

The Japanese Experience of the NameExoWorlds Competition: Translating Official Information into Japanese to Enable Domestic Groups to Participate in a Global Event

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Translation of information from English is an essential step toward ensuring the involvement of non-English speakers in global events. The NameExoWorlds competition, led by the International Astronomical Union (IAU), was held from 9 July 2014 to 15 December 2015. It was a unique event that invited the public to name celestial bodies. In Japan, language acts as a significant barrier for amateur astronomers and school students to participate in global events hosted in English. To address this concern, we established a domestic working group to set up a Japanese website and provided a translation of the IAU's official site for the NameExoWorlds competition. We also developed additional original information in Japanese when needed and sent announcements to a mailing lists of astronomy societies in Japan. As a result, 28% of the registered groups and 47% of proposals for names were from Japan, making Japan the most active country for these stages of the competition. After the competition had ended, we carried out a survey in the Japanese astronomy community and received 124 responses. We found that most of the Japanese participants referred to our official Japanese website in order to overcome the language barrier and participate in the competition. This article explores our work of translating the competition information into Japanese and our evaluation of the impact of this action on the uptake by Japanese astronomy enthusiasts.

The NameExoWorlds Competition

NameExoWorlds¹ (Montmerle et al., 2016) was a worldwide competition led by the International Astronomical Union (IAU) and organised by the IAU Office for Astronomy Outreach (OAO), which is located at the headquarters of National Astronomical Observatory of Japan (NAOJ) in Tokyo, Japan. The competition gave astronomy clubs and non-profit organisations related to astronomy a chance to name exoplanets and their host stars, referred to as 'exo-worlds'. Ever since the first exoplanet around a main-sequence star — known as 51 Pegasi — was discovered in 1995 (Mayor & Queloz, 1995), more than 3000 exoplanets have been discovered. For these exoplanets, the scientific nomenclature follows the international rules widely adopted by the scientific community, which are drawn from the rules for naming binary stars. For each planet, the name given is that of the host star around which the plan-

ets are orbiting, followed by a lower-case letter: b for the first discovered exoplanet, c for the second, and so on. For example, 55 Cancri b, 55 Cancri c and 55 Cancri d are planets that orbit the host star 55 Cancri. These official and scientific names are not very memorable and are more like a code. Therefore, the IAU issued a statement on the Public Naming of Planets and Planetary Satellites, which outlined the first set of rules that allowed the public to become involved in assigning common names to exoplanets².

Since the IAU's establishment in 1919, the only way in which a non-professional astronomer can name a minor planet is to discover it³. Now, that has changed.

The NameExoWorlds competition is the first opportunity for non-professional astronomy groups to propose names for exo-worlds.

The procedure of the competition was as follows.

Step One: Announcement from the IAU

On 9 July 2014, 260 exo-worlds were listed as eligible for public naming by the IAU. Each exo-world has between one and five exoplanets, all of which were discovered before 31 December 2008.

Step Two: Registration of clubs and organisations

The IAU issued a call to astronomy clubs and non-profit organisations worldwide that could be interested in naming the exo-worlds to register on the IAU Directory for World Astronomy website⁴. Registration originally closed on 31 October 2014 but was later extended to 1 June 2015.

Step Three: Selection of exo-worlds to be named

The registered clubs voted online for which of the 260 exo-worlds they wanted to be

eligible for naming and by 15 February 2015, more than 400 registered clubs and organisations had voted and 20 exo-worlds had been chosen. The exo-world list was released on the IAU official website in April 2015, with 15 stars and 32 exoplanets eligible to be named. Five of the 20 chosen — Ain (epsilon Tauri), Edasich (iota Draconis), Errai (gamma Cephei), Fomalhaut (alpha Piscis Austrini) and Pollux (beta Geminorum) — already had star names, only exoplanets names were eligible for the next stage of the competition.

