What's SLOOH With You?

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Abstract: What is SLOOH? It is the only internet provider of near-real-time deep sky observation. It observes the Moon, planets, galaxies, nebulae, clusters, comets, minor planets, and more. It was designed to serve individuals, families, and schools. It requires no astronomical knowledge to use, but it still appeals to experienced observers and has an obvious application in the planetarium field. That's SLOOH.

Disclaimer: Before I delve into the niceties of using SLOOH in the planetarium, I feel compelled to mention that I have an ongoing relationship with the company. I'll get to the nature of that relationship a bit later.

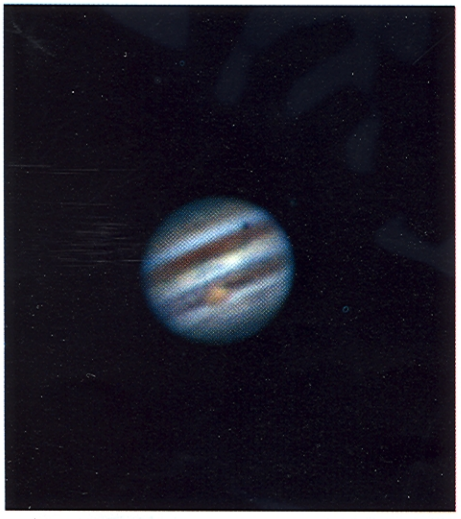
SLOOH: An Online Experience

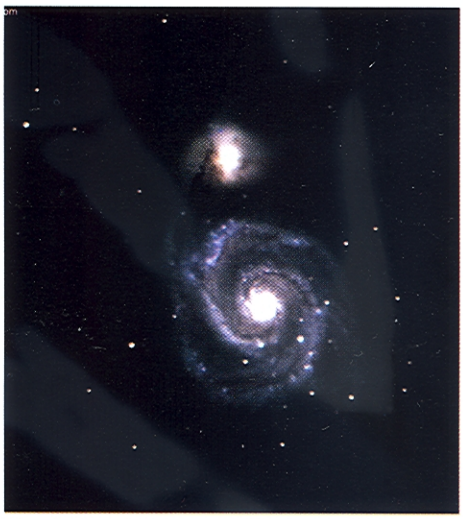
SLOOH, which gets its name from a play on the word "slew," currently operates two telescopes at the Observatory of Teide (OT) on the Canary Islands. The Canary Islands, a territory of Spain, are located in the Eastern Atlantic, 100 miles off the coast of Morocco. The island of Tenerife hosts a dormant volcano named Teide, the peak of which is the highest point on any island in the Atlantic Ocean. OT is located on a foothill of Teide and is run by the Institute of Astrophysics of the Canary Islands (IAC), a consortium of governments led by Spain. The OT comprises over 40 major telescopes and is Europe's leading observatory site. Numerous advanced astronomical research projects use data gathered at OT. At an altitude of 2340 meters, the site is photometrically clear approximately 90% of the time in the summer and 50% in the winter; seeing is usually better than 2 arc-seconds. The site also has the benefit of being dark 4 to 8 hours ahead of North America, timing that is ideal for planetariums here.

The fully robotic SLOOH Observatory is housed in two 10-foot diameter fiberglass domes. Each dome contains a Bisque Paramount ME mount, a Celestron C-14 SCT, and a piggybacked refractor. On each C-14 is a SBIG ST-10 CCD camera, and on each refractor is a SBIG ST-2000 ABG CCD camera. The piggybacking allows for concurrent observations of any object at different scales. Each of the four instruments includes an LRGB filter wheel and electronic focuser. In addition, there is an all-sky camera between the domes that provides nighttime views of the weather.

The observatory software performs automated image processing. SLOOH is the first and only system that automatically processes color deep-sky images in near real time. The image processor handles frame alignment, color combination, contrast adjustment, and other steps. The raw image data produced by the cameras is in FITS format. The image processing can produce FITS, but JPEG format is used to encode end-user-ready images that transmit quickly over bandwidth-limited connections.

The CCD chips used by SLOOH produce monochrome data. The first exposure produced in each mission is rendered as a grayscale image that is quickly transmitted to users. Then more images are gathered using color filters and a color image can be transmitted, followed by luminance images and more detailed color images. All the observatory control and image generation happens in real time within the span of each 5-minute mission. According to the folks at SLOOH, no other system in the world can do this.





