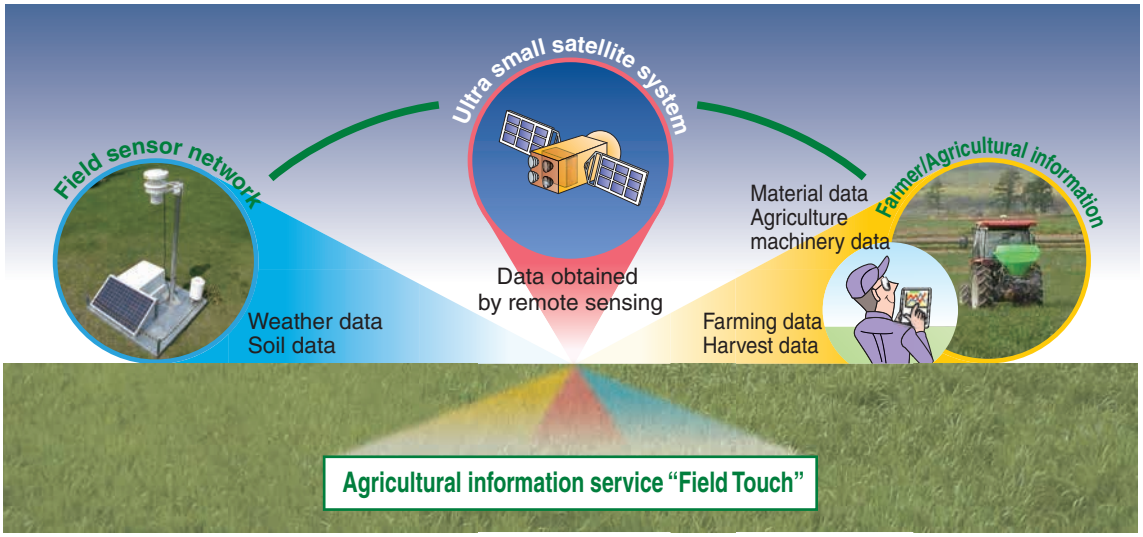
Supporting Agricultural Production from Outer Space

Agricultural information service "Field Touch" encourages agriculture in Japan

We would like to introduce a project in which we are trying to find a breakthrough from the perspectives of outer space and information with the aim of reviving agriculture in Japan as it is facing many problems.
"Field Touch" watches the growth of agricultural products from outer space to support agricultural production.



Problems with agriculture in Japan

Currently, agriculture in Japan is facing difficult problems such as reduced productivity due to aging farmers and unstable supply of agricultural products. In addition, consumers are demanding more and more high-quality agricultural products made in Japan because they worry about the safety of imported foods. Furthermore, as more farmers give up farming and as a new generation takes over, farmland is conglomerating in the hands of a small number of farmers resulting in the formation of large-scale farms, fundamentally changing the way agriculture is in Japan.

Agriculture supported by information

Until now, agriculture has mainly been thought of as production activities on cultivated lands (rice and vegetable fields), but when looked at on the basis of information, another activity comes into view.

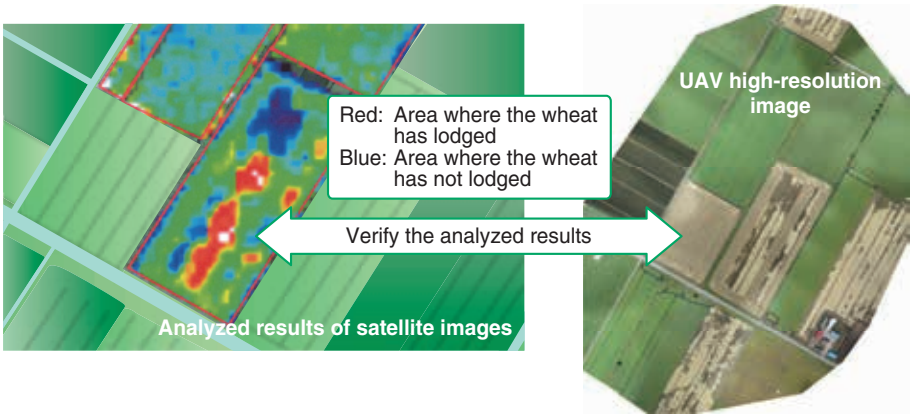
Agricultural production involves several kinds of information: Work information represented by farm management journals, environmental information (e.g., weather data), and growth information that shows the states of agricultural products. There have been no business services that collect, process, and offer such information to support agriculture in a centralized way and such services would be a solution for problems agriculture is currently facing in Japan. In addition, such information would show that the farm products are safe, secure, and high in quality, so it would serve as important data in the distribution and selling of products. It was from these viewpoints that IHI developed the agricultural information service "Field Touch."

