VOLUNTEERS WANTED:
HAS needs members to staff our club table at IfA annual public event
(see flyer below).
NO EXPERIENCE NECESSARY,
JUST DESIRE TO INTERACT WITH
KIDS AND FAMILIES.

Hawaiian Astronomical Society
P.O. Box 17671
Honolulu, HI 96817-0671

The Astronews
www.hawastsoc.org

Volume 62, Issue 4
April 2014

UNIVERSITY OF HAWAI‘I INSTITUTE FOR ASTRONOMY

ASTRONOMY OPEN HOUSE

Sunday, April 6, 2014
11:00 am – 4:00 pm
Activities for all ages
New discoveries
Displays & demonstrations
Robotics & LEGO
Hawaiian Astronomical Society
Maunakea Observatories
Bishop Museum
Pacific Aviation Museum
Open to the public. Free admission & parking.

Inside this issue:

President’s Message 1
NASA Space Place 4
Meteor Log 5
Observer’s Notebook 6
Calendar 8
Minutes 9
Star Parties 10
Treasurer’s Report 10

Inside this issue:

BRRISON (Balloon Rapid Response [for Comet ISON]) launch sequence,
Fall 2013. From bottom of the gondola up to the apex of the balloon
measures over 1000 feet – just longer than a Nimitz-class aircraft car-
ter. At altitude, the balloon expands to nearly the size of the Rose Bowl
stadium. See more on BRRISON on page 3. Credit: NASA/JHU/APL.

Volunteers wanted:
Has needs members to staff our club

table at IfA annual public event
(see flyer below).

No experience necessary,
just desire to interact with
kids and families.

Inside this issue:

- President’s Message
- NASA Space Place
- Meteor Log
- Observer’s Notebook
- Calendar
- Minutes
- Star Parties
- Treasurer’s Report

Inside this issue:

- President’s Message
- NASA Space Place
- Meteor Log
- Observer’s Notebook
- Calendar
- Minutes
- Star Parties
- Treasurer’s Report

Upcoming Events:

- The next meeting is 7:30 PM on Tues., Apr. 1 at the Bishop Museum.
- Bishop Museum’s next evening planetarium shows are every Saturday of the month at 8:00 p.m.
- The next Board Meeting is Sun., Mar 30 at 3:30 p.m. at the POST building at UH.
Up To The Minute:

**Editor's Note:**

There are no Minutes filed for last month’s club meeting, so what follows is an article on research by Gemini astronomer Chad Trujillo and Scott Sheppard of Carnegie Institute for Science. They discovered an Inner Oort cloud object in the distant reaches of the solar system. This is the first Inner Oort cloud object found since the discovery of Sedna about a decade ago. This discovery confirms that Sedna is not a unique object, but Sedna and 2012 VP113 are actually both members of the Inner Oort cloud, a solar system population that could outnumber the Kuiper Belt Objects.

**REDEFINING THE EDGE OF THE SOLAR SYSTEM**

The Solar System has a new most-distant family member. Scientists using ground based observatories have discovered a dwarf planet that is believed to have the most distant orbit found beyond the known edge of our solar system. Named 2012 VP113, the dwarf planet’s observations were obtained and analyzed with a grant from NASA. The detailed findings are published in the March 27 edition of Nature. This discovery adds the most distant address thus far to our solar system’s dynamic neighborhood map,” said Kelly Fast, discipline scientist for NASA’s Planetary Astronomy Program, Science Mission Directorate (SMD) at NASA Headquarters, Washington. “While the very existence of the inner Oort Cloud is only a working hypothesis, this finding could help answer how it may have formed.”

The observations and analysis were led and coordinated by Chadwick Trujillo of the Gemini Observatory in Hawaii and Scott Sheppard of the Carnegie Institution in Washington. They used the National Optical Astronomy Observatory’s 13-foot container: small juice box.

- Power source: battery made from a yellow sponge.
- Instruments: small plastic dish attached with a pick-up stick.
- Communication: Radio dish made with half a styrofoam ball, black construction paper, and a part of a pick-up stick.
- Orientation finder: star tracker made from a screw.
- Held together with: Scotch tape.