Step Four: Submission of proposals for names

The registered clubs and organisations submitted proposals for a name(s) for one of the selected 20 exo-worlds, with a deadline of 15 June 2015. These names had to be based on the naming rules of the IAU⁵. Each group was allowed to propose a name for only one exo-world. A total of 247 proposals from 45 countries were submitted⁶ and 237 proposals were approved for voting.

Step Five: Public vote

On 11 August 2015, following a public ceremony at the IAU XXIX General Assembly in Honolulu, USA, the public began voting to rank the proposed names. The public vote was closed on 31 October 2015, by which time 573 242 valid votes had been received.

Step Six: Release of approved names

In early November 2015, the IAU, via its Executive Committee Working Group on the Public Naming of Planets and Planetary Satellites, oversaw the final stages of the competition and validated the winning names from the vote. On 15 December 2015, the winning names of 31 exoplanets and 14 host stars approved by the IAU were released⁷.

Japanese Working Group, Website and Content

In the autumn of 2014, the Astronomical Consortium of Japan (ACJ) established a NameExoWorlds working group to encourage Japanese people to participate in this global event. The ACJ consists of several astronomy societies, associations and research institutes such as the Astronomical Society of Japan (ASJ), National Astronomical Observatory of Japan (NAOJ), Japan Aerospace Exploration Agency (JAXA), Japanese Society for Education and Popularization of Astronomy (JSEPA), Japan Planetarium Association (JPA), Japan Public Observatory Society (JAPOS) and Japan Amateur Astronomers Association (JAAA). JSEPA set up its own working group and led the ACJ's working group activities.

The purpose of the ACJ working group was to provide accurate information from the IAU to the Japanese community when-

ever needed. Many amateur astronomers and school students were interested in naming an exo-world but most of them faced a language barrier and had insufficient English proficiency to participate in the competition. The working group members developed the official website exo-planet.jp⁸ and uploaded releases from the IAU in Japanese, including information on how to register an organisation on the IAU Directory for World Astronomy website. The group also provided several examples of the registration form using very simple English words and sentences that Japanese secondary school students could write. According to the questionnaire-based survey responses (summarised in the next section of this article), more than 50% of the groups who referred to the official Japanese website looked at the examples on the website and registered successfully. The group also created newsletters to remind people of deadlines and to provide useful information about the competition. The newsletters were sent to the mailing lists of ACJ-related organisations. Registered groups also received announcements and useful information from Dr. Hitoshi Yamaoka, the IAU National Outreach Contact (NOC) of Japan.

The NameExoWorlds competition also had an educational component, with registered groups needing to know about exo-worlds and the science behind them. The resources created for Japanese audiences reflected this educational compo-



Figure 1. This illustration shows the procedure of the competition as shown in the official NameExoWorlds poster created by the IAU OAO. Credit: IAU

研究者からのおすすめ惑星系

ここでは、研究者からのおすすめ惑星系についてご案内します。

←前へ その他の追加情報

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系外惑星に興味をお持ちのみなさまへ



国立天文台の太陽系外惑星探査プロジェクト室では、太陽系外惑星（以下、系外惑星）の直接観測をはじめとして、さまざまな系外惑星の観測とそのための装置開発を推進しています。

系外惑星は既に1800個以上発見されていますが、そのほとんどが惑星を間接的に発見する手法です。

惑星を画像に写す「直接観測」では現在日本が世界をリードしています。今回のリストではごく最近に発見された惑星は含まれないため、自分達が発見した惑星ではないのですが、リストに含まれる惑星のうち系外惑星研究で重要と考えられている惑星を少し推薦いたします。

HD 149026 b (主星: HD 149026)

