Evaluation of the Advanced Technology Center of NAOJ

Panel Report

Adrian Russell (NRAO)
Greg Fahlman (HIA)
Wolfgang Wild (SRON)

March 2008

Summary

They key findings of the external review of the ATC are summarized below:

- **The Review panel was extremely impressed with the achievements of the ATC as visible in the material presented both during and prior to the review. It is clear that much has been accomplished in the last four years and all the staff at the ATC should be very proud – the ATC looks good on a Global Stage**
- **The Review panel has examined the self-assessment material provided by the ATC. After some discussion, the panel agrees with the internal evaluations with one noteworthy exception: the development and distribution of the ALMA cartridge test sets should be elevated to SS**
- **We feel that the ATC is now ready to make the next step and offer advice that we hope will help you to transition from the "heroic" success of the last four years into a future of sustainable excellence**
- **In order to continue playing a prominent role, ATC (and NAOJ) should consider participation in future international project opportunities as part of a strategic plan**
- **Within the framework of an NAOJ strategic plan, the ATC itself should develop its own strategic plan to achieve the top-level goals and in doing so, will necessarily set specific strategic goals of its own**
- **One important activity within the ATC is the development of technology roadmaps which feed into science priorities**
- **A key aspect of the process for the ATC is be able to identify and support the in-house project champions needed to secure interesting and challenging work for the center**
- **We recommend that NAOJ-ATC carefully analyze the technical and engineering requirements of space projects and its implications on the ATC as well as the relation of space instruments with the NAOJ science strategy to reach a well founded conclusion**
- **We feel that 48 staff is insufficient for such a broad mission, especially considering the need to provide free common user support**
- **We feel that to remain competitive in a global landscape it is crucial that the ATC be able to hire professional engineers**
- **We recommend the ATC adopt a Project Manager/ Instrument Scientist partnership model**
- **We recommend that the top-level selection criteria need to explicitly recognize the potential of post-doctoral candidates for participation in development projects at the ATC**
- **Graduate students are an important source of creative energy and both science-oriented and engineering oriented students should be considered**

1 Introduction

An external panel comprising Adrian Russell (chair), Greg Fahlman and Wolfgang Wild was convened by the Director General of the NAOJ in order to assist with the campaign to evaluate the research and academic activities of the Advanced Technology Center of the NAOJ. The panel met in Mitaka on the 28th and 29th of February 2008.

This report is split into two parts, an evaluation of the research output of the ATC that represents the key deliverable of the review. The panel was also asked to comment on the future direction and organization of the ATC. A lot of time in the review was spent discussing the future direction of the organization and the panel feels that there are a number of recommendations that would add significant value to the ATC in the future; these are discussed in section 3.

2 Evaluation of Research Output

The Review panel was extremely impressed with the achievements of the ATC as visible in the material presented both during and prior to the review. It is clear that much has been accomplished in the last four years and all the staff at the ATC should be very proud – the ATC looks good on a Global Stage.

The Review panel has examined the self-assessment material provided by the ATC. After some discussion, the panel agrees with the internal evaluations with one noteworthy exception: the development and distribution of the ALMA cartridge test sets should be elevated to SS. These higher rankings recognizes the fact that these systems have been distributed to all the ALMA partners and are an indispensable item in all of the ALMA Front End development labs. While not directly enabling science in the same way as most other work at the ATC, they do constitute a well-recognized outstanding technology contribution to the ALMA international partnership.

The material provide is voluminous and it would require considerable effort and space to fully address all the items offered for consideration. Below we offer comments on the Form I-1 and, in passing, on selected items presented in the "List of Remarkable Research Outputs".

The Mission Statement of the ATC was recently changed (2005) and now emphasizes the role of the ATC in leading and implementing the various NAOJ strategic development programs, which include the ALMA and Subaru projects. ALMA-J is now fully embedded within the international project and has a well defined context in which activities are planned and executed. Subaru has embarked on an upgrade of its signature instrument to Hyper Suprime-Cam, a complex development that will require modification of the telescope infrastructure as well as the construction of a new, large FOV camera. However, this too has a well defined context and is now funded. In both cases, the work has an international profile and is being pursued at the NAOJ-ATC at the highest international standards.

