



“Space Big Data Rice” cultivated using satellite data

Efficient Rice Cultivation Utilizing *Space Data*

A novel method of rice cultivation developed by a Japanese space venture business that utilizes data from Earth observation satellites in response to recent climate change is attracting attention both in Japan and around the world.

SASAKI TAKASHI

Rice cultivation is thought to have been practiced on the Japanese archipelago for around 3,000 years. Throughout this time, the Japanese have worked to improve rice varieties and methods of cultivation. Indeed, it would be no exaggeration to say that the delicious tasting rice enjoyed by Japanese people today is the result of these centuries of endeavor by our ancestors. Recently, the space venture business Tenchijin, Inc., certified by

the Japan Aerospace Exploration Agency (JAXA), has begun supporting Japanese rice farmers in a highly innovative way.

“The Japanese agricultural sector has encountered significant challenges in recent years, including a manpower shortage due to an aging population and climate change due to global warming. We are striving to overcome these challenges by harnessing the vast amount of data gathered from satellites orbiting the Earth,” says Tenchijin CEO Sakuraba Yasuhito.

Sakuraba’s interest in satellite observation data was sparked by an encounter with Hyakusoku Yasutoshi, current COO of Tenchijin and a JAXA engineer, when he was working in the area of agricultural IoT¹. A shared interest in harnessing satellites for business led the pair to found Tenchijin in May 2019 under JAXA’s start-up support program, and to begin cultivating “Space Big Data Rice.” This is a program under which JAXA certifies and provides support to projects that utilize JAXA’s intel-

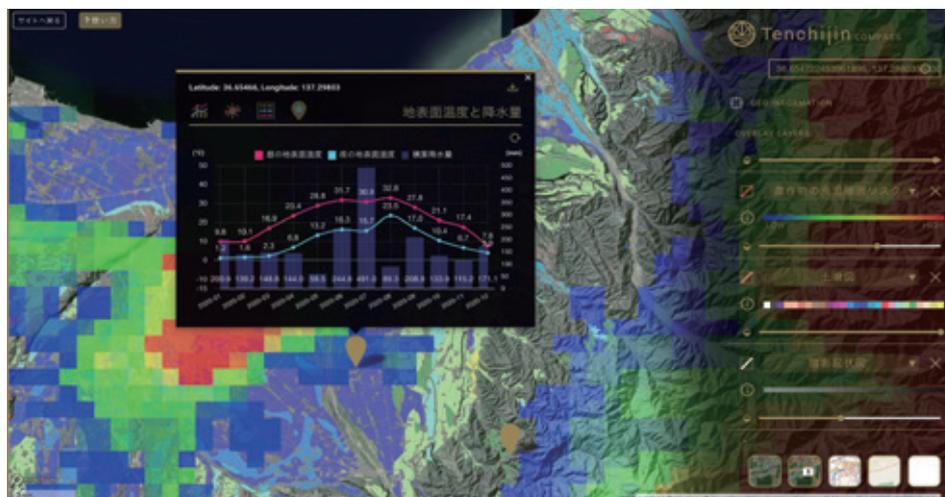
i. Internet of Things. Connecting people and physical objects via the Internet, allowing for the sharing of a vast array of knowledge and information to unlock previously unimaginable value.

lectual property and expertise, with JAXA employees investing in the venture company start-ups. As of June 2022, nine such companies have been established.

Says Sakuraba, “In Japan, around 300 varieties of rice are consumed as staple foods alone, each requiring differing climatic conditions for cultivation. Our first step was to analyze the vast amount of data obtained from satellite observations of atmospheric temperature, precipitation, surface temperature, and so forth, in order to determine the most suitable farmland for the cultivation of each variety.”

Tenchijin selects the optimal match between cultivation sites and rice varieties utilizing big space data such as meteorological and topographical information collected from satellites. Meanwhile, a “smart” sluice gate for rice fields that uses IoT to control water temperature automatically by linking it to satellite data was approved for use in a project to produce rice appropriate for the environment.

Contracted farms began cultivating rice using this method in 2021. Rather than handle the labor-intensive process of controlling water themselves, farms outsourced the process to an IT company which implemented a system that automates the control of water utilizing satellite data. During a spell of unusually hot weather, for example, when a risk of high temperature damage to rice plants is detected through satellite data analysis, rice fields are automatically flooded with



Tenchijin Compass, a land evaluation engine that utilizes space big data. The technology enables detailed surface temperature data in units of 1 kilometer and precipitation data in units of 10 kilometers from around the world to be viewed in an intuitive manner, making it possible to evaluate the environment of land that is difficult to observe directly.

water, ensuring that the appropriate soil and water temperature are maintained. This means that farms no longer have to manually control the water temperature of rice fields, resulting in a substantial reduction in labor requirements. In addition, the system enables farms to reliably cultivate rice varieties that are appropriate for the farmland, ensuring that the harvested rice is of high quality.

Rice produced using this system and method of control was harvested for the first time in the fall of 2021, and marketed under the brand name “Space Big Data Rice” in December of that year. Industry professionals highly evaluated the product, stating, “The rice exceeded expecta-

tions in terms of taste appraisal valueⁱⁱ, measured by protein and moisture levels, as well as in terms of yield.” Consumers also praised the rice, saying things like, “The texture is fluffy and it is very tasty.”

“Space Big Data Rice was more popular than anticipated, so much so that the warehouse ran out of stock soon after it was launched. I cooked the rice myself and also tried onigiri made from the rice at a rice ball specialty store. It tastes amazing,” says Sakuraba with a smile.

Tenchijin was awarded the Minister of Agriculture, Forestry and Fisheries Award by the Japanese government in March 2022 (Space Development and Utilization Award by the Cabinet Office).

According to Sakuraba, one of the greatest benefits of analyzing the climate pinpointing the soil from satellite data is that identifying varieties that are appropriate for each region and location becomes as simple outside Japan as it is inside the country. With the recent surge in popularity of Japanese cuisine, an increasing number of farmers are becoming interested in cultivating Japanese rice varieties overseas. This innovative technique for growing rice not only saves farmers time and effort but also responds to the effects of climate change, and as such is gaining widespread attention both in Japan and in other parts of the world with different climatic and geographical conditions for its potential to improve the chances of producing high-quality rice. 



Hyakusoku Yasutoshi, COO of Tenchijin and JAXA engineer



Sakuraba Yasuhito (right) receives the Minister of Agriculture, Forestry and Fisheries Award (Space Development and Utilization Award by the Cabinet Office)

ii. Calculated by measuring and analyzing the components in the rice, such as the amount of protein, starch and water content, and quantifying the taste on a 100-point scale.