観測が進むにつれ、太陽系の惑星と比べて、系外惑星は実に多様であることがわかってきました。

まさに、「新世界」と呼ぶべき天体たちなのです。

系外惑星探査の国際チームN2Kによって、「すばる望遠鏡」などを用いて発見されたこの惑星は巨大惑星のひとつですが、その平均密度が異常に大きいという特異惑星です。

おそらく、惑星中心に巨大コアがあるためだと考えられていますが、その正体は良くわかりません。

Figure 2. This page from the Japanese site recommends planets for voting. Dr. Motohide Tamura recommended HD 149026 b. On this page, he says: 'Dear all who are interested in exoplanets, At the Extrasolar Planet Detection Project Office of NAOJ, we promote observations of various exoplanets and development of observational instruments. More than 1800 exoplanets have been discovered (as of 2015). However, most of them were discovered using indirect methods. Today, Japan is a leading country in direct imaging observations. Though the exoplanet list provided by the IAU does not include my discoveries after 2008, I would like to recommend some which are thought to be important in exoplanet studies: HD 149026 b (host star: HD 149026). With a lot of discoveries, we have learned how diverse exo-worlds compare to our Solar System. This planet was discovered by the international team N2K using the Subaru Telescope and other telescopes. It is a giant planet but an unusual one, with an extremely high density, and is thought to have a giant core. However, more studies are needed to conclude this'.

ment, with exoplanet researchers in the working group providing basic information on the official Japanese site, such as how to discover an exoplanet and the characteristics of some well-known planets. On the Japanese site the exoplanet list provided by the IAU also showed which planets were discovered by Japanese research groups, to highlight national relevance. This was supplemented by messages from three Japanese researchers of exoplanets, namely, Dr. Motohide Tamura at The University of Tokyo/NAOJ (as of 2015), Dr. Bun'ei Sato at Tokyo Institute of Technology, and Dr. Takahiro Sumi at Osaka University. These astronomers recommended planets based on which important discoveries were made by Japanese researchers (including themselves) using Japanese telescopes. The three planets recommended were HD 149026 b, which has an unusually high density; Epsilon Tauri b, which was the

first exoplanet discovered in a star cluster; and OGLE235-MOA53 b, which was the first exoplanet discovered using the gravitational microlensing method. Part of the original content on the Japanese site was a gallery page, where amateur astronomers and astro-photographers could upload images in which the host stars of exoplanets could be seen.

Promotion and Uptake in Japan

Information was distributed across Japan, not only via the website and mailing lists but also via other media, including Twitter. Scientists and astronomy educators wrote articles for amateur astronomy, science fiction, and teachers' magazines and distributed flyers about the competition at their public lectures. Working group members at the NAOJ responded to questions from the media and, as a result, the

competition was aired on television and in newspaper articles.

Thus, 28% of the registered groups for the competition were Japanese, making Japan the most active country at the registration stage. As of 28 July 2015, 166 of 600 groups were from Japan, 57 were from the United States, 32 were from Spain, 26 were from Argentina, and 22 were from the United Kingdom. Among the top 20 nameable exo-worlds voted for and selected by the registered groups, seven nameable systems had been discovered by Japanese research groups. For example, HD 104985 b is the first exoplanet discovered by Japanese astronomers using the 188-cm Reflector Telescope of Okayama Astrophysical Observatory in Okayama, Japan, and HD 149026 b was discovered by an international team from Japan, the USA, and Chile using the Subaru Telescope, a 8.2-m optical and infrared Japanese telescope on Maunakea, Hawai'i, USA (Figure 2). Among the 237 proposals for names that were approved to be voted upon and listed on the IAU official website, 111 proposals were submitted by Japan, followed by 15 from the USA, nine from Italy, seven from France, and six from Germany.

When the public vote started, a page on how to vote was set up on the official Japanese website and a brief Japanese translation of the proposed names was provided. Messages and explanations from Japanese individuals who had proposed names were also uploaded to the website. Some working group members wrote articles about the public vote for amateur astronomy magazines, and members at NAOJ responded to media enquiries. However, we did not have a strong strategy to reach beyond the astronomy community. In the public vote, the IAU received 573 242 valid votes, which equalled 0.94% of the public votes worldwide and ranked Japan 18th in the number of voters; in contrast, 36.27% of the votes were from India, 19.48% from the USA, and 7.93% from Spain⁹.

