

PUBLIC OUTREACH OF HAYABUSA2 MISSION. M. Yoshikawa¹, S. Hosoda¹, H. Sawada¹, N. Ogawa¹, Y. Tsuda¹, A. Kishi¹, H. Asakura¹, and Hayabusa2 Public Outreach Team, ¹Japan Aerospace Exploration Agency, 3-1-1 Yoshinodai, Chuo-ku, Sagami-hara-shi, Kanagawa 252-5210, Japan, yoshikawa.makoto@jaxa.jp

Introduction: Hayabusa2 spacecraft was launched on December 3rd, 2014. Hayabusa2 is a follow-on mission of Hayabusa, so it is the asteroid sample return mission (Fig.1). Hayabusa2 will arrive at the target asteroid (162173) 1999 JU3 in 2018 and will come back to the Earth in 2020. The main purpose of Hayabusa2 is science, that is, to study the origin and evolution of the solar system and the life, especially to study the original material for the life. The engineering is also the important purpose of Hayabusa2. We had a lot of problems in Hayabusa mission, so we modified many parts of the spacecraft and we put several new mission payloads on board ([1],[2]). In addition to there science and engineering purposes, we think that the public outreach is also important. Here we show our public outreach activities up to now and from now on.

Public Outreach of Hayabusa: At first, we briefly introduce about the public outreach of Hayabusa. Hayabusa was launched in 2003 and came back to the Earth in 2010. The outreach activities were started before the launch and continued for several years after the Earth return, so we did a lot of things more than ten years. For example, before the launch of Hayabusa, we carried out a campaign called "Let's meet with Le Petit Prince! Million Campaign." In this campaign, people sent us their names and we put in a target maker a sheet where these names (more than 880,000 names) were written. This target maker is on the surface of Asteroid Itokawa now. After the Hayabusa's Earth return, we exhibited the reentry capsule all over Japan and about 890,000 people came to see it.

We made many things for public outreach, such as pamphlet, booklet, papercraft, etc. One of the unique



Fig.1 Hayabusa2 touching down to the newly created crater on Asteroid 1999 JU3 (Illustration by A. Ikeshita)

things is jazz music. Jazz singer Emiko Kai composed jazz music for Hayabusa and released a CD called "Lullaby of Muses." This name came from MUSES-C, the code name of Hayabusa. Using this CD music, we made a mission video, which is much more like a music video rather than a science video. And after this, several movies were made based on the Hayabusa mission. These are not so scientific or technological, but rather emotional. The advantage of such movies are that people who had nothing to do with Hayabusa or universe or science might have interest in these fields. Actually after the Hayabusa mission, the number of people interested in universe increased much. We could know this from the number of people who visit to our institute.

Another important aspect in the public outreach of Hayabusa is that people outside the project did a lot of activities (Fig.2). Some of them were just enjoying or amusing, far from studies of science or technology. But this is good by the same reason mentioned above.

Public Outreach of Hayabusa2 up to Now: The Hayabusa2 project was proposed in 2006 first. Since then, we have done many outreach activities, such as, public lectures, town meetings, making pamphlet, goods, videos, and etc.

One of the big events was the message and name campaign which is similar to Hayabusa's one. So we named it as "Let's meet with Le Petit Prince! Million Campaign 2" (Fig.3). In the Hayabusa2's campaign, in addition to putting people's names in the target makers, we inserted in the reentry capsule a memory chip, in which we stored people's names, messages, photos,



Fig.2 Public activities related Hayabusa mission



Fig.3 Let' meet with Le Petit Prince ! Million Campaign 2

and illustrations. The target markers will be left on the surface of the asteroid, but the memory chip will return back to the earth, so we can reproduce the data when we get the reentry capsule. More than 400,000 people sent their names, messages, photos, and illustrations to us. For this campaign, we had a collaboration with the Planetary Society in a similar way that we did for Hayabusa's Million Campaign.

Like the Hayabusa's case, people outside the project team also carried out their own public outreaches (Fig.4). In order to help those people who want to do some outreach activities, we made very detailed fact sheet and other materials and provide them to everybody who want them. So some made a model of Hayabusa2 spacecraft in the real size, or others made presentations for public talks. Especially on the day of the launch, a lot of public viewings were planned all over Japan, and the fact sheet was used much. The mass media, such as TV, newspapers, and journals also used the fact sheet.

Public Outreach of Hayabusa2 from Now on: The first thing that we want to do after the launch is to name Asteroid 1999 JU3. The target asteroid of Hayabusa was named Itokawa, and this name was selected by the Hayabusa project team. For 1999 JU3, we are considering a public campaign to select the name. The next big event is the earth swingby at the end of 2015. At the earth swingby, the spacecraft can be observed by optical telescopes. And in 2016, Asteroid 1999 JU3 approaches the earth so it can be observed by telescopes. Although relatively large aperture telescopes are necessary to observe Hayabusa2 at the earth

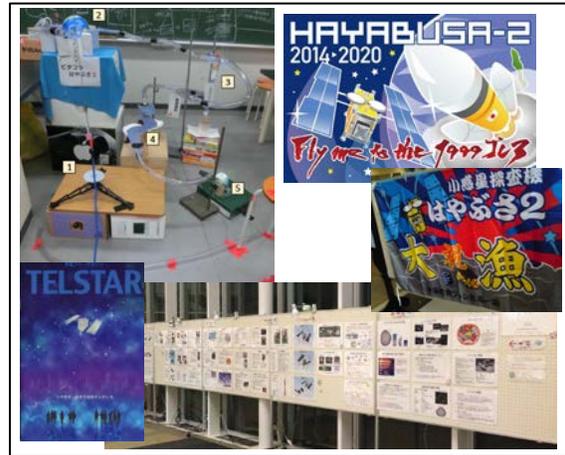


Fig.4 Public activities for Hayabusa2

swingby and 1999 JU3 in 2016, these events are good opportunities to promote public interest.

Apart from these events, we will do basic activities, such as, public lectures/discussions, school educations, enhance and promote outreach activities by people outside the project team much more.

Final Remarks: In Hayabusa case, the public outreach activities were done mostly inside Japan. In Hayabusa2, we would like to extend our activity internationally. Since we have collaborations with Europe (especially DLR and CNES), United States, and Australia, we have good opportunities to have collaborations with these countries also for outreach activities. We have already started discussions with the OSIRIS-REx team.

There are a lot of possibilities in the public outreach activities by using Hayabusa2 mission and we would like to enhance the public interest toward the solar system, the universe, and science and technology much more. Please contact us if you want to join us.

References: [1] Tsuda Y., Yoshikawa M., Abe M., Minamino H., Nakazawa S. (2013) System design of the Hayabusa 2 - Asteroid sample return mission to 1999 JU3. *Acta Astronautica*, **91**, pp.356-362. [2] Yoshikawa M., Watanabe S., Tsuda Y., Kuninaka H. (2014) Trans. JSASS Aerospace Tech. Japan Vol. 12, No. ists29, pp. Tk_29-Tk_33.

Additional Information: The information about Hayabusa2 can be found in the Web of JAXA:

<http://global.jaxa.jp>

<http://global.jaxa.jp/projects/sat/hayabusa2/index.html>

<http://www.jspec.jaxa.jp/hayabusa2/> (in Japanese)

The photos and movies related Hayabusa2 can be seen in JAXA Digital Archives: <http://jda.jaxa.jp/en/>