New! Space Japan Opinion

Can We Understand Wind?

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- *What changes have emerged in the world since the beginning of the 21st century?*
- *We should recognize the changing role of the national research organization.*
- *Manned space development is the most suitable choice of our country.*
- *Are there still reservations to start manned space development?*
- *Manned space development does not obstruct R&D of satellite communications.*

1. The End of the 20th Century To the Beginning of the 21st Century

Firstly, let's look back at what happened from the end of the 20th century to the very beginning of the 21st century. Most of us had great expectations for a new century: The 21st century was to be one which we generally could look at through rose-colored glasses. Of course, this was not without a reason. In the 1990s, the Soviet Union collapsed, signifying the end of the Cold War, and we thought that an era of true peace was finally upon us. During this time, the global economy was developed dramatically, and the whole world was excited in new-found prosperity.

However, there were some outbreaks that brought with them some general unease to this new global village. Difficult and challenging medical challenges rose, such as AIDS, EBOLA haemorrhagic fever, and O-157 virus disease. In addition, the sarin subway attack that happened in Tokyo was a harbinger of a trend toward "mass terrorism" on innocent civilians. Furthermore, in 1995, the Hanshin Awaji great earthquake disaster happened, and forced people save more of their income to pay for future natural disasters. This provided further hardship on the average person because government provided support to victims and their families was insufficient. The path from an economic bubble to economic recession also became prevalent. So, what kind of world appeared just at the beginning of the 21st century? A century at least initially marked by chaos quickly emerged as the result of a series of unforeseen developments. Sadly, it was not the expectation we had of a new century; one which we had hoped would be filled with limitless promise.

The first evidence of the upheaval and chaos in the 21st century was the terrorist attacks upon the U.S. on September 11, 2001. It is thought that Japan is a country that is "peacefully senile", but, sadly, Japan is not alone in this regard. It seems to have been so even in the U.S. The long-standing policies of "non-interference" would quickly crumble to these new realities and lead to open conflict in places like Afghanistan, that had become hotbeds of terrorism, fostered by this benign neglect. Another example at how rapidly the policy of non-interference was reversed was the 1990-1991 Gulf War. There were at that time few politicians who expected that Iraq would have ever invaded Kuwait(1). The second Bush administration confronted a new world -beginning with the 9•11 terrorist attack through the

On the New Column of Space Japan Opinion

Publication articles of this magazine are discussed and selected by the AIAA-JFSC Editing Committee Meeting held every month. At the meeting, we often talked about proposals to progress Japanese space development, demands and points which should be improved. Therefore we found a new column in our magazine to show our discussion and thought in order to discuss with readers widely. This column will be set every number of this magazine and we expect active opinions such as criticism and/or agreement from readers.

most recent Iraqi War. Clearly, the world is in a state of flux.

And it is not only war. Unexpected diseases like the spread of SARS, West Nile virus, BSE, avian influenza, and (in Japan) carp herpes have proliferated during this period. To complicate matters, the simultaneous economic recession has thrown the world into a malaise further exacerbating this feeling of "chaos".

It has been said that Chinese influence was big factor that led to such a global recession. It has been surmised that Chinese exports exacerbated deflation and were the root cause of the global economic recession due to the glut of inexpensive Chinese labor(2). Companies in Japan started moving their factories to China to remain globally competitive, thus, "hollowing out" local industrial production.

In addition, due to the economic recession, it became popular that even big companies abandon their fundamental research to remain competitive through cost-cutting measures. Most of the large Japanese companies asked the government to provide funding for fundamental research to continue because it is was no longer possible for companies to incur these costs. The "Principle of death valley" became evident, as increasingly the private sector increased its reliance upon government to ensure their very survival. This concept became popularized as an image, because it took an inordinate amount of money to turn basic research into an immediate practical economic benefit for the company. And the concept mirrored the social atmosphere more and more, providing a gloomy global economic outlook

At the same time, many companies were failing and going out of business. This is not always bad, of course. I am surprised that there are so many hopeless companies, even in some cases larger, more established companies. It is matter of fact that a company, despite its size, will never survive with poor management or with a lack of sensitivity to the needs of its customers.