The advanced development projects include gravity-wave detection and Terahertz technology as leading items, with a number of common-user projects also being pursued. The context of all these projects was less obvious to the Panel although in all cases there was ample justification provided by the ATC staff for going forward. Moreover, the

Panel members were quite impressed by the quality of the work being accomplished. The missing context should be provided by a Strategic Plan for the NAOJ as a whole and a derivative Strategic Plan for the ATC. We comment on this issue in Section 3 of our report.

The Self-Evaluation Form is divided into three areas and we comment specifically on each area as follows:

2.1 Research Activities

The self evaluation given is "Commendable". This is a fair assessment considering the entire range of research activities included. Within this mix, at least one area may be considered "Distinguished": Hyper Suprime-Cam. There is no comparable development anywhere among the numerous 8m-class OIR Telescopes. Suprime-Cam is already a unique, highly productive instrument and the step to HSC has surely anticipated a coming shift toward the use of large aperture telescopes for wide-field survey work. We have noted above the unique and important role the NAOJ-developed test set for the ALMA cartridges: this too would warrant a "Distinguished" (or SS) rating if judged alone. Most of the other "high priority development themes" while specific and unique, nevertheless can be compared to work elsewhere; e.g., the ALMA cartridges. We certainly agree that the ATC work compares very well to the very best work done elsewhere. Less convincing perhaps are the various projects within F8, "Common Use of ATC Facilities." This is discussed in section 1.2 of the self-evaluation document.

We agree with the expressed opinion that the current lack of in-house engineers is a significant handicap in the competitive world of international astronomy projects. We comment extensively on this issue in Section 3 of our Report. The staffing issues raised are very important and should be dealt with through a formal planning process.

2.2 Common User Support and Collaborative Research Activities

Given the status of NAOJ as an Inter-University Institute, we understand that the organization has an obligation to make its facilities available at no cost to university research groups. This is a unique function in our experience. The corresponding terms and conditions were not made available: we gathered that use of the ATC was a right enjoyed by the universities, leaving little discretion to NAOJ-ATC.

However, the mission of the ATC was redefined within the review period to include a new class of "collaborative programs", which are implied to be a more desirable use of the ATC facilities. The usage statistics indicate that these are still a numerical minority of the annual projects The use of a peer-review system to examine the proposals under this Program is also important, if only to ensure that needs are well understood and can be fulfilled. We believe that the distinction between simple facility use and collaborative programs to be important and encourage NAOJ-ATC to develop a Strategic Plan so that the evaluation of external proposals can be judged against the strategic goals of the whole organization. Publicising the Plan when complete should help to generate more of the desirable collaborative projects as well as providing a defendable basis for rejecting (or limiting the scope) of simple facility use proposals. The priority assignment of resources

is clearly a key element for managing this program and we would urge the ATC to develop a proper strategy-based foundation for that purpose.

The self-evaluation supplied here is "Exceeds the level of standards expected". We have no real basis for challenging such an assessment since the program is a unique feature of NAOJ-ATC. The basis for this assessment is the heavy usage the facilities are subject to, coupled with selected notable outcomes. Overall, we suggest the evaluation is best left to the user groups themselves.

2.3 Mid-term Research Objectives

The documented progress toward meeting the goals listed is quite impressive and demonstrates excellent performance in the high priority areas, including the development of the ALMA receivers, the SIS device development and HSC. The Advanced Technology items are somewhat more difficult to evaluate; some, such as the deep depletion CCDs and the IR cut-off filter for Hinode have found application in high-profile science programs. In other cases, the absence of clear science drivers and applications makes it difficult to evaluate the true degree of success. Overall, we agree that the self-evaluation is about right.

2.3.1 Mid-Term Objectives in the Common-User Support and Collaborative Research Programs

The objectives in this program are to provide useful facilities for independent University-based research and collaborative programs. As commented on above, this operational mode is uncommon and unfamiliar to the Panel members. The variety and high-level of the available equipment is very impressive. Consequently, we concur with the self-evaluation. We note that the continued success of this Program under the new mandate does require a strategic plan for the ATC itself. This is a particularly important matter when considering major capital investments in new equipment.

2.3.2 Mid-Term Objectives on Graduate School Education

The year-by-year program objectives did not appear to be met. We noted that incremental progress in the level of attainment for the students has been documented in general terms. No Thesis topics were provided, nor other quantitative measures of success, such as number of refereed publications with student authorship. The self-evaluation in this case, "meets the level of standards expected", might well apply to the internal goals but, frankly, the record provided is more consistent with "needing improvement" if judged by external standards. As noted in the document provided, it *is* a serious problem if students fail to complete their degree program. We comment in Section 3 on the value of graduate students and noted that a successful program must, in addition to offering opportunities for high quality research, recognize the career development needs of the students themselves, which includes publishing and exposure to their peers through conference attendance, participation in topical workshops, and the like.

