Volanz Aerospace Inc. in cooperation with the

National Aeronautics and Space Administration (NASA)

Present the

National Student Sounding Rocket Program

Unique Opportunities for Educational Scientific Research

The National Student Sounding Rocket Program (formerly the Student Troposphere Sounding Rocket Program) (**NSSRP**™) was developed by Volanz Aerospace Inc. in cooperation with the National Aeronautics and Space Administration (NASA), as an educational outreach program for United States-based students[1] of all ages (1st Grade through College/University level), and is designed to foster interest in the areas of space science, technology, engineering, and mathematics. With the help of a teacher or mentor, one (or more) students create, design and build an experiment and submit a proposal for the opportunity to fly it on a Sounding Rocket launched from the NASA Wallops Flight Facility (WFF) in Virginia[2]. Experiments are qualified for the program through a flight certification process that includes an experiment proposal review. Proposals are accepted throughout the year, and experiments are typically launched twice a year. This document outlines the program, and the how to submit an educational proposal.

Sounding rockets are utilized to carry student experiments into the Troposphere. Although the overall time in the Troposphere is brief (typically less than 5 minutes from takeoff to landing), this is more than adequate to carry out successful scientific experiments.

Provides Unique Opportunities for Student Scientific Research

Under the guidance of educators, students will prepare a hypothesis, design the experiment, collect the materials, prepare the flight article and the control sample, and then analyze the results after the launch. Students will also develop hypotheses about the flight itself, which can then be compared to actual flight data that will be provided after the launch. Students can investigate the possible effects of the flight environment (including weather, acceleration/G-forces, flight time, temperature, time in microgravity, radiation, etc.) upon the sample, develop a pre-flight hypotheses, analyze the returned sample and flight data (comparing them to the control sample), and produce a final report and an optional presentation.

How much class time is needed? The amount of time will vary depending on how the educational organization uses the activity. At a minimum, we recommend 10 hours for flight preparation and post-flight analysis.

---

[1] You do not have to be a U.S. citizen or resident, but you must attend school in the U.S. Students must be sponsored by a teacher/mentor working at an educational institution or space-related organization.

[2] Experiments for Grades 1-5 may be launched from the NASA Goddard Space Flight Center in Greenbelt, MD.

What kind of experiments can you launch? Almost anything safe is permitted (see **Experiment Requirements**). Also, there is no requirement that the experiments be original. The most important thing is that the activity be part of a supervised educational experience that will stimulate student participation and interest. Student experiments that have been used in previous NASA programs include: seeds, molds, brine shrimp, soil, soap, popcorn kernels, solar radiation detectors, photographic film, magnets, accelerometers, florescent minerals, litmus paper, baker's yeast, hair, toothpaste, glue, cement, and insulation (in conjunction win one of the above materials).

Designing an Experiment

We recommend that all experiments compare a sample that will fly to a control sample that will be kept on the ground. The control sample must be identical to the flight experiment. After launch, students will compare the flight sample to the control sample to determine any effects experienced during space flight.

Sounding Rockets

We use low-cost reusable launch vehicles (RLVs) provided by Dragon Spaceflight. These RLV provide us with:

- Reliable, quick, and low cost access to the Earth's Troposphere (0 - 3 km)
- Consistent performance
- Up to 20 seconds of microgravity per flight
- Ability to fly numerous payloads on a single launch vehicle, and
- Ability to recover and re-fly scientific instruments and experiments.

Payload Experiment Module

The Payload Experiment Module (PEM) holds a single experiment. One or more PEMs are flown in a sounding rocket payload bay to an altitude ranging from .45 km (~1,500 feet) to 3 km (~10,000 feet) or higher.