Given all this, in Japan an economic activation plan was considered the best way to escape from recession. One of these plans is the "industry-university-government cooperation effort" currently underway. Independent administrative institutions, national laboratories and universities are all expected to contribute to this economic activation through such cooperation. This is not a bad thing.

2. Change of Situation These Days

We must also not overlook recent changes in the macro-situation that support the theory that an economic recovery of sorts is currently underway. I personally believe that a principal reason for industry-university-government cooperation, that of economic activation, is no longer needed. This is because there are signs that the economy continues to rebound even before industry-university-government cooperation has been able to achieve its desired results. Furthermore, I have even questioned whether the "death valley" concept is really true. I asked this question to a friend of mine who worked in business, whether he believed in this concept and whether it was a reality. His answer to me was that he felt it simply did not exist. The biggest influence in this economic change was that China has changed from a economic menace to an economic savior(4). Factories' relocation back to Japan has happened in recent months(5). This is largely attributed to the increased demand for large household appliances and digital electronic equipment. Therefore, should we recognize that the role of research and development (R&D) has shifted to one whose priorities are one of increased national security to protect our country and away from the industry-university-government cooperation model as a means of gaining economic traction. This does not deny the fact that industry-university-government cooperation is a successful model, but rather that national research institutes should increase their contributions toward lucrative markets such as the ones tied to national security.

3. A National Security Point of View Is Necessary

In the postwar period, it is said that Japan is a nation having divided opinions in the areas of diplomacy, security and energy. However we should now pay attention to recent changes that have occurred and recognize the growing importance of others such as:

- Self-Defense Force is dispatched to Iraq (affirmative opinions exceeded the objectional ones according to recent public opinion poll)
- Maintenance of a legal framework for war contingencies
- Introduction of a trial system
- Movement to constitutional amendment

Regarding R&D in particular, we ought to watch closely the recent increases of the military budgets of the U.S. and China. Because most of those defense budgets are spent on the development of new weapons systems, we ought to regard them as increases of the R&D budgets. An achievement of a wholesale RMA (Revolution in Military Affairs) of the U.S. defense forces is the resulting evidence of these increased budget[(7)]. It is a widely held fact that even NATO countries stared wide-eyed at the progress of weapon systems used by the U.S. forces in the 1990-1991 Gulf Wars, as well as in the Kosovo dispute. As for the space development, people concerned about space development in Japan do not consider that NASA is conducting R&D for communications satellites anymore, but it seems that actual satellite communications development budgets in the U.S. – especially of the U.S. Defense Forces – is close to 2 Billion Dollars per year alone. We should take note that this budget virtually equals the entire space development budget in Japan. Furthermore, the proportion of the defense related R&D budgets to the overall R&D one is probably high in many advanced countries, and more than 50% of space development budget is defense related one in the case of the U.S. In addition, the defense related R&D spending is usually classified. However, most of Japanese R&D is completely transparent. Is this not disadvantageous for our country?

In such a situation, it is necessary that the national laboratories and independent administrative institutions in particular recognize their changing role in this process. In other words, we ought to think that their roles should support national security and technological security, in particular. For example, the National Institute of Information and Communications Technology (NICT) has roles for;

- Internet security
- Systematic measures for electromagnetic environment
- Technical support such as an information gathering satellite

It will be inevitable that national security concerns will be reflected in the next Science and Technology Basic Plan, and naturally its impact on the space development plan will be inevitable.

