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LUNÁTICO ASTRONOMIA'S POCKET CLOUD WATCHER

THESKY IMAGING BUNDLE

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IIn his cover article Dr. James Dire reviews the TheSky Imaging Bundle. Shown in the astro image is M13 (NGC 6205) which is considered by many to be the best globular star cluster visible from mid-northern hemisphere latitudes. Also known as the Great Globular Cluster in Hercules, M13 is the brightest and largest of three such clusters in the constellation. M13 has a magnitude of 5.8. The cluster is 20 arcminutes in diameter which corresponds to ~160 light years at its distance of 25,000 light years. M13 is home to more than 100,000 stars. This image frames the cluster with galaxy NGC6207. The image was captured with an 8-inch f/8 Ritchey–Chrétien Cassegrain (with a Tele Vue 0.8x focal reducer/field flattener yielding f/6.4) using an SBIG ST-4000XCM CCD camera. The exposure was 60 minutes. Image capture was in 10-minute subframes using TheSkyX Professional Edition.

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LUNÁTICO ASTRONOMIA'S POCKET CLOUD WATCHER

THESKY IMAGING BUNDLE

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Industry News/New Products

ATT Contributing Writers

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James Dire has a M.S. degree in physics from the University of Central Florida and M.A. and Ph.D. degrees from The Johns Hopkins University, both in planetary science. He has been a professor of chemistry, physics and astronomy and an administrator at several colleges and universities. He has played a key role in several observatory projects including the Powell Observatory in Louisburg, KS, which houses a 30-inch (0.75-m) Newtonian; the Naval Academy observatory with an 8-inch (0.20-m) Alvin Clark refractor; and he built the Coast Guard Academy Astronomical Observatory in Stonington, CT, which houses a 20-inch (0.51-m) Ritchey Chrétien Cassegrain. Dire is a seasoned visual observer and veteran astro-imager.

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Stuart Parkerson has been the publisher of Astronomy Technology Today since its inception in 2006. While working primarily in the background of the company's magazine and website business operations, he has recently taken a more active role in contributing content covering industry news and other company centric topics

Mark Zaslove is a two-time Emmy Award winner and recipient of the coveted Humanitas Prize. Mark is a born-again astro noobie, who once had an Optical Craftsman scope as a kid, and is now recapturing his youthful enthusiasm (with a digital twist) and having a lovely time doing it.

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THESKY
IMAGING BUNDLE

By Dr. James R. Dire

TheSky Imaging Bundle is a complete set of software to meet the needs of any astroimager or telescope user. The bundle comes with TheSkyX Professional software, TPoint software and Cameras+ software. I'll cover each of these software packages here.

Software Bisque produces TheSkyX Imaging Bundle. Software Bisque also manufactures a complete line of high-quality telescope mounts. TheSky Imaging Bundle is included with a purchase of one of their mounts. But all of their software can be purchased separately to use with most any telescope system.

For this article I used version 10.5.0. The software is available for Windows, Macintosh and Linux operating systems. Previous versions were 32-bit, but the current version is 64-bit. The Windows version requires Windows 10 or 11. The Mac version will run on OS 10.13 or newer. The software recommends 16GB of RAM and 16GB of free hard drive space. I have been running it on Windows 10 with 8GB of RAM and have not encountered any problems.

Software Bisque released TheSky in 1992. Like other astronomy programs, it has evolved considerably since its initial release. The biggest changes to TheSky

Image 1 - The author downloaded and printed out TheSky User Guide. It is very comprehensive. Printing it double-sided, it filled up two three-inch binders.

came in Version 10 released around 2015. The software was completely rebuilt with extraordinary features. With this change the software was renamed TheSkyX.

