

Space as an enabler to achieve the Sustainable Development Goals

By **ISHII Yasuo**, Vice President, Japan Aerospace Exploration Agency (JAXA)

■ The Japan Aerospace Exploration Agency ([JAXA](#)) is Japan's national research and development agency designated to support the Japanese government's overall aerospace activities. It engages in a wide range of undertakings, from basic aerospace research and development to space utilization.

Japan's new Basic Plan on Space Policy, adopted in June 2020, has set solving global issues, including contributing to achieving the Sustainable Development Goals (SDGs), as one of the core targets of Japan's space activities.

Space science, technologies and innovation have significant potential to contribute to the SDGs. With its diverse expertise and assets, JAXA is well-positioned to support these global and national efforts.

Earth-observation satellites or Earth exploration satellites in particular are cutting-edge technologies that strongly contribute to the achievement of the SDGs. Satellites provide essential information on disaster-risk management and agricultural activities in our daily lives on Earth. Long-term observation and the accumulation of archived data can improve worldwide climate change projection. In this way, Earth observation by satellites can enhance the sustainability of our Earth, including human society.

A variety of JAXA's Earth-observation programmes have been contributing to relevant SDGs through its partnerships with various stakeholders around the world. Here are some examples of our efforts.



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Life on land and climate action

The first example concerns “Life on land” and “Climate action”. Together with the Japan International Cooperation Agency (JICA), JAXA has been operating the JICA-JAXA Forest Early Warning System (JJ-FAST) to monitor forest data since 2016. It offers free and easy access to information on deforestation and changes in global rainforests via the Internet.

The data from JAXA’s L-band Synthetic Aperture Radar satellite, ALOS-2, is used to observe the Earth’s surface day and night, and in all weather conditions. It now monitors tropical forests in 77 countries and has detected more than 308 000 areas of forest cover changes since its launch.

JJ-FAST is a valuable tool for sustainable forest management, combatting global warming, and halting biodiversity loss.

Sustainable water management, resilient cities and climate action

Another example is a global rainfall watch system called GSMaP for “Sustainable water management”, “Resilient cities,” and “Climate action”.

Every hour, JAXA provides an updated global precipitation map by integrating various satellite and sensor data from Japan’s meteorological satellite (Himawari), precipitation radars (PR, DPR), and the Advanced Microwave Scanning Radiometer (AMSR-2), together with those of the United States and Europe. Currently, meteorological agencies and disaster-management organizations in 133 countries worldwide are using the data from GSMaP. It significantly helps countries in the Asia-Pacific region suffering from Typhoons and hazardous rainfall by providing essential information that is difficult to observe with ground-based radars. We are pleased and honoured that GSMaP effectively supports the stability and resilience of the region.

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The COVID-19 Earth-observation dashboard

Another more recent example is the response to the COVID-19 pandemic. Three space agencies, JAXA, NASA and ESA have joined forces to create a satellite data dashboard that shows the environmental and economic effects of the COVID-19 pandemic. It demonstrates the strength of Earth-observation satellites that can provide synoptic and scientific views from space despite the global challenges caused by the coronavirus outbreak on Earth.

JAXA satellites for SDG 15 – forest monitoring



For example, the CO₂ and NO₂ emission reduction during lockdown can be seen based on the data from each respective organization's greenhouse gas observing satellite series, including the Greenhouse Gases Observing Satellite (GOSAT), the Orbiting Carbon Observatory 2 (OCO-2), and Sentinel.

Such satellite data is expected to contribute to the Global Stocktake under the Paris Agreement (see figure).