Left: Jupiter and some of its moons; Above: The Pleiades in full color; and Right: The Whirlpool galaxy in high detail are examples of the image processing done with SLOOH. All images provided by author and courtesy of www.slooh.com.

And Internet Radio

Each night at 1:00 UT, SLOOH hosts one of several in-housed produced, astronomy-themed internet radio programs. An mp3-quality stream broadcasts from the astronomers to users. The astronomers, like David Levy, Phil Harrington and Bob Berman, describe the events of each mission and answer questions submitted in a dedicated online chat area. And here's where I come in: every Friday evening I co-host The Event Horizon with NASA/JPL Solar System Ambassador M. Scott Foerster. Unlike the other programs, our show is less formal and relies more on open debate than the images on SLOOH while also featuring a call-in segment using Skype.

The Cranbrook Planetarium recently upgraded to a Digistar 3 and adding content is incredibly simple. Rudimentary knowledge of Photoshop and a connection to the internet are really all that is needed to add dazzling, awe-inspiring content. In the early going, we decided to add an element of distinctiveness by employing SLOOH imagery in our live sky shows. So far we've used SLOOH in two particular modes. The first is to capture images from SLOOH ahead of time and simply "plug" them into the show later on. The second method, I think, is more interesting as it utilizes the live nature of SLOOH by scheduling "missions" that are viewed, in real-time, during each program. Each mission observes a specified target, like the Pleiades

At the beginning of each mission, the mount slews to the target. Then the cameras, focusers, and filter wheels are used to produce a sequence of images. By carefully scheduling missions ahead of time, our planetarium can augment each show with real-time images as they're being taken.

The SLOOH computer interface.

SLOOH in the Planetarium

You may wonder if this means that the entire world is subject to the whims of the staff at Cranbrook. That would be nice, wouldn't it? Sadly, it isn't so. Each night one of SLOOH's two domes is assigned to an "Editor Channel" and the other dome is assigned to a "Member Channel." On the "Editor Channel," SLOOH automatically schedules missions from dusk until dawn (typically over 100 missions per night). The missions are selected from a set of 250 popular astronomical objects in the database. The scheduling software basically follows a "Messier Marathon" strategy of observing progressively up from the western horizon after sunset, then progressively down towards the eastern horizon nearing dawn. On the "Member Channel," the user is able to block out time to view specific targets, either based on name or right angle/declination.

SLOOH is obviously not restricted for use by digital planetariums. In fact, any planetarium capable of connecting a PC to the internet and projecting onto their dome can make use of this resource. Additionally, you can save any of the images you take for use later! Is this a replacement for those stunning HST images that are so readily available? Hardly. But SLOOH does give live-sky shows an interesting new element and also gives the planetarium show producer a new resource for generating show content.

If interested, anyone can sign up for a free seven-day trial at www.slooh.com. ☆

*(**Taiwan**, continued from page 22)*

their information is just the first step of our work. Owing to the long disregard of astronomy science in Taiwan, the study of the planetarium is also very scanty. At the beginning of our research in 2000, most of the planetariums were isolated from others and only 31 of them were recorded (TAM 2001). Besides, the correlations among these planetariums were weak. We made a survey for the ignored planetariums and invited their staffs to a workshop at NMNS in 2002. Now we have 71 existing and 5 retired planetariums within our directory.

In our research we found that the human resource is the problem that bothers planetariums most. At the beginning of our research, almost all staffs of the planetariums, except the TAM, came from untrained teachers, technicians, and employees. Many of them can recognize only the Sun and the Moon before they came to their positions. Therefore, they are eager for participating in the training camps or workshops which may increase their knowledge about astronomy and help them learn how to teach.

Fortunately, the attendees of the workshop in 2002 have got a common consensus of the importance of the human resource. Many of recently established planetariums have assigned experienced teachers to follow the preparation works and to manage the planetariums. This is a positive progress in Taiwan's planetarium education.

There is still a lot of work that has to be done. In the future, we expect that there will be regular training camps and workshops held for the planetarium staffs so they may share their experiences and exchange their ideas with others.

Another important task is to reform the resource allotment. Some public, mid-sized planetariums are now under discussion in southern Taiwan. No matter where they will be located finally, this will make up for the shortage of public planetarium in that area. Although the number of planetariums in mid-Taiwan is increasing, it is still a long way before reaching maturity.

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