Compared to the population of each country, 0.016% of the people in India voted (34th place in comparison with the population), 0.035% in the USA (11th place), 0.099% in Spain (1st place), and only 0.004% in Japan (76th place).

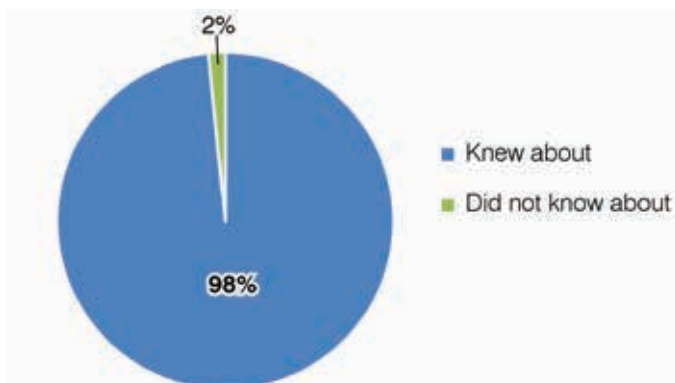


Figure 3. This graphic shows percentages of the 124 respondents who knew and did not know about the NameExoWorlds competition.

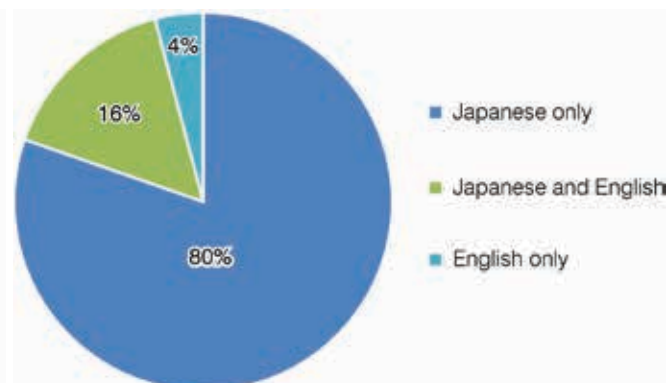


Figure 4. This graphic shows the languages in which the 122 respondents from the Japanese astronomy community found out about the NameExoWorlds competition.

Despite the small portion of votes from the Japanese public, names of four exo-worlds proposed by Japanese groups won and were approved by the IAU: Tokushima Prefectural Jonan High School Science Club named 18 Delphini ‘Musica’ and its planet ‘Arion’; Kamagari Astronomical Observatory named the planet Ain b ‘Amateru’; Okayama Astro Club named HD 81688 ‘Intercrus’ and its planet ‘Arkas’; and the student club at Hosei University Libertyer named xi Aquilae ‘Libertas’ and its planet ‘Fortitudo’. All four of these planets were discovered using the 188-cm Reflector Telescope at Okayama Astrophysical Observatory.

Results from a survey among the Japanese astronomy community

Respondent

The Japanese language support provided by the working group was successful in ensuring a high registration rate and generating a large number of final entries of Japanese origin. To identify the success of key components of our activities, a questionnaire survey was carried out within the Japanese astronomy community. The announcement of the survey was sent to members of ACJ-related societies and registered groups via email. Using a Google Form, 124 answers were collected between 15 January and 15 February 2016, and 122 of the respondents (98%) knew about the NameExoWorlds competition (Figure 3).

Knowledge of the Competition

Of the 122 respondents who knew about the competition, 98 (80%) had found information about the competition in Japanese

language only, 19 (16%) found it in both Japanese and English, and five (4%) found it only in English (Figure 4). In total, 96% of our respondents had received Japanese information.

