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Star Points for February 2012

“Navigating the Celestial Sphere”

by Curtis Roelle

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Travelers need a map when driving to unfamiliar destinations, whether they’re going to the other side of town or across the country. The map is a model of the real world and knowing how to navigate with one saves time. It’s no different when trying to locate a star cluster, nebula, galaxy, or planet in the sky. Using a star atlas to navigate the night sky to find a celestial object is a handy skill.

A key element all maps have is a system of coordinates for pinpointing locations. On an Earth globe, a system of latitude and longitude is used. Latitude measures a point’s distance north or south of the equator, which marks 0° latitude. Longitude measures the position east or west from the prime meridian, defined as 0° longitude.

Any point on Earth may be defined by a coordinate consisting of its latitude and longitude. This is the system used in globes, geographical atlases, and even road maps.

In astronomy a similar system is used. It helps to ignore the three-dimensional aspect of the universe by visualizing the sky in a simplified manner. Think of the night sky as nothing more than the inside of an immense sphere. On its inside surface is attached every star, planet, and everything else of interest.

Regardless of any object’s true distance, simply think of it as existing on the inside of the celestial sphere. If you’ve been to a planetarium before, you’re familiar with this simplification. There, all stars are projected onto the spherical surface of a dome even though the actual stars they represent are scattered at various distances in three-dimensional space.

Note the similarity between an Earth globe and the celestial sphere. Both are spherical surfaces. As on the globe, points on the celestial sphere can be represented using a coordinate system similar to latitude and longitude, but more about that later. First we need to identify some references useful in celestial navigation. You will need to use your imagination a little.

(Continued on page 3)

February Meeting: Wednesday, February 8, 2012, 7:30 p.m., at Bear Branch Nature Center

Speaker: Christian Ready will present “A Hubble Tour of the Universe.” See a description on page 5.

Star Points, *cont.*

First picture an Earth globe being inside of and at the center of the celestial sphere. Someone on the globe looking up sees the night sky and the stars on the inside of the sphere. In the meantime, Earth is rotating on its axis while the celestial sphere remains motionless. Imagine extending Earth's axis north and south until it intersects the celestial sphere. These points mark the north celestial pole and south celestial pole, respectively. Polaris, the North Star, is located near the north celestial pole.

Next, imagine extending Earth's equatorial plane outward until it also intersects the celestial sphere. The celestial sphere now has a band around its middle known as the celestial equator. We are almost ready to define our celestial coordinate system.

On the Earth, longitude is measured from the prime meridian. Is there anything similar to it like a celestial prime meridian? Yes, there is.

As Earth revolves around the Sun during the year, the Sun traces a path all around the sky. In the northern hemisphere's spring and summer seasons, the Sun is north of the celestial equator. On the first day of spring, known as the vernal equinox, the Sun crosses the celestial equator from south to north. That specific point on the celestial equator, called the "First Point of Ares," is similar to the prime meridian.

Celestial longitude is measured eastward from the First Point of Ares. However, instead of being measured in degrees, the celestial sphere is divided into 24 hours — 0 through 23 — with each hour subtending 15° in longitude. However, instead of degrees of longitude, astronomers refer to them as hours of "right ascension" or simply R.A. These hours are, in turn, divided into 60 minutes of R.A., and each minute into 60 seconds. So an object's R.A. is expressed in hours, minutes, and seconds.

Celestial latitude is measured in a way that's nearly identical to terrestrial latitude. It is measured in degrees — 0 through 90 — above (i.e., north) or below (i.e., south) of the celestial equator. Instead of latitude, astronomers refer to this measurement as "declination." Declinations north of the celestial equator are designated as positive, and south as negative. As in degrees of latitude, declination is expressed in degrees, minutes, and seconds.

If one knows an object's R.A. and declination, it can be looked up on a star map or atlas. The relative positions of the field stars on the chart can be used as guideposts for locating the object in the sky. For example Sirius, the brightest star in the night sky, has R.A. 6 hours 45 minutes 41 seconds, expressed as 6h 45m 41s. Sirius's declination is 16 degrees 43 minutes and 50 seconds, expressed $-16^\circ 43' 50''$.

