



ASTRAL PROJECTIONS

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MARCH MEETING: "Swap Meet." ASTRA members brought in their astronomy items that they no longer use and wish to trade or sell. Some items were purchased.

Also Megan Vicidomini showed us her science project for chemistry about Jupiter and our Sun. It was a great project!

APRIL MEETING: Our next meeting is on 11 Apr and will be Terminology Guide II by Sam Micovic. He will talk about (1) the rapid accumulation of knowledge due to advanced space technology; (2) International Space Station; (3) history of astronomy blunders; and (4) Solar System.

Announcements

ASTRA DUES ARE PAST DUE: Membership application form is online. Members not paid up after this month will not receive the newsletter.

MEMBERSHIP IN THE ASTRONOMICAL LEAGUE is separate and requires an additional dues payment of **\$7.50**. The Astronomical League Membership Form was sent with the January Newsletter and is available online.

COYLE FIELD ASTRONOMERS CLUB: A message from John Endreson: Does anyone from ASTRA want to join the Coyle Field Astronomers club and needs help with logging onto the CFA website? Have you sent in your membership dues but haven't heard back yet and want to gain access to the observing field? I've volunteered to be the ASTRA administrator of the Coyle Field Astronomy club and will be able to get you logged onto the CFA website, help you download or provide you with the CFA's Bylaws, Membership Application form, and the Coyle Field R.O.U. "Rules of Use" forms. I will also be able to accept your signed membership forms and dues payment and issue you a temporary CFA field use license and gate combination while you wait for your membership to be processed. This will get you onto the field ASAP. Coyle Field Astronomers membership dues are \$30 per year. See John Endreson at the next meeting for more information.

What's up This Month?

JAKE'S BRANCH COUNTY PARK: Come join us under star filled skies to observe the Universe. Saturday, Apr 5, 2014, 8:00 PM - 10:00 PM. Location: Jakes Branch County Park, 1054 Sunset Rd., Beachwood, NJ 08722

NORTH EAST ASTRONOMY FORUM: America's Premiere Astronomy Expo – Saturday and Sunday, Apr 12-13, 2014 at Rockland Community College, Suffern, NY. Go to <http://www.rocklandastronomy.com/NEAF/Index.html> for more information

Check the online message board on the date of the star party for up to date information on these events.



Old Tool, New Use: GPS and the Terrestrial Reference Frame

By Alex H. Kasprak

Flying over 1300 kilometers above Earth, the Jason 2 satellite knows its distance from the ocean down to a matter of centimeters, allowing for the creation of detailed maps of the ocean's surface. This information is invaluable to oceanographers and climate scientists. By understanding the ocean's complex topography—its barely perceptible hills and troughs—these scientists can monitor the pace of sea level rise, unravel the intricacies of ocean currents, and project the effects of future climate change.

But these measurements would be useless if there were not some frame of reference to put them in context. A terrestrial reference frame, ratified by an international group of scientists, serves that purpose. "It's a lot like air," says JPL scientist Jan Weiss. "It's all around us and is vitally important, but people don't really think about it." Creating such a frame of reference is more of a challenge than you might think, though. No point on the surface of Earth is truly fixed.

To create a terrestrial reference frame, you need to know the distance between as many points as possible. Two methods help achieve that goal. Very-long baseline interferometry uses multiple radio antennas to monitor the signal from something very far away in space, like a quasar. The distance between the antennas can be calculated based on tiny changes in the time it takes the signal to reach them. Satellite laser ranging, the second method, bounces lasers off of satellites and measures the two-way travel time to calculate distance between ground stations.

Weiss and his colleagues would like to add a third method into the mix—GPS. At the moment, GPS measurements are used only to tie together the points created by very long baseline interferometry and satellite laser ranging together, not to directly calculate a terrestrial reference frame.

"There hasn't been a whole lot of serious effort to include GPS directly," says Weiss. His goal is to show that GPS can be used to create a terrestrial reference frame on its own. "The thing about GPS that's different from very-long baseline interferometry and satellite laser ranging is that you don't need complex and expensive infrastructure and can deploy many stations all around the world."

Feeding GPS data directly into the calculation of a terrestrial reference frame could lead to an even more accurate and cost effective way to reference points geospatially. This could be good news for missions like Jason 2. Slight errors in the terrestrial reference frame can create significant errors where precise measurements are required. GPS stations could prove to be a vital and untapped resource in the quest to create the most accurate terrestrial reference frame possible. "The thing about GPS," says Weiss, "is that you are just so data rich when compared to these other techniques."



Artist's interpretation of the Jason 2 satellite. To do its job properly, satellites like Jason 2 require as accurate a terrestrial reference frame as possible. Image courtesy: NASA/JPL-Caltech.