4. Reflection to Space Development Plan

It should have been a considerable shock for our country to learn that China succeeded in its manned rocket launching. However, the Japanese press did not seem too surprised. In its Op Ed pieces, it insisted that the present era is not the time of “national prestige” but rather the era to advance in international cooperation[(8)]. However, international cooperation is not really established unless a certain parity of technical levels is reached among current and future partners. I think that it is a misunderstanding to believe that our country has already reached the needed technological level. The only hard evidence we can have is to be able to maintain successful launches on an ongoing basis. In certain circles there is the tacit recognition that nobody will consider us to be a reliable partner, if we propose cooperation and are not technologically sophisticated enough to support that partnership.

It seemed that the U.S. took the Chinese success of their manned space flight seriously. President Bush announced a new space development plan soon after that launch[(9)] [(10)].

Unfortunately, in our country, the serious situation seems only finally to be recognized by the H-2A launching failure[11].

Considering the cause of that launching failure, one can ask, "does the technical progress go well in Japan?" I do not think in particular that it is unrelated to recent frequent occurrences of fires and/or accidents in factories in Japan. As far as recent malfunctions of satellites and of rockets, there seems to be much more trouble within the power supply system. I think that such fundamental technologies as those in a power supply system must be maintained carefully in particular.

One of the possible solutions must not be that the upper management of organizations fire their engineers because of such failures. It is particularly important not to reduce a national budget that supports fundamental engineering technology development, especially in space development. When budgets are decreased, a feeling of confinement is born. Such a feeling is one of the worst to endure and often spreads to other sectors. Therefore, it is most important to beat the feeling of confinement. I think that, in this regard, it is necessary and would be effective to review our country's space development plans from the national interest (security) point of view.

I would like to add another point here. There was a phrase; "contribute to the humankind" as the objective of Japanese space development. I pointed that there must be no country whose primary aim of space development is to "contribute to the humankind." National interests are of paramount importance and if contributions to mankind are made as a result of those pursuits, then it serves as a win-win for both. This is what I expressed in the "three space organizations (NASDA, NAL and ISIS)" unification preparations meeting [12].

Originally, space development was performed as part of a set of three developments; nuclear weapon, missiles, and manned space[13]. This is clear if we consider foreign countries (the U.S., Russia, China and even India) for example. In other words, serious consideration of national interests and prestige are self-evident. However, a corresponding set of parallel developments has not been established in Japan.

5. Advice of Manned Space Development

It is obvious that one of the projects which must be pushed forward from the technological and national security point of view is that of space development. The reason is because the right or wrong of this project becomes an index to better understand the technical level of a country.

It is most important that a person engaged in such a project can work with a pride and a sense of duty because the project is very important to the goals and objectives of their country. However it is problematic whether in Japan we can instill such pride in a person engaged in recent space development, except perhaps in the early days of space development. The reason will be mentioned later, but I think that manned space development is the most suitable manner in which to solve the problem, because manned space development is both a big project and an ideal one. There is plenty of room to push forward manned space development from this point forward. I would like to say that it is proper that we have not conducted manned space development so far, although the word “proper” may itself be improper.

I think that the best way is to have a big project, which is easily understandable and captures the imagination of the public. Manned space development is most suitable for this. The public undoubtedly will want to go to space someday, and the Apollo project is representative of such a project, according to both the Millennium Project of Prime Minister Obuchi in 1999[14] and an article that demanded a re-examination of science and technology policy[15].

The importance of the proper environment was mentioned in which to push forward a big project; one in which a person engaged in it can be so with pride and a sense of duty.

However, in the case of our country, a taboo for particularly manned space development seems to have arisen so far, due to a number of reasons.

I think that the manned space development is an ideal big project for the following reasons[17] [18]. Three elements of an ideal big project are:

- To have great significance for the nation
- To be supported by a sufficient budget
- To be conducted with a sense of duty

“Significance” is generally achieved when we see our space development project. However, "a budget" is often not enough. Therefore it is the present situation that "a sense of duty" is apt to be vague. Historically, space developments in foreign countries had a close relationship to military technology, as described earlier, though I do not think that the situation has changed dramatically even today. Space development was pushed forward with an adequate budget and concerned people felt a passionate sense of duty in national defense. However, (cf. **Figure 1**) there has been a wall of "a peaceful use principle of space" in Japan and we have not advanced beyond that wall.