There are many kinds of star maps on the market. The simplest form is the planisphere, sometimes called a "star wheel." Star atlases are an important reference used by amateur astronomers. There are also downloadable computer based planetarium programs, such as Stellarium, that are very good and easy to use.

Understanding the coordinate system used to plot celestial objects and having the ability to read a star map in order to use it to locate objects in the sky are valuable skills all serious amateur astronomers should have.

President's Message continued

In preparation for my goal of completing the Binocular Messier Program, I reviewed my existing observation logs and found them to be a bit on the lackluster side. Brian Eney had recently reminded me that the [WASI Group page \(Yahoo\)](#) has a robust collection of useful resources and that amongst these files is a good observational log (“G. Sauter Observation Log Sheet”). I took a moment to re-review the files we have made available to our members. I have to admit that I haven't been reviewing these pages as much as I should have. WASI has made available all kinds of handy resources on our [YAHOO page](#):

- Observatory ground breaking photos
- Laguna Star Party Log
- Observatory committee information
- WASI telescope inventories (**by the way, does anyone know who has our Edmund Scientific AstroScan?**)
- 24 Hours of Astronomy signup sheet
- G. Sauter Observation Log Sheet (in Excel format)
- Baltimore Sun article 6/24/2004
- Clear Sky Indicator
- ISS Transit of Jupiter image
- Ron's Messier Marathon PowerPoint program
- “Mars Previewer II”
- Carroll County Times article about UMBRAS
- Soldiers Delight directions map
- Telescope Buyers Workshop Flyer
- Thermal management in Newtonians (Alan Adler's Sky & Telescope article)
- Video observing form
- Flyer for General Club Info
- WAS 130 Marathon Analysis
- File to load the WAS 130 list into an Argo Navis DSC Computer
- Bylaws of WASI translated into English (**They were in another language?**)
- The Bylaws of WASI
- “Latest Version of a great little planning package. If you ever wanted to try your hand at designing a Newtonian, here is your chance.”

Whew! It may take me a year just to read all of that stuff!

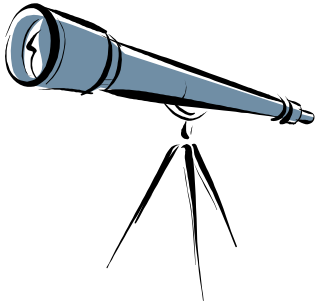
Now I have a “new & improved” log file (compared to what I have been using). I'm also going to take advantage of another, probably under-utilized resource that we all have available to us via the Westminster Astronomical Society webpage: [The Clear Sky Clock](#).

The Clear Sky Clock: “...*It's the astronomer's forecast. At a glance, it shows when it will be cloudy or clear for up to the next two days. It's a prediction of when Bear Branch Nature Center, MD, will have good weather for astronomical observing....*” The Clear Sky Clock is accessed from the WASI website by clicking on “Observing Notes” and then on “[Observing Conditions](#).” It provides information that is useful not only to current sky conditions, but also information that is needed in your observation log(s) — cloud cover, transparency, seeing, wind, humidity, and temperature. In case you aren't familiar with some of all of these terms, you can read more about them here:

<http://cleardarksky.com/c/BearBraMDkey.html>.

Will I manage to log and sketch accurately enough to earn myself at least one pin this year? I don't know. I hope I have enough resolve to live up to my resolutions. Tune in and see! Join me if you like. :)

Upcoming WASI Observing and Events



Monthly Meeting February 8,
7:30 p.m., at Bear Branch Nature Center (BBNC)

Soldiers Delight Public Stargazing February 11, 8 p.m., at
Soldiers Delight Natural Environment Area in Owings Mills

WASI Member Observing Weekend February 17 & 18, BBNC

Planetarium Show February 25, 7:30 p.m., at BBNC

FEBRUARY MEETING PROGRAM

Hubble's stunning images of our universe will be showcased in a tour, beginning in our solar system, then onto newly discovered solar systems. The births, lives, and deaths of stars, as well as colliding galaxies will be explored, looking all the way back toward the very edge of the final frontier. Your tour guide will be Christian Ready, a local astronomer who worked at the Space Telescope Science Institute in Baltimore and later at NASA's Goddard Spaceflight Center in Greenbelt, Maryland.

