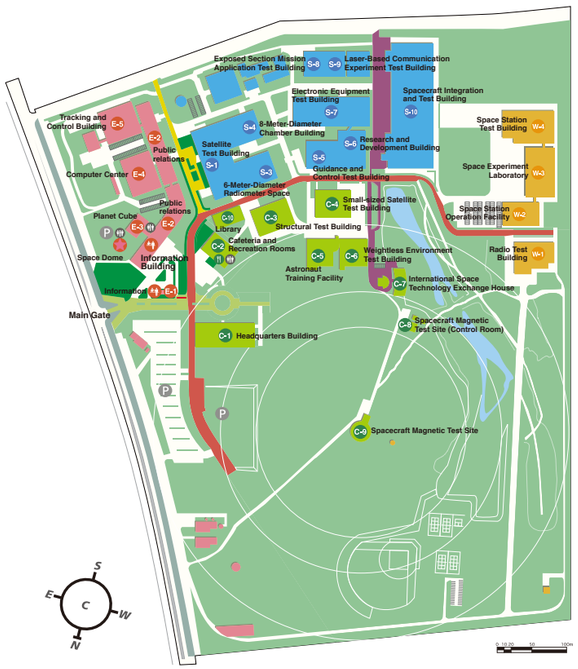
Space Environment Utilization
Contributing to an international society by safely and steadily operating the Japanese Experiment Module "Kibo" and the H-II Transfer Vehicle (HTV) “KOUNOTORI“ a cargo transporter to the ISS.

Research on Aeronautical Technology
Contributing to the growth of Japan’s aviation industry and a safer society by promoting research and development mainly on the “environment” and “safety.”

Research Relating to Fundamental Technology
Contributing to strengthening Japan’s industrial competitiveness by improving advanced and fundamental technologies in the aerospace field.

Tsukuba Space Center Organization

The Tsukuba Space Center consists of three directorates – the Space Technology Directorate I, the Human Spaceflight Technology Directorate, and the Research and Development Directorate. The Tsukuba Space Center, the core office of JAXA, is a place for various activities including research, development, and testing in the cutting-edge fields of space development.



E-Zone

- E-1 Information
- E-2 Public relations / Information Building
- E-3 Planet Cube
- Space Dome
- E-4 Computer Center
- E-5 Tracking and Control Building

W-Zone

- W-1 Radio Test Building
- W-2 Space Station Operation Facility
- W-3 Space Experiment Laboratory
- W-4 Space Station Test Building

S-Zone

- S-1 Satellite Test Building
- S-3 6-Meter-Diameter Radiometer Space
- S-4 8-Meter-Diameter Chamber Building
- S-5 Guidance and Control Test Building
- S-6 Research and Development Building
- S-7 Electronic Equipment Test Building
- S-8 Exposed Section Mission Application Test Building
- S-9 Laser-Based Communication Experiment Test Building
- S-10 Spacecraft Integration and Test Building

C-Zone

- C-1 Headquarters Building
- C-2 Cafeteria and Recreation Rooms
- C-3 Structural Test Building
- C-4 Small-sized Satellite Test Building
- C-5 Astronaut Training Facility
- C-6 Weightless Environment Test Building
- C-7 International Space Technology Exchange House
- C-8 Spacecraft Magnetic Test Site (Control Room)
- C-9 Spacecraft Magnetic Test Site
- C-10 Library

The Tsukuba Space Center plays a multifaceted role in thinking about the future of space

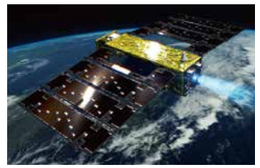
Development and utilization of satellites

Satellites such as communications and broadcasting satellites, meteorological satellites, and Earth observation satellites, are essential in our lives. We develop various types of satellites aimed at acquiring basic satellite technology, improving Earth observation technology, and achieving advanced Earth communications technologies in order to meet more diversified and sophisticated demands.
Using a space application system mainly based on satellites, we are achieving more prosperous lives through Earth environment observations, disaster monitoring, and the development of technologies for communications, broadcasting and positioning.