Approach from the perspective of outer space

Growth information that is the core of "Field Touch" is obtained by getting a bird's-eye view of agricultural products

using artificial satellites (i.e., remote sensing). This method is far superior for understanding the overall situation to conventional observation on the ground. It also makes it possible to visualize the growth of agricultural products in a two-dimensional distribution.

The degree of growth of agricultural products is converted into numbers as Normalized Difference Vegetation Indexes (NDVIs) and such indexes are used to make decisions. These indexes make it possible to adjust the amount of fertilizer to be used depending on the degree of growth for an evenly distributed harvest throughout an entire cultivated field. In other words, it will be possible to add more potent fertilizers to areas where products grow slowly. When wheat grows too high, it falls to the ground and the quality deteriorates (which is a problem called "lodging"). However, lodging can be prevented by reducing the amount of fertilizers used in areas where wheat is growing too fast. Yields can be maximized by applying the maximum amount of fertilizers just short of the amount that would result in lodging.



Map showing lodged wheat

Placing a watch on the ground

Environmental information can be obtained from meteorological satellites, but local weather information is more effectively collected on the ground. Weather observation systems, represented by POTEKA made by MEISEI ELECTRIC CO., LTD. can collect in real-time ambient temperature, humidity, atmospheric pressure, solar radiation, wind direction, wind speed, amount of rainfall, and other weather data, and monitor local weather and soil conditions.

In addition, work information such as work details and yields can be recorded using cloud services and shared between producers and consumers. Such data can also be easily recorded, referred to, and searched at production sites using smartphones and other similar devices, which is convenient.

Trial in the Tokachi Obihiro area

We have been conducting a test run of "Field Touch" in the Tokachi Obihiro area in Hokkaido since FY2011 to provide services to support agricultural production in the area with agricultural producers as monitors. This area has 36 sensors installed for obtaining environmental information. Real-time images of the area can be seen. We have been exchanging opinions with 300 contracted farmers (monitors) to periodically upgrade the system. Some successful cases have been reported: lodging was avoided by adjusting the distribution of fertilizers based on the information and a harvest was increased by 20%. The system has been producing actual results.

Striving toward further dreams

We are developing an agricultural product growth simulation function to add to "Field Touch." This function will make it possible to predict harvest timing and the amount of yield in consideration of changes in daily weather, etc., which makes scheduled production possible. In addition, we are developing a GPS variable fertilization system in which GPS-equipped agricultural machinery (fertilizer spreaders) is used in combination with growth information from "Field Touch" in a cooperative development with IHI STAR Machinery Corporation. The aim is to provide support for saving energy and resources. Furthermore, we are considering adding flexibility to the interfaces between agricultural machinery with GPS and systems for collecting environmental information so that producers can use equipment that they already have in an effective way.

In recent years, Unmanned Aeroplane Vehicles (UAVs) have been quickly reaching a level of practical use and it is said that 2015 is the first year of the drone era (drone is another name for UAV). There are many differences between UAVs and artificial satellites (e.g., in flight attitude and resolutions). We are considering adopting both for "Field Touch" by drawing on each of their features.

We will develop and offer products, centered around "Field Touch," that will be used to plan, implement, and improve agricultural production and management using the combined strength of the IHI group in different technological fields (space development, meteorological observation, and agricultural machinery) which will allow us to contribute to sustainable food production and the safety and security of foodstuffs.

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