**NASA Kids:**

**Build Your Own Satellite**

**HAS Webmasters**

**Peter Besenbruch**

peter@besenbruch.info

**Harry Zisko**

harryz@pobox.com

**School Star Party Coordinator**

**John Gallagher**

gallagher002@hawaii.rr.com

**The Astronews Editor**

**Carolyn Kaichi**

c.kaichi2001@gmail.com

**Board Members at-Large**

**Otis A. Wikman**

otisann49@gmail.com

**Charles Rykken**

ejrykken@gmail.com

**Secretary**

**Gretchen West**

282-1892

gwest002@hawaii.rr.com

**Treasurer**

**April Lew**

734-2705

stardustlounge@hotmail.com

**President**

**Chris Peterson**

956-3131

chrisp@higp.hawaii.edu

**Vice-President**

**Peter Besenbruch**

peter@besenbruch.info

**Up To The Minute:**

**REDIFINING THE EDGE OF THE SOLAR SYSTEM**

**OUT OF THIS WORLD: A BALLOON BOON IN FRONT OF A BLUE MOON:** Although not technically a “blue moon” in astronomical terms, the BRRISON mission carried an 0.8 m telescope and optical and infrared sensors to study the comet ISON from above nearly all of Earth’s atmosphere. In addition to observing Comet ISON, scientists plan to have BRRISON observe many other targets during its flight. These include Comet Encke; moons and other satellites of Jupiter; the hydrated (water-bearing) asteroids 24 Themis and 130 Elektra; the star systems Castor and Mizar; and Earth’s moon. See more on BRRISON on page 3 and image on back cover.
Treasurer’s Report

HAS Financial Report for the month ending as of Mar. 15, 2014

<table>
<thead>
<tr>
<th></th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Balance:</strong></td>
<td>$3,585.12</td>
</tr>
<tr>
<td><strong>Income:</strong></td>
<td></td>
</tr>
<tr>
<td>Astronomy Payment</td>
<td>34.00</td>
</tr>
<tr>
<td>Dues Received</td>
<td>193.00</td>
</tr>
<tr>
<td><strong>Total Income:</strong></td>
<td>$227.00</td>
</tr>
<tr>
<td><strong>Expenses:</strong></td>
<td></td>
</tr>
<tr>
<td>Astronews</td>
<td>67.86</td>
</tr>
<tr>
<td>Equipment</td>
<td>60.00</td>
</tr>
<tr>
<td>S&amp;T Subscription</td>
<td>22.00</td>
</tr>
<tr>
<td><strong>Total Expenses:</strong></td>
<td>$194.81</td>
</tr>
<tr>
<td><strong>Final Balance</strong></td>
<td>$3,617.31</td>
</tr>
</tbody>
</table>

HAS welcomes new members Ted, Deborah, & Andrew Pierson, and Leighton Hasegawa, and thanks all members who renewed their membership this year. Also big mahalo to members Noel Villamil and Kayoko Calef for their donations last month.

A reminder to those whose membership expired at the end of last year. Please check your mailing label for your anniversary date.

---

NOTICE:

HAS will publish a complete listing of Club members in the June 2014 issue of the Astronews. This publication is required by Club by-laws, Article III, Section 2 Para C(e) and Article VIII, Section 1B. Unless notified otherwise, this list will include all member’s names, mailing addresses, and phone numbers. If you wish to have some or all of your data excluded, please notify the Club Treasurer, April Lew before May 15, 2014.

Please be advised that this listing is intended for Club members’ personal use only in contacting one another. It is not to be used for any commercial or solicitation purposes. With the exception of our membership in the Astronomical League, HAS does make this list available to, nor do we sell its contents to anyone for any purpose. Please respect our member’s right to privacy.

Member information is not to be republished, redistributed, or used for any commercial or solicitation purposes.

---

President’s Message

by Chris Peterson

I’m writing this from Houston after the conclusion of the 45th Lunar and Planetary Science Conference. As usual, this year’s meeting was filled with fascinating talks on the latest results of planetary science research. I’ll tell you just a little of what there was to hear.

