

## Delmarva Stargazers Meeting

August 3, 2010

Attendance: 18

The club President, Jerry Truitt, started the meeting at 7:01

Coming up in the September meeting:

- David Ekher (Editor in Chief of Astronomy Magazine) will speak over the 'net.
- A presentation on the Clear Sky Clock.
- Nasa Update.

October Meeting:

- Ed Reznac on the Nasa Hubble Telescope team. In person.

November Meeting:

- Gianluca Masi (Italian Astronomer) on the virtual telescopes. He started the Virtual Telescope Project using remotely controlled robotic telescopes.

December Meeting:

- James Webb space telescope people will talk to us by Skype.

Don's Presentation: Constellation Draco

- Windy constellations (as my idea of empty space) what's obvious is the asterism that forms Draco's

head. Almost like the Hercules's keystone and Hercules is about to pop it on the head with his club. Little dipper points away to the head.

- Interesting Astronomical Facts
  - Thuban,  $\alpha$  Dra, was the pole star about the time of the pyramids 4, 5,000 years ago.
  - Very large constellation but not bright. Quadrangle is half the size of the dipper's bowl.
- Mythology:
  - Pharaoh Khufu ruled Egypt about 2550 BC when Thuban was the pole star. There were two shafts in his pyramid, one pointing at Orion, the other to Thuban. Scholars thought they were air shafts 'til the new meaning was discovered.
  - Egyptians – Tawaret goddess of the northern sky a fierce and protective crocodile/human or portrayed as a lioness/hippopotamus.
  - Greek: It was Ladon the hundred headed drago that guarded the golden apples of Hesperides (of Hercules Labors) Hercules killed Ladon.
  - Greek: Atlas who held up the world tried to get Hercules to take his place. Atlas offered to get Hercules the golden apples in exchange for temporarily holding up the world. Atlas came back and thought he would let Hercules do his job. Hercules tricked the Titan Atlas by asking him to hold up the world for a minute while he put his lion skin on. Atlas agreed and Hercules ran away.
  - Greek – Draco represents the dragon/serpent killed by Cadmus (founder of Thebes) belonging to Aries.

For this crime Cadmus was turned in to the dragon/serpent and placed in the sky.

- Roman – Draco was a dragon killed by the goddess Minerva and tossed in the sky upon his defeat.
- Arabs interpreted it as the Mother of Camels.
- Christians of the Roman or Greek faith depicted Draco as the serpent that tempted Adam and Eve.
- Objects:
  - Cat's eye nebula NGC 6545
  - Several faint galaxies NGC 4236 (9.7m), 4125 (9.8m), 5866 (10m).
  - Dwarf galaxy low surface brightness (one of the faintest) – a satellite of the Milky Way Galaxy.

Doug Norton's presentation on Setting Circles:

- Right ascension similar to longitude. It is numbered in hours increasing to the east.
- Zero hours is called the First Point of Aries. Because of precession it currently runs through Pisces.
- The Right Ascension axis is usually is 24 hours with each hour being  $15^\circ$ .
- Tilt changes the earth so that equatorial coordinates change with the year of their observation.
- Declination – like latitude measured in degrees north is positive. Equator 0, north pole +90
- Fork mounts are a problem in the North part of the sky in the Northern Hemisphere.
- Scopes made for the northern hemisphere increase in a counter clockwise direction. South is opposite.

Some have the RA axis numbered in both directions.

- The tilt of the declination will be set to our latitude.
- On a German Equatorial mount (GEM) RA is on the polar axis.
- Some circles have a Vernier scale to estimate smaller angles. The ring sometimes slips so Doug put a set screw to keep the RA scale in place.
- All objects have RA and Dec positions. Eg M42 (5 hours 37minutes, and  $-5^{\circ} 23$  seconds)
- Doug uses the setting circles to get into the neighborhood and then uses charts to find the object.

Jerry Truitt: Presentation on the Kepler space telescope:

- Kepler is searching for exo-planets.
- Gas giants, hot super-earths, ice giants.
- The challenge is to find terrestrial planets in the habitable zones. One half to twice the size of earth.
- Johannes Kepler a German mathematician 1571-1630 (59 years) was an astronomer, astrologer. math teacher, assistant to Tycho Brahe (pronounced Teeko Brah in Danish, but he Latinized it to Tiekö). Did fundamental work in optics inventing an improved version of the refracting telescope: the Keplerian telescope which used a positive lens for the eyepiece (but the image is up side down – not a good terrestrial scope). Allows for considerably higher magnification – large f/ratio. It also allows for instruments at the focal plane like filar micrometers.

- Mission to survey and discover hundreds of Earth size planets to get statistical information on numbers and orbit size.
- HZ habitable zone is based on where it's possible to have liquid water. Also depends on star size and expected life time.
- Uses the transit method of finding planets. Must be proven to be a transit and not some star spot or other variable feature. The depth of the transit determines the size of the planet.
- Tycho Brahe's data on Mar's movements enabled Kepler to produce math models that worked.
- Kepler's laws of orbital motions were found by playing with numbers and Kepler never knew why they worked. Did work for the planets but not the moon-earth.
- Newton made this work with better math.  $M_1 + m_2 = A s^2 / p^3$
- Kepler's third law (**The ratio of the squares of the revolutionary periods for two planets is equal to the ratio of the cubes of their semimajor axes**) allows astronomers to find the mass of an object. Measure mass of the sun by measuring the orbits of the planets. Planet masses are measured by the moons.
- Mass of stars is usually done by modeling.
- Telescope - .95 m scope called a photometer continuously stares at the same field of view. Large field.
- 42 CCD's 50 X 23mm Read every three seconds. Images are intentionally defocused to 10 arc

seconds to improve photometric precision.

Integrated for 30 minutes.

- Sensitivity earth size transits to vis. Mag 12. 400nm to 850nm. 100,000 main sequence stars are watched continuously but the data is only downloaded once per month.
- Can't have the moon or sun cannot block the view so the galactic plane is a better view. Earth trailing heliocentric orbit.
- The mission has to detect the periodic transits – 4 orbits to determine that the planet is real. Has a proposed two year extension.
- Better light curves than terrestrial telescopes – very clean.
- Lets us put our own planet in perspective with lots of data points.
- Can detect planets within binary star systems. Looking for orbital periods for up to two years.
- Measure the stars at least once every few hours.
- Half the stars are expected to be binaries. 61 percent are expected to be dwarf stars and are excluded. Variable stars are excluded. FAGK.
- Thousands of variables have been found which will provide a lot of data for study.
- Has found 700 planet candidates. 7 have been independently confirmed.

David Short presentation: recent trip to the big island of Hawaii.

- This was primarily visual so no good notes.

- Pictures of the Mauna Kea site and telescope.
- Biggest safety hazard is falling ice.