Space Business Monthly News

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Satellite Business Network

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Editorial 01: Autonomous technology—simply a buzzword or essential tech? (Kuzuoka)

From August 7 to 12, 2021, I attended Small Satellite Conference 2021. This year's theme was "MISSION OPERATIONS & AUTONOMY." It was helpful for me to see recorded announcements, as there is a time difference, but it's a shame that we don't have the hot discussions that piqued the interest of the presenters, along with the fun of the ice cream that we ate on the green grass at the University of Utah.

I feel that the word "autonomy" has become a buzzword over the past year or so. Originally, the word "automation" seemed to play that role in terms of the operation of satellites. What I mean by that is, the satellite separates from the rocket, initial attitude is secured, the solar panel is deployed, and a line of communication with ground terminals is established. It was normal for this series of actions to proceed automatically and sequentially without human intervention. So, this is “automation.” On the other hand, NASA defines "autonomy" as self-directedness and self-sufficiency. Autonomous technology involves the situation in which the satellite itself sets its own targets, collects necessary information such as data on surrounding conditions, and then automatically achieves the target. In this, it is not essential that artificial intelligence (AI) is applied, but it is widely used. Since Perseverance’s (the Mars rover) landing on Mars on February 19, 2021, it seems that the word "autonomy" has become a buzzword ever since, as the word has come to refer to technology for self-deciding and self-advancing the course on which a machine runs.

At the conference, there were more than 10 announcements related to mission operations and autonomy. Of these announcements, there was talk of anomaly detection using AI at initial satellite checkout and of using satellites to inspect other satellites, but what interested me most was "tip and cue" onboard automation and autonomy for observation via observation satellites, along with target detection, and the automatic planning of subsequent observation planning. In fact, I was able to take in valuable lectures on such topics such as: onboard observation satellite data processing and target detection; onboard TCPED (tasking, collection, processing, exploitation, dissemination) autonomy; and the realization of the Sagittarius A * smallsat.

Some technology as presented will be used in DARPA's BlackJack project, and it can be said that such promising technology will be used in SDA's Tranche series.

However, for "autonomy" to become effective, it is important that an appropriate area to use such technology is selected. Currently, as an example of such area, it is practically difficult for humans to directly operate autonomous technology due to cost and communications conditions involving large-scale constellation operations and in-orbit services. Not only that, but the situation changes by the day, and this makes it hard to formulate a concrete path forward. Also, although not spoken about at this conference, regarding space surveillance (SSA)/space traffic control (STM), some startups are developing systems that allow satellites to "think" for themselves and take evasive action against nearby debris.

Lastly, only in new areas such as constellations where the number of satellites exceeds a certain threshold and where new missions that require real-time operations can new technology such as "autonomous technology" show true value, thereby becoming "indispensable." New & effective technology can only be developed by choosing the right area of use, i.e., by avoiding a mismatch, as embodied in the old proverb of "Putting new wine into old wineskins."

Editorial 02: Accelerating constellation construction for the "K-space" (Korean) era? (Oishi)

In regard to the space activities of countries neighboring Japan, China of course does have an overwhelming presence, but the activities of South Korea, which have somewhat been under the radar, have recently become quite active.

Especially, this year, and perhaps due to a public relations strategy, news from South Korea suddenly became noticeable, and here at Satellite Business Network, we have been paying attention to that. However, instead of speaking generically about South Korean content, perhaps it would be more pertinent to describe the movements of Hanwha Group, which owns Hanwha Aerospace, South Korea's largest aerospace company.

Cultural exports from South Korea are often colloquially referred to using the "K-" prefix, much like "K-pop." Thus, at the 19th National Space Commission meeting in South Korea, Hanwha Aerospace's representative, Hyun-Woo Shin, said something to the effect of the company's goal: "Being a leader in the global space industry and becoming a company that represents the 'K-space' era." (Source: *JoongAng Ilbo*).

The main coverage that we have seen regarding Hanwha Group since last year is shown in the table on the next page.

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Looking at the information in the table, starting with the acquisition of Phasor Solutions last year, the Hanwha Group seems to be steadily laying the groundwork for the construction of a smallsat constellation in collaboration with the South Korean government.

