

Evaluation of Operating Results for  
Japan Aerospace Exploration Agency  
Estimated at the End of the 3rd Mid to Long-Term Objective Period

August 2017

Prime Minister,  
Minister for Internal Affairs and Communications,  
Minister of Education, Culture, Sports, Science and Technology and  
Minister of Economy, Trade and Industry

1. Items related to the evaluation			
Agency	Japan Aerospace Exploration Agency		
FY for evaluation	FY evaluation	the 3 <sup>rd</sup> mid to long-term objective period (including estimated performance in the final year)	
	Mid to long-term objective period	FY 2013-FY2017	

2. Items related to the assessor				
The Competent Minister		Prime Minister		
	Incorporated jurisdiction dept.	National Space Policy of the Cabinet Office	Dept. and person in charge	National Space Policy of the Cabinet Office, Counselor, Hidekazu Takakura
	Evaluation and inspection dept.	Policy Evaluation Public Relations Division, Minister's Secretariat	Dept. and person in charge	Policy Evaluation and Public Relations Division, Director, Hiroki Kawata
The Competent Minister		Minister of Internal Affairs and Communications		
	Incorporated jurisdiction dept.	Global ICT Strategy Bureau	Dept. and person in charge	Space Communications Policy Division, Director, Hisashi Onaga
	Evaluation and inspection dept.	Policy Evaluation Public Relations Division, Minister's Secretariat	Dept. and person in charge	Policy Evaluation and Public Relations Division, Director, Shinya Hirano
The Competent Minister		Minister of Education, Culture, Sports, Science and Technology		
	Incorporated jurisdiction dept.	Research and Development Bureau	Dept. and person in charge	Space Development and Utilization Division, Director, Hirota Tani
	Evaluation and inspection dept.	Science and Technology Policy Bureau	Dept. and person in charge	Planning and Evaluation Division, Director, Kenji Matsuoka
The Competent Minister		Minister of Economy, Trade and Industry		
	Incorporated jurisdiction dept.	Manufacturing Industries Bureau	Dept. and person in charge	Space Industry Office, Office Director, Masanori Toyoda
	Evaluation and inspection dept.	Policy Evaluation Public Relations Division, Minister's Secretariat	Dept. and person in charge	Policy Evaluation and Public Relations Division, Director, Satoshi Miura

3. Items regarding implementation of the evaluation	
June 16, 2017	Field visit by Sub-Committee members of Japan Aerospace Exploration Agency (JAXA) under the Ministry of Education, Culture, Sports, Science and Technology (JAXA Chofu Aerospace Center)
June 22, 2017	Field visit by Sub-Committee members of JAXA under the Ministry of Education, Culture, Sports, Science and Technology (JAXA Sagami-hara Campus)
June 23, 2017	Field visit by Sub-Committee members of JAXA under the Ministry of Education, Culture, Sports, Science and Technology (JAXA Tsukuba Space Center)
June 27, 2017	Joint hearing regarding business performance of JAXA by Ministry of Internal Affairs and Communications and Ministry of Education, Culture, Sports, Science and Technology
June 30, 2017	Hearing about business performance of JAXA by Ministry of Economy, Trade and Industry
July 6, 2017	Hearing about business performance of JAXA by Ministry of Education, Culture, Sports, Science and Technology
July 7, 2017	Hearing about business performance of JAXA by Cabinet Office
July 11, 2017	Hearing about business performance of JAXA by Ministry of Internal Affairs and Communications
July 20, 2017	Hearing in the Sub-Committee of JAXA under the Cabinet Office
July 24, 2017	Hearing in the Sub-Committee of JAXA under the Ministry of Economy, Trade and Industry
July 25, 2017	Hearing in the Sub-Committee of JAXA under the Ministry of Internal Affairs and Communication
July 26, 2017	Hearing in the Sub-Committee of JAXA under the Ministry of Education, Culture, Sports, Science and Technology
August 3, 2017	Hearing in the National Research and Development Agency Council under the Ministry of Internal Affairs and Communications
August 3, 2017	Hearing in the National Research and Development Agency Council under the Ministry of Education, Culture, Sports, Science and Technology
<p>[Sub-Committee members of JAXA, Space Policy Committee under Cabinet Office are: Hiroshi Yamakawa, Member (Professor, Navigation System Engineering Field, Research Institute for Sustainable Humanosphere, Kyoto University)</p> <p>Kuniaki Tanabe, Ad hoc member (Professor, Graduate School for Law and Politics/ Graduate School of Public Policy, University of Tokyo), Setsuko Aoki (Professor, Keio University Law School), Haruhiko Kataoka, Ad hoc member (ex-Chief of Staff, Air Self Defense Force), Seiko Shirasaka, Ad hoc member (Professor, Graduate School of System Design and Management, Keio University), Toshiko Seki, Special ad hoc member (Representative,</p>	