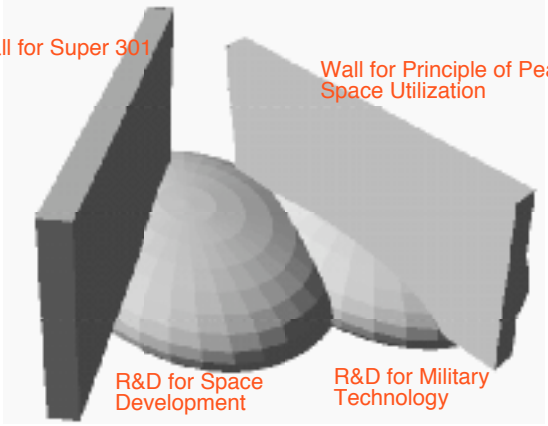

Fig. 1 Two Walls with Sealed Pillars in Japanee Space Development.

It is also very difficult to motivate employees with this "a sense of duty", because of the so-called “wall” of "Super 301" which is the result of Japan/U.S. trade friction. Super 301 has actually had a counterproductive result at the very time when we are intending to strengthen our national space development program and to connect it directly to the private sector. These frictions also make it difficult to develop a budget for such a program, because the requested amounts tends to be low, in order to accomplish those objectives as cheaply as possible.

It is not easy to eliminate such artificial barriers. Such barriers deteriorate the human spirit, disheartening and de-motivating talented project managers with superficial obstacles and obfuscating goals and objectives on larger, more challenging projects. Therefore, it should not be a surprise that I am apprehensive about the current situation and whether or not we can still motivate and attract the youth of the next generation to feel the majesty and the wonder to pursue careers in space. However, despite these obstacles, we must continue to forge ahead, because the total technical ability of a country is measured by the size, technical complexity, and the commitment of the government and its people to see it through to successful completion.

If, however, we ask ourselves whether or not we could engage ourselves in a space development project that can be accomplished without being subject to the restrictions of such barriers, the answer is “Yes”. It would be to begin on a new manned space development project of which Japan has never seen. In other words, we should notice that the borders of the domain of conventional R&D for space development do not directly connect to those of R&D for military technology. When this is done effectively a very large domain for manned

space development opens to consideration and possibility, as shown in **Figure 2**.

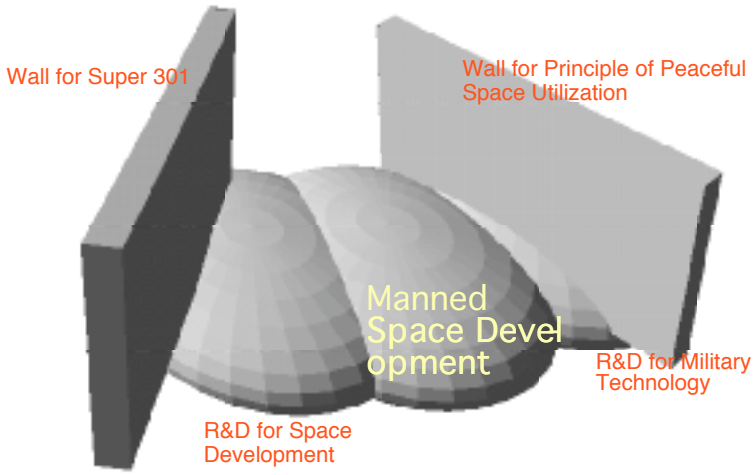

Fig. 2 Existence of Manned Space Development between Conventional Space Development and Military Technology R&D.