On the weekend before the conference there is a Microsymposium on a selected topic. This year’s theme was “Scientific Destinations for Human Exploration” and featured talks by Jack Schmitt, Apollo 17 Lunar Module Pilot, and David Scott, Apollo 15 Commander. Schmitt was the only geologist to walk on the Moon, and he always brings unique insight into discussions about the samples he collected from the Moon’s surface and his observations from lunar orbit. Scott recounted some of his experiences as well as reporting on work he is involved with in conjunction with students who are exploring ways of improving on Apollo-era technology to return to the Moon.

Planetary Scientist Jim Head told the audience of his experience as a grad student and fresh Ph.D. scientist working on the training of the Apollo astronauts who were preparing to explore the Moon. Another speaker who joined us by remote audio hookup was Sergei Khrushchev, son of Nikita Khrushchev, the leader of the Soviet Union at the time of the race to the Moon. Sergei was involved with the Soviet effort and brought a unique perspective on the (then secret) competition to be first to land a human on the Moon. Alexander Basilevsky, a Soviet scientist at the time, provided a detailed look at the Soviet Union’s program of robotic missions to the Moon that were supposed to be precursors to human landings.

The conference itself consisted of oral and poster presentations covering the latest research on all classes of objects in the solar system. Many talks reported on the latest results from numerous spacecraft missions. Other talks reported on the results of analysis of samples of meteorites and lunar material returned by the Apollo crews. I’ll talk a little about some of the talks I attended at our April meeting.

---

Balloon-Bourne Observatories

by Rob Landis, NASA

Nearly four decades have passed since NASA has attempted observations of Solar System targets via balloon-borne platforms. Through the 1960s and early 1970s, the Stratoscope II and other telescopes lofted into the stratosphere made fundamental observations of the Moon, Venus, Mars, Jupiter, Io and Uranus. For a fraction of the cost of a spacecraft instrument along with the recent developments of improved pointing devices [to compensate for balloon and gondola motion], a balloon-borne platform offers a unique vantage point from which new compelling planetary science observations can be accomplished.

Observations at ~38 km (~125,000 feet) and higher are above 99% of the Earth’s atmosphere. In fact, the air mass stability at this science ‘float altitude’ is truly a space-like environment in which diffraction-limited performance can be achieved (sans adaptive optics) at visible wavelengths – better than many ground-based facilities which house much larger aperture telescopes. After flying which amounted to a technology demonstration (BRRISON Balloon Rapid Response [for Comet] ISON) last year with mixed results, NASA’s Planetary Science Division is assessing the value of a balloon-borne observatory.
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.”

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.

(Meteor Report continued from page 5)

It was nice to see some real science down with regards to meteor showers. I think this shows experiments may or may not find what they are looking for, but often something new and unexplored is seen. (below)
Last month I described the Phoenicids (PHO) meteor shower which peaked around April 16, 2014. The two showers in April are majorly affected by the Moon this month. The Lyrids (LYR) are reliable, albeit not abundant, but will be challenging to observe after midnight with a last quarter Moon in the way. Meteor shower specifications are found in the table below.

The annual gathering of solar system scientists occurred during the week of March 16, 2014. Chris Peterson and I attended the Lunar and Planetary Science Conference (LPSC) and listened in at the various talks. I was pleasantly surprised to hear several talks that discussed meteor showers, which is not a normal occurrence at this conference. The reason was that there was a special session on the latest mission to the moon involving the Lunar Atmosphere and Dust Environment Explorer (LADEE) mission. Now the stated mission objectives were to:

1) Determine the composition of the lunar atmosphere, investigate processes controlling distribution and variability – sources, sinks, and surface interactions.

2) Characterize the lunar exospheric dust environment, measure spatial and temporal variability, and influences on the lunar atmosphere.

Now, these goals don’t really scream out that meteor showers will be examined, however, the careful reader will notice that the lunar “atmosphere” also includes a dust component. As it turns out, impacts on the lunar surface from meteoroid streams encountered by the Moon were anticipated to produce enhancements to the lunar atmosphere and dust environment.

