



A co-operation with Serbia on Space and Astronomy Education: A report of activities in 2013

宇宙・天文教育でのセルビアへの協力：2013年の活動報告

**Akihiko Tomita¹, Dušan Radosavljević², Hiroaki Akiyama¹,
Masachika A. Kijima¹, Masami Okyudo¹, Chiaki Yoshizumi¹,
Naoko Sato¹, Tomomi Otani¹**

富田晃彦, ドウシャン・ラドサヴリエビッチ, 秋山演亮,
貴島政親, 尾久土正己, 吉住千亜紀, 佐藤奈穂子, 小谷朋美

¹Institute for Education on Space, Wakayama University, Japan

²Preschool Teacher Training College, Novi Sad, Republic of Serbia

和歌山大学宇宙教育研究所

セルビア共和国, ノビサド保育教員養成大学

This article reports a collaboration work of IfES staff with Dušan Radosavljević from Serbia, who aimed to observed IfES activities and discuss on new space and astronomy education in Serbia, in August 2013. We have been discussing the future collaboration during various activities, including CLTP4, visiting preschool, and other events. A tentative list of future activities in Serbia is presented.

Keywords : Space education, astronomy education, collaboration with Serbia

1. Background

One of the authors, Dušan Radosavljević is a civil engineer, and a staff of expert associate for informatics, science-technology-engineering-mathematics(STEM) application and risk management, Preschool Teacher Training College, Novi Sad, Republic of Serbia. Serbia experienced a severe war in late 1990s, and Dušan has a dream that space and astronomy education can contribute to improve the cultural, educational, and technological developments in Serbia, and foster international friendship among former Yugoslavian countries as well. In order to observe the activities by Institute for Education on Space (IfES), Dušan applied the Japan Foundation Fellowship Program for Intellectual Exchange 2013-2014 with a proposal title, “The Strategy for Achieving the Socio-Economic Benefits of Space Knowledge and Technology

Applications; Education and Human Resources Development: Lessons for Structural Reforms of Serbian Educational System.” Though the proposal was not accepted, Committee for Space Programme Development, Serbia funded the proposal, which realized Dušan’s visiting Japan. Space and astronomy education can contribute to formal and informal science educations. Development of satellites can contribute to improving the technology level. Environment monitoring and other observations using the satellite data can contribute to improving quality of life including disaster mitigation programs. Improvements in educational, technological, and cultural aspects can contribute to a broader human network and reuniting people’s mind in former Yugoslavian countries.

The outline of Dušan’s schedule in Japan was as follows:

- 10 August 2013: Arrived at Narita Airport.
- 11 to 18 August 2013: Observed the 4th Annual Meeting of CanSat Leader Training Program and discussed with related staff.
- 18 to 31 August: Stayed in Osaka, including discussion with staff of IfES, Wakayama University.
- 1 September: Left for Serbia from Narita Airport.

In section 2, we describe the activities during the Dušan's stay. In section 3, we describe the programs we discussed. Finally in section 4, we describe the future prospects.

2. Dušan's Stay in Japan

2.1 CLTP4

The annual training program of CLTP, CanSat Leader Training Program^[1], has been held from 2011. The CLTP is co-organized by UNISEC, University Space Engineering Consortium^[2], and UNISEC member universities to provide a training course for researchers and educators as one of the capacity-development programs in space technology. The 2013 program was the 4th program, CLTP4, from 22 July to 21 August, and the site was Shin Kawasaki Campus, Keio University, Kawasaki, Kanagawa, and Seminar House Crosswave Funabashi, Funabashi, Chiba, Japan.

The CLTP4 performed the CanSat launching in the final stage of the month-long schedule. Dušan observed the launch presentation and had chances to meet CLTP staff to discuss about participating future CLTP meeting from Serbia and new space education in Serbia. Akiyama and Kijima attended the CLTP4 and they showed Dušan around.

During the observation of CLTP4 final activities, Dušan directly learned about the methods of launching CanSat models made by other participants from different countries including Mexico, Angola, Mongolia, Bangladesh, and Philippines. Each CanSat model was special by itself and therefore the results of the mission

were important for gaining knowledge and experience. A variety of planned and unplanned situations made the activity more realistic in relation to the real satellite. These situations are invaluable for learning and gaining experience and are often ignored or concealed because of human nature that continually strives to show only the good results which often causes the opposite effect. Some of these situations are failure of opening the CanSat parachute during descending, not getting the signal and data from CanSat, the descending of CanSat a lot further than planned place due to a strong wind or overcapacity of parachute, loss of CanSat because of descending on the high tree, and many more. CanSat as a simulator of real satellite and helium balloon and rocket as simulators of satellite launching methods are excellent ways to motivate students, teachers and educators to develop their creativity and interests, and focus on the things that have power of unification of people's minds.