Deep-diving into the information, it is noteworthy that, via the investment made into OneWeb as announced in August, Hanwha will be able to send personnel to OneWeb's board of directors. In the future, we expect this to result in management participation for synergistic effects in satellite development and collaboration for low-Earth-orbit satellite communication antennas. And we do feel that there is a possibility that the technology and know-how of OneWeb will be used to build a communications constellation (either simply development or full usage) before Japan does.

Main space news items involving South Korean Hanwha Group since last year

Year	Month	Title (content and supplementary information)
2020	Jun.	Hanwha Systems acquires Phasor, which was in bankruptcy • Phasor has developed phased-array antenna for LEO satellite communication terrestrial terminals
2021	Jan.	South Korea's largest aerospace company, Hanwha Aerospace, to acquire a 30% stake in Satrec I • Satrec-I is a South Korean small and medium-sized observation satellite manufacturer. • Both companies have established strategic partnerships for domestic and overseas business.
	Apr.	Hanwha Systems opens US office • Scheduled to open later this year, to strengthen promotion of space business; location undecided
		Hanwha Systems plans 2,000 satellite LEO constellations for mobility applications • 2025: Service started with 1,000 units, scheduled to provide 6G satellite communications service via 2,000 units in 2030
	Jun.	Hanwha, KAI, and LIG Nex1: Leaders in South Korean civilian-led satellite development • KAIST (Korea Institute of Science and Technology) transfers smallsat technology accumulated so far to the private sector.
		Construction of a private rocket launch site: South Korea accelerating toward era of private sector in space • Construction of private launch infrastructure, for small rocket development companies such as Hanwha to enter the market
	Aug.	Hanwha expands its focus on space with a USD 300M investment in OneWeb • Following the investment, Hanwha secured one OneWeb board seat.
		Hanwha Group's Satrec-I plans building of a high-resolution Earth observation satellite constellation • The satellite name is “SpaceEye-T,” at 700 kg/resolution of 30 cm; scheduled to be launched in 2024

Considering Japan's relationship with South Korea over the last few years, there has been a lot of focus on the conflict between the two countries as related to historical and diplomatic issues, and it can be said that the relationship is very chilled. Personally, I used to visit South Korea often for business and participated in regular meetings, but recently, excluding enjoying occasional Korean food, I have the impression that South Korea has become a country geographically close to Japan but distant at the same time.

However, at least in terms of the fields of space and security, which we all work within, I think it is a great asset to analyze and learn from neighboring countries in terms of what they are thinking and doing.

Editorial 03: The Artemis lunar plan (Murakami)

The traffic light for the Artemis program to send people back to the moon in 2024 just turned yellow.

Both the U.S. presidential administration and the U.S. Congress have agreed to promote the Artemis program, and we were wondering if things would go smoothly after the inauguration to the new administration. We do have some concerns. Originally, there was the opinion that the program schedule of 2024 was a political decision and not realistic, but it is also true that there are some matters that must be taken into consideration before arriving at this point.

For manned landers, which are a core infrastructure of other related areas, and regarding the case where Blue Origin and Dynetics objected to the U.S. Government Accountability Office such that they felt selection was inadequate, it WAS concluded on August 10 that the selection was indeed appropriate. It was then thought that the deal could begin, but Blue Origin filed proceedings in U.S. federal court. In tandem, NASA decided to postpone the contract until November 1.

Originally, the selection work was required to be managed in a way that accorded with budgetary restrictions, and it is now at the current situation after substantial delays. In addition to this, space suit development was delayed, and there were reports that such development was expected to be delayed until 2025.

U.S. Congress is preparing an additional budget, and there is the possibility that two manned landers will be used, so it is expected that more time will be needed to finalize the budgetary and contractual issues. This leaves us wondering whether this situation could have been handled better.

Since retiring the Space Shuttle, NASA decided to develop a manned vehicle for the International Space Station in partner with two private enterprises, and then moved to development. This took 10 years. During that time, manned rockets could not be launched from the U.S., and instead, the International Space Station program required the use of Russia's Soyuz family of rockets.