Experiment Requirements

In order to qualify for a sounding rocket flight, an experiment must fit inside a single PEM container. The available container sizes are approximately:

- **For Grades 1 through 5:** 3.4 inches (8.6 cm) in diameter, by 2.8 inches (7.1 cm) in length. Maximum payload weight is 70.87 gr.
- **For Grades 6 through 12:** 4.1 inches (10.4 cm) in diameter, by 2.5 inches (6.4 cm) in length. Maximum payload weight is 99.23 gr.
- **For College/University Level:** 4.1 inches (10.4 cm) in diameter, by 3.1 inches (7.9 cm) in length. Maximum payload weight is 127.58 gr. If a larger size/weight is needed, contact the **NSSRP** Program for more information.

The containers are made of translucent plastic, and have a white plastic cap. Holes may be drilled in the container by the experimenter if needed. Each experimenter will be provided with four (4) PEM containers. Additional PEM containers are available for a small fee. If an experimenter wishes to provide their own container, it must not exceed the size of the largest size PEM container, and this must be stated in your application. In addition, experimenter-provided PEM containers must be made of plastic or other approved lightweight materials. Contact the **NSSRP** Program for more information.

The following types of items are not allowed in the PEM:

- Living creatures (Only exceptions are non-poisonous plants, seeds, and non-poisonous fungus)
- Any fluids (liquids), including flammables or combustible liquids
- Pressure vessels
- Hazardous chemicals, corrosives, reactive chemicals, or any chemicals that react with water
- Pyrotechnics, explosives, or blasting agents
- Radioactive sources

All experiments will be subjected to a safety review before being approved for flight.

A separate control sample, identical to the flight experiment, must be provided prior to receipt of the actual flight experiment. This control sample will be used as a ground control and will be subjected to pre-launch testing by the **NSSRP** Program. This control sample will not be returned, so it is essential that each group keep one (or more) control samples for their own use. If the experiment is so unique (or costly), that providing a control sample is not feasible, a partial or non-functional control sample may be provided, with the approval of the **NSSRP** Program Manager.

The following restrictions apply to all educational PEM flights:

- No electric connections are provided. Experimenters are responsible for providing their own electrical power (if needed).
- No telemetry monitoring capability is provided.

The following should be considered for all experiments:

- Is there an experiment activation mechanism? If so, how is the experiment activated (i.e. started)?
- Do you plan on using a timing function using a computer or PDA? If so, any required ground equipment must be described in your proposal. The equipment may have to be provided along with the experiment.
- Does your experiment include a G-switch?
- In the event the rocket is not launched, how is the experiment reset? The launch crew needs to be able to easily reset the payload, prior to any launch attempt.

Experiment Graphics

Each group will be responsible for developing graphics for the emblem to be mounted onto their PEM containers. The emblem with graphics design will be returned to the experiment group to apply to the experiment. The following are sample layouts for the vial's emblem:

QAS Science Team
Queen Anne School, MD
Spring 2005
Gamma Radiation Detection
NSSRP EXPERIMENT NO: ZAS-2005-05-001

University of Maryland
College Park, MD
Spring 2009
Acceleration Detection
NSSRP EXPERIMENT NO: ZAS-2009-05-009

Each emblem must be 2" (5.08cm) wide by 1" (2.54cm) high, and have the experiment's logo/name, organization/school name, and the experiment number at the bottom. The experiment number will be provided for each experiment.

Submission Dates

Educational proposals are accepted throughout the year, and are launched in the spring and fall. If you require a launch at a different time of the year, please contact the **NSSRP** Program Manager via email, at **nssrp@spaceflightamerica.org** before submitting a proposal. The program begins February 1, 2006 and ends on December 31, 2010.

Participation

All participants will receive a certificate of accomplishment signed by a representative of NASA. Educational Institutions will also receive a certificate of participation.

Attending Launches

Launches are usually held at the NASA Wallops Flight Facility (WFF), located in Virginia. As this is an official U.S. Government facility, visitors are not normally admitted. Under some circumstances, it may be possible for one (or more) student/teacher/mentor(s) to attend the launch of an approved scientific experiment. The attending student/teacher/mentor(s) must be a US citizen. All expenses are the responsibility of the student/teacher/mentor(s), and must be approved in advance by the **NSSRP** Program Manager **prior to flight**. There are **NO EXCEPTIONS** to this policy!

