



Formation of the National Near Space Alliance

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At the 2011 Academic High Altitude Conference held at Iowa State University, a meeting was held on the formation of a national chapter that would serve to promote, educate, and inform the general public in the areas of high altitude or near space activities such as high altitude ballooning. In addition, this organization is to act as an interfacing level for communicating and working with the Federal Aviation Administration and other relevant groups to ensure that these activities continue in a safe and productive manner. This paper will discuss on first why this type of organization is needed in the first place. It will then continue to outline what actions have currently been done to help lay the foundation for this organization. Finally, this paper will discuss what future items are in the works and how it hopes to interface with both the entities that it is here to serve as well as governing agencies such as the FAA.

Nomenclature

ATC = Air Traffic Control
FAA = Federal Aviation Administration
HAB = High Altitude Balloon
ISU = Iowa State University
NNSA = National Near Space Alliance
STEM = Science Technology Engineering and Math
ZP = Zero Pressure

I. Introduction

High altitude ballooning has been on the rise. In recent years the amount of high altitude ballooning groups, both in academia and outside of academia has been steadily increasing. There has also been a steady rise of the number of flights and HAB activities that have been occurring across the United States and across the world. Most of this has been due to the increased usage of HAB flights in the classroom both at higher education institutions and in K-12 classrooms. However there is also an increase of private groups and individuals that have been HAB flights as well. There is very good reason for this, HAB activities allow many groups to obtain near space conditions for a fraction of the cost it takes to send a space borne satellite. This enables education entities and even the general public access to space like conditions for less than \$500. While it is truly wonderful to see this very exciting activity reach so many people, concerns have been brought up on operating these flights in a safe and effective manner. In addition, more can be done to bring this activity to more organizations especially the education sector. Currently, there is no national organization that is representing this growing group. It is for these reasons that discussion was held at the 2nd Annual Academic High Altitude Conference on the establishment of this group. This paper will explore what has prompted the need to form this organization and what steps have been taken to begin the establishment of this organization which has been tentatively named the National Near Space Alliance.

II. Rational for the formation of a national organization

With the rise of near space activities such as HAB flights, more attention has been brought to both to groups that regularly fly these HAB flights and to the public on the safe practices of these flights. In addition, there has been an increase in requests from educators on how they can use this activity to promote STEM learning in the classroom. Many of also asked about how to work with the FAA and interaction between one FAA representative to another have varied greatly from group to group. This has caused confusion on interpretation of the FAR 101 rules that govern these types of flights. And finally as with any growing group there comes a need to be able to share ideas and information that better help those that wish to conduct these flights but also build a better community. It is with these items in mind that the national organization has established the following four core values.

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1. Promote safe operation of any near space activity and that all near space activities follow all FAA, local and state laws
2. Promote the usage of near space activities such as HAB flights to further education in both higher education and K-12 educational outlets
3. To establish and maintain a relationship with the FAA so that near space activities can continue to be accessible to all groups
4. To promote and encourage the sharing of information between all types of near space flights and to build a stronger community

These core values are the guiding principles on to which the organization will be founded on and will help define its mission and purpose to the communities it will serve.

A. Increase HAB activity

In Iowa alone we have had 3 additional HAB groups since 2011 that have begun actively launching high altitude balloons. Two of those have been working with K-12 schools and one is an amateur radio group. Nationally, we have seen an increase in the number of balloon groups that have launching high altitude balloons for both academic and personal reasons. Some of these groups may only do one or two flights while others have shown promise that they will be continuing HAB flights in the foreseeable future. The images below show this growth. The data was collected from HAB flights that were using amateur radio and reporting their position to the APRS network. As it can be seen below, there is a visible growth in the number of flights recorded.

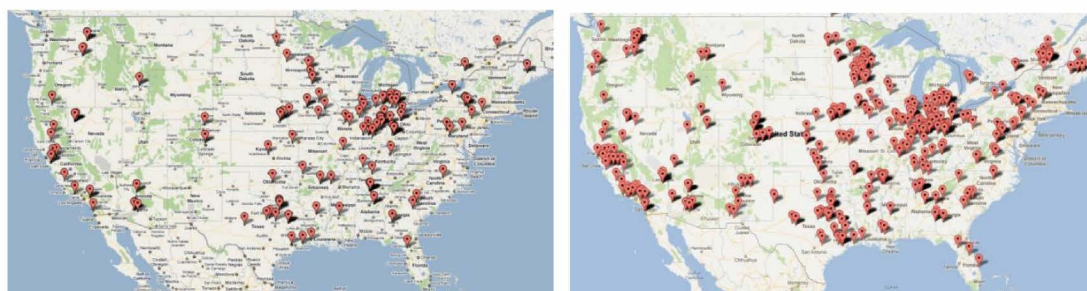


Figure 1 - The image on the left was taken on June 6th, 2011 of a Google map of HAB launches in the United States, the image on the right was taken on June 11th, 2012. -Source s3 Research¹

This map only represents HAB flights that use amateur radio. While a vast majority of HAB flights do use one or more amateur radio transmitters on their payloads, this does not mean all payloads use them. There is an increasing number of HAB flights that have used only 900 MHz transceivers or even satellite radios to communicate with their payload. Despite that, it is clear that this is a growing activity both in the academic sector and in the private sector.

