

Agenda item 4,

“Joint educational initiatives for primary and secondary school students and teachers”

Enhancing Water Rocket Activities for Education

Proposal to organize an International Water Rocket Workshop for Educators and to develop a Multilingual Leaflet on Water Rockets

BACKGROUND

During the eleventh session of Asia-Pacific Regional Space Agency Forum (APRSAF-11), held in Canberra, Australia, in November 2004, the Space Education and Awareness Working Group (SEA WG) agreed upon an important action to stimulate the interest of school children in space activities while learning basics of scientific principles. It was the agreement to hold the first regional Water Boosted Rocket Competition on the occasion of the twelfth session of APRSAF. All the participating countries of SEA WG were encouraged to organize water boosted rocket competitions in their countries to select the participants for the regional competition.

With the first one held in October 2005, APRSAF Water Rocket Event marks its third year in November 2007, in Bangalore, India on the occasion of APRSAF-14. While the number of participating countries remained around 10, with the number of participating student competitors and accompanying teachers and leaders between 40 and 50 each year,¹ the countries that held national competitions in a systematic manner gradually increased over the past three years. Some countries included science and math quizzes as part of the selection process. Some other countries introduced various measures to evaluate the performance of water rocket launch, including not only flight distance but also accuracy of launch or duration of flight time. Creative ways and means to make water rockets and launchers were also explored in various countries.

¹ The numbers of the countries, student competitors and accompanying teachers and leaders from 2005 to 2007 are as follows: 2005 – 10 countries, 18 students, 20 teachers/leaders; 2006 – 13 countries, 29 students, 21 teachers/leaders; 2007 – 10 countries, 24 students, [16] teachers/leaders (the numbers to be finalized after the event.)

In order to provide opportunities for the teachers and leaders who were accompanying the student competitors to exchange their experiences as well as ideas for making water rockets and launchers, the organizers of the Second APRSAF Water Rocket Event convened a leaders session in the evening before the launch competition with the participation of interested members of SEA WG. Lively discussions and demonstrations of their water rockets and launchers took place among those teachers and leaders. As a result, 25 participants of that leaders session agreed to set up a network of educators and instructors of water rockets, in order to continue their exchange of information and experiences with water rocket activities for educational purposes.

In time for the Second APRSAF Water Rocket Event, the Space Education Center of Japan Aerospace Exploration Agency (JAXA) had developed an Educator's Manual for Water Rockets and its accompanying DVD in both Japanese and English. The English set of the Manual and DVD was distributed to the participants of the meeting of SEA WG during APRSAF-13 and the above leaders session. The distribution of the set was intended to stimulate discussions among interested teachers and educators toward developing teaching methods and materials that would better meet their objectives in their educational activities.

Water rocket launch competitions may be organized for young people to experience the excitement of launch and to have fun. However, such activities that do not progress beyond excitement and fun would not last too long in view of, among other things, numerous distractions that surround them, to have fun and excitement.

If the young people are properly guided by skilled and informed instructors or educators, the activities with the use of water rockets could stimulate their intellectual, scientific curiosity and cultivate their challenging spirit to pursue excellence through trials and errors. SEA WG may wish to consider ways and means to increase the pool of such instructors and educators and to provide them with proper support to further promote water rocket activities to enhance education for the young people in the region.

PROPOSED ACTION 1: Organizing the international water rocket workshop

Building upon the success of the leaders session, organized during the Second APRSAF Water Rocket Event, and taking advantage of the potential usefulness of the network established among the interested educators and space experts who attended the session, it is proposed that within the framework of APRSAF, an international workshop on teaching methods and materials for water rocket activities should be organised in 2008 to provide

opportunities for interested teachers and educators to exchange information and experiences on carrying out water rocket activities for educational purposes and to identify and jointly develop, if deemed appropriate, teaching materials.

Objectives

- i) To exchange “lessons learned” in promoting water rocket activities for educational purposes and to identify challenges;
- ii) To discuss and identify the common educational objectives of water rocket activities in the region of Asia and the Pacific;
- iii) To identify useful teaching materials for water rocket activities and discuss a possible systematic method for sharing those materials;
- iv) To discuss steps to be taken to establish a functional network of interested teachers and educator and experts of space-related fields to support each other by, among other things, sharing on a regular basis the teaching methods, teaching materials and any information and ideas considered useful for promoting water rocket activities for educational purposes.