2.2 Preschool and kids club

Informal science education including ones for young children has a great impact on quality of life as well as an impact on formal science education. Tomita has been doing informal astronomy education for nursery school kids, preschool kids, and after-school day-care club for primary school (*gakudo* in Japanese) kids, in line with UNAWA, Universe Awareness^[3] activity. The activity is also in line with IAU OAD, International Astronomical Union, Office of Astronomy for Development^[4].

On 22 August, Tomita and Dušan visited Tokiwa Gakudo Matsuzaki Club, a *gakudo* in Abeno Ward, Osaka City. Tomita performed five evening programs during this summer vacation at *gakudos* and visiting Tokiwa was the third of the program. Tomita performed a slide show, a talk about stars and Martian legend, and a question-and-answer session. Dušan and his partner Sandra observed the performance, and at the end of the performance, children played with Dušan and Sandra. Children got interested in Serbia and international

human network in astronomy education. Parents and educators of *gakudo* also enjoyed talking with Dušan and Sandra.

On 27 August, Tomita and Dušan visited Satsukiyama Preschool, Kainan City, Wakayama Prefecture. Tomita has visited many nurseries and preschools to perform kids fun activity on astronomy. This time, Tomita and



Fig.1 Tomita and Dušan at Satsukiyama Preschool performing a talk using Uchu Game.



Fig.2 A screen shot of the daily motion of the Sun in Uchu Game.



Fig.3 A screen shot of the solar system grand tour in Uchu Game.

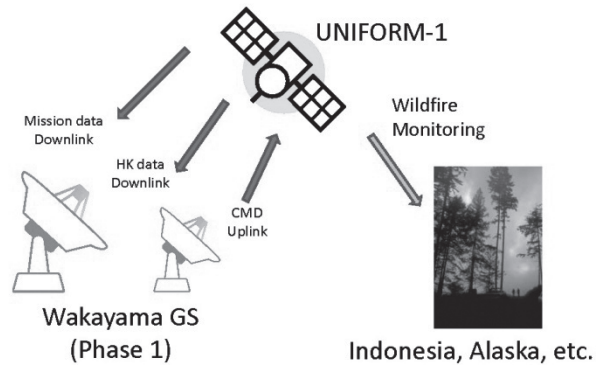
Dušan performed together. Uchu Game, a package of electronic astronomy education materials developed by us, was presented (see figure 1). Children enjoyed the daily cycle of the Sun and the Moon motions with lovely characters, and the imaginary space trip by a nice rocket through solar system (see figures 2 and 3). Children were also eager to ask Dušan questions. Tomita translated children's Japanese into English.

Dušan realized that astronomy education enhanced children's smile, which makes all the people happy. We also confirmed that Uchu Game is an attractive material to preschool children.

2.3 Radio antenna project and Cosmic Café

The Radio antenna project had a big impact for Dušan, and the project has three aspects to him; the first is the high-tech science education, the second is transmission to and from satellites, and the third is easy-to-understand monument for local community including search for extra-terrestrial intelligence, SETI.

Antennas in Wakayama Ground Station



Antennas in Wakayama Ground Station

- 12m antenna for Mission data downlink
- 3m antenna for HK data downlink & CMD data uplink



Fig.4 A part of introduction of IfES's latest radio antennas and their functions. The material was prepared by Sato.

The project in IfES has been successful in constructing practical big antennas (see figure 4) and in constructing antennas in a very inexpensive way. Some of the inexpensive radio antenna kits are popular among middle school science education¹⁾.

Sato and Otani who are in charge of radio antenna project in IfES explained the project to Dušan and showed him the 12m antenna. Okyudo introduced how to start the inexpensive radio antenna kit program.

IfES's science outreach program was also impressive to Dušan. During Dušan's stay, Cosmic Café²⁾, a half-



Fig.5 At Cosmic Café on 26 August; Dušan and Tomita standing, Yoshizumi, a coordinator of the café, sitting in the rightmost, Okyudo who started many projects including the radio antenna project, sitting in the leftmost, and two students supervised by Okyudo between them.



Fig.6 Tomita explained his picture book which Yoshizumi was showing.

year-round series of science café organized by IfES and Machikado Satellite of Wakayama University^[5] was held at Wakayama University Library on 26 August.

This time's theme was picture book related to stars (see figures 5 and 6).

3. Summary of Discussed Projects

Following is a list of future plans of space and astronomy education in Serbia summarized by Dušan through our discussion (see figures 7 to 9).

Space Education Programs

Level and contents

University level:

Cansat 3 - CTLP level + BalloonSat

Manual for local community is under preparation.

If the future CLTP is held, participate it, and if the future CLTP is not held, achieve the same level of the activity.

Secondary education level:

CanSat 2 (with rocketry) + BalloonSat - Middle level

Manual for local community is under preparation.

Primary education level:

CanSat 1 - Introductory level

Manual for local community was already completed.

Kindergarten level:

Uchu Game

We want to develop it as a share ware.