Value-added Technology Research Institute)]

[Sub-Committee members of JAXA, the National Research and Development Agency Council under the Ministry of Internal Affairs and Communications are: Masahiro Umehiko, Member (Professor, Department of Media and Telecommunications Engineering, Ibaraki University), Keiko Chino, Member (Senior Staff Writer, Yomiuri Newspaper Tokyo Head Office), and Hideki Mizuno, Member (Professor, School of Engineering, Tokai University) Yuta Irisawa, Expert advisor (Partner, Avantia GP), Yumi Ogose, Expert advisor (Professor, Professional Graduate School, Tokyo University of Science), Souichirou Kozuka, Expert advisor (Professor, Department of Law, Faculty of Law, Gakushuin University), Noriharu Suematsu, Expert advisor (Professor, Research Institute of Electrical Communication, Tohoku University), Shinichi Nakasuka, Expert advisor (Professor, School of Engineering, University of Tokyo), Yoshiyuki Fujino, Expert advisor (Professor, Department of Electrical and Electronic Engineering, Toyo University), Masayo Fujimoto, Expert advisor (Partner, Fuji Xerox Co., Ltd.) Ikuko Yairi, Expert advisor (Associate Professor, Faculty of Science and Technology, Sophia University)]

[Sub-Committee members of JAXA, the National Research and Development Agency Council under the Ministry of Education, Culture, Sports, Science and Technology are : Tokuyuki Takahashi, Member (President, Toyofuji Shipping Co., Ltd.), Yoshiko Kojo, Member (Professor, Graduate School of Arts and Sciences, College of Arts and Sciences, University of Tokyo), Seiko Shirasaka, Special member (Professor, Graduate School of System Design and Management, Keio University), Steve Squyres, Special member (Professor, Cornell University), Arisa Kuroda, Special member (CEO, Antares Corporation Co., Ltd.), Yuko Nagahara, Special member (Deputy Director, Research Center for Science Systems, Japan Society for the Promotion of Science), Masao Hirano, Special member (Professor, Faculty of Commerce, Waseda University)]

[Sub-Committee members of JAXA, the National Research and Development Agency Council under the Ministry of Economy, Trade and Industry are: Hiroshi Ashibe, Special member (Advisor, GCA Corporation) Misuzu Onuki, Special member (Space Business Consultant, Space Frontier Foundation), Takashi Goto, Special member (President and CEO, Seibu Holdings, Inc.) Tetsuya Sakashita, Special member (Director, Utilization of Digital Information Research Department, JIPDEC), Yoshiko Taya, Special member (Professor, Japan Woman's University) Takashi Yoshimura, Special member (Director, Industrial Technology Bureau, Japan Business Federation)]

#### 4. Important items and others relating to the evaluation

- Reorganized items in the mid to long-term objectives and mid to long-term plan in line with three policy goals set forth in the Basic Plan on Space Policy (determined by the National Space Policy of the Cabinet Office on January 9, 2015)
- On December 13, 2016, JAXA approved the revision of the mid to long-term plan, specifying the use of supplementary budget for FY2016

1. Overall evaluation	
Rating*1 (S, A, B, C, D)	A
Reasons for rating	As shown in the overall evaluation of the agency as a whole, more progress of performance than expected in the mid to long-term plan and the FY plan is recognized.