2.3.3 Mid-Term Objectives on the collaboration with the general public and international exchanges:

While the "Status of Progress" appears to only obliquely address the stated "Annual Plan" objectives in the supplied document, the Panel was certainly satisfied that the ATC was very well engaged with the international community and able to attract non-nationals for collaborative visits and employment, particularly in ALMA-related activities. The self-evaluation is correct and consistent with international norms. No information was provided on public outreach.

2.4 Future Plans

This section was split into "near-future" (1-3 years) and "mid-term" (3-10 years) considerations, with three divisions: radio (including FIR and sub-mm); Optical and Infrared (OIR) and finally Gravitational-wave (GW) developments. The Panel was certainly impressed by the GW development program underway but is unable to comment authoritatively because of a lack of expertise. The "near-future" developments are mostly the obvious continuation of current programs and need no further comment from us.

Apart from ALMA-related work, the "mid-term" activities in long wavelength astronomy are focussed on a multi-pixel submm/FIR camera. This is sure to be a highly competitive area of future development world-wide and therefore offers some scope for strategic partnerships. On the OIR side, a scatter of quite ambitious ideas is presented, mainly related to wide-field IR imaging in space, and perhaps Antarctica. These ideas need to be sharpened and prioritized. A general effort with Japanese industry to bring the pixel cost of IR arrays down would likely attract considerable international interest.

3 Comments on the Future Direction and Organization of the ATC

Overall, the panel felt that the mission change was appropriate and well thought out. It has brought more focus to the organization. ***We feel that the ATC is now ready to make the next step and offer advice that we hope will help you to transition from the "heroic" success of the last four years into a future of sustainable excellence.***

3.1 Global landscape

The global landscape of astronomy is changing. Driven by ambitious science goals, astronomical instrumentation projects have continuously been growing in size, cost, and capability over the past decade, and this trend will certainly continue. Astronomical instrumentation has reached a stage where national and international collaboration will be crucial since one institute alone, or even one country alone is not in a position, financially or technically, to develop and build a broad suite of advanced instruments. For the NAOJ-ATC, this means that it needs to find and maintain its place in a field which is characterized by national and international collaboration, international competition, and fast developing technology.

The Review panel notes that the ATC (which is basically equivalent to NAOJ for the outside world) has been very successful in international collaborations. The involvement and achievements in ALMA, Subaru, the HSC, and gravitational wave detection are visible examples. The panel thinks that the continuation and extension of participation in international collaborations would be beneficial for NAOJ and the ATC. In this respect, the hiring of more foreign (non-Japanese) staff by the ATC in recent years (notably for ALMA Band 10) is seen very positive by the panel since it allows to add expertise to the ATC and to strengthen the links and relations of the ATC with the international scene.

In order to continue playing a prominent role, ATC (and NAOJ) should consider participation in future international project opportunities as part of a strategic plan. The participation in large international collaborations will create long-term commitments in terms of funding, staff effort and technology, and needs to be well thought out and balanced with possible returns.

Given the science and technology capabilities at NAOJ and ATC, the panel would advise NAOJ and ATC to also consider the leadership of global projects which were (or will be) initiated by Japanese scientists and can only be carried out in an international collaboration.

3.2 Strategic Planning within the ATC

The pursuit of astronomy is driven by observational, theoretical and computational research aimed at advancing the state of knowledge of the universe and its contents. Thus, the field is science driven. However, even a cursory examination of the history of astronomy demonstrates that essentially all significant advances, including most new discoveries, have come from the exploitation of new technology embodied by novel instruments and improved telescopes. Hence, the science of astronomy may be said to be technology enabled. We understand, however, that top-flight scientists often recognize

that new technical capabilities will allow advances in particular areas of the science and such sub-fields then become, in effect, technology driven. There is an inherent circular quality to the evolution of astronomical science and its enabling technology.