Since human life concerns are paramount for manned space development, considerable funding, time and manpower are necessary to ensure the safety and security of future pioneers. Therefore, it is expected that we must first be able to achieve the “sufficient budget” for such endeavors. The government ultimately becomes the entity to provide the go-ahead for such development. Yet, it is different from space commercialization and must be seen as such. It may also be said that twin walls or barriers described above do not exist, since it does not connect to either military nor to the Super 301 directly. As a result, the project objectives and goals become clarified. In this model, "a sense of duty" can now be achieved.

Then, can we finally state with confidence that the "significance" of manned space development is achieved? In fact, it is not simple to state the significance clearly. We will never be able to start manned space development if this cannot be done until we find the significance completely. However, it cannot be denied that the technical developments that not only professional people but also the general public enjoy are indispensable if we believe it is inevitable that humanity will ultimately leave the bonds of the Earth. We should pay attention also that technology progresses greatly by making efforts to realize such a technology. The accumulated merits of manned space development can clearly be seen as "significance”. Therefore, it is widely thought that manned space development is the “ideal” big project if we are consistent and think in this way.

6. Is There Still Hesitation to Start Manned Space Development?

There are many in Japan who are opposed to these opinions. I would like to present my counter arguments to these claims on the basis of changes to the current situation.

(1) Because It Concerns Human Life

Exploring frontiers and participating in pioneering ventures have never been for the faint of heart and have always incorporated some inherent risk. Had such concerns stifled our ability to explore, we would have never created pioneers such as test pilots. Besides, the recent situation does not permit us to say any longer that it is risky for humankind to go into space Was not Japanese consciousness fundamentally changed through our dispatch of the Self-Defense Force to Iraq? Why should human space flight not endure the same “shift” in thinking?

(2) Because It Takes An Enormous Expense

An enormous investment is surely necessary, and manned space development would never be successful if there were not such an infusion of capital. However, should this really be a

deterrent? Instead, we ought to see this as a net positive factor. 30-80 Billion dollars will be necessary, spread over for the next 20 years[18]. A conventional development budget is insufficient for manned space development, and a considerable increase of budget is needed to support such endeavors. Two manned space centers with about 5000 employees are required to push forward manned space development responsibly.

I believe that space development investment is very efficiently and effectively used, because the results are quite visible immediately. Successful rocket launches are an excellent example of such successes. In addition, since the space development is based on the total technology and its integration into various systems, effective commercial "spin-offs" from a big budget item such as space development are possible. I therefore believe that we must push forward, with fundamental research getting its funds from a big project[19].

(3) Because It Merely Follows the Footsteps of the U.S. and Russia

As I described before, manned space development has been performed in a sequential chain of technology employment with nuclear weapon development, missile development/precision improvement as the means of its conveyance, and manned space development to support national pride. One need only examine how manned space development has been performed in the U.S. and the Soviet Union (Russia) and ironically, which is now also similar in China. It seems that if we were to pursue such goals, it will create an extremely significant moment in the history of space deelopment, especially if we were to start to such a manned space development without this specific chain. And such a development method would be good for Japan.

China became the third country in the world to successfully pursue manned space objectives. In addition, we feel enormous power in the recent Indian space developments. If a chain of nuclear weapons development and missile development is considered, manned space development may ultimately be performed[20]. Then I am afraid that Japan may be behind India as well as China in manned space development, unless we do our best to overcome our fears and engage in the next phase of space development. Otherwise, Japan runs the risk of being left even further behind if our action is unnecessarily delayed due to an inability to convert our debate and discussion into tangible actions. If it does not matter to us that such a situation unfolds, the story is different, but since space development expresses a technical synthesis and competence which becomes a measure of country's technical capability, I wonder whether or not we can maintain the luxury of carrying out these discussions any longer – especially when we are proud of the advantages we boast in other fields.