It is regretful that the Artemis program could end up in the wake of China/Russia space activities if too much time is spent on domestic and budgetary issues.

However, NASA's veteran administrator announced a review plan in the fall, with hopes to: strengthen the system for realization; invest all resources into it; and move toward the final realization of the plan.

August 2021 Space Business-related Topics by Business Position/Market Field

Satellite Business Network

OldSpace and other topics

Satellites

- Ariane 5 launches two satellites in first mission in almost a year (no.001)
- China almost done with operational capacity of an ocean observation satellite NW (no.005)
- Future GPS satellites: Could host military communications (no.011)
- NRO exercises satellite imagery contract option with Maxar (no.017)
- Measat-3: With problems, now deorbited (no.024)
- ESA develops "brain" to support future space missions (no.032) (fig.1)
- Lockheed Martin aims for satellite services market (no.036)
- Government of Canada invests CAD 1.44B in telesat constellation (no.051)
- Airbus delivers next-generation military satellite communications systems to Australia (no.060)
- World-first: China's "TanSat" acquires carbon flux data collection (no.061)
- Satrec-I plans to build high-resolution EO satellite constellation (no.071) (fig.2)
- Collaborative agreement signed for BRICS space agencies' remote-sensing satellite data-sharing (no.078)
- Chinese military satellite could collide with Russian spy satellite debris (no.084)
- Maxar wins manufacturing contract for SXM-10 satellite (no.102)
- Majority of Intelsat debtholders approve bankruptcy reconstruction plans (no.108)
- Global shortage of ultra-small electronic components affects military satellite programs (no.115)
- China builds satellite constellation for natural disaster observation (no.116)
- TAS, EGNOS Navi system new capability delivery contract made (no.118)

Launching

- China succeeds launch of Long March 6, with two small communications satellites (no.020)
- India's GSLV rocket launch fails (no.041) (fig.3)
- Vega rocket-launched Pleiades neo-Earth observation constellation see resolution of 30 cm (no.079)

Others

- Russian Nauka's module malfunction deemed cause of engine misfire (no.002)
- China working on manned lunar module lander (no.035) (fig.4)
- NASA Mars rover, first sampling problem (no.037)
- Korea-US diplomatic authorities discuss cooperation in space (no.039)
- FCC skeptical about Lockheed-Aerojet merger proposal (no.058)
- "Zhurong" Mars rover successfully completes exploration mission (no.058) (fig.5)
- Northrop, L3Harris demo gateway systems with high-speed processing (no.073)
- South Korea invests USD 13.6B to strengthen defense capabilities in space (no.076)
- LM invents new satellite communications antenna technology (no.094) (fig.6)
- Space agencies support ISS extension as NASA warns of space race with China (no.106)
- China researching challenges of kilometer-scale ultra-large spacecraft (no.113)

From Japan

- IHI Aerospace provides Epsilon rocket for commercial use (no.034)
- Vietnamese NanoDragon satellite launched by JAXA (10/1) (no.077)
- H2A rocket released, Mitsubishi Heavy Industries launches GPS satellite (no.083)
- Japan's FY2022 budget request hits record of over USD 1T (41% increase) (no.110)

Mixed space topics

Satellites

- European meteorological satellite agency purchases first commercial data (no.019)
- Hanwha of South Korea invests USD 300 million in OneWeb (no.042)
- Euroconsult: Pandemic little effect on smallsat sectors (no.044)
- Canadian Space Agency signs contract with EarthDaily Analytics (no.049)
- Exponential growth of CubeSat, possibility due to tapering (no.053)
- Ovzon receives USD 1M contract from the U.S. DOD (no.065)
- O3b Mpower acquires first cloud customer (no.067)
- OneWeb constellation close to 300 units upon launch of Ariane (no.087)

Launching

- Rocket Lab succeeds in launch of US Space Force satellite (no.025)
- Development of "space freight train" for US Space Force smallsats (no.027) (fig.7)
- Supply of small launch vehicles continues growing (no.047)