The announcement of the competition was made through the network of the societies and personal contacts. Our survey respondents belonged to ACJ-related societies, and as expected, almost half (48%) the respondents who learned about the competition in Japanese received an announcement via the societies’ mailing lists (Figure 5). Information was also conveyed from person to person; the respondents learned about the competition via personal communications (17%), at conferences (16%), and at the NAOJ’s

open house events (8%). About 35% of the respondents learned about the competition on websites such as exoplanet.jp and the website of the Japan Amateur Astronomers Association (JAAA). However, about 60% of those who visited the websites also received information via the mailing list. It is natural to see a majority of the respondents received the information through the mailing list since we used the same channel for conducting the survey. On the other hand, only 5% of the total respondents received information via newspapers and magazines.

Level of Participation

Of the 122 respondents who knew about the competition, 72 (59%) registered their groups, 29 (24%) participated in the pub-

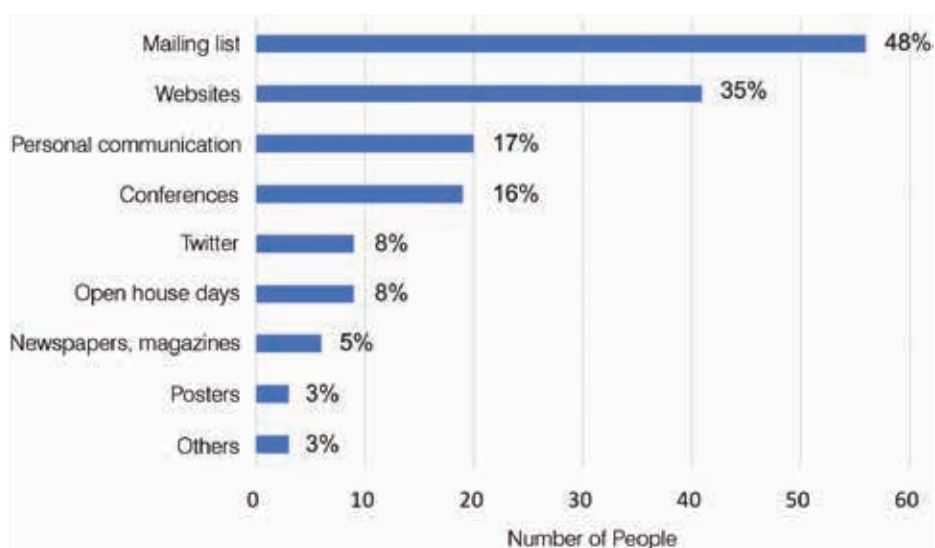


Figure 5. This graphic shows which resources the Japanese respondents used to learn about the NameExoWorlds competition. Percentages are fractions divided by the total number of respondents who read Japanese resources (117). The survey allowed for more than one option to be selected.

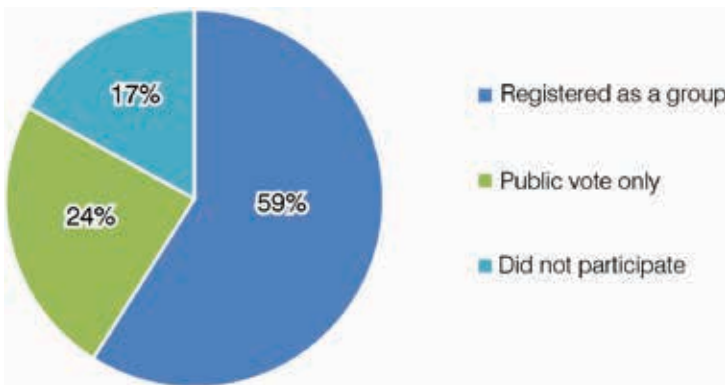


Figure 6. This graphic shows the distribution of how the 122 respondents participated in the NameExoWorlds competition.