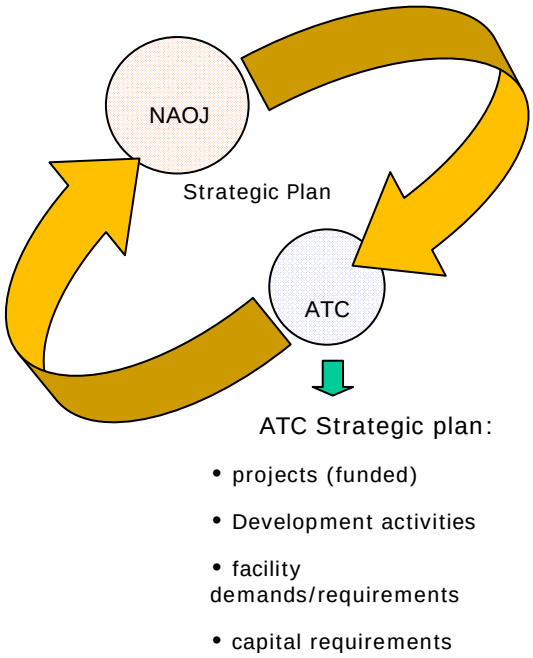
With this in mind, the role of the ATC within NAOJ assumes critical importance: the ATC is an engine that powers the process whereby new advances are made by the scientists of NAOJ itself and by the Japanese community as a whole. Now the discovery space available in the study of the Universe exceeds the capabilities of even a wealthy and populous country like Japan to completely exploit. Choices must be made. Plans must be formulated because the fundamental problems are hard and the leading research facilities are now of a scale that requires long intervals for the design and construction of major equipment, as well as substantial financial resources. These arguments clearly apply to the major ground-based observatories. For space astronomy, even small and simple missions require significant investments and long duration commitments.

Strategic planning for the ATC is unlikely to be successful in the absence of a corresponding plan for the parent organization: NAOJ. The ATC Review Panel was told that no such plan exists now. NAOJ is to be subject to its own review and we might anticipate that Panel recommending the development of an organization-wide Strategic Plan. At the risk of overstepping our mandate, a few comments on this subject are offered below.

A common problem for all national astronomy organizations is how to make rational choices from the menu of possibilities and desires expressed by individuals and other interested national organizations: industry and universities, perhaps even other government agencies and institutes. Increasingly, communities world-wide are developing long range plans through a process of formal community consultation. The most familiar examples, perhaps, are the Decadal Plans developed in the USA. Many countries now have such a process in place with varying degrees of formality and status. As long as such plans clearly embody both a community consensus as well enjoy the support of leading scientists, the expressed priorities in such a plan can form the basis for a strategic plan for national facilities like the NAOJ. A principle component of the plan will be prioritized goals that address the entire range of activities within NAOJ and, as is common elsewhere, will define the new facilities and instruments that the community seeks access to in order to advance their common scientific interests.

Once the NAOJ Strategic Plan has been defined, a subset of the specified top-level priorities will cascade down to the ATC for action: new instruments and new facilities to be built, new technical capabilities to be developed and so on. As noted in the introductory comments to this section, the process by which the NAOJ develops its Plan is expected to be iterative with the ATC. Aspirations can often get ahead of technical capabilities and goals can be set that are unachievable because the organization lacks a fundamental technical capability for implementation. Hence, the cascade of priorities does not mean that the ATC should be passive. ***Within the framework of an NAOJ strategic plan, the ATC itself should develop its own strategic plan to achieve the top-level goals and in doing so, will necessarily set specific strategic goals of its own.*** The graphic below illustrates the process,

The iteration process is essential because technical capabilities dictate what is possible to achieve. The funded projects generally have their own milestones, which may well be keyed to external demands (e.g., ALMA). The planning within the ATC for those has a simple aim: to ensure that the agreed upon targets are met. ***One important activity within the ATC is the development of technology roadmaps which feed into science priorities***, again as part of the iterative process with the whole of NAOJ. ***A key aspect of the process for the ATC is be able to identify and support the in-house project champions needed to secure interesting and challenging work for the center***.



3.3 Space versus ground

It is clear that NAOJ could make significant and unique contributions to scientific space missions. However, the decision on ATC/NAOJ involvement in space and/or ground projects has important implications which need to be taken into account when reaching a conclusion. The choice of ground vs. space will influence a number of fundamental aspects in a scientific organization such as NAOJ and ATC.

To begin with, the wavelength range covered from ground or space are only partly overlapping, and the decision to develop and build a space-based instrument can mean the development of technology for a specific wavelength range (like e.g. the far-infrared or x-ray range, both not accessible from the ground). The detector optimization for ground- and space-based instruments can differ (sometimes substantially), and a decision on the observing platforms would need to be taken very early on in the technology development stage. As an example, there are quite different requirements (sensitivity, background loading, mass, heat dissipation etc.) on submillimeter bolometers depending on whether they will be used on ground or in space.