Educational Proposal Submission

You must submit your proposal electronically to the **NSSRP** Program via email to **nssrp-proposal@spaceflightamerica.org**, by providing the following information:

1. Experiment Name
2. Date of Submittal
3. Experimenter Organization Name
4. Organization Description (Please describe your educational organization. Include grade levels and the number of students enrolled.)
5. Experimenter Team Description (Describe the team who will actually be designing, constructing, and implementing the experiment. Include the number of individuals involved.)
6. Principal Contact (Faculty/Staff)
    a. Name:
    b. Full Mailing Address:
    c. Daytime Telephone Number:
    d. Evening (Alternate) Telephone Number:
    e. Email Address:
    f. Alternate Email Address:
7. Alternate Contact (What is the name of the individual to be contacted regarding the experiment in case the Principal contact cannot be reached? Provide the same information as in #6 above.)
8. Experiment Description (Describe the experiment. Is there a date by which this experiment must be completed?)
9. Experiment Purpose and Hypothesis (What are the expected results of the experiment? What is the potential scientific and/or educational value of the experiment?)
10. Is there any other information that will help us in rendering a decision?

Please include a title page indicating that this educational proposal is an application to the National Student Sounding Rocket Program.

The **NSSRP** Program will acknowledge receipt of your proposal, and will notify you of its status within 60 days of submission. Additional information may be requested in order to make a decision. Rejected proposals will be returned to the experimenter along with the basis for our decision.

Processing Fees

Accepted proposals from students in grades 1-5 are launched without charge. Accepted proposals from students in grades 6 through 12, will be charged a $25 USD processing fee for each approved proposal to partially defray the cost of providing the flight, and returning the experiment to the educational institution. Accepted proposals from students in Colleges and Universities will be charged a $50 USD processing fee for each approved proposal to partially defray the cost of providing the flight, and returning the experiment to the educational institution. There are no other fees involved in launching your experiment.

Once the experiment is accepted, and any fee is paid (if applicable), the experiment will be scheduled for launch. The sponsoring organization is responsible for arranging the shipment of the experiment and one of the control samples to the **NSSRP** Program Office. Shipping information will be sent to out to the Principal Contact listed on the Proposal Submission Form.

Experiment Results

Please provide a copy of all experiment results to the **NSSRP**™ Program Office (Volanz Aerospace, Inc.). Please email the results to **nssrp@spaceflightamerica.org**.

For More Information

If you have any additional questions, please contact the **NSSRP**™ Program office via email at **nssrp@spaceflightamerica.org**.

Program Sponsorship

The National Student Sounding Rocket Program (**NSSRP**™) is sponsored by:

Volanz Aerospace Inc.
1209 Sheridan Drive
Owings, MD 20736
Website: **www.volanzaerospace.com**
Website: **www.spaceflightamerica.org**

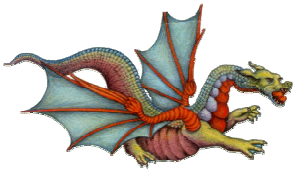
National Aeronautics and Space Administration (NASA)
Website: **www.spaceflightamerica.org**

We wish to thank the NASA Goddard Space Flight Center, Wallops Flight Facility (WFF), Range and Mission Management Office, for their assistance in making this program a success.

Corporate Sponsors

Optimal Solutions and Technologies, Inc.
1155 15th Street, NW
Suite 600
Washington, DC 20005
(202)466-8099
Website: **www.ostglobal.com**

Dragon Spaceflight
Website: **www.dragonspaceflight.com**



To become an NSSRP™ corporate sponsor, please contact the Program at nssrp-sponsor@spaceflightamerica.org.