2. Evaluation of the whole agency
<p>Amid such a change in situation, all items have achieved B or higher ratings in the item-by-item evaluation, making steady business progress in all fields. Furthermore, there are 4 items among them that are rated S and 12 rated A, and steady progress is recognized for items under “Maximization of R&amp;D achievements and quality improvement of the other operations” for each field. Accordingly, it is concluded that progress of performance beyond the one stipulated in the mid- to long term plan is recognized as a whole.</p> <p>Noteworthy points are the successful development of the new epsilon rocket, the space transport system that has repeated world top class operating performance, including success rate of launch, and satellite remote sensing developed as a social infrastructure essential for disaster prevention, environmental conservation and economic activities as well as improvement of aeronautical science and technology that has produced world's first and highest level research results. Space science/exploration and manned space activities have greatly contributed to the improvement of international presence in Japan, through creation of world-class research results, and operation and active utilization of space station replenishment machine “Konotori” (HTV) and Japan’s experiment building machine “Kibo” (JEM), indicating that the creation of remarkable results is recognized. Furthermore, Japan’s significant achievements in development of technologies for domestic production, including development of base parts, a key to strengthening international competitiveness of spacecraft, have also made progress and are being recognized. Note that, in FY2015, astronomical X-ray satellite “Hitomi” (ASTRO-H) was lost, but later, JAXA began project management reforms and deployed its management measures to other projects, thereby preventing the recurrence of such an accident.</p> <p>In terms of corporate management, outstanding achievements are recognized and remarkable results are also expected to be created in the future concerning the following initiatives: The agency, when it shifted to a National Research and Development Agency in FY2015, restructured itself from the head office-based organization to a departmental system in which projects can be promoted by the organization as a whole, thereby establishing an organization intended for maximizing the outcomes of research and development. And in FY2014, the Basic Plan on Space Policy was formulated to carry out flexible management of the organization in accordance with changes in the government’s security policy and foreign policy.</p>

3. Issues to be solved and /or improved for each subject
<ul style="list-style-type: none"> <li>○To further advance the fundamental challenges of promoting the space industry and strengthening international competitiveness from among measures for strengthening industrial base and science/technology base that support individual projects, we consider it necessary to clarify the technological development to be principally promoted and address it in cooperation with the industry. (See page 42)</li> <li>○With regard to aeronautical science and technology, meticulous approach is desired for the protection of intellectual property and prevention of technology outflow. (See page 45)</li> <li>○With regard to comprehensive efforts for promotion of usage of aviation aeronautical science and technology, effective use of JAXA's various achievements and assets is expected to contribute to expanding the industrial base for space business by supporting the creation of new services and business, including environment improvement for promoting the use of satellite data. (See page 48)</li> <li>○Concerning the comprehensive enhancement of domestic human resource base and promotion of public understanding, given that the innovation hub is important in terms of research results and, at the same time, it may be regarded as “human resource development activities utilizing the structure of innovation hub,” we consider it necessary to perform promotional activities recognized as human resource development for private companies, through practical training at a site of JAXA’s advanced research and development. (See page 54)</li> <li>○In terms of enhancement of internal controls and governance, JAXA has undertaken project management reform and is working on four management measures against the loss of X-ray astronomical satellite “Hitomi” (ASTRO-H). In light of the results of investigating the cause of experiment failure of SS-520-4, it is important to continue to ensure reliability in the future. (See page 67)</li> <li>○In the field of flexible and efficient management of the organization, it is difficult to see the outcome on the basis of each fiscal year, but it is highly appreciated that structural reform has been made under the strong leadership of the president over the mid to long-term objective period in response to environmental changes, such as amendment of the Law concerning JAXA and the formulation of the Basic Plan on Space Policy. (See page 70)</li> </ul>