Since space instruments often require rather advanced and specific engineering practices, sophisticated modelling techniques and the use of specific materials and components, the staff working on such instruments would have to be specifically trained and specialized. (This aspect emphasizes our recommendation below to hire professional engineers). Also, space instruments have a higher cost as compared to "the same" ground-based instrument.

On the other hand, space missions are usually quite unique, and many science goals can be pursued *only* with space missions (e.g. x-ray or far-infrared astronomy). A successful space mission can have (and in the past did have) a tremendous and unequalled science impact sometimes changing our picture of the Universe. In a sense, space missions can be seen as "high risk, high cost", but when successful also as "high or unique science return". Finally, we would like to point out that in case NAOJ decided to become more active in

scientific space missions, the relation and interfaces between NAOJ and JAXA/ISAS should be well defined and clarified. Table 1 gives a summary.

We recommend that NAOJ-ATC carefully analyze the technical and engineering requirements of space projects and its implications on the ATC as well as the relation of space instruments with the NAOJ science strategy to reach a well founded conclusion.

Table 1 – Aspects of ground vs. space instruments

Topic	**Ground instrument**	**Space instrument**
Science impact	Often shared	Potentially unique
Synergy	Can be very fruitful	
λ coverage (IR)	< 10 μm	> 10 μm
λ coverage (submm/FIR)	Up to ~1 THz	Above 1-2 THz
Detector development	Different optimization for ground and space → R&D may be (very) different for ground and space	
Manpower		More needed for the "same" instrument
Skills		Need extra skills
Cost		Higher for the "same" instrument
Facilities		May need extra equipment
Organizational	Role as facility ?	Relation with JAXA/ISAS ?

3.4 Resource-Mission mismatch

The ATC has a far-reaching mission with a broad portfolio of work. ***We feel that 48 staff is insufficient for such a broad mission, especially considering the need to provide free common user support***. Under such circumstances, organizations have two choices, provide additional resources and/or invoke priorities. All organizations are to some extent resource limited and it is clear that the ATC is working in a very tight budgetary environment. Therefore, a process of prioritization has been employed. Clearly, ALMA is a high priority at present. This is entirely appropriate. Formally, it should flow down from the NAOJ strategic plan, but it is clear to us that when such a plan is produced, ALMA will be a high priority.

Within the ALMA project we believe the staffing plans for Bands 4 & 8 are appropriate and the Band 10 *plan* (i.e. not the current staffing) presented at PDR (still to be approved)

are appropriate. We note however, that additional resources could always be needed downstream when the inevitable problems arise. We also note that the ATC is doing *three* ALMA Bands which considerably increases the risk that additional resources will be needed at some point. It would be a worthwhile exercise to carry out a detailed formal risk assessment of the ALMA Band 4, 8 & 10 work.

Another high priority for the future is Hyper Suprime-Cam. For HSC to be a success, we feel that it is very likely that additional staff at the ATC will be needed particularly in terms of skill set (see section 3.5 below). The reason for this is that although HSC may be a unique instrument, a key science driver, the weak lensing survey to explore Dark Energy is being pursued vigorously by other groups using different techniques. This is a situation where the timeliness of the project is extremely important; whoever gets this science first is likely to lead the citation index for some time.

3.5 Strengthening the staffing

There is no question that the ATC has a wonderful compliment of highly skilled, dedicated and motivated staff. However, we were very surprised to hear that there are basically no professional engineers at the ATC. That so much has been achieved without them is truly remarkable. ***We feel that to remain competitive in a global landscape it is crucial that the ATC be able to hire professional engineers***. For example, a professional mechanical engineer with a degree in mechanical engineering and several years of design/analysis experience would be of immense value to the HSC project. Similarly, in the area of Optics, access to experienced professional optical engineers is of paramount importance. To date the opto-mechanical engineering has been done by scientists and technicians, together with appropriate outsourcing to Japanese industry (e.g. Canon for the HSC prime focus corrector). However, the initial conceptual design work for complex astronomical instruments cannot be outsourced, it requires an intimate working relationship between a scientist who understands and can interpret the requirements and the professional engineers. Furthermore, without professional engineers it is hard for any organization to be able to act as an "intelligent customer" and to be able to interact with industry in an appropriate and timely way to ensure both value for money and make the appropriate design tradeoffs. Finally, it is very unlikely that the ATC would be able to be a major player in Space Instrumentation without access to the necessary engineering skills.