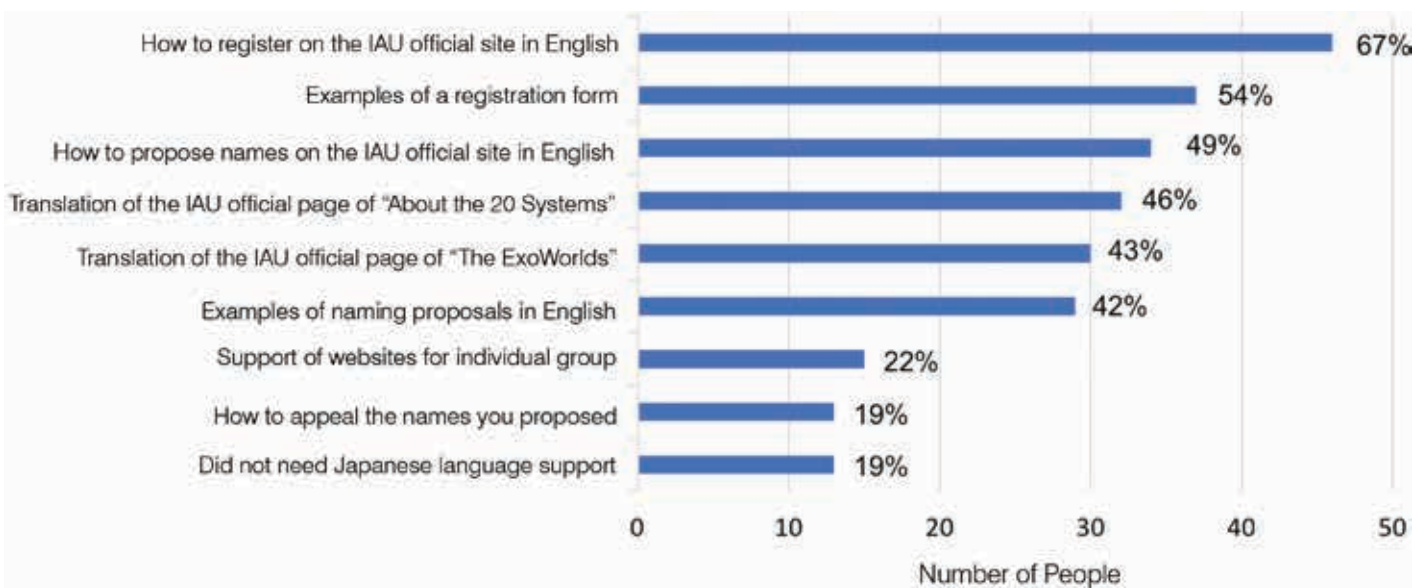


Figure 7. This graphic shows the reported 'essential pages' on the official Japanese website used by the 69 respondents who referred to the site at registration. Number one (how to register), number four (about the 20 systems) and number five (the exo-worlds) were the translation of the IAU official site, and others (except number nine) were original information developed by the Japanese working group.

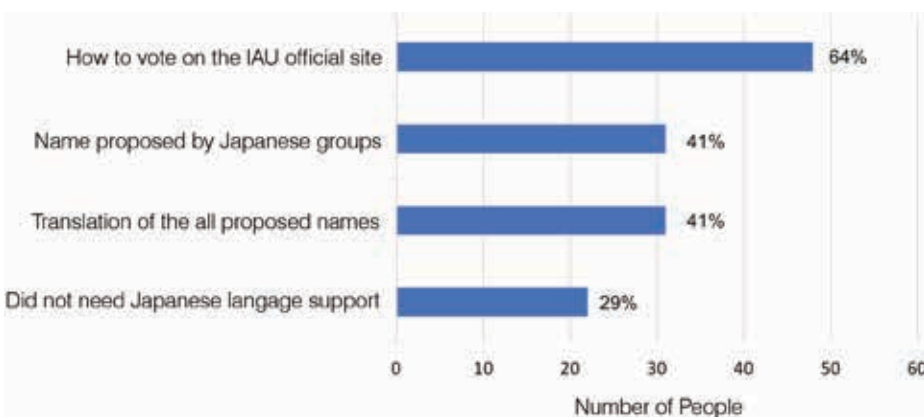


Figure 8. This graphic shows the reported 'essential pages' on the official Japanese website for the 75 respondents who referred to the site at the public vote. Number three (the all proposed names) is the translation of the IAU official site, and number one (how to vote) and number two (name proposed by Japanese groups) are original information developed by the Japanese working group.