For fun, I tried to capture a few pictures of the results with my phone camera, which is tough in the darkened room. I tried to crop out the heads in front of me in this image that compares dust measurements over different time intervals – you can see some of the major meteor showers listed (Geminids, Quadrantids), and it’s interesting note that there was virtually no signal for the Leonids. I need to check, but this may confirm that the Leonids were weak this last year. (See images on pg. 9)
Observer's Notebook

Planets Close To the Moon
Times are Hawaii Standard Time

Apr 6, 11h, M 5.3° S of Jupiter
(85° from sun in evening sky)

Apr 14, 08h, M 3.4° S of Mars
(172° from sun in midnight sky)

Apr 16, 21h, M 1.2° W of Saturn
(155° from sun in morning sky)

Apr 24, 09h, M 4.8° NNW of Neptune
(45° from sun in morning sky)

Apr 25, 11h, M 4.1° NNW of Venus
(43° from sun in morning sky)

Apr 27, 00h, M 2.0° NNW of Uranus
(23° from sun in morning sky)

Mercury is closer than 15° from the sun when near the moon in April

Other Events of Interest

Apr 1, 21h, Uranus at conjunction with the sun (Passes into morning sky)

Apr 8, 11h, Mars at Opposition

Apr 11, 17h, Venus 0.66° NNW of Neptune (45° from sun in morning sky)

Apr 12, 19h, 4-Vesta at Opposition

Apr 14, 03h, Mars closest to earth - (0.618 a.u.)

Apr 14, 11h, 1-Ceres at Opposition

Apr 14, 21:44h, Moon Full (Total eclipse of Moon)

Apr 20, Easter Sunday (First Sunday after the first full moon after the Vernal equinox)

Apr 22, Lyrid Meteors

Apr 25, 17h, Mercury at superior conj. with sun (passes into evening sky)

Apr 28, 20:17h New Moon

Mercury finishes a rather poor apparition in the morning early in the month. Reaches superior conj. on April 25

Venus
Shines brightly in the morning sky, rising about two hours before the sun.

Mars
Reaches opposition on April 8. This opposition is a little below average with Mars having a magnitude of -1.5 and a disk diameter of 15°.

Jupiter
Is near the meridian at sunset and shines brightly in the SW evening sky.

Saturn
Rises in the mid-evening. It is best observed after midnight when it is high in the sky.

Uranus
Is lost in the glare of the sun in April.

Neptune
Is above Venus in the eastern sky before sunrise. It will be better placed for viewing later in the year.

Asteroid 4 Vesta
Reaches opposition on April 12 at a magnitude of about +5.8

Dwarf Planet 1 Ceres
Reaches opposition on April 14 at magnitude of about +7.0

The search for these distant inner Oort cloud objects beyond Sedna and 2012 VP113 should continue, as they could tell us a lot about how our solar system formed and evolved,” says Sheppard.
Other Events of Interest
Times are Hawaii Standard Time

- **Apr 1, 21h, Uranus at conjunction with the sun** (Passes into morning sky)
- **Apr 8, 11h, Mars at Opposition**
- **Apr 11, 17h, Venus 0.66° NNW of Neptune** (45° from sun in morning sky)
- **Apr 12, 19h, 4-Vesta at Opposition**
- **Apr 14, 03h, Mars closest to earth - (0.618 a.u.)**
- **Apr 14, 11h, 1-Ceres at Opposition**
- **Apr 14, 21:44h, Moon Full** (Total eclipse of Moon)
- **Apr 20, Easter Sunday** (First Sunday after the first full moon after the Vernal equinox)
- **Apr 22, Lyrid Meteors**
- **Apr 25, 17h, Mercury at superior conj. with sun (passes into evening sky)**
- **Apr 28, 20:17h New Moon**

**Mercury**
Mercury finishes a rather poor apparition in the morning early in the month. Reaches superior conj. on April 25

**Venus**
Shines brightly in the morning sky, rising about two hours before the sun.

**Mars**
Reaches opposition on April 8. This opposition is a little below average with Mars having a magnitude of -1.5 and a disk diameter of 15°.

**Jupiter**
Jupiter is near the meridian at sunset and rises brightly in the SW evening sky.

**Saturn**
Saturn rises in the mid-evening. It is best observed after midnight when it is high in the sky.

**Uranus**
Uranus is lost in the glare of the sun in April.

**Neptune**
Neptune is above Venus in the eastern sky before sunrise. It will be better placed for viewing later in the year.

