

## Space education activities and local UNISEC establishment in Taiwan

*Taiwan/Asia*

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### Main Space education/research actors

In Taiwan, most of the educational space activities are carried on by four universities (National Cheng Kung University-NCKU, National Central University-NCU, National Taiwan University-NTU and National Tsing Hua University-NTHU) and by the National Space Organization (NSPO). NCKU and NCU are the most active universities in Taiwan for student space projects. Those two universities are envisaged as a baseline consortium for the UNISEC-Taiwan.

Some of those universities are currently involved in engineering and space researches through CubeSat, Micro-satellites, atmospheric balloons and satellite payload design. NSPO shares some of the data from its space missions (FORMOSAT series) with universities and have organized space summer camps for educational and outreach purposes to interested students.

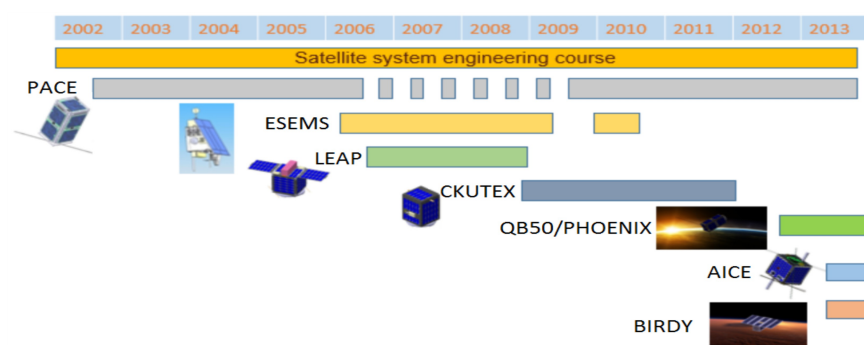
This extended abstract will focus on the NCKU main space activities as this university has the most diverse range of space education activities in Taiwan with a focus on the engineering field.

### Main Space education activities

The main space activities are related to satellites and atmospheric balloons. Most of the projects involve both, local and international students.

NCKU has been involved in satellites activities since 2002 and two of the satellites in which the university have been worked on have already been launched: ESEMS and PACE. The PACE (Platform for Attitude Control Experiment) is the first nanosatellite project of NCKU, it has been successfully designed and tested under the university responsibility and launched into space in June 2014. The ESEMS (Experimental Scientific Education Micro-Satellite), a Russian satellite mission involving NCU and NCKU have been launched in September 2009.

The LEAP (Low Frequency Earthquake Precursor) and CKUTEX micro-satellites have both been fully designed by NCKU and the latter one also fully integrated, tested and ready for launch.



*Illustration 1: NCKU satellite activities since 2002*

The AICE (Atmosphere-Ionosphere Coupling Explorer) satellite design has been presented at the 21<sup>st</sup> Satellite Design Contest in 2013 and received the Grand Prize.

Currently, NCKU is working on two CubeSats: PHOENIX and BIRDY.

The PHOENIX satellite is part of the QB50 mission, which is an international network of CubeSats for atmospheric studies. NCKU will deliver an operational CubeSat carrying a set of sensors provided by MSL (Mullard Space Laboratory) and home-made solar EUV sensors.

The BIRDY (Bleeping Interplanetary Radiation Determination Yo-yo) CubeSat, currently at the preliminary design stage, is a French-Taiwanese interplanetary CubeSat mission which aims to collect radiation data on the way to Mars and back to prepare the future manned Mars missions.

Moreover, NCKU has developed a low-cost high-altitude instrument experiment platform with sounding balloon, which has successfully flown several times. In the future, the low-cost sounding balloons which can carry instruments aloft can be applied in the development of various sophisticated micro-space scientific instruments and can capture ground images in larger scope to support disaster prevention.

And finally, recently one NCKU team composed of French, German and Taiwanese students has participated to the *Find An Asteroid 2014* search campaign organized by the Space Generation Advisory Council.

### **Potential collaboration areas**

The international collaboration in NCKU space activities are all encouraged.

For satellite collaboration, many good ideas already exist and the Satellite Design Contest and Mission Idea Contest are both events promoting new satellite missions/design proposed by students in which NCKU has been (and will keep going to be) involved. It would be interesting to encourage the proposition of new satellite missions/design by international student teams: one team = several universities. The shared experiences of the different teams could be merged and the projects might have more chances to go further in the design by sharing costs and knowledge.

The NCKU sounding balloons usually carry NCKU payloads. It may be possible in the future to carry payloads from others universities in the frame of international collaboration.

### **UNISEC-Taiwan activities**

UNISEC-Taiwan will help to organize outreach events (e.g. Yuri's night, World Space Week) and to allow a better collaboration between several laboratories from local and international universities in space student projects (satellites and sounding balloons) as well as a better interaction with the industry.

Local universities, organizations and industrial partners potentially interested in joining UNISEC-Taiwan activities have been identified. The promotion of UNISEC-Taiwan is foreseen in an annual local event gathering most of the Taiwanese space actors.

### **Conclusion**

International collaboration in satellites and sounding balloons are strongly encouraged. The experiences, costs and scientific results could be shared. Working together would allow more ambitious space projects. Thus, we encourage potential partners to contact us for further information.