The biggest difference between TheSky and other planetarium software is TheSky is a comprehensive observatory control system. Beside digital sky charts,

the software can control telescopes mounts, cameras (still, video and guiders), focusers, and even domes or roll-off-roof enclosures. Many of these features require the professional version plus add-ons, which are contained in the TheSky Imaging Bundle.
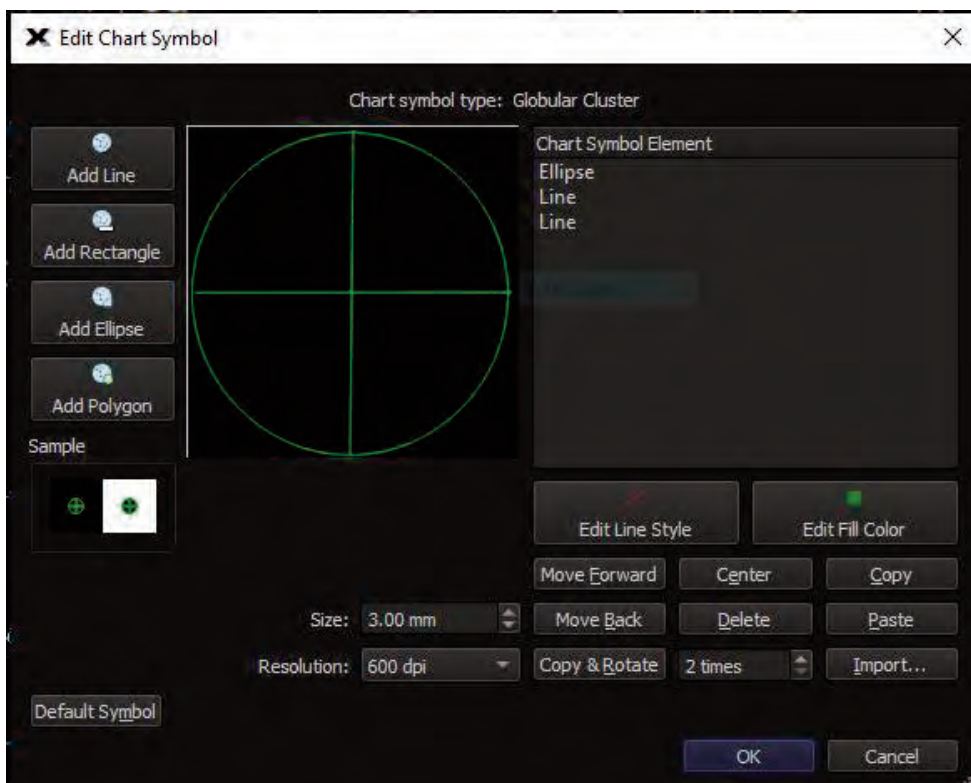
The software license for TheSky Im-

Image 2 - TheSkyX has a symbol editor allowing custom symbols to be created for myriad celestial object types for the planetarium display window.

Image 3 - This view of TheSkyX shows how the Find window was used to center M31, the Andomeda Galaxy, in the planetarium window.

aging Bundle can be purchased with a one-time payment with the option of an annual subscription to get upgrades to all the new builds. New builds are useful as new equipment enters the market and is added to the software for control (e.g. new imaging cameras, mounts and fo-

cusers).

TheSkyX has an excellent user guide describing everything the software can do in detail. The user guide can be downloaded in a PDF file from their website. The version I downloaded for this review was 854 pages long. I printed it out dou-

ble sided and it filled two three-inch, three-ringed binders (**Image 1**).

The software has many customizable display features. The software screenshots in the images contained on these pages is how I have configured it to look on my screen. The software has a built-in editor for symbols that appear on the sky chart. The software's default symbols are different than what appear on traditional star atlases like Sky Atlas 2000, Norton's Star Atlas, or the Millennium Star Atlas. So I used the symbol editor (**Image 2**) to make the symbols for open clusters, globular cluster, galaxies, and planetary nebulae look the same as on my paper star atlases.

Image 3 shows the screen that appears after doing a search for the Andromeda Galaxy (M31 or NGC224) and centering the galaxy. Note the six tabs on the left side of the screen. I have placed these tabs in those positions in that order. They are called Find, Telescope, Camera, Date and Time, Autoguider and Focuser. These are quick links to those functions. They could also be found under the Display menu at the top.