Welcome, New WASI Members!

WASI extends a warm welcome to the following new member.

Donald & James Bayne of Catonsville, Maryland
Roxanne Desai of Finksburg, Maryland

Message from Observing Chair/Second VP, Tom Lipka

Fellow **astronomers**: I would like to issue a quick note of thanks to all past and returning officers and appointees of WASI for their efforts on behalf of the club, and to the membership at large for electing me to the Observing Chair. I take the call very seriously and hope to bring fresh ideas and a different perspective to this arm of the club. Additionally, my platform, *per se*, for the upcoming term will be divulged in two parts. Here in part 1, I will discuss basic issues and suggestions, with a subsequent missive, part 2 (in March), that will flesh out details.

In that vein, I have given much thought regarding the *balance* of club activities. WASI at present consists of two equal but not equally utilized arms of activity: 1) outreach, and 2) intra-club activities, a.k.a. “observing”! In my view, club activities have become ***unintentionally*** skewed heavily in the area of outreach. As a consequence, there is little to *no emphasis on promoting actually doing astronomy!* Having said this, I must emphasize that outreach is a necessary and vital component of any healthy organization so conceived. How much more vital and necessary then are the actual reasons and motivations for coming together and forming a club in the first place? Should we not place equal emphasis on the common interest that unites us? In WASI’s case, that reason of course is the science of astronomy. But rather than suggesting that we reduce outreach (which I am not!), I would like to explore ways to challenge the membership to *increase* their personal involvement, participation and dedication to conducting astronomy. We must strive to reinvigorate this terribly atrophied arm of club activity so that we may bring it on a par with our much lauded and award-winning outreach arm!

By latest count, WASI touts nearly 100 members. However, in my short tenure with the club, I have rarely seen more than 15-20 people attend any given meeting and a subset of those tend to be visitors. What impression are we presenting to those visitors and potential members? Similarly, attendance is nil to negligible at club observing events. ***Where are the rest of you?*** WASI members have the luxury of the Yahoo Groups list. I strongly urge everyone to strive to make more use of it. Use it to inform other members of what you are doing or plan on doing, astronomically speaking. Solicit feedback or even complimentary observation. Then submit an informal report, synopsis, or note of your results either to me for the newsletter or on Yahoo Groups! Foster collaboration with other members in this endeavor. Submit sketches, descriptions, and pictures to the aforementioned media, if possible. In the case of a significant observation, consider submitting a short 5- to 10-minute talk at a future meeting, or a blurb to the newsletter through myself. These spark interest and motivation for others to follow.

We can do better! After all, astronomy unlike many other scientific disciplines affords anyone and everyone an opportunity to obtain quality instruments and good software that are within the affordability range of most amateurs in order to produce meaningful results. Couple these with access to an open and receptive professional community of astronomers, and one can easily see that astronomy truly is an equal-opportunity venture. In my own experience, the only other “high profile” science that comes to mind that permits one to conduct science avocationally and yet be regarded as an *important contributor* to the field is that of paleontology. It stands to reason then that a properly functioning club should naturally be the locus for regular, ongoing, and robust scientific interactions that transcend the monthly meeting, right up to the eyepiece!

Message from Tom Lipka, continued

Furthermore, I humbly submit that since WASI represents a microcosm of the astronomy community that our meetings should likewise strive to emulate a level of organization not unlike that of a typical (professional) conference, but without the imposing and intimidating formality of one!

Similarly, there is another underutilized resource that lies within the heart of WASI itself! That resource consists of the broad spectrum of knowledge and experience among the membership at large but especially among the senior membership, who can and should help to engender a more vibrant and robust (astronomical) club experience from beginners to advanced astronomers; and new members to emeriti! It needs to be harnessed! Tap into that knowledge base.