**Asteroid 4 Vesta**
Reaches opposition on April 12 at a magnitude of about +5.8

**Dwarf Planet 1 Ceres**
Reaches opposition on April 14 at magnitude of about +7.0

---

For more details on the new dwarf planet, visit: [http://home.dtm.ciw.edu/users/sheppard/inner_oort_cloud/](http://home.dtm.ciw.edu/users/sheppard/inner_oort_cloud/)
Last month I described the Phoenicids (PHO) meteor shower which peaked around The two showers in April are majorly affected by the Moon this month. The Lyrids (LYR) are reliable, albeit not abundant, but will be challenging to observe after midnight with a last quarter Moon in the way. Meteor shower specifications are found in the table below.

The annual gathering of solar system scientists occurred during the week of March 16, 2014. Chris Peterson and I attended the Lunar and Planetary Science Conference (LPSC) and listened in at the various talks. I was pleasantly surprised to hear several talks that discussed meteor showers, which is not a normal occurrence at this conference. The reason was that there was a special session on the latest mission to the moon involving the Lunar Atmosphere and Dust Environment Explorer (LADEE) mission. Now the stated mission objectives were to:

1) Determine the composition of the lunar atmosphere, investigate processes controlling distribution and variability – sources, sinks, and surface interactions.
2) Characterize the lunar exospheric dust environment, measure spatial and temporal variability, and influences on the lunar atmosphere.

Now, these goals don’t really scream out that meteor showers will be examined, however, the careful reader will notice that the lunar “atmosphere” also includes a dust component. As it turns out, impacts on the lunar surface from meteoroid streams encountered by the Moon were anticipated to produce enhancements to the lunar atmosphere and dust environment.

For fun, I tried to capture a few pictures of the results with my phone camera, which is tough in the darkened room. I tried to crop out the heads in front of me in this image that compares dust measurements over different time intervals – you can see some of the major meteor showers listed (Geminids, Quadrantids), and it’s interesting note that there was virtually no signal for the Leonids. I need to check, but this may confirm that the Leonids were weak this last year. (See images on pg. 9)
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.”

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.

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.
### Treasurer’s Report

**HAS Financial Report for the month ending as of Mar. 15, 2014**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Balance</td>
<td>$3,585.12</td>
</tr>
<tr>
<td>Income:</td>
<td></td>
</tr>
<tr>
<td>Astronomy Payment</td>
<td>34.00</td>
</tr>
<tr>
<td>Dues Received</td>
<td>193.00</td>
</tr>
<tr>
<td><strong>Total Income:</strong></td>
<td><strong>$227.00</strong></td>
</tr>
<tr>
<td>Expenses:</td>
<td></td>
</tr>
<tr>
<td>Astronews</td>
<td>67.86</td>
</tr>
<tr>
<td>Equipment</td>
<td>60.00</td>
</tr>
<tr>
<td>S&amp;T Subscription</td>
<td>22.00</td>
</tr>
<tr>
<td><strong>Total Expenses:</strong></td>
<td><strong>$194.81</strong></td>
</tr>
<tr>
<td>Final Balance</td>
<td>$3,617.31</td>
</tr>
</tbody>
</table>

HAS welcomes new members **Ted, Deborah, & Andrew Pierson, and Leighton Hasegawa**, and thanks all members who renewed their membership this year. Also big mahalo to members **Noel Villamil and Kayoko Calef** for their donations last month.

A reminder to those whose membership expired at the end of last year. Check your mailing label for your anniversary date.

### President’s Message

I’m writing this from Houston after the conclusion of the 45th Lunar and Planetary Science Conference. As usual, this year’s meeting was filled with fascinating talks on the latest results of planetary science research. I’ll tell you just a little of what there was to hear.

On the weekend before the conference there is a Microsymposium on a selected topic. This year’s theme was “Scientific Destinations for Human Exploration” and featured talks by Jack Schmitt, Apollo 17 Lunar Module Pilot, and David Scott, Apollo 15 Commander. Schmitt was the only geologist to walk on the Moon, and he always brings unique insight into discussions about the samples he collected from the Moon’s surface and his observations from lunar orbit. Scott recounted some of his experiences as well as reporting on work he is involved with in conjunction with students who are exploring ways of improving Apollo-era technology to return to the Moon.

Planetary Scientist Jim Head told the audience of