All the tabs that could be positioned on the left are found in the Display menu. Those not appearing in Image 3 are Chart Elements, Chart Status, Labels, Observing List, Photos, Tours, Dome, Filter Wheel, Power Controller, Rotator and Video (camera). For me, I am just using a camera, autoguider, focuser and telescope. I don't display tabs for equipment I am not using to minimize clutter on the screen.

Note Image 3 has a 40° wide field of view on the chart. **Image 4** is zoomed to a five-degree field of view. Now a depiction of M31 as it appears in the sky is shown. I have set the field of view indicator, the big purple rectangle, to show the field that would be seen on my SBIG ST-2000XCM CCD camera using a 0.8x
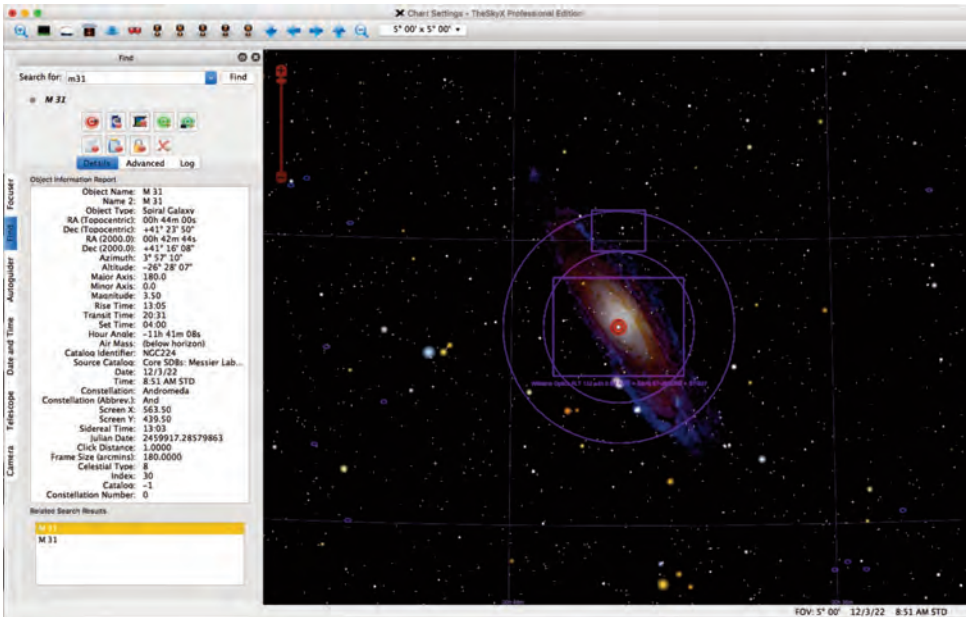
Image 4 - The Macinstosh version of TheSkyX has a slightly different view, but is identical in functionality. This view zooms in on M31 were the field of view indicator has been turned on for a dual chip ST-2000XCM CCD camera using a 0.8x focal reducer/field flattener for a William Optics 132mm f/7 Telescope.
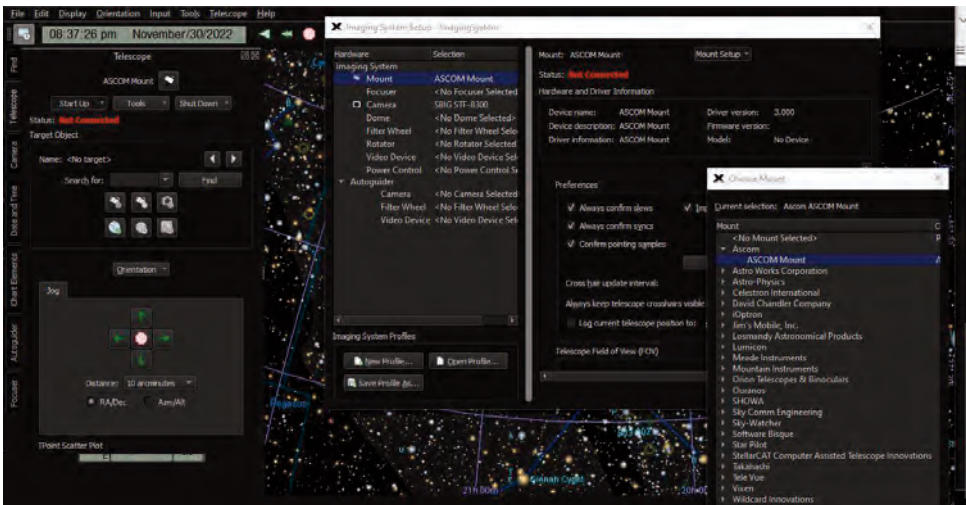

