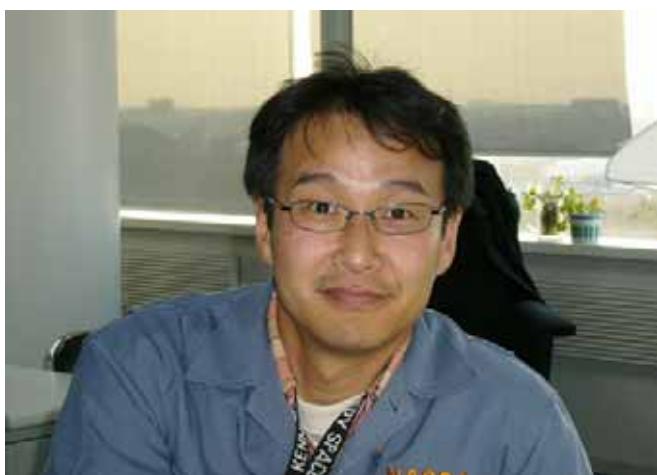


Space Japan Club (16)

Meet people who swear for developing satellite communications



Mr. Kogure talks, Leader in GPS R&D

JAXA

It seems that the positioning and timing data is getting more and more important in next decade. The satellite positioning technology is comprehensive from space

vehicles to ground user receivers. In order to maintain Japanese position in the world GPS application market, I believe we have to continue R&D of satellite positioning system, especially space segment.

Interview by Y. Kazekami, Senior Editor

Satoshi Kogure : After graduate Nagoya University in 1995, enter National Space Development Agency of Japan(NASDA, currently JAXA) and started his first carrier in satellite operation division. Now taking charge of satellite system design for pre-phase A study, especially experimental satellite positioning system on Quasi-Zenith Satellite System (QZSS).

Thank you very much for your time in our interview. First of all, please brief introduce your organization and your current activities.

Mr. Kogure : Japan Aerospace Exploration Agency (JAXA), the brand-new organization, has just been established since October 1, 2003, united three research and development institutes, National Space Development Agency (NASDA), Institute of Space and Astronautical Science (ISAS) and National Aerospace Laboratory in order to implement R&D activities related to aerospace and astronautical science more efficiently. It is expected that the new agency attains a great success gathering their heritages and experiences.



JAXA Tsukuba Space Center

I have worked for NASDA for 11 years since 1993. I started with my carrier in satellite operation division. I am taking charge of satellite system design for pre-phase A study, especially experimental satellite positioning system on Quasi-Zenith Satellite System (QZSS).

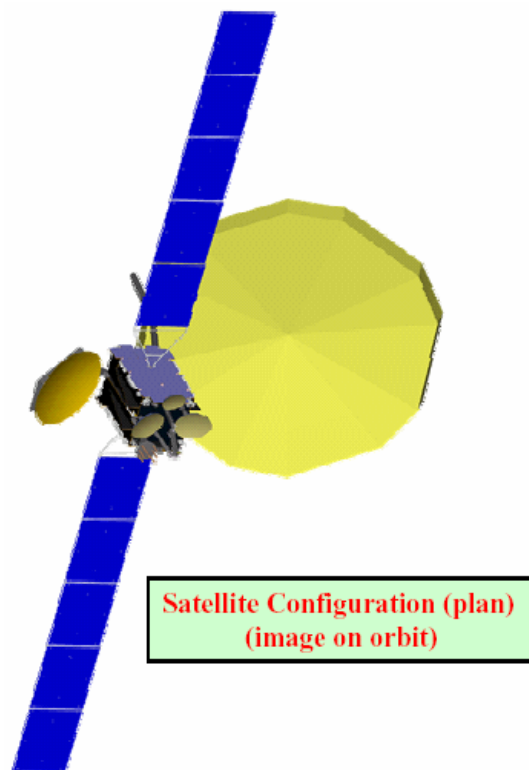
QZSS is a satellite constellation consisting of several satellites on inclined geosynchronous orbits. It will provide GPS augmentation service adding to mobile communications and broadcasting from a satellite with high elevation angle. The QZSS program is promoted under the collaboration between Japanese industry and government. We, governmental research institutes, have responsibilities for R&D portion of the program, especially positioning services. The high accuracy satellite positioning technology will be developed and demonstrated through the QZSS program.

Please explain about US-Japan GOS Plenary Meeting. What kind of contents will be discussed in the plenary?

Mr. Kogure : US-Japan GPS plenary meeting is organized to implement ideas originally outlined in the Joint Statement regarding cooperation in the use of the GPS which was issued on September 22, 1998. The purpose of the meeting was to study and discuss important matters regarding cooperation in the use of the GPS Standard Positioning Service (SPS). Since both parties agreed to establish Technical Working Group (TWG) in order to discuss the compatibility and interoperability between GPS and QZSS in the second plenary meeting held in 2002, Three technical meetings have held. I attended these technical meetings as a member of Japanese delegation and discuss how QZSS and GPS are harmonized and user benefits are maximized

I heard that you have participated a lot of conferences in overseas. Do you have any episode?

Mr. Kogure : Before I participated in the TWG at first, I was afraid that US would not welcome to our proposal which QZSS transmit same signal as GPS. US, however, is very cooperative and positive stance for our QZSS program. The number of PRN code described on the GPS ICD 200 is limited and there is no room to allow other RNSS systems than GPS to use. We, therefore, cannot receive L1 signal from QZSS and calculate position by existing receiver. As for



QZSS Satellite Concept

L2 and L5, QZSS can transmit same signal structure with the defined PRN code. L1C, which is brand-new signal on L1 and updates the existing C/A legacy signal, is one of candidates of QZSS L1 signal. Adding to these discussions about signal structure, US provide various suggestions and advises about system design, development and operation based on their 30 years experiments. I believe this framework is working effectively and very useful for us.

Several positioning satellite systems such as GPS, Galileo, COMPAS, have been proposed. What kind of goal do these systems aim and what is the key technologies to realize the system?

Mr. Kogure : Just a couple of days before, the news was announced that long dispute about GPS and Galileo spectrum issues had reached an agreement at last. The overlay problem between GPS military signal and Galileo signal on the L1 band was resolved. Europe agreed that Galileo signal is separated its spectrum peak away from M-code peak. Moreover, both parties agreed the employment of same signal structure in order to enhance the interoperability between both systems. I think that we may handle signals from 2 systems, Galileo and GPS (after GPS-III), on the same receiver in future. It means we will have a great possibility to get much better availability than we can obtain it from one system. Besides improvement of availability, robustness is also improved by adding Galileo to GPS. New applications such as transportation control are expected to grow up in next generation. Assuming QZSS is to be added to such situation, I think QZSS should have additional benefit for users, not just same signals as GPS, but also collection data and other regional

information.

In the ending, please provide your comments on the technologies of positioning satellite systems in Japan and the relation between Japan and outside of Japan.

Mr. Kogure : As for the application of the satellite navigation area, the level of Japanese technology is seems to be high level in the world, as you can see total shipment number of car navigation unit. The spread of the 3G mobile phone service is likely to push up drastically, because many of them have GPS receiver. For application of 2-frequency receiver, Geographical Survey Institute (GSI) distributed more than 1200 receivers in order to monitor crustal movements. GSI opens their observation data to generate RTK collection data for business use. Several companies have started collection data distribution service.

Otherwise, we don't have enough mature technologies to develop, manufacture, and operate satellite-positioning system. I think that the difference between Japan and US, Russia and Europe, which has their own satellite positioning systems, are huge. Though NASDA and CRL have been implementing the R&D for elemental technologies, we have not yet had an opportunity to demonstrate the performance as the total system. QZSS program is highly expected to provide such kind of chance to develop, demonstrate and operate satellite-positioning system totally.

It seems that the positioning and timing data is getting more and more important in next decade. The satellite positioning technology is comprehensive from space vehicles to ground user receivers. In order to maintain Japanese position in the world GPS application market, I believe we have to continue R&D of satellite positioning system, especially space segment. The agreement between GPS and Galileo may open the door lead to future civil RNSS based on international cooperation. We would like to contribute to the construction and operation of such system if it realize.