All three organizations represented by the panel members, plus the UK ATC in the case of the panel chair have professional engineers on their permanent staff and could not function without them.

The panel suggests that the ATC employ a two stage process to bring professional engineers into the organization:

> **Stage One – hiring:** The ATC should seek to bring professional engineering staff into the ATC as soon as possible. We suggest that a mechanical engineer for HSC would be a good starting point.
>
> **Stage Two – staff retention:** To be able to recruit and retain the best staff, the ATC will need to ensure that there is put in place a suitable career path for

engineers. We understand that this will involve discussions at NINS level and could take some time to fully explore and resolve all the issues.

We urge you to not delay stage one, even if stage two takes some time.

3.6 Role of "Project Leaders"

The ATC has highly motivated scientists leading projects. This is very good and most of these staff have tied their future career success to their projects. However, often the same staff are carrying out project management (PM) functions on their projects. Whilst this is being carried out successfully, we feel that it is an inefficient use of a very precious resource.

We recommend the ATC adopt a Project Manager/ Instrument Scientist partnership model. In such a model, the existing project leaders would fulfill the role of Instrument Scientist. The Instrument Scientist takes the lead in ensuring the science performance/cost tradeoffs are done well and in providing the technical/scientific leadership for the project (supported by a team of dedicated engineers and technicians). The Project Manager would carry out all of the PM functions. We note that for the ALMA project the PM functions require a considerable effort as the management and documentation, PA/QA requirements are significant (Comparable international Space projects can present even more demanding project management requirements.). Therefore, we urge that this recommendation be implemented as soon as possible for the ALMA work in order to free up the time of the project leaders and allow them to focus on ensuring the success of the project.

Bringing in Project Managers from industry is one possibility, but in our experience, the cultural differences between a National research organization like NAOJ and industry could be a significant barrier. An alternative that worked well for the ROE/UK ATC is to groom suitable engineering staff to become project managers. This was done by the ROE Chief Engineer and created a strong project management culture.

3.7 Strengthening Science Input to ATC

One area of concern to the Panel was the links between development activities within the ATC and the broader scientific goals of the NAOJ are not as strong as they should be to fully inform the strategic planning process. We encourage the ATC to consider the concept of the Instrument Scientist described above. Such an individual maintains linkages between science requirements and technical specifications, thereby ensuring that development is consistent with the science goals.

We note that post-doctoral fellows are often the key ingredient that provides critical mass to a successful project. We recognize that selection of such individuals is done at the NAOJ level. ***We recommend that the top-level selection criteria need to explicitly recognize the potential of post-doctoral candidates for participation in development projects at the ATC***. At the same time, the project managers and instrument scientists must recognize the career development needs of the post-docs engaged in development work and provide opportunities for publishing and attending major international conferences as appropriate. A sustainable program requires that those who leave the ATC are seen to be successful.

In a similar vein, we note that ***Graduate students are an important source of creative energy and both science-oriented and engineering oriented students should be considered***. As with the post-docs, development work must be consistent with academic goals (completion of degree programs) and career development needs for the students. Finally, we note that in the home institutes of the panel members, senior undergraduate students are offered work opportunities, typically 3 to 6 month terms where they work side-by-side with staff on "bite-size" pieces of scientific and development projects. This activity builds a constituency of future graduate students as well as expanding the network of contacts for the institute. We encourage the NAOJ-ATC to consider implementing such a program.

Appendix 1: Panel Membership

Dr Adrian Russell

National Radio Astronomy Observatory,

Charlottesville, USA

Dr Greg Fahlman

Herzberg Institute of Astrophysics,

Victoria, Canada

Dr Wolfgang Wild

Netherlands Institute for Space Research

Groningen, Netherlands

Appendix 2: Panel Charge

The Evaluation of Research and Academic activities:

Advanced Technology Center of NAOJ

The documentation, which has been prepared by the Advanced Technology Center (ATC hereafter) explaining their past activities, is enclosed with the request to evaluate it critically for the purpose of assessing the track record of the ATC as a research group.

Attached below is the list of the objectives of the review.

In order for us to assess the ATC's recent achievements, we would appreciate your critical comments on the following items, according to the order they appear in the documentation (format I).