Image 5 - This view shows how to select a specific telescope type to control with TheSkyX.

focal reducer/field flattener if attached to a William Optics 132mm f/7 Apo. The smaller purple rectangle shows the field of view that would be on the ST-2000's built-in guide chip if it were oriented north of the imaging chip. This field of view can be rotated to match the camera's orientation on the telescope.

Field of view indicators can be selected for an abundant number of cameras and telescopes, or the user can make custom field of views. They can also be created for eyepiece-telescope combinations selected from a large list of commercial eyepieces and telescopes in the software, or by creating custom ones knowing the eyepiece focal length, field of view, the telescope aperture and the telescope focal length.

TheSkyX has tens of millions of celestial objects in its database and the ability to import more. An object can be found by typing the name of an object in the Find menu or clicking on it in the planetarium window. Once a telescope is connected and aligned, the software will slew to the selected object.

Short of a perfect mount model (see TPoint discussion later in this article), TheSkyX has this nifty feature called a "closed loop slew". When selecting an object to image, the software will slew a telescope to where it thinks the object is, take an exposure with the connected camera, evaluate the image, and then move the telescope to perfectly center the selected object. For this to work, the Camera add on must be installed and the field of view for each pixel on the camera must be entered in a specific location within the program.

TheSkyX also contains a horizon editor. This is useful for users with obstructions in one or more directions to avoid slewing a telescope to look at buildings or trees. However, limits can be placed on telescopes without creating a horizon.

Image 5 displays the windows to select a telescope for TheSky to control. Under the Telescope tab, the dropdown menu "Start Up" allows one to select a telescope. This opens the larger window covering the sky chart. A dropdown menu there called "Mount Setup" opens the "Choose Mount" window. One can choose a mount by manufacturer and model.

Here I have chosen to connect TheSky to an ASCOM controlled mount. ASCOM is an astronomy hardware standard developed in 1998 that allows connectivity to any supported hardware device. ASCOM software must be installed on the same computer with hardware drivers for specific devices. Since ASCOM is free, this is a way to add hardware connectivity when new equip-
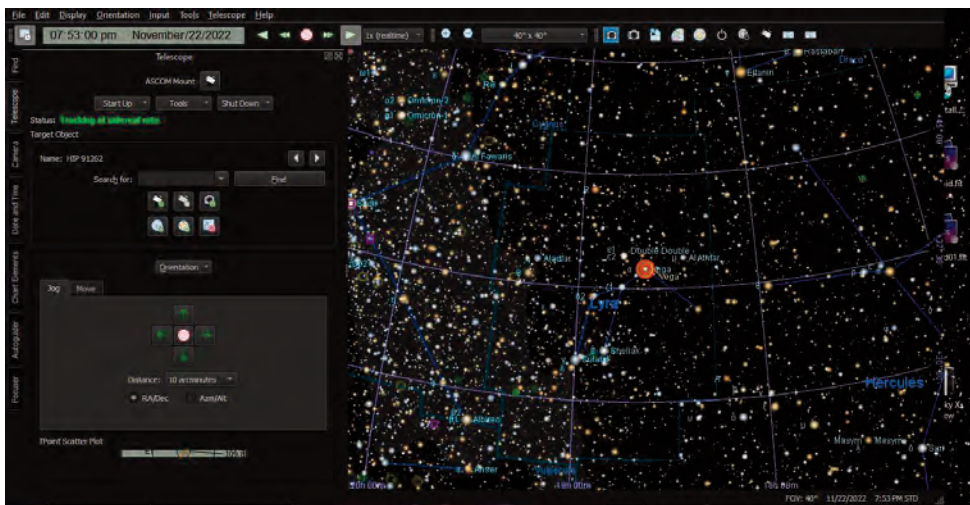
Image 6 - The telescope was polar aligned and set up with its hand controller before connecting it to TheSky. TheSky was then used to point the telescope to the star Vega.