(4) Because of Japan's Advantage and Strength in Robotics

Robotics does not become obsolete as a result of our pursuing of manned space development. It is widely recognized that robotics cannot cover all of manned tasks in the exploration process. It is important to push forward the continued technical development of both a strong robotics program and manned program, depending simply on the phase of space exploration that a country is pursuing, and utilizing the most effective means for those particular missions. In particular, in the times after manned space activity gets into full swing, we can easily imagine that robotics can peacefully coexist with manned space programs and play an important often complementary role. Therefore I do not deny robotics. Rather it becomes important as a tool to facilitate manned space programs.

(5) Because Other Space Projects Will Be Suppressed

Japan's pace of technological development will increasingly lose its spirit if various space development projects compete against one another for a smaller piece of the space funding pie, if the space development budget is reduced. Because I insist that manned space development is an important catalytic agent to support the rebirth of a renewed spirit, a new budget scheme will be necessary. It is certain, as described later, that satellite communications projects will become increasingly important as the means of communication in the manned space

development era. I think that manned space development can become a driving force to move most of Japan's technology in a positive direction for the mid to long term.

I think that the above-mentioned hesitation is one of self-regulation. This is why manned space development itself was a taboo for some time in Japan. I do not think that there is anyone who supports this notion today.

7. What is the Merit of Manned Space Development?

It is needless to say that manned space attracts a much greater interest of people than unmanned space does. In Japan, we have not experienced the reality of pushing a launch button for a manned rocket mission. If I consider myself to become a person to push a launch button for a manned rocket, I can absolutely not be permitted to use the system having any black box technology, because I am concerned with human life as many others are. In manned space development, it cannot be imagined that we adopt any technology that can only be provided to us by foreign countries. Manned space development must make a clear distinction from our conventional space development in this respect.

It cannot be permitted that we have to use communication systems (as this is the field of my specialty) that we must rely upon a foreign country to create for us as an original system design. We must develop a total system at our own expense and with our engineers and scientists being held responsible. In other words, a global high capacity communication system must be developed by Japan for the same reason as above. It is similar with data relay satellites. Furthermore, space weather forecast must be provided at our own expense as well, to ensure the security of our astronauts. To accomplish these objectives, considerable funding, time and manpower are necessary. However, the evolution of technology will greatly assist us in these endeavors.

It seems to be planned to open a classroom or a special series of easy to understand lectures to attract the interest of children in order to prevent them from shying away from science. A child's eyes would brighten if we carry out a manned space development, and a program to let a child understand science might then become unnecessary.

If we think in this way, it is not a deficit that a big budget is necessary for manned space development. Big budgets produce high levels of employment, and in the process, generate a lot of talent and new technical expertise necessary for the country's continued development.

8. Toward the Future

In summary, in Japan's science and technology R&D plan, it is necessary to raise the priority of space development as a big project and from the national security point of view. As has already been described, neither a rocket nor a satellite would be launched, even if we created a host of studies through competition. Needless to say, a structure is necessary where money is channeled for fundamental research to a big project. In the U.S., fundamental research gets funded from big projects supported by DoD, NASA, DOE and NIH, all with the exception of the NSF.

Most important is that not much time remains for us to succeed in our manned space development. We do not want Japan to be left behind in the world. Although I gave national interests the priority in this opinion piece, I do not mean an idea of only national interest but I understand that the national interest exists among some idea of balance [(22)]. What is important is that we have a strong sense of national pride and a collective duty toward work. It should not take much reorientation in our national thinking to reconsider the merits of manned space development.

