



## ANDØYA SPACE CENTER

### G-CHASER

A large-scale space education rocket built by students from Norway and United States.



**The NASA Sounding Rockets Program (SRP) has been conducting research missions from various locations around the world since the early 1960's.**

Originally located at the Goddard Space Flight Center in Greenbelt Maryland, the SRP was moved to the Wallops Flight Facility campus in the early 1980's when Goddard and Wallops were merged. The Wallops Flight Facility is located on the Eastern Shore of Virginia and consists of three main geographical areas: the Main Base, Wallops Mainland, and Wallops Island. While the majority of engineering and manufacturing occurs on the Main Base facilities, the actual launch range is located on Wallops Island which is adjacent to the Atlantic Ocean and the Virginia Capes Warning Areas (VACAPES) which is where all launches take place.

Organizationally under NASA's Science Mission Directorate, Heliospheric Division, the SRP prides itself in providing researchers rapid low-cost access to the space environment. With a fully equipped machine shop and environmental test capabilities, the SRP can custom design experiment systems and platforms to meet the unique requirements of the scientists and researchers supported by the program. Using a variety of surplus military and commercial rocket motors and systems, the SRP is able to put these science instruments directly into the space environment for a fraction of the cost associated with orbital class science missions.

The low-cost high risk nature of the program allows missions to go from concept to launch in a matter of months versus years. The SRP currently maintains a fleet of 14 vehicle configurations. These

vehicles are designed to reach the lower portions of the Earth's atmosphere up to a maximum of 1 600 km on the largest 4-stage configuration with the goal of placing the science instruments directly into the region of interest to the researchers. Another hallmark of the program is to go where the science is most interesting. Whether it is northern Alaska or Norway to study the Aurora or to the Kwajalein Atoll in the South Pacific to study the equatorial ionosphere, the SRP takes missions all over the globe.

While still a relatively small program by typical NASA standards, the SRP supports many disciplines of scientific interest. Solar and Astrophysics researchers are supported with suborbital telescope missions typically launched from WSMR, New Mexico and in Australia for Southern Hemisphere targets.

Earth Science and Geospace Science missions are supported at locations all over the globe depending on the science of interest. To further mature technologies used in other applications such as planetary missions, the SRP can develop missions to test the new instruments or systems in real space flight applications before they are deployed on large orbital class missions. Another unique attribute of NASA's SRP is our support of educational outreach activities.

SRP currently supports two suborbital outreach missions annually with the ROCKSAT and ROCKSAT-X missions and we are proud to be a member of the G-Chaser international student mission.



**Colorado Space Grant Consortium (COSGC) is a state-wide organization and is part of a national program funded by NASA that was formed in 1988.**

Each state has its own Space Grant Consortium, and all together they support undergraduate and graduate students in over 900 higher education institutions across the country in areas of research, hands-on engineering, teaching, and public outreach.

COSGC consists of 20 higher education institutions and the Space Foundation in the state of Colorado. Through COSGC's hands-on programs, they engage over 500 post-secondary students state-wide each year, providing them with experiences that will aid them in their future academic courses and careers. COSGC students interact with engineers and scientists from NASA and aerospace companies to develop, test, and fly new space technologies and to support its outreach and teaching programs.

Projects include observatory and robotics projects, balloon and sounding rocket payloads, and orbiting satellite missions, in addition to aerospace-focused faculty and student research. Their "Gateway" courses expose students to the field of aerospace and space science. COSGC workshops enable educators and students from around the nation to start their own programs. Since 1989, COSGC students have completed numerous research projects, launched over 2,000 balloon satellites, 200 sounding rocket payloads, three low-Earth orbiting satellites and demonstrated over 100 ground-based autonomous robotic designs.

COSGC runs and manages the RockSat sounding rocket programs, including RockON!, RockSat-C, RockSat-X, and now RockSat-XN.

More information can be found at [spacegrant.colorado.edu](http://spacegrant.colorado.edu).



**Andøya Space Center (ASC), an ISO 9001:2008-certified company, was established in 1962.**

It is a service provider for sounding rocket, balloon and unmanned aircraft operations from Norway. ASC is also involved in remote sensing and owns and operates the Alomar Observatory.

The ASC headquarters is located on the island of Andøya, two degrees north of the Arctic Circle, in the heart of Northern Norway. As a corporation,

ASC is owned 90% by the Ministry of Trade, Industry and Fisheries and 10% by Kongsberg Defence. Including the two subsidiaries Andøya Test Center (ATC) and the Norwegian Center for Space Related Education (NAROM), ASC's customers and partners include ESA, NASA, JAXA, CNES, DLR, IAP, and Airbus, as well as a large number of universities and research institutions worldwide

ASC is proud to be one of the initiators of the Grand Challenge Initiative – CUSP project and its complimentary student rocket, the G-CHASER, and will strongly support them both.



**PennState**

**The Communications and Space Sciences Lab (CSSL) in the Electrical Engineering Department at Penn State was established in the early 1960s to explore the dynamics of the earth's atmospheric layers.**

Research groups in CSSL have been actively exploring the mesosphere and ionosphere ever since, using sounding rockets, radars and lidars. During that time, CSSL has collaborated with teams in the US and Europe to fly from Wallops Flight Facility (VA), Andøya (NO), Poker Flat (AK), Kwajalein (MI) and Churchill (CA), among others.

With the support of the PA Space Grant Consortium, Penn State developed a program of three student-built rockets, called SPIRIT, that launched in 2000, 2003 and 2006. These highly successful launches demonstrated that sounding rockets are an excellent pedagogical tool for training the next generation of space-related engineers and scientists. About 100 students participated in each of the missions. The third SPIRIT rocket was called ESPRIT and it boasted a collaboration of student teams at Penn State and three Norwegian universities (UiO, HiN and UiB).

ESPRIT was launched successfully from Andøya, NO in July of 2006. It was the inspiration for the G-Chaser student rocket. Penn State is proud to be a part of G-Chaser, where our role will be to develop a joint international student collaboration. Students from US and Europe will work together to learn atmospheric science, payload design and systems engineering. The payload instrument that we build will be result of a close collaborative effort of students and scientists on both sides of the Atlantic.

We are eager to begin!

[www.grandchallenge.no](http://www.grandchallenge.no)



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