Image 7 - Performing a mount model using the TPoint software requires finding at least six stars, centering them in the telescopes field of view, and adding each as a sample point in the software.

ment comes out rather than upgrading other software. TheSky works seamlessly with ASCOM and other astronomy software such as MaximDL.

In **Image 6**, the telescope display window indicates that the ASCOM telescope mount (in this case a 2006 model Orion Atlas mount) is connected and tracking at the sidereal rate. To accomplish this, I used the mount's hand controller to do a three-star alignment of the mount prior to connecting it to TheSky. The planetarium view in Image 6 indicates, by the orange and red bull's-eye, that the telescope in pointing at the star Vega (HIP91262).

The mounts that I connected to test the software were polar-aligned German equatorial mounts. To improve the accuracy of a mount to slew to and center objects, the TPoint add-on software can be employed. TPoint can produce a mount model with an unlimited number of reference stars for exact pointing of a telescope onto objects. This software can also check a telescope's polar alignment and help a user zero in on a perfect alignment.

As stated earlier, three stars were used to align the Orion Atlas using the mount's hand controller. I connected the mount to my laptop using a USB cable. When I connected the mount to the software, TheSky is in control of the telescope. To improve the GOTO accuracy
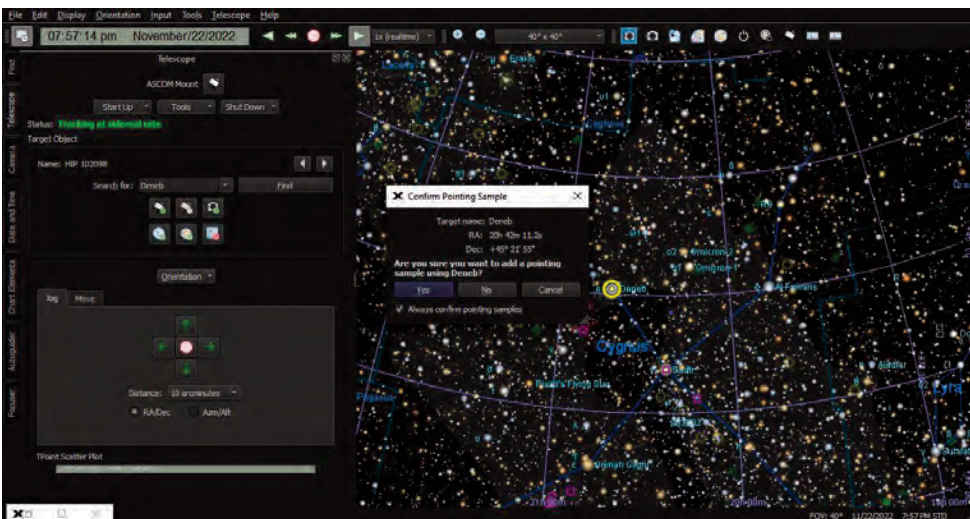
of TheSky, a minimum of six stars, spread around the sky, must be centered in the telescope and added to a TPoint model.

The first star I used for the TPoint model was Deneb. TheSkyX slewed the telescope to Deneb. I centered Deneb in the eyepiece (this could be done with a camera in TheSky instead of using an eyepiece). I then added the star to the mount model (**Image 7**). Notice the six small icons in the center of the Telescope control tab in Image 7. The center icon on the lower row is for adding stars to the mount model. Clicking that icon cause the software to prompt a pop up asking me to confirm adding Deneb to the mount model. I wouldn't recommend more than six stars for a portable telescope that is only going to be set up for one night. Six stars will get any object called for into the eyepiece.