Space Development Programs: Cubesat project

Schedule:

- [1] Consult labs of cube sat in Japan.
- [2] Ministry of Foreign Affairs of Serbia writes to Japanese Embassy, and Ministry of Foreign Affairs of Serbia asks Japan for cubesat studies.
- [3] Space Committee of Japan (Akiyama is a member) inspects the proposal.
- [4] Consult labs in Estonia, Turkey, Spain, maybe Hungary and Romania's future collaborators.

Radio Telescope Programs

[1] Develop radio telescopes

- Okyudo is the supervisor

[2] Various applications

- SETI
- Uplink/downlink to satellites
- Radio astronomy
- Science/technology education
(including International Space Station communication if possible)
- Local symbol
- GENSO^[6] (under European Space Agency and University of Vigo, Spain)

Other Programs

[1] The booklet, COSMOS in your pocket activity book,



Fig.7 Akiyama (left) discussed with Dušan (right) at Akiyama's office.



Fig.8 At IfES office; from right to left, Dušan, Kijima (standing on a chair), Otani, and Morita.

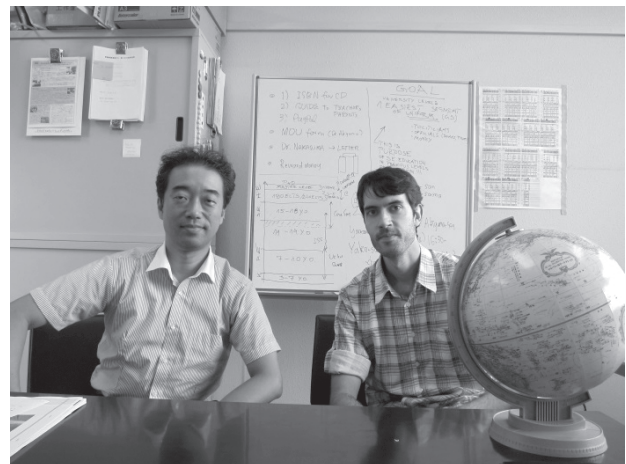


Fig.9 At Tomita's office; Tomita (left) and Dušan (right). White board in the back was full of discussion memo.

published by UNAWE

- Translate into Serbian
- Translate into other Yugoslavia languages
- [2] Preschool/Kindergarten activities
- Collaboration in science/art/cultural education
- "Pozsenki" collaboration with an art education
- Astronomy play

All programs aim at improving quality of life of Serbian, and reuniting people in former Yugoslavian area.

4. Future Prospects

IfES is looking for international friendship through space and astronomy education. This cooperation with Dušan from Serbia is in line with the IfES's great mission.

Notes

- [1] CLTP, CanSat Leader Training Program: <http://cltp.info/>
A CanSat is a miniaturized satellite, which needs the technology of artificial satellites and fitted inside of a juice can. CanSats can be made with low cost, short preparation time, and simple design, therefore CanSats are suitable tools for students and educators taking their first steps into space. CanSat competitions and training programs are held all over the world. In Japan, "CanSat Koshien" is for high school students, "Noshiro Space Event" is for

university students, and “CLTP” is for educator training course.

- [2] UNISEC, University Space Engineering Consortium:
<http://www.unisec.jp/>
- [3] UNAWAWE, Universe Awareness: <http://www.unawe.org/>
- [4] IAU OAD, International Astronomical Union, Office of Astronomy for Development: <http://www.astro4dev.org/>
- [5] The name of the satellite “Machikado” means “on the street” or “in the city.”
- [6] GENSO, Global Educational Network for Satellite Operations, a worldwide network of ground stations and spacecraft which can interact via a software standard. The GENSO aims to increase the return from educational space missions.

References

- 1) Masami Okyudo, Naoko Sato, Kenta Fujisawa, Akihiko Tomita, Wataru Ishizuka, Toshiyuki Sato, Takayuki Shiokawa, Kensuke Chikata, Toshiyuki Yukitani, and Toshihiro Handa (2007), “Development of a Small Radio Telescope for the Observations of the Neutral Hydrogen Emission Line and an Observing Lesson of the Milky Way at a High School”, *Education of Earth Science*, Vol. 60, No. 5, 171-178
- 2) Chiharu Goto and Chiaki Yoshizumi (2013), “Cosmic Café for Bridging between Community and University”, *Bulletin of Institute for Education on Space*, No. 2, 35-38

Acknowledgements

We would like to thank all people, including Mr. Katsumi Morita, Ms. Miyuki Hayashi, and other staff of IfES, who were concerned in arranging Dušan’s stay and useful discussion. We also thank CLTP4 and UNISEC staff for their kind inviting Dušan during the CLTP4 program, Cosmic Café staff for their welcoming us, principal Ms. Akemi Hyodo of Satsukiyama Preschool for her kind inviting us, and Tokiwa *Gakudo* Matsuzaki Club staff for their hospitality during our visit.