4. Other items	
Main opinions of the council on research and development	<ul style="list-style-type: none"> <li>○To maximize the achievements of research and development, it is most important to maximize the performance of both individuals and teams. It is therefore hoped that the agency will make efforts for implementing various reforms, including improvement of worker's treatment, workplace environment and personnel-related systems, thereby maximizing the performance.</li> <li>○It can be appreciated that while management and workforce tackle the work efficiency together on site, a lot of outcomes are achieved in a wide range of aerospace-related projects even under the constraints of budget and human resources. Concerning the projects for which a large amount of budget is used, it is strongly required to present clear benefits to the public. Also, it is important to accelerate efforts for utilizing external forces which have just begun, such as business transfer to the private sector and open innovation.</li> <li>○Given that strategies based on international information, and collection and analysis of information from the private sector are expected to be further required in the future, enhancement of the functions for research/analysis and strategic planning is important for the agency as a whole.</li> <li>○It can be evaluated that many outcomes were achieved responding to environmental changes during the 3rd mid to long-term objective period, which fell on a turning point for space policy, such as amendment of the Law concerning JAXA and formulation of the Basic Plan on Space Policy, and required more business diversification (it turned to be necessary to respond to requests from the viewpoint of not only development of science and technology but also diplomacy and security).</li> <li>○As far as the organization is concerned, a major policy change took place on the way through the mid to long-term objective period, such as the formulation of a new Basic Plan on Space Policy and the shift to a National Research and Development Agency, and the drastic organizational reform was undertaken under the direction of the president to promote appropriate management of the entire organization toward the realization of space policy.</li> <li>○It is hoped that the agency will cooperate with the industrial circle in proactively utilizing the outcomes for promotion of industry, while continuing to work on improvement of infrastructure and research/development. In setting targets and evaluation indicators, the agency is expected to consider making such efforts and outcomes sufficiently evaluated.</li> <li>○Expansion of the utilization of space is an important issue, and how effectively JAXA's various research outcomes and properties are used is also important. While proceeding with development of the environment for promoting use of satellite data, the agency is expected to strengthen efforts to contribute to the creation and support of new services and business through expansion of network, thereby contributing to expanding the industrial base for space business.</li> </ul>
Auditor's special comments	No special matters to note

\* S: Based on the National Research and Development Agency's aims, businesses, mid to long-term objectives and so on, as a result of comprehensive consideration based on some circumstances regarding the agency's business achievements, efforts and so on through its activities, especially the creation of considerable achievements, anticipated creation of special achievements in the future and so on toward "maximization of R&D achievements" under the conditions of appropriate, effective and efficient operations are recognized.

A: Based on the National Research and Development Agency's aims, businesses, mid to long-term objectives and so on, as a result of comprehensive consideration based on some circumstances regarding the agency's business achievements, efforts and so on through its activities, the creation of considerable achievements, anticipated creation of achievements in the future and so on toward "maximization of R&D achievements" under the conditions of appropriate, effective and efficient operations are recognized.

B: Based on the National Research and Development Agency's aims, business, mid to long-term objectives and so on, as a result of comprehensive consideration based on some circumstances regarding the agency's business achievement, efforts and others, a certain degree of expectation for the creation of achievement and creation of achievement in the future toward "maximization of R&D achievements" were recognized, and steady business operations have been also recognized.

C: Based on the National Research and Development Agency's aims, businesses, mid to long-term objectives and so on, as a result of comprehensive consideration based on some circumstances regarding the agency's business achievements, efforts and so on through its activities, the creation of achievements, further drastic efforts and improvements toward "maximization of R&D achievements" or "the appropriate, effective and efficient operations" are anticipated.

D: Based on the National Research and Development Agency's aims, businesses, mid to long-term objectives and so on, as a result of comprehensive consideration based on some circumstances regarding the agency's business achievements, efforts and so on through its activities, special efforts and improvements including a fundamental drastic review, toward "maximization of R&D achievements" or "the appropriate, effective and efficient operations" are required.