Target participants

The Workshop should be open for participation by any interested teachers, educators, leaders of voluntary groups for young people and experts in the space-related fields that have experience in carrying out water rocket activities. It is highly desirable that the teachers and leaders who have participated in the APRSAF Water Rocket Events in the past years are encouraged to participate and contribute to the Workshop. Those teachers and educators who have contributed to Space Education Workshops or Space Camps organized by United Nations Educational, Scientific and Cultural Organization and hosted by developing countries, particularly to water rocket sessions, should also be encouraged to participate. The optimum number of participants would be between 40 and 50.

Programme elements

The programme of the proposed Workshop would include, but not limited to, the following elements:

- A. Presentations
 - i) Overview of the water rocket activities: origin and history
 - ii) Water rocket activities in Asia and the Pacific
 - APRSAF Water Rocket Events
 - Country reports on the evolution and status of water rocket activities
 - iii) Water rocket activities in other regions

- B. Discussion sessions
 - i) “Lessons learned” in promoting water rocket activities for educational purposes
 - ii) Teaching materials and teaching methods: how to share in a systematic manner
 - iii) Educational objectives of water rocket activities
 - iv) Possible establishment of a network of water rocket instructors and educators

- C. Demonstrations: hands-on session
 - Making and launching of water rockets

Suggested dates

It is suggested that the International Water Rocket Workshop be held by a few months before the next APRSAF Water Rocket Event in 2008.

Funding arrangements

The Space Education Center of JAXA could cover the cost of: i) sending a few instructors and lecturers from Japan; ii) providing sufficient sets of water rocket launchers, air pumps and nozzles for use during the hands-on session; iii) international air travels of a limited number of selected participants (Note: The maximum number would depend on whether there would be a host country and on the level of financial or in-kind support to be provided by the host country and any other interested countries and international organizations).

It is highly desirable that there would be a host country in Asia and the Pacific to provide rooms and board for the participants, conference facilities and equipment, local transportation for the participants for the participants and large-enough space for water rocket launch.

Language

The language used at the International Water Rocket Workshop would be English.

PROPOSED ACTION 2: Developing a multilingual leaflet on water rockets

Taking into account the Educator's Manual for Water Rockets and its accompanying DVD, developed by JAXA Space Education Center, and any other existing teaching materials and methods for water rocket activities, a leaflet containing the set of basic elements of water rocket activities, e.g. scientific principles, materials used to make water rockets and practical guide for launching water rockets, could be jointly developed by an international group of interested teachers and educators and could be translated into multiple languages for wider distribution among school children.

Objectives

- i) To develop learning materials for school children in various countries to understand in their own languages basics of water rocket activities, including the basic science behind them;
- ii) To facilitate the promotion of water rocket activities for educational purposes in various countries in the languages of those countries;
- iii) To initiate the process of jointly developing teaching and learning materials within the framework of APRSAF SEA WG.

Suggested methodology

It is suggested that during the above-proposed International Water Rocket Workshop, a small international group of voluntary members be formed to: i) identify a set of basic elements to be included in the leaflet; ii) identify the target ages of school children for the leaflet; iii) develop a work plan to prepare the draft of the leaflet; iv) identify best ways and means to have the leaflet translated into as many languages as possible.

It is also suggested that the findings and recommendations of the above international group be presented to the members of APRSAF SEA WG for endorsement and further action.

Potential for collaborations with other international organizations

Consideration could be given to seeking for collaborations with those international organizations that have expressed interest in water rocket activities for educational purposes,

such as UNESCO,² to develop the leaflet on water rockets and to make it available in various languages. Consideration could also be given to working with Study Group 6.10 of the International Academy of Astronautics (IAA), which is developing a multilingual dictionary of aerospace terminologies. Some members of SEA WG have joined that Study Group as the language coordinators.³

² The water rocket activities were introduced, for example, to some countries in Latin America, such as Colombia and Ecuador. In view of the need expressed by some of those countries to make teaching materials available in their language, i.e. Spanish, UNESCO and JAXA Space Education Center are collaborating to make the Educator's Manual for Water Rockets and its DVD available in Spanish by the end of 2008.

³ See annotation for agenda item 7 "Other matters", first paragraph, in document APRSAF/SEA-WG/2007/1.