lic vote only, and 21 (17%) did not participate in the competition (Figure 6). Over 80% of the registered respondents also proposed names (64 out of 72) and participated in the public vote (60 out of 72). Among the 72 registered, 69 (96%) referred to the official Japanese site. The reasons that people did not refer to the official site were that they did not need Japanese language support (one) or were not aware of the site (two). This means that almost all of the respondents referred to the official Japanese site once registered.

The Registration and Submission of Proposals

According to the answers to the question, 'Which page in Japanese was essential for you to register your group and to propose a name for an exo-world?' among the 69 respondents who referred to the official Japanese site (multiple answers allowed), the most important information was 'How to register on the IAU official website' (translation of the IAU official site), followed by examples of a registration form (Figure 7).

More than 40% of respondents considered that all the three translated pages of the IAU official sites ('How to register', 'About the 20 systems' and 'The exo-

worlds') were necessary. Also, about half of the respondents needed simple examples for registration and submission of proposals in English. Multiple respondents sent their appreciation for the Japanese working group, saying things like 'Without the official Japanese site, I could not have registered'.

The Public Vote

A total of 89 respondents participated in the public vote: 60 registered and voted, while 29 did not register but only voted. Of the 89 respondents, 75 (84%) referred to the official Japanese site. The reasons that 14 people did not refer to the Japanese site were that they did not need Japanese support (14) or were not aware of the site (three). The lower rate than the number of registered people referring to the Japanese site (96%) implies that voting using multiple choice in English was easier for Japanese users than registration, which required English writing. Among 75 respondents who referred to the Japanese site to vote, 29% responded that they could have voted without Japanese support (Figure 8), while 64% stated that they needed the primary information about 'how to vote' in Japanese in order to vote.

Among the respondents, 21 did not participate in the competition although they knew about it. The main reasons were that they did not know how to participate (six), they were not interested in the competition (five) and they did not have enough time (three). We also received other feedback about the competition from the participants, which included calls for a better schedule and one that did not change, as this had reportedly created difficulties for the participants. There was also a suggestion that the winning names should stick to the rules and that modified versions should not be permitted. Easier ways to register and vote and consistent and clear rules were also cited as barriers to participation in the competition.

Discussion

The results of the survey revealed the fact that a language barrier exists among non-professional astronomers, including amateur astronomers and school students, and that the working group's development of an official Japanese website was essential for these individuals and groups to par-

Box 1: Summary of Survey Findings

- 98% of the survey respondents knew about the NameExoWorlds competition.
- At least 80% of the respondents first heard about the competition from Japanese sources and purely relied on the Japanese information rather than the IAU's official site written in English.
- 83% of the respondents who knew about the competition joined in some capacity.
- 59% of the respondents who knew about the competition registered as a group.
- 7% of the respondents who knew about the competition dropped out (they registered in the first stage but did not propose a name in the next stage).
- 24% of the respondents who knew about the competition did not register but only voted.
- The Japanese translation of the registration guidelines proved to be the most useful of the resources created.
- For Japanese speakers, voting using multiple choice was easier than registration, which required English writing.

ticipate in the worldwide NameExoWorlds competition.