You can learn more about NASA's efforts to create an accurate terrestrial reference frame here: <http://space-geodesy.nasa.gov/>.

Kids can learn all about GPS by visiting <http://spaceplace.nasa.gov/gps> and watching a fun animation about finding pizza here: <http://spaceplace.nasa.gov/gps-pizza>.



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CELESTIAL EVENTS FOR APRIL

Mercury is visible in the dawn sky until mid-month. Venus is visible in the E in the dawn sky. Mars is in Virgo – rising early evening (at opposition on 8 Apr). Jupiter is in Gemini – in the western evening sky. Saturn is visible in Libra rising late evening (in retrograde motion). Highlights for the month:

- 4 Aldebaran 2° S of Moon
- 6 Jupiter 5° N of Moon
- 7 First Quarter Moon
- 8 Mars at opposition
- 12 Venus 0.7° N of Neptune
- 14 Mars 3° N of Moon
- 15 Spica 1.7° S of Moon
Full Moon – Total Eclipse
- 17 Saturn 0.4° N of Moon
- 22 Last Quarter Moon
- 25 Venus 4° S of Moon
- 29 New Moon

Credit: Observer's handbook



CLUB TELESCOPES: A.S.T.R.A. owns seven small telescopes:

- 6-inch Dobsonian (in need of repairs)
- 8-inch Dobsonian
- 80mm Celestron Refractor
- 120mm EQ AstroView Refractor.
- Lunt 35mm H-Alpha solar scope
- 8-inch Celestron NexStar 8i SE
- 60mm Meade EQ refractor

These telescopes are available for club members to borrow and use for a month or two at a time. Contact John Endreson at Telescope_Loan@astra-nj.org to borrow a telescope.

ASTRA-WEAR – Embroidered and/or Printed items with the ASTRA Logo

You can see some samples at ASTRA meetings. To order by mail: Shelter Cove Embroidery Co. 1333 Bay Ave Toms River, NJ 08753 call 732-506-7700 or E-mail astra-wear@estitches.com. Order form is on the ASTRA website.

ASTRA LIBRARY OF BOOKS AND DVDS: Many books and DVDs are available for loan from the ASTRA Library for a one month period. A list of these items is available on the ASTRA website. Request for these items must be made prior to our regular meeting and returned by the following meeting. Please e-mail your request for these items to our Librarian Barbara Novick at Library-Loan@astra-nj.org or call her at 732-840-3111.

ASTRONOMICAL ITEMS FOR SALE, OR HELP WANTED ADVERTISEMENTS: If you have an item to sell, or need help with an astronomical problem (a question, or telescope setup) contact the

President President@astra-nj.org to announce it at a meeting and send the advertisement to the newsletter (See Newsletter below).

ASTRONOMICAL LEAGUE MEMBER SOCIETY

Astronomical League National Headquarters, 9201 Ward Parkway; Suite 100, Kansas City, MO 64114, 1-816-333-7759 or www.astroleague.org

The REFLECTOR is published in March, June, September and December. If you do not receive your copy of the REFLECTOR magazine, contact Astronomical League Coordinator (Alcor) Ro Spedalieri (Treasurer@astra-nj.org)

EXECUTIVE BOARD

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NEWSLETTER: E-mail material (meeting reports, observing reports, or other items of interest) to Newsletter@astra-nj.org.

Check us out on Facebook, search groups for (ASTRA Astronomy) and look for our logo.



ASTRA

REMAINING SCHEDULE FOR 2014

Jake's Branch and other star parties not included
(Comments and Suggestions are Welcome)

- Apr 11* Terminology Guide II – Sam Micovic
- April 12/13 *Saturday/Sunday – North East Astronomy Forum*
- May 9* Astronomy on-line – Ryan Knipple
- May 10 *Saturday – Astronomy Day – Exhibits and Public Star Party at OCC*
- Jun 7 *Saturday – Summer Star Watch – Public star party at OCC. (Moon 2 days after 1st Qtr)*
- Jun 13* Mars – Megan Vicidomini
- Jul 11* Open
- Aug 8 No Meeting
- Aug 9 *Saturday – Perseid Picnic*
- Sep 6 *Saturday – Fall Star Watch – Public star party at OCC. (Moon 4 days after 1st Qtr)*
- Sep 12* Chemistry in the Universe – Matthew McCue
- Oct 10* Planetarium Show
- Nov 14* Solar Update – Bill Edelen
- Nov 29 *Saturday – Winter Star Watch – Public star party at OCC. (Moon 1st Qtr)*
- Dec 12* Awards, Open Meeting, Elections

* Regular Meeting