For my eight-inch Ritchey-Cretien telescope atop a Paramount MyT German equatorial mount (made by Software Bisque) permanently set up in my Sky Shed Pod, I put 19 stars in a mount model. **Image 8** shows the TPoint window after completing the mount model. For a small telescope, ~20 stars should get any object near the center of the eyepiece or camera field of view no matter where it points to in the sky. This assumes the stars in the model are located all around the sky visible from the observatory.

For a large, long focal length telescope in a permanent observatory, some people will do a couple-of-hundred-star model. Fortunately, after six stars are added to the model, the software can take over automatically adding stars to the model if a camera is attached to the telescope and connected to TheSky.

The user may have to set limits on the region of sky the software would search for stars to add. And if the telescope is in a dome, the software would have to control the dome, too, in order to
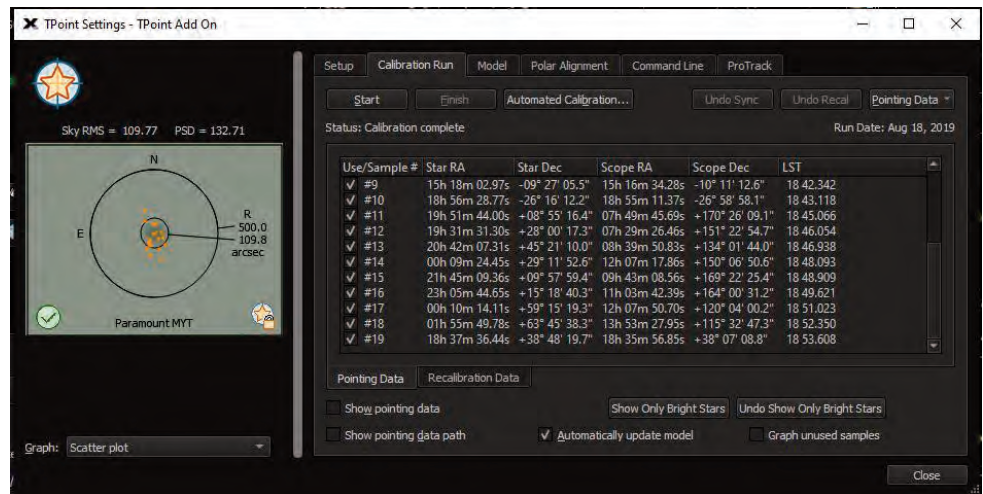

Image 8 - The TPoint mount model window showing 19 stars added to the mount model for a Paramont MyT German equatorial mount permanently located in the author's Sky Shed Pod observatory.
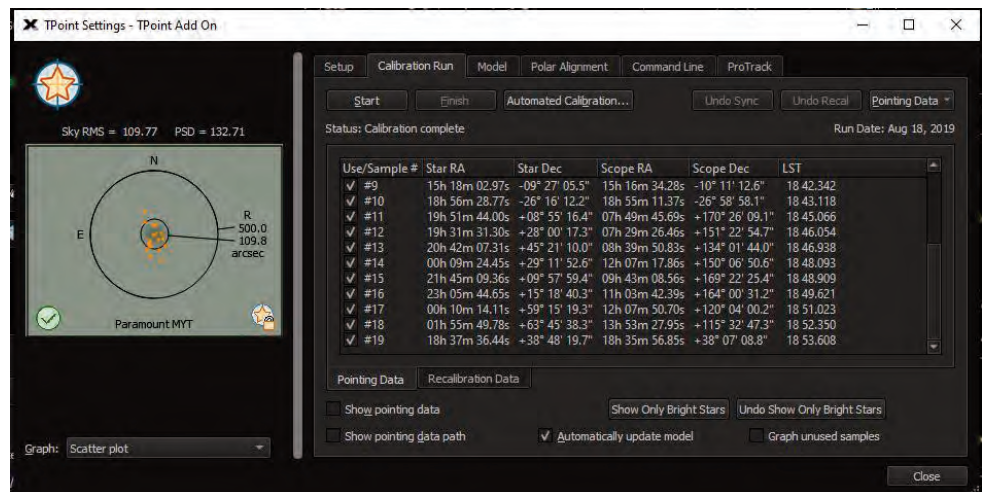