The working group's constitution of professional astronomers, amateur astronomers and members of several ACJ-related societies was key to its success as it enabled these individuals to provide an accurate translation of the IAU official site and development of original web content with reliable information. Within the working

group, professional and amateur astronomers worked together to develop the web content and distribute information. Thanks to the location of the IAU OAO at the NAOJ headquarters, the working group members could be in direct contact with OAO and send cross-checked information from the IAU to the Japanese community with minimal time lag. In addition, the working group was authorised by the ACJ, and

Competition Stage	Worldwide	Japan
Registration from clubs and organisations	600 groups (as of 28 July 2015)	166 groups (28%, 1st place)
Selection of exo-worlds	20 exo-worlds	Seven exo-worlds discovered by Japanese researchers
Submission of proposals	237 proposals*	111 proposals (47%, 1st place)
Public vote	573 242 votes	5411 votes (0.94%, 18th place)
Approved names	19 exo-worlds**	Four exo-worlds (21%, 1st place)

* The number of proposals approved for voting.

** The winning name for tau Boötis was not approved by the IAU.

Table 1. Statistics comparing competition uptake in Japan with other participating countries at each step of the competition.

its website and newsletters were shared widely throughout the nation through its channels.

Reaching beyond the astronomy community was challenging. Strategic publicity planning and media contacts should have been considered in the public vote. In the future, we would like to investigate successful examples in other countries.

To increase the number of participants in the global event, a simpler procedure seems to be necessary. The main reasons that respondents who did not participate gave for their lack of participation were that they did not know how to participate and that they did not have enough time. These reasons imply that the competition procedure was too complex and the timeline was too short.

Some of our respondents submitted written requests to the IAU to develop a voting page that was less text heavy and had translations in other languages. Creation of a translation network and provision of less official pages but in multiple languages would be desirable if the competition is to be held again.

There were also other cultural barriers to participation in the competition. For the public vote, participants were required to answer questions to prevent voting by a robot. The validation system used was produced by Google, and most photos in the quizzes were based on American culture. Thus, some Japanese participants had difficulty recognising the difference between a street sign and a traffic sign, a pancake and a cake, etc. Consideration of diverse cultures in addition to various languages is thus important for a global event.

Conclusion

Establishing a domestic working group in Japan and developing an official Japanese website helped with the language barrier for the Japanese astronomy community. Among our survey respondents, 96% referred to the Japanese website when they registered, and 84% did so when they voted. The most important information provided was simple content such as 'How to register' and 'How to vote' on the IAU official website. Being able to access primary information in their mother tongue was

thought to lower the language and psychological barriers faced by many Japanese astronomy community members. Simple examples of English writing for registration and submission of proposals also seemed to be helpful.

Existing mailing lists of the ACJ-related societies were useful to distribute information. On the other hand, a strategic publicity plan should have been considered to reach more people outside of the astronomy community.

Web design with less text on the IAU official site would have been helpful and having the public voting page in various languages would have attracted more participants. Consideration of diverse cultures, in addition to various languages, is thought to be important for a global event.

Acknowledgements

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Notes

- ¹ NameExoWorlds website: <http://nameexoworlds.iau.org>
- ² NameExoWorlds press release: <http://www.iau.org/news/pressreleases/detail/iau1404/>
- ³ IAU naming: <https://www.iau.org/public/themes/naming/>
- ⁴ IAU directory: <https://directory.iau.org>
- ⁵ The IAU naming rules are: 16 characters or less in length; preferably one word; Pronounceable (in some language); Non-offensive; Not too similar to an existing name of an astronomical object. More details are explained at: https://www.iau.org/public/themes/naming_exoplanets/
- ⁶ IAU press release: <https://www.iau.org/news/pressreleases/detail/iau1511/>
- ⁷ Winning names announcement: <https://www.iau.org/news/pressreleases/detail/iau1514/>
- ⁸ Official website exoplanet.jp has been moved to: <http://tenkyo.net/exoplanets/wg/index.html>
- ⁹ Statistics from the competition: <http://nameexoworlds.iau.org/statistics>

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Biographies

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