Mid to long-term objectives (Mid to long-term plan)	FY Ratings					Mid to long-term objective period evaluation Estimated evaluation	No. of document each item	Remarks	Mid to long-term objective period evaluation Estimated evaluation	No. of document each item	Remarks					
	FY2013	FY2014	FY2015	FY2016	FY2017											
<b>I. Maximization of R&amp;D achievements and quality improvement of the other operations</b>									<b>II. Items concerning the efficiency of the administration of the operations</b>							
1. Securing space safety and security	/	/	/	/	/	/	/	/	/	/	/					
(1) Positioning satellites	A	B	B	B		B	I-1-1	-	C	A	B	II-1	-			
(2) Remote sensing satellites	S	S	B	B		B	I-1-2	-								
(3) Satellite communication/satellite broadcasting	A	B	B	B		B	I-1-3	-								
(4) Space transportation systems	S	A	S	S		S	I-1-4	-			A	II-2	-			
(5) Other efforts	-	-	B	B		B	I-1-5	-								
2. Promoting space utilization in the private sector	/	/	/	/	/	/	/	/	/	/	/					
(1) Positioning satellites	A	B	B	A		A	I-2-1	-	B	B	B	II-3	-			
(2) Remote sensing satellites	S	S	A	A		S	I-2-2	-								
(3) Satellite communication/satellite broadcasting	A	B	B	B		B	I-2-3	-								
(4) Other efforts	-	-	B	B		B	I-2-4	-								
3. Maintaining and enhancing the foundations of the space industry and scientific technology	/	/	/	/	/	/	/	/	/	/	/					
(1) Space transportation	S	A	S	S		S	I-3-1	-								
<b>III. Items regarding improvements in financial related matters</b>																
III. Budget (Including personnel expenses)/ income and expenditure plan, and funding plan									A	-		B	B	B	III - VII	Evaluation is made in III. Items regarding improvements in financial related matters.
IV. Limit amount of short-term borrowing									-	-						
V. If the agency has									-	-						

systems									any unnecessary property or any property that is expected to be unnecessary property, a plan for disposal of such property								
(2) Space science/exploration	A	A	C	A		B	I-3-2	-	VI. If the agency intends to transfer or provide as collateral any important property other than the property provided for in the preceding item, a plan therefor	-	-						
(3) Manned space	S	B	A	A		A	I-3-3	-	VII. Purpose of using accumulated profit	-	-						
(4) Space solar power	A	B	B	B		B	I-3-4	-	IV. Other matters								
(5) Measures for strengthening industrial base and science/technology base that support individual projects	-	-	B	A		A	I-3-5	-	1. Facilities and equipment related issues	A	B	B	B		B	VIII-1	-
4. Aeronautical science and technology	/	/							2. Plans for personnel	A	B	A	B		A	VIII-2	-
(1) Research and development focused on environment and safety	B	A							3. Safety and reliability related issues	A	B	C	B		B	VIII-3	-
(2) Promotion of usage of aviation aeronautical science and technology	A	B	S	S		S	I-4	-	4. More debt burden than in mid to long-term objective period	-	-	-	-		B	VIII-4	-
(3) Contribution to strengthening technology base and industrial competitiveness	-	-							5. Use of reserve	-	-	-	-		-	VIII-5	-
5. Cross-cutting issues	/	/	/	/	/	/	/	/									
(1) Comprehensive efforts to expand use	A	B	B	B		A	I-5-1	-									
(2) Strengthening of research analysis and strategic planning functions	A	B	B	B		B	I-5-2	-									
(3) Development of fundamental facilities/equipment	A	B	B	B		A	I-5-3	-									

(4) Comprehensive enhancement of domestic human resource base, promotion of public understanding	A	A	A	B		A	I-5-4	-
(5) Realization/enhancement of rule of law in outer space	A	A	A	A		A	I-5-5	-
(6) Strengthening of international space cooperation	A	A	A	A		A	I-5-6	-
(7) Promotional activities to meet country infrastructure needs overseas	A	B	A	A		A	I-5-7	-
(8) Information disclosure and public relations	A	A	A	A		A	I-5-8	-
(9) Business assessment	A	B	B	B		B	I-5-9	-

\* For items that are set to “high” level of importance, a “circle” shall be marked next to each comment.

For items that are set to “high” level of difficulty, each comment shall be underlined.

\* Evaluations up to FY 2013 were made based on “the basic guideline regarding business results evaluation for Incorporated Administrative Agency under MEXT’s jurisdiction” (The Evaluation Committee for Incorporated Administrative Agency under MEXT’s jurisdiction on March 22, 2002).