Others

- China's space station emerges as competitor for commercial ventures (no.015) (fig.8)
- Australia's first space accelerator to introduce startups in expansion plans (no.016)
- Unmanned test of Starliner spacecraft, launch postponed again (no.018)
- LeoLabs and New Zealand's space agency sign multi-year agreement to develop "Space Regulatory and Sustainability Platform" (no.023) (fig.9)
- Arlington Capital Partners to acquire L3 Harris Technologies' Electron Devices + Narda Microwave-West Divisions (no.029)
- For satellite constellation that adversely affects astronomical observation, software development to mitigate impact begins (no.038)
- Startup plans to develop cargo services for Chinese space station (no.052)
- Microsoft, SES and GRC showcase Azure Cloud for remote missions via secure govsat connectivity service (no.057) (fig.10)
- US Space Force launches new program to attract SMEs and startups (no.059)
- NASA's HLS contract with SpaceX suspended in proceeding brought by Blue Origin (no.080)

From Japan

- NIED: Synthetic "space eyes" for disaster prevention and for understanding damage via small SAR satellites (no.033) (fig.14)
- Axelspace, Synspective adopted as subsidiary companies under METI's demo project for ultra-smallsat constellation technology development (no.112) (fig.15)

NewSpace

Satellites

- Ursa Space now offering BlackSky EO imagery (no.022)
- SpaceX acquires Swarm Technologies (no.026) (fig.11)
- Rocket Lab receives orders for 3 Photon missions (no.043)
- Satellite operator plans testing of satellite anti-collision tool (no.046)
- Merger of Spire Global and NavSight declared valid (no.048)
- Mynaric signs multi-million-dollar contract with SpaceLink (no.050)
- Electrodynamic tether speeds up satellite re-entry (no.055)
- Satellitelogic and GeoTerraImage collaborate on development of geospatial solutions for Africa (no.056)
- Spire Global announces completion of merger with NavSight Holdings (no.069)
- Skykraft plans launch of first air traffic management constellation (no.100)
- All future Starlink satellites: Equipped with laser crosslinks (no.111)
- Amazon asks FCC to reject second-generation Starlink program (no.114)

Launching

- Chinese space company launches, lands small test rocket (no.008)
- Planet announces multi-year, multi-launch agreement with SpaceX (no.028)
- Vector Acquisition's Rocket Lab merger approved by company's shareholders (no.084)
- Virgin Orbit goes public due to merger with SPAC (no.092)
- Virgin Orbit expands launch business and shifts to satellite services (no.099)
- Lack of liquid oxygen puts pressure on SpaceX launch plan (no.107)
- South Korea's Kolon Rotech enters rocket market (no.109)
- Astra Rocket 3.3 launch fails (no.117)

Others

- Virgin Galactic resumes ticket sales (no.021)
- Slingshot Aerospace produces world's first collision avoidance collaboration & communication space platform, "Slingshot Beacon" (no.064) (fig.12)
- Intuitive Machines partners with Spaceflight to provide secondary ride-sharing services for next IM-2 Antarctic mission (no.088)
- South Korean OneWeb announces minimum user terminal for LEO BB (no.098) (Fig.13)
- OneWeb antenna supplier expands production (no.105)

From Japan

- Successful launch of the IST "TENGA Rocket" (no.003) (fig.16)
- Hokkaido Electric Power Company invests in space venture/spaceport support (no.004)
- Astroscale received request for development of robot arm for spacecraft external work (no.006)
- GITAI Japan succeeds in ground demo of "robo rover" for lunar work (no.007) (fig.17)
- Axelspace starts demo experiment with JX PRESS for distro of preliminary satellite photos (No.012) (fig.18)
- iSpace announces new big lunar module (no.093) (fig.19)
- Toward the first wooden satellite, Kyoto University and Sumitomo Forestry to conduct experiment in Dec. (no.101)
- Astroscale completes first test of satellite acquisition technology (no.104)

OldSpace and other topics

Mixed space topics

NewSpace

From the world

Fig.1: Orbital image of the "PT-SAT" experimental satellite used to verify the "EGS-CC" software platform (credit: ESA) (no.032)

Fig.2: South Korean Satrec-I, in-orbit image of SpaceEye-T under development for launch in 1Q of 2024 (credit: Satrec Initiative) (no.071)

