

# Taking Science On-air with Google+

## Dr Pamela Gay

Southern Illinois University Edwardsville /  
Astrosphere New Media Association  
pamela@starstryder.com

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## Summary

Cost has long been a deterrent when trying to stream live events to large audiences. While streaming providers like UStream have free options, they include advertising and typically limit broadcasts to those originating from a single location. In the autumn of 2011, Google premiered a new, free, video streaming tool — Hangouts on Air — as part of their Google+ social network. This platform allows up to ten different computers to stream live content to an unlimited audience, and automatically archives that content to YouTube. In this article we discuss best practices for using this technology to stream events over the internet.

## Background

Google Hangouts-on-Air (HoA) went into beta-testing in the autumn of 2011. Almost immediately, teams within the astronomy community received early access to this new way of streaming video, and began to find ways to use Google HoA to communicate science to the public innovatively. The Astronomy Cast podcast, the Planetary Society, the SETI Institute, and Universe Today were among early adopters, who together defined best practices in streaming academic seminars, hosting online star parties and using hangouts to conduct interviews. They were even used to provide special coverage of live events such as the landing of *Curiosity* and the transit of Venus in 2012. Their early efforts garnered audiences often numbering in the thousands, and caught the attention of Google executives, who highlighted the virtual star parties created by Fraser Cain and Pamela Gay during the 2012 Google I/O event. These efforts and Google's support helped to facilitate the rapid growth of a vibrant astronomy community on Google+.

HoA was released for general use as part of Google+ on 7 May 2012. With this expansion of the software, it became possible for anyone (and everyone) to stream

content live. This article seeks to disseminate the lessons learned by these early adopters. As with all pieces written about software undergoing active development, the reader is to be cautioned that specifics about the HoA software are liable to change without warning, causing various aspects of this article to become deprecated. In order to stay up to date, please refer to documents linked to <http://cosmoquest.org/Hangouts/>. Documents on that site include complete how-to guides, and guides to selecting the best equipment and software for streaming content.

## Creative applications

In its simplest form, Google HoA technology can be used to stream one person, or even ten people, talking directly via a web camera to an unlimited audience. While this can be effective for some topics, this technology can be stretched to encompass much more creative uses. Video-capture software like CamTwist and ManyCam allows sections of a screen to be captured and streamed into a HoA, while audio-capture software like Soundflower allows audio to be streamed into the hangout. Using these kinds of tools, creative HoA producers can capture and share the out-

put of cameras and other forms of sensors. For instance, it is possible to share the output of CCD cameras, and thus share live observing sessions.

Past hangouts for special events have included film screenings with accompanying panel discussions during Global Astronomy Month; providing live commentary to launches and landings that brought together individuals from multiple sites in combination with a stream from NASA TV; and even watching the transit of Venus from multiple locations with noticeably different viewing angles.

This kind of technology has the potential to enable science to be conducted in front of a live audience. With multi-site capabilities, it may be possible to measure asteroids in real time through carefully planned occultation observations. For educational purposes, it is possible to use this technology to study equinox shadows from different locations and watch eclipses pass across the planet. It is a technology that can break new ground in astronomy outreach and break down geographical restrictions. The only limitations on what you can do are those of imagination.

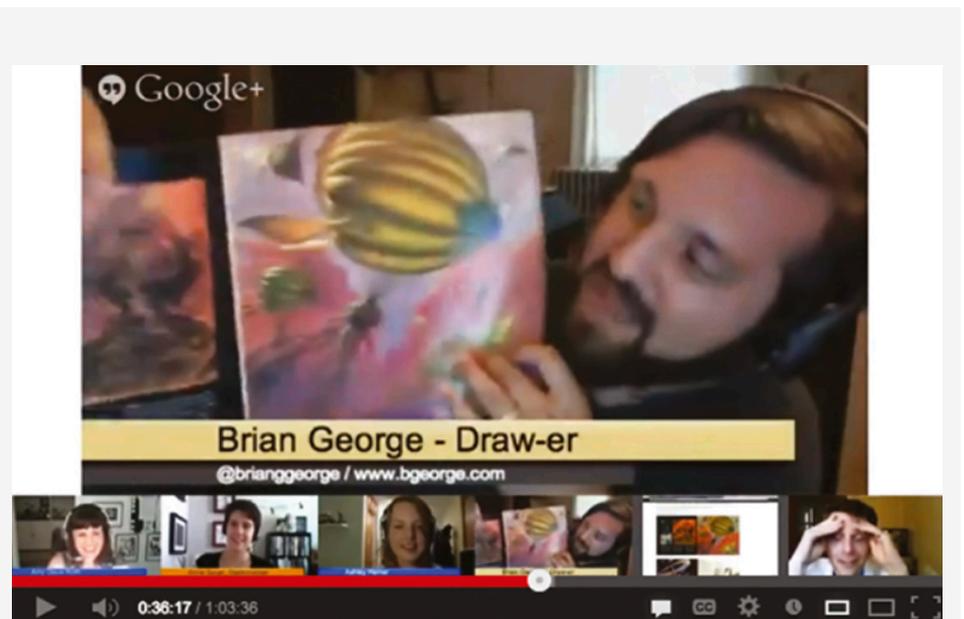
## Conclusion

The Google+ astronomy community is hungry for content, and most community members are eager to share the content of others and to support one another's efforts. When you are ready to dive in and start using Google+, don't be afraid to reach out to existing community members and ask for an introduction or some help. A variety of existing shows, such as CosmoQuest's Learning Space and The Cosmic Ray Show, invite guests to discuss their programmes. Joining an existing show may be a great way to dip your foot in the HoA waters.

You are invited to become part of this growing online community. From discussing astrophotography to discussing open science and even the issues within professional astronomy, Google+ has an audience for your astronomy programme, no matter what it may be.

### Biography

**Pamela L. Gay** is an astronomer, writer, and podcaster focused on using new media to engage people in science and technology. Through CosmoQuest.org, she works to engage people in both learning and doing science. Join her and CosmoQuest to map the Solar System in unprecedented detail through citizen science projects, and learn astronomy through media productions like Astronomy-Cast.org. Through this weekly podcast, she and co-host Fraser Cain take you on a facts-based journey through the cosmos, exploring not only what we know, but how we know it.



*Figure 1. In Learning Space Episode 22, the Mad Art Lab team discussed communicating astronomy through various artistic means and where they find inspiration. (<http://youtu.be/xL5pJRQA39w>)*

### Google+ terminology at a glance

**Circles:** Organising people into lists is *passé*. With Google+, people and products are placed in circles. When you share content, you can share it to: individuals, specific circles, all circles, or publicly.

**Communities:** Groups of people can gather around ideas and form either open (anyone can join) or invitation-only discussions. Content posted to communities can only be seen by community members.

**Hangouts:** People can chat via text or video using hangouts. Text discussions can include large circles, but video chats are limited to ten people. These discussions are private, and the chat histories are stored and are searchable from gmail.

**Events:** Similar to Facebook events, Google+ events allow you to invite people (individuals, circles, or the public) to real world or online events. Attendees can use the event page to share photos, videos and comments.