B. Promote safe operation of any near space activity

While HAB flights are for the most part a safe activity, as with any activity there is always some inherent risk. HAB flights use pressurized gas which can be dangerous. HAB flights can pose a potential hazard to life and property if the proper precautions are not taken. And finally HAB flights can pose a risk to aircraft that are in the airspace as well. It is for these reasons we wish to promote safe operating procedures and that all FAA FAR 101 rules and regulations are followed. In addition, we want to promote that all groups follow all local and state laws as well.

Many members within our organization have years of experience on the safe operation of the equipment and to carry out these flights in a safe manner and in accordance with all laws. We will use these experiences to draft up a sample procedure list that groups can use as template for their procedures. In addition, we will encourage groups to file the proper paperwork with the FAA and give advice on how to contact their local FAA office and example notifications that can be sent to the FAA.



Figure 2 - Students at Iowa State University using procedures to setup a safe launch area.

C. Promote near space activities for STEM education

The NNSA began in academia and many of the founding members of this organization are in academia. For this reason this will be a strong core value for the organization. By promoting STEM education using near space activities we are also bringing in a new generation of scientists, engineers, and educators to near space activities and will help ensure that this type of activity continues on. Near space activities such as HAB flights is a fun and exciting learning experience that teaches students from a wide variety of ages on the core values of science, technology, engineering and math. The NNSA will do this by working with the National Space Grant Consortium and the local state grant consortiums to promote these activities in higher education. For K-12 the NNSA will also work with local space grant consortium and with local and national chapters for K-12 education.

D. Establish and maintain a relationship with the FAA

Virtually all near space activities and HAB in particular are regulated by the FAA. As a HAB flight is launched, it will travel through managed airspace which is managed by the FAA and shared with many other aircrafts. These rules and regulations were originally written over 35 years ago with only a few minor updates made to the rules. Since then several changes in technology and how the FAA handles certain information has changed. As more and more airports switch to the newer Mode S transponders how ATC towers track non-aircraft such as HAB flights have changed. Unfortunately, many of the rules have not kept up with these changes. One of the primary goals of our organization is to begin a dialog with the FAA on updating the rules.

In addition to updates to the rules that govern our flights, we also want to keep an open dialog with the FAA to promote better communication between HAB groups and the FAA. By keeping this open dialog it is hoped that groups will find it easier to notify the FAA on upcoming flights and to streamline the process for any waiver requests or additional information that groups may have.

E. Promote and encourage the sharing of information

While some organizations have been launching and flying high altitude balloons, some have only be flying for 2 or less years. Some organizations have accumulated over 150 flights while others may have 10 or less. It is for these reasons we wish to establish and encourage the sharing of information. Many groups can serve as a mentor to organizations that possess less experience with these near space activities. We also wish to encourage the sharing of data. This data can be valuable to new groups looking at trying new things or to researchers in both the academic and private sector. Collaboration is also very important in supporting growth within an organization. Collaboration can also help groups that may have less experience and can promote more ideas and research into near space activities. The NNSA will work with and plans to endorse a system that will help distribute data to our members and to encourage collaboration between members.

III. Current activities

As with any organization it takes time to establish what the organization is going to do and to get started. This year we focused on getting the name out and testing the waters to what others felt about such an organization. To do that we were invited to attend the National Space Grant Consortium meeting that was held in November of 2011. We also talked to amateur radio HAB enthusiasts at the 2011 Great Plains Super Launch, which yielded a positive response. Finally we have begun to get an internet presence so we communicate better with those interested in our organization.



A. National Space Grant Consortium

In November of 2011 Matthew Nelson was invited to attend the National Space Grant Consortium. The Iowa Space Grant Consortium agreed to sponsor Matthew for his trip to this conference. At the conference Matthew was given a 10 minute slot in order to talk about the NNSA and what the goals were. In addition, Matthew invited the National Space Grant Consortium to be involved with the NNSA since many of the space grants in the states conduct activities such as high altitude balloon launches on a regular basis. The presentation went very well and afterwards there was a lot of positive feedback encouraging the formation of this organization. The conference allowed for networking to other groups that have an interest in this type of organization and helped to spread the word about this new organization.

B. Establishment of the website

To help promote better communication a website has been setup and while it is in the early stages still does give our organization a presence on the web. AeroDyne Labs has donated web hosting space on their servers for the website. This website will allow us to communicate our ideals but will also allow for feedback from our members that the organization can use to carry out its core values.

IV. Next steps

This is only the beginning for the National Near Space Alliance. The feedback we have received from amateur radio groups, education groups and the National Space Grant Consortium has been very positive and encouraging for us to continue moving forward. We plan to continue growing awareness for our organization by visiting other organizations such as the American Institute of Aeronautics and Astronautics and also reaching out to the FAA. We plan to continue to communicate through our website information on safe operation of a HAB flight and to allow groups to share information. Furthermore we hope to take the legal actions needed to organize the group into a legal entity.

After the organization has been fully established as an entity, we will then work on how membership within our organization will work. This is still a lot of discussion that needs to take place, but we will work to make membership as open and fair to all.

V. Conclusion

As outlined in this paper, there is a need for a national organization to help to promote not only near space activities such as HAB flights but as promote using HAB flights for STEM activities and conducting these activities in a safe manner. To ensure that future generations are able to conduct these HAB flights, it is important that we focus on the safe operation of these flights and that we build a working relationship with the FAA that regulates the airspace that we fly. It is for this reason we are presenting this paper and presentation to continue this discussion so that we might build a strong organization that can continue to promote the core values outlined and further enhance near space activities.

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References

Electronic reference

¹"Balloon Flights Extracted from APRS-IS Stream" *S3 Research*.
<<http://www.s3research.com/flightdata/launchmap.htm>>