Global Change Observation Mission-Climate「SHIKISAI」(GCOM-C): Observe Earth's rich array of colors from space

"SHIKISAI" can observe 19 wavelengths (colors), and is equipped with unique features such as polarization and multi-direction, and near UV observation functions.
"SHIKISAI" is capable of observing the whole Earth with a range of over 1,000 km every about two days at a high resolution of 250 m. Hence the satellite is expected to acquire important data related to our living environment including data on clouds, aerosols and vegetation essential for improving the accuracy of global warming predictions, as well as data for forecasting fishery grounds, and understanding the movement of yellow sand and red tide occurrences.

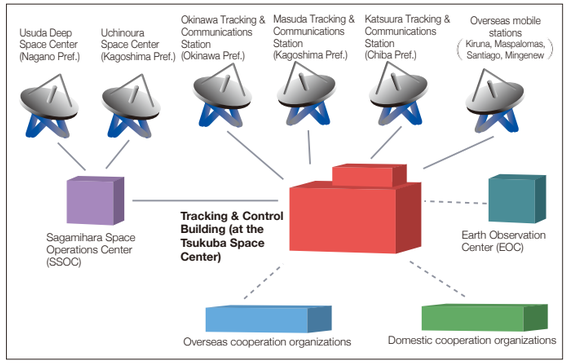
The Super Low Altitude Test Satellite 「TSUBAME」(SLATS): Open a new orbit



In a very low-altitude orbit that is lower than 300 km ("super low orbit"), a satellite faces difficulties in keeping its orbit for a long-term period due to large air resistance.
"TSUBAME" is aiming to achieve a prolonged life in a super low orbit by utilizing its high-efficiency ion engine to conduct technologic demonstrations for future development and application of satellites in this orbit.

Core station for tracking and control (network) for satellites

"Tracking and control" means comprehensive data communications and monitoring and controlling operations with a satellite including confirming its injection into its orbit after being launched and separated from its launch vehicle, and data transmission and reception. Multiple satellites are tracked and controlled from the Tsukuba Space Center. In addition, the Tsukuba Space Center is a core station of domestic and overseas "ground stations" by connecting them via communication networks to construct the tracking and control network. It gathers data received by ground stations (tracking and communication stations) to ensure efficient tracking and control for various satellites.



Tracking and control network

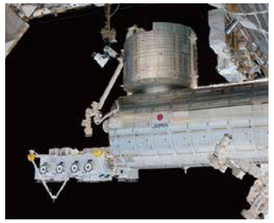
A tracking and control network is established with the Tracking and Control Building at the Tsukuba Space Center as a central station, and is connected to domestic stations of Katuura, Masuda, and Okinawa, and space stations in Usuda and Uchinoura. The network is also linked to overseas mobile stations of Kiruna, Maspalomas, Santiago, and Mingenew, and collaborates with overseas and domestic cooperation organizations. Through the tracking network widely developed on the Earth, we have achieved efficient tracking and control by having more communication opportunities with various satellites in space.

First step to make space a place where everybody can visit International Space Station / "Kibo" operation and utilization

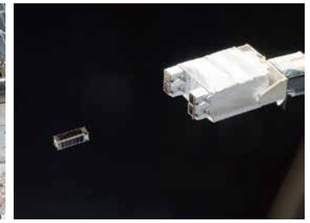
The International Space Station (ISS) is the largest manned space facility in the history of mankind built at an altitude of approx. 400 km through the international cooperation of 15 countries. In the Japanese Experiment Module "Kibo" of the ISS, which was developed by Japan, a variety of experiments and technical demonstrations are conducted using the unique space environment such as microgravity and space radiation. We also provide fundamental support for ISS missions through safe and steady operations of our cargo transporter, the H-II Transfer Vehicle (HTV) "KOUNOTORI" with its consecutive successful transport missions. "KOUNOTORI", independently developed by Japan, can transport up to six tons of cargo, the largest transportation capacity in the world, including water, food, test samples and experiment instruments that are imperative for the ISS. Operation of the "Kibo", experiment operations, and operation and control of the "KONOTORI" are performed at the Tsukuba space Center.