A couple years ago another member, whose name escapes me, coined the term "*in-reach*" when referring to this neglected other arm of club activity. I hereby adopt its use to refer to the observational side of WASI. Besides, what better demonstration of outreach can there be when visitors and non-members as well as members, encounter highly attended meetings where a passionate and motivated membership are actively engaged in interesting and informative discussions and giving presentations (resulting from membership in-reach) are the norm, and where presentations by guest speakers are *the sine qua non* of the evening, culminating in an anxious group who cannot wait to get to their scopes?

Therefore as *your* Observing Chair, I am stepping up to act as your in-reach coordinator with these express desires in mind — to improve our shared experience, to make better astronomers of us all, and to make the experience **enriching and FUN for everyone**, from beginner on up.

In the coming months I will be submitting various ideas and suggestions designed to hopefully revive our mutual passion for *doing and talking* astronomy. Here are some initial thoughts and ideas (my “platform,” *per se*) for the upcoming year for you, the assembled mind, to consider as a means of club in-reach:

- 1) Emphasize that astronomy is an observational science.
 - 1a) Integral to any science is the need to communicate your observations to the community.
- 2) Make monthly meetings more interesting and informative.
- 3) Discuss current and not-so-current events.
- 4) Foster Q&A sessions on any aspect of astronomy and related technology.

These and more will be discussed in greater detail in subsequent missives both via the MDA and through Yahoo Groups. At a *minimum* WASI should strive to resume Member Observing Events and build fellowship. More next month....



The Nerdiest Video Game Ever

by Dr. Tony Phillips

NASA has a job opening. Wanted: People of all ages to sort, stack, and catalogue terabytes of simulated data from a satellite that launches in 2015. Agile thumbs required. Sorting terabytes of data? It's more fun than it sounds.

In fact it's a game: Satellite Insight. The Space Place Team at the Jet Propulsion Laboratory created the entertaining app for iPhones to get the word out about GOES-R, an advanced Earth science satellite built by NOAA and NASA.

Described by the *Los Angeles Times* as possibly "the nerdiest game ever," Satellite Insight may be downloaded for free from Apple's app store. Be careful, though, once you start playing it's hard to stop. Some reviewers have likened it to Tetris, one of the most popular video games of all time.

GOES, short for "Geostationary Operational Environmental Satellite," is the workhorse spacecraft for weather forecasters. NOAA operates two (at a time) in geosynchronous orbit, one above the west coast of North America and one above the east coast. They monitor clouds, wind, rain, hurricanes, tornadoes, and even solar flares. The GOES program has been in action since 1975.

GOES-R is the next-generation satellite with advanced technologies far beyond those of the older GOES satellites. It has sensors for lightning detection, wildfire mapping, storm tracking, search and rescue, solar imaging, and more. Many of the sensors are trailblazers. For example, the Advanced Baseline Imager has 60 times the capability of the current imager — 16 channels instead of 5. It has twice the spatial resolution and five times the temporal refresh rate, including the 30-second imaging of weather systems over a region of 1000 km x 1000 km. Also, the Geostationary Lightning Mapper can count and pinpoint lightning bolts over the Americas 24/7. It's the first such detector to fly on a geosynchronous satellite, and it could lead to transformative advances in severe storm warning capability.

All in all, GOES-R represents a "huge technological leap from the current GOES." We know this because Satellite Insight tells us so. The app has an informative "Learn More" feature where players can find out about the satellite and the data they have been sorting.

Which brings us back to sorting data. It's a bit like eating Cheerios; just don't tell the kids it's nutritious, and they love it. Helping GOES-R gather and stash data from all those advanced sensors is just as satisfying, too — a dose of Earth science wrapped in thumb-flying fun.

(continued on next page)

More information about Satellite Insight may be found on the web at <http://itunes.apple.com/us/app/satellite-insight/id463588902?mt=8>. The game is also available in web form (flying thumbs optional) at spaceplace.nasa.gov/satellite-insight.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



This new iPhone game is the first NOAA app and only the second NASA game app. Just as with the real GOES-R, the challenge with Satellite Insight is to keep up with the massive influx of weather and other environmental data.