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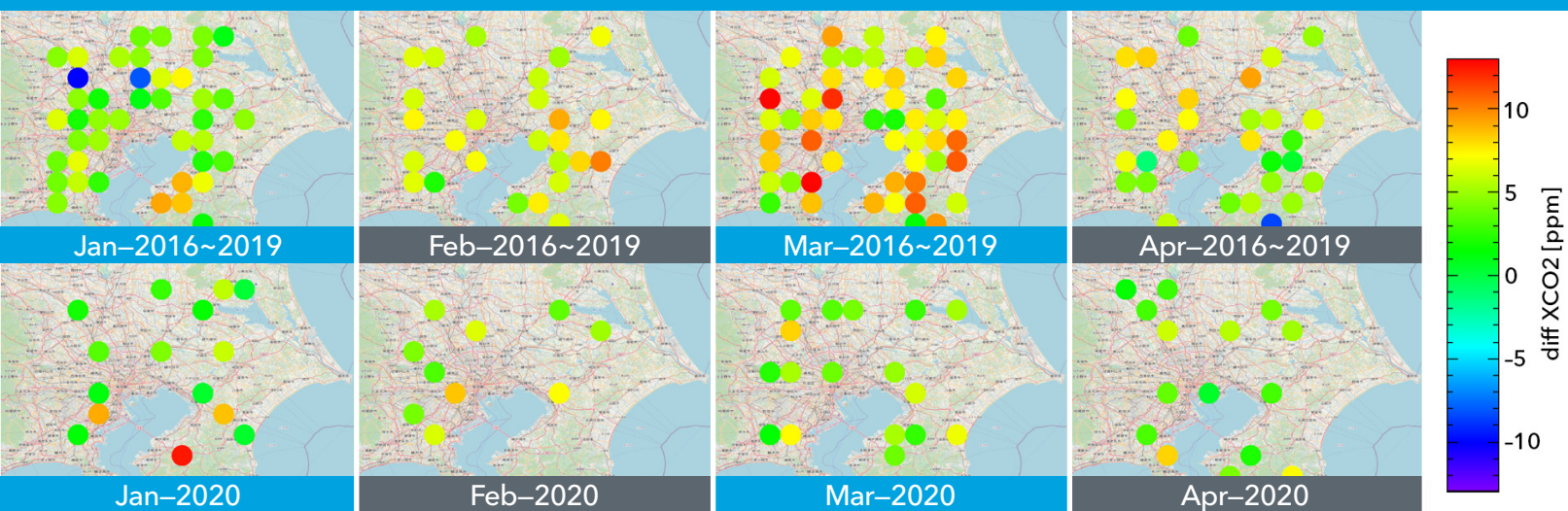
KiboCUBE: A partnership for education, industry, innovation and infrastructure

JAXA's contribution to the SDGs is not only in the field of Earth observation. Through a partnership initiative called KiboCUBE, implemented with the United Nations Office for Outer Space Affairs (UNOOSA), JAXA also supports the emerging and developing countries by providing opportunities to deploy CubeSats from the Japanese Experimental Module "Kibo" on the International Space Station, as well as providing the training and capacity building on satellite technologies.

KiboCUBE promotes "Resilient infrastructure, inclusive industrialization and innovation" in the participating countries by supporting "Quality education" in high technological skill sets. Kenya and Guatemala have already deployed their first satellites into orbit through KiboCUBE, building their space technology skills and gaining access to satellite data.

In parallel to the advancement of aerospace technologies that contribute to society, JAXA actively promotes international cooperation and partnerships to realize a society where "No one will be left behind."

Figure – Monthly lower tropospheric CO₂ enhancements map over Tokyo for January through April 2020 compared with the 2016–2019 monthly climatology. (GOSAT target observations are shown in color-coded circles of 10 km diameter field of view.)
Analysed by JAXA/EORC.



JAXA's Earth-observation satellites and the Sustainable Development Goals

JAXA's ALOS-2

JAXA's GCOM-W,
GPM/DPR and ALOS-2

JAXA's ALOS-2,
GCOM-W, GPM/DPR,
GOSAT and GCOM-C

JAXA's ALOS-2,
GCOM-W, GPM/DPR
and GOSAT

To maximize the benefits of space technologies, especially Earth observation for solving global issues and achieving the SDGs, space activities' sustainability towards the future is a prerequisite, and we plan to launch several new satellites and sensors such as ALOS-3/4, AMSR3 (GOSAT-GW), and Cloud Profiling Radar (EarthCARE).

It is essential to secure radio frequencies used by Earth-observation sensors and satellites, and to protect them from interference. The ITU World Radiocommunication Conference (WRC) can play a significant role in this regard.

We hope that these critical issues are duly taken into consideration at the next WRC, in 2023, to strengthen our efforts to serve society.

Today's world brings us various challenges and opportunities, as crystalized in the SDGs. As we have seen, aerospace technologies are an enabler to achieve a better and more sustainable future for all. JAXA continues to endeavour to realize the SDGs through its innovative missions and global partnerships.

Let us act together and make a significant impact on society and Earth! ■