Space Environment Utilization with unlimited potential

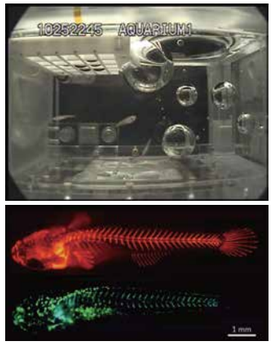
The "Kibo" consists of two experiment facilities, the Pressurized Module (PM) inside the "Kibo" and the Exposed Facility (EF) to space, to conduct experiments mainly for life science and space medicine and to observe space.
Some experiments there are attracting attention from overseas, such as the high-quality protein crystal growth experiment as well as small satellite deployment and simplified exposed experiments conducted by taking advantage of the "Kibo"'s unique function of being equipped with both an airlock and a robotic arm so that an instrument can be easily moved inside and outside of the "Kibo". The use of the "Kibo" by overseas users is now increasing.



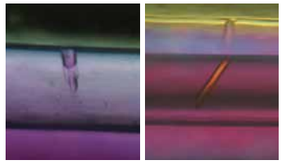
Japanese Experiment Module "Kibo"



Small satellite deployed from the "Kibo"
CubeSat "EGG" of University of Tokyo was deployed from the JEM Small Satellite Orbital Deployer (J-SSOD)



Medaka Osteoclast Experiment
Raising Medaka (killifish) in space (above) to study the process of a decrease in the volume of bone is expected to contribute to developing a remedy for osteoporosis.
In the experiment, Medaka's osteoblasts were colored in red, and osteoclasts were in green (below) so that bone metabolism can be analyzed.
(Image (below) provided by Prof. Akira Kudo, Tokyo Institute of Technology)



High quality protein crystal growth in space
Left: Crystal grown during the ground verification
Right: Crystals grown in the "Kibo" (Image through a microscope)
(Images provided by Iwate Medical University / JAXA)

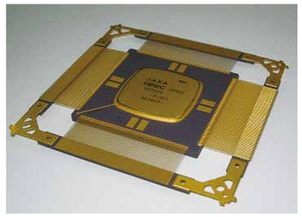
"Kibo" Mission Control Room
Operation of the "Kibo" is performed 24 hours a day, 365 days a year by JAXA's flight control team on a three-shift a day basis.

R&D for new technologies being prepared for the future

JAXA performs research on a unit by unit basis that is specialized in space transportation technology namely: a unit for electric technology including orbit navigation / guidance / control, communications, power generation and avionics; a unit for mechanical technology including thermal issues, structure / mechanism, fluid / aerodynamics, satellite propulsion, and manned space environment control; and a unit for software technology including programming, mathematical simulation, and information engineering. In addition, steady progress is being made on research on the global issue of space debris and the practical use of a space solar power generation system for the future.

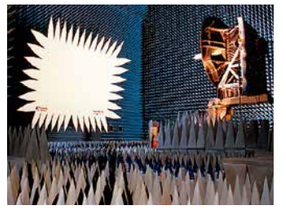
Tests and verification to ensure higher reliability in space

Various ground experiments must be conducted to develop highly reliable spacecraft that can be operated precisely to meet goals in the harsh space environment. Vibrations and acceleration at the time of rocket launch and the vacuum conditions and temperatures of space are simulated at the Tsukuba Space Center to test spacecraft functions and performance.
Furthermore, research and development of test methods and assessment and verification methods are carried out based on technology accumulated through previous tests to contribute to the development of new satellites and launch vehicles.

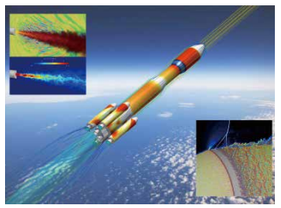


Space-qualified MPU

100 Ah Lithium- ion Battery



Radio Test Facility (Radio Test Building)
This facility is for conducting radio system tests on satellites and tests on onboard antennae and radio wave sensors in rockets and satellites, to measure their radio wave properties.



Numerical simulations of rocket engine external flows
Aiming to acquire the world top-level numerical simulation technology, JAXA performs its R&D in cooperation with domestic and overseas organizations.

13 m φ Space Chamber (Spacecraft Integration and Test Building)
This chamber is for checking the environment resistance of satellites in a space vacuum and thermal environment.

Large Scale Vibration Test Facility (Spacecraft Integration and Test Building)
This facility is for conducting vibration tests on each system of a satellite or a launch vehicle, or on parts of the system.