References

(1) “BS Prime Time--CIA: The Truth That was Hidden (1), (2), (3)”, NHK-BS, Nov.25-27, 2003 (in Japanese).
(2) "Revolution by Deflation--Management to be Challenged, one-25th of Labor Costs, Production in China, Companies Rashes", Nikkei Newspaper, May 17, 2001(in Japanese).
(3) "No Advancement in Interchanging Manpower, Difference in R&D Power, Bottle Neck of the Industry-Academia Collaboration", Nikkei Newspape, Nov.22, 2002 (in Japanese).
(4) Kiyoshi Okonogi: “The Messiah is China of High Growth, Recovering Japanese Economy, Prospect of Breakaway from Deflation, Thanks to Demand from Overseas”, Asahi Newspaper, Mar.10, 2004 (in Japanese).
(5) “Japan’s Industry--Strong Again, Efficient Production by Abandoning Common Sense, Flexible Allocation of Both Manpower and Facilities”, Nikkei Newspaper, Mar.9, 2004 (in Japanese).
(6) “Asking Japanese Course to Mr. Masakazu Yamazaki, Dramatist, Ten Years in the dramatic evolution, Possibility in the Service Field”, Asahi Newspaper, Dec.30, 2002 (in Japanese).
(7) Kensuke Ebata: “New U.S. Military Forces--Changing Defense Strategy and Weapon System”, Kodan-sha Publishing Co, No.1594, Mar.20, 2002.
(8) "Editorial: Shenzou 5--Dazzlingness and Anxiousness", Asahi Newspaper, Oct.16, 2003 (in Japanese).
(9) "China’s Manned Space Flight, Stimulated U.S. and Giving Opportunity to Reopen Space Development, Anxious about Military Use", Nikkei Newspaper, Oct.16, 2003 in Japanese).
(10) Tomohiro Murayama, Tetsuo Taniguchi: "To Moon Again--President Bush’s New Space Development Strategy, No Show of Total Cost to Avoid Opposition", Asahi Newspaper Jan.21, 2004 (in Japanese).
(11) "Editorial: Failure of H2A Launch—Is this Real Ability?", Asahi Newspaper, Nov.30, 2003 (in Japanese).
(12) http://www.mext.go.jp/b_menu/shingi/chousa/kaihatu/002/gijiroku/02.htm Minutes of the Second Meeting for Preparing Three Space Development Organizations, Oct. 29, 2001 (in Japanese).
(13) Ikuo Yoshiwara (Edit.): "Chinese Nuclear Weapon, Missile and Space War Potential", Sousou-sha Publishing Co., Jul. 2002 (in Japanese).
(14) http://www.ne.jp/asahi/ecodb/yasui/Obuchi1000.htm
(15) Katsuya Tamai: "Economic Classroom: Recheck Science and Technology Policy, Clarify Government Role, Collaboration between Industry and Academia, Need Professionals", Nikkei Newspaper, Dec.17, 2002 (in Japanese).
(16) Takashi Iida: "Column: What is Ideal Big Project?", NIME Newsletter, No。25, p.3, Aug. 2001 (in Japanese).
(17) Takashi Iida and Fumihiko Tomita: "How to Energize Japanese Space Development...", 21st System Plan Study Group Meeting—What Do We Do in the Space Development? (3), pp.27-33, Jan.24, 2003 (in Japanese).
(18) Takashi Iida and Susumu Toda: “Action to Manned Space Activity”, 4th Basic Strategy Committee, Space Activity Commission, Doc. 4-5, Sep.19, 2000 (in Japanese).
(19) "Special Issue: Discussion on Future Space Development—Prospect on the Future Space Development”, Jounal of Educaion and Science, No.1506, pp.14-25, Nov. 2001 (in Japanese).
(20) Presented by Mr. Lakhbir Virdee, COSPAR/IAC Plenary Event, New Technologies for Space Applications, The World Space Congress, Houston, Texas, Oct. 16, 2002.
(21) Takashi Iida: "Column: What is Progressive Direction of Japanese Space Development?", DRC, Vol.10, No.4, pp.4-6, Feb. 2001 (in Japanese).
(22) Akira Irie: "Trend of Thought 21: Lessoned and Learned from Japan-Russia War, Failure of National Interest Center Principles, Make Use in the Iraqi War", Asahi Newspaper, Mar.3, 2004 (in Japanese).

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