Also, the evaluations after FY2014 are made based on “criteria relating to the evaluation for Incorporative Administrative Agency under MEXT’s jurisdiction” (decided by the Minister of MEXT in June 30, 2015). The details are as follows

Ratings up to FY2013	Ratings after FY2014
<p>S: Outstanding achievements are fulfilled (Without providing a cross-cutting objective standard for the agency in advance, S is rated according to the characteristics of the agency’s business operations.).</p> <p>A: Achievements are in line with the plan for medium-term, or beyond, or are steadily being implemented toward a medium-term objective, or beyond (achievement rate for the medium-term objective should be over 100% in a given FY.).</p> <p>B: In some ways the plan is not being implemented in line with medium-term objectives, however, the plan may be achieved by means of ideas and efforts (achievement rate for the medium-term objective should be 70% to 100%).</p> <p>C: The implementation of the plan is behind the medium-term objective, therefore, improvement of business is necessary in order to realize the achievement of the medium-term objective (achievement rate for the medium-term objective in a given FY is less than 70%).</p> <p>F: The Evaluation Committee needs to warn the agency concerning the improvement of its business management and others (Without providing an objective standard in advance, F is rated as a result of judgement that a warning concerning business improvement is necessary.).</p>	<p><b>【Administrative and projects related to research and development (I)】</b></p> <p>S: Based on the National Research and Development Agency’s aims, businesses, mid to long-term objectives and so on, and as a result of comprehensive consideration based on some circumstances regarding the agency’s business achievements, efforts and so on through its activities, especially the creation of considerable achievements, anticipated creation of special achievements in the future and so on toward “maximization of R&amp;D achievements” under the conditions of appropriate, effective, and efficient operations are recognized.</p> <p>A: Based on the National Research and Development Agency’s aims, businesses, mid to long-term objectives and so on, and as a result of comprehensive consideration based on some circumstances regarding the agency’s business achievements, efforts and so on through its activities, the creation of considerable achievements, anticipated creation of achievements in the future and so on toward “maximization of R&amp;D achievements” under the conditions of appropriate, effective, and efficient operations are recognized.</p> <p>B: Based on the National Research and Development Agency’s aims, businesses, mid to long-term objectives and so on, and as a result of comprehensive consideration based on some circumstances regarding the agency’s business achievement, efforts and so on through its activities, a certain degree of expectation for the creation of achievement and creation of achievement in the future toward “maximization of R&amp;D achievements” were recognized, and steady business operations have been also recognized.</p> <p>C: Based on the National Research and Development Agency’s aims, businesses, mid to long-term objectives and so on, and as a result of comprehensive consideration based on some circumstances regarding the agency’s business achievements, efforts and so on through its activities, the creation of achievements, further drastic efforts and improvements toward “maximization of R&amp;D achievements” or the “appropriate, effective, and efficient operations” are anticipated.</p> <p>D: Based on the National Research and Development Agency’s aims, businesses, mid to long-term objectives and so</p>



on, and as a result of comprehensive consideration based on some circumstances regarding the agency's business achievements, efforts through its activities, special efforts and improvements including a fundamental drastic review, toward "maximization of R&D achievements" or the "appropriate, effective, and efficient operations" are required.

**【Other than administrative work and projects regarding research and development (After II)】**

S: Based on the activities of a corporation, remarkable performance exceeding the intended objectives is recognized quantitatively and qualitatively in the mid to long-term plan (in terms of quantitative indicators, 120% or more vis-à-vis planned mid to long-term values (or planned FY value), and remarkable performance is also recognized qualitatively.

A: Based on the activities of a corporation, remarkable performance exceeding the intended objectives is recognized in the mid to long-term plan (in terms of quantitative indicators, 120% or more vis-à-vis planned mid to long-term values (or planned FY value).

B: Performance exceeding the intended objectives is recognized in the mid to long-term plan (in terms of quantitative indicators, 100% or more but less than 120% vis-à-vis planned mid to long-term values (or planned FY value).

C: Performance falls below the intended objectives in the mid to long-term plan, requiring improved performance (in terms of quantitative indicators, 80% or more but less than 100% vis-à-vis planned mid to long-term values (or planned FY value).

D: Performance falls below the intended objectives in the mid to long-term plan, requiring drastic improvement of business including its abolishment (in terms of quantitative indicators, less than 80% vis-à-vis planned mid to long-term values (or planned FY value), or it is recognized that the competent Minister is required to make an order for improving business operation or taking other necessary measures).