Image 9 - The camera control window after TheSky was connected to a SBIG STF-8300C CCD camera.

assure the telescope has clear view through the dome's shutter for every star it tries to identify. The scatter plot in the TPoint window in Image 8 provides an indication of how the telescope had to be slewed to exactly center each star used in the model after the initial slew to each.

The Camera+ software in TheSky Imaging bundle integrates with TheSky Professional to control a broad range of astronomical imaging devices including cameras, autoguiders, focusers, filter wheels, instrument rotators, remote power switches, and more. To test these

features, I connected a SBIG ST-8300C CCD camera to TheSky (**Image 9**). Although I only use single-shot color cameras, TheSky camera software can control any size filter wheel and allow series of images to be taken though each filter.

To connect the camera, I first had to attach it to the computer with a USB cable. Then I clicked on the camera icon at the top of the camera control window (Image 9) and chose the camera from a list of manufacturers (**Image 10**), similar to choosing the telescope mount in Image
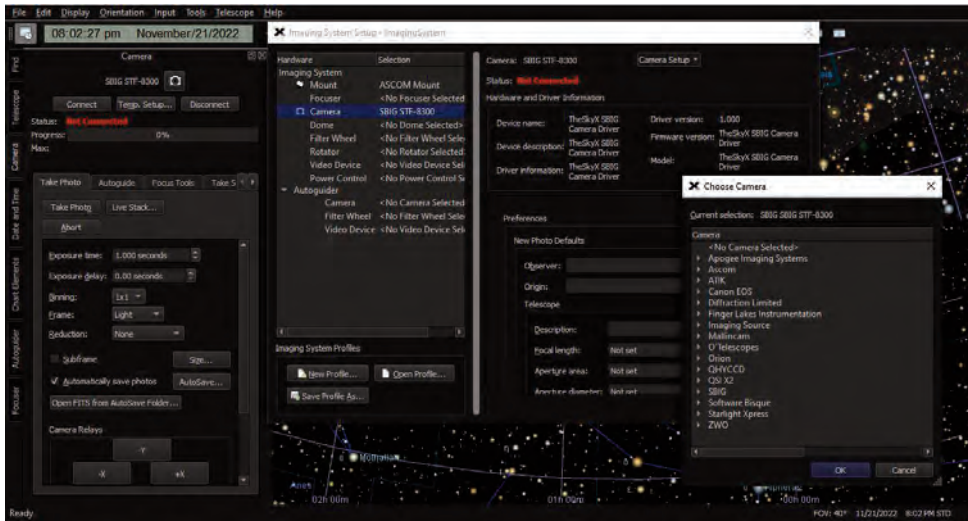
Image 10 - Setting up the imaging camera is similar to setting up the telescope mount, or any other piece of equipment attached to TheSky.
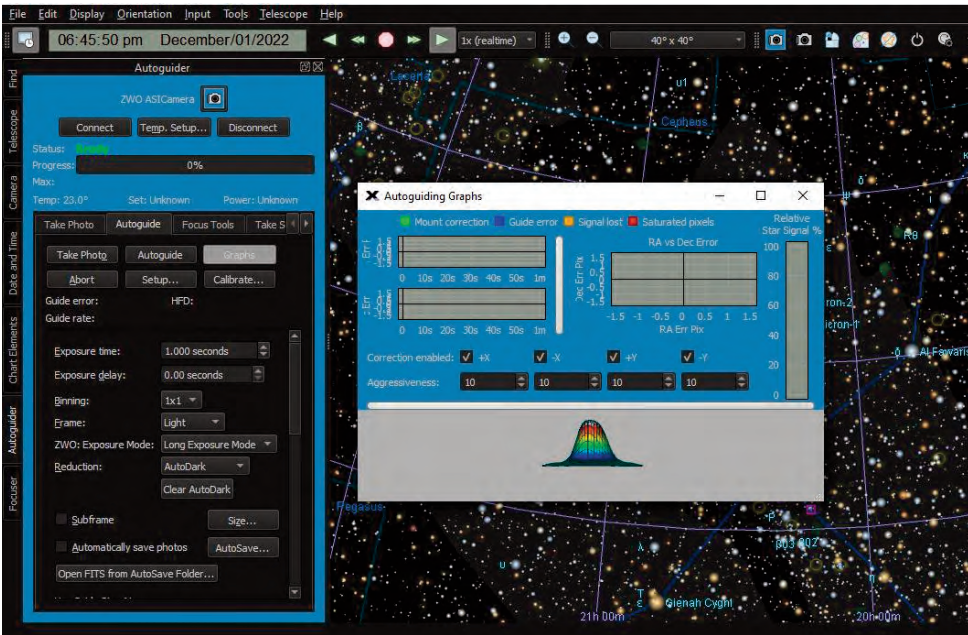