1. Evaluation of Status of Research Activities and, User Support and Collaborative Research Activities

The quality and significance of the research-based outputs and common user support as set out in the ATC's documentation.

The emphasis of your evaluation should be on achievements in the last four years in relation to previous work.

1.1 On Research activities

(a) Is the list of outstanding research outputs such as remarkable papers published, proposed by the ATC, appropriate?

Can these papers be properly considered as SS (distinguished) or S (commendable) as are proposed in the self-evaluations (format III and IV)? Please comment on each paper listed in the documentation.

(b) Are self-evaluated levels of the research outputs and its rationales, the rating scale suggested in the documentation, properly considered? Please comment on these levels.

(c)Is quality improvement shown by the ATC appropriate?

Please comment on the degree of improvement achieved.

1.2 On User Support and Collaborative Research Activities

(a) Is the list of outstanding research outputs such as remarkable activities, proposed by the ATC, appropriate?

Can these activities be properly considered as SS (distinguished) or S (commendable) as are proposed in the self-evaluations (format V and VI)?

Please indicate your comments on every activity listed in the documentation.

(b) Are the self-evaluated overall level of the user support and collaborative research activities appropriate?

Are the rating scale suggested in the documentation properly considered?

Please comment on this level.

(c) Is quality improvement shown by the ATC appropriate?

Please comment on the degree of improvement achieved.

1.3 Overall Evaluation

Please give a brief summary of this section, based on the items 1.1 and 1.2 in the above but with additional comments and suggestions if applicable.

2. Evaluation of Achievement of the Mid-Term Objectives

Is the self-evaluation of the progress achieved on the following items of the activities, proposed by the ATC, appropriate?

Please comment on each item shown below.

2.1 On Research Activities

2.2 On the User Support and Collaborative Research Activities

2.3 On the Graduate School Education

2.4 On the Collaborations with general public and the international exchange

2.5 Overall Evaluation of the achievement of the Mid-Term Objectives

Please give a brief summary of this section, based on the items in the above but with additional comments and suggestions if applicable.

3. Future Plans

Are the future plans (scientific objectives, instrument development, policy, etc.) properly considered?

Please note that the planned future research is not a project proposal. As this assessment is based on their track record groups have been requested to submit only a brief statement of intent.

4. Others

If you have particular knowledge on the ATC's research-based contributions to academic-industry and cooperative research, where these are applicable, we would appreciate any comments you can make.

We would be very grateful if your comments (preferably not exceeding ten A4 pages) could reach us by 28 March 2008. If you cannot replay by this date but need some additional time please let me know by when you could submit a report.

Yours sincerely

Toshio Fukushima

Head: The NAOJ Evaluation Working Group

2008 January 31

Appendix 3: Review Agenda

Day 1 (Feb 28)

start	end	time		
9:00	9:20	0:20	Reception	
9:20	9:40	0:20	Opening remarks	(T. Fukushima)
9:40	10:40	1:00	ATC presentation	S. Tsuneta
10:40	10:55	0:15	Coffee Break	
10:55	12:15	1:20	ATC presentation	S. Tsuneta
12:15	13:30	1:15	Lunch	
13:30	15:30	2:00	Lab. tour	
15:30	15:45	0:15	Coffee Break	
15:45	17:00	1:15	Discussion	
18:30	21:00		Hosted dinner	

Time Table of ATC Lab. Tour 2008 Feb. 28

start	end	time	Prepared by	
13:35	13:45	0:10	Matsuo	Machine shop
13:45	14:00	0:15	Miyazaki, Kamata	CCD
14:00	14:15	0:15	Kawamura	Gravitational wave detection
14:15	14:20	0:05		opt shop
14:20	14:25	0:05	Matsuo	THz group
14:25	14:35	0:10	Uzawa	Band 10
14:35	14:45	0:10	Sekimoto	Band 8
14:45	14:50	0:05		check-out room
14:50	15:00	0:10	Asayama	Band 4
15:00	15:20	0:20	Noguchi	Clean room
15:20	15:25	0:05		High precision machining

Day 2 (Feb 29)

9:00	10:30	1:30	Future plan	S. Tsuneta
10:30	10:45	0:15	Coffee Break	
10:45	12:10	1:25	Discussion	
12:10	13:30	1:20	Lunch	
13:30	15:30	2:00	Closed session	
15:30	15:45	0:15	Coffee Break	
15:45	16:45	1:00	Preliminary Summary	A. Russell