Fig.7: Nanoracks CEO said Chinese research to fly on NASA's space station for first time (credit: China Manned Space Agency) (no.015)

Fig.8: Image of a space freight train; the LDPE mission, which the US Space Force plans to launch later this year, will use the ESPA Star Bus for smallsats and hosted payloads. (Credit: Northrop Grumman) (No.027)

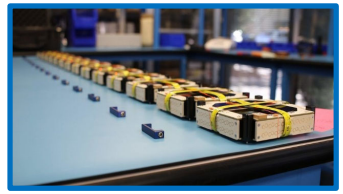

Fig.11: Swarm, acquired by Space-X, currently deploys 120 “Space Bee” smallsats in orbit for IOT services. After the acquisition of SpaceX, it will become a wholly owned subsidiary of the company. (Credit: Swarm Technologies) (No.026)

Fig.3: ISRO's GSLV Mark 2 rocket malfunctions immediately after ignition and fails to launch (credit: ISRO) (no.041)

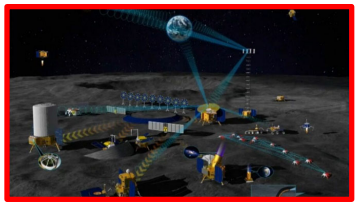

Fig.4: China plans to carry out a manned lunar landing as part of its International Lunar Research Station program. (Credit: CNSA) (No.035)

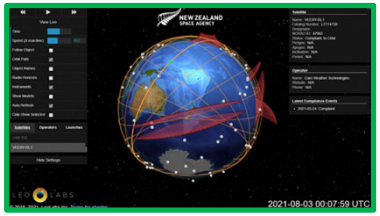

Fig.9: LeoLabs collaborates with New Zealand's space agency to create a space regulation and sustainability platform (credit: LeoLabs) (no.023)

Fig.10: Photo of Microsoft's Azure Stack Mini R device (no.057)

Fig.12: Slingshot Beacon will be tested via OneWeb, Spire, Orbit Fab, and other projects. 53% of LEO satellite constellations participated in this pilot project. (No.064)

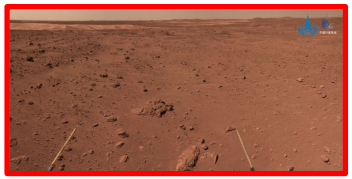

Fig.5: Image taken via the navigation and terrain camera of the Chinese "Zhurong" Mars rover (no.070)

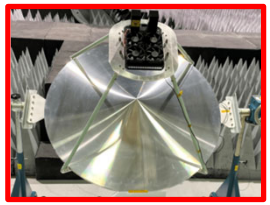

Fig.6: Photograph of LM's Wide Angle ESA Fed Reflector (WAEFR) antenna; this antenna is a hybrid of a phased-array electron-scanning antenna (ESA) and a parabolic reflector; this is cheaper than a conventional phased-array and features a 190% increase in coverage area and is applicable to satellite mounting and ground terminals. (No.094)

Fig.13: Photograph of OneWeb terminal OW1 (credit: OneWeb) (no.098)

From Japan

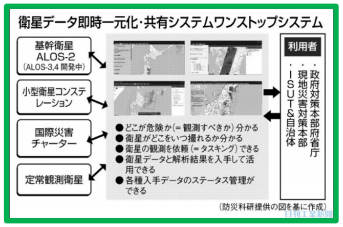

Fig.14: One-stop system for instant centralization and sharing of satellite data (credit: *Nikkan Kogyo Shimbun*) (no.033)

Fig.15: Axelspace and Synspective receive METI subsidies and jointly promote a microsatellite demo project to realize one-stop service for satellite constellations (no.112)

Fig.16: "TENGA rocket," with the engine is ignited, leaving the bed of MOMO's first two consecutive arrivals in space (credit: IST) (no.003)

Fig.17: GITAI Japan, Robo Rover for lunar work (no.007)

Fig.18: Axelspace to begin distribution demo experiment for preliminary satellite images with JX PRESS (no.012)

Fig.19: Image of the lunar module released by ispace, to be manufactured in the US for the NASA monthly freight contract (no.093)