Image 11 - The Autoguider control and monitoring windows are displayed here.

the Autoguider tab opens the autoguider control window (**Image 11**).

An Autoguider camera is set up similar to an imaging camera. As can be seen in Image 11, I am using a ZWO ASI camera to autoguide. This camera has no temperature regulation, so the temperature reading displayed will always be the ambient temperature. As always, an autoguider needs to be calibrated for the mount and optical system. The software does this calibration by taking images, slewing the mount in all four cardinal directions, and seeing how much a bright star moves for the set slewing time periods. After calibrating, the autoguider camera can track and maintain a guide star in the center of the autoguider's field of view. The "Autoguiding Graphs" window can be turned on to keep track of the guiding errors. Images can also be saved from the autoguide camera, if desired.

In this article I have covered the most commonly used features of TheSky Imaging Bundle. But it does so much more. No review article can cover the plethora of features this software contains. As I said earlier, the manual contains more than 850 pages. Users of this software should first learn the basics as I have outlined here to get started on telescope control and astroimaging. Once these are mastered, studying the manual further will lead to a better understanding of all the other features, which may or may not be needed by every individual user.

I have been using TheSky since it was first released in 1992. I have been using various versions of this software for about ten years to control equipment in observatories. I do not do any long exposure CCD imaging without having this software control my equipment. I think it's the most amazing astronomy software package I have ever used. I am sure I will be using it the rest of my life! AT

5. Once the camera was connected, I could set the camera cooler temperature (here -5°C) from the "Temp. Setup" tab. The four tabs below the temperature data are Take Photo, Autoguider, Focus Tools, and Take Series.

Take Photo allows the camera to be configured for a single exposure light frame, dark frame, flat field frame or bias frame. The exposure and binning are set here, too. The "AutoSave" feature allows setting a folder and filename for each photo taken. The Take Series tab works similar to Take Photo tab except that multiple exposures can be set to occur in series. The Focus Tools essentially opens the focuser control window. This allows the software to control a motor focuser and use the camera to take a series of images to hone in on a perfect focus. Finally,

Image 12 - M13 or NGC 6205 is considered by many to be the best globular star cluster visible from mid-northern hemisphere latitudes. Also known as the Great Globular Cluster in Hercules, M13 is the brightest and largest of three such clusters in the constellation. M13 has a magnitude of 5.8. The cluster is 20 arcminutes in diameter which corresponds to ~160 light years at its distance of 25,000 light years. M13 is home to more than 100,000 stars. This image frames the cluster with galaxy NGC6207. The image was captured with an 8-inch f/8 Ritchey–Chrétien Cassegrain (with a Tele Vue 0.8x focal reducer/field flattener yielding f/6.4) using an SBIG ST-4000XCM CCD camera. The exposure was 60 minutes. Image capture was in 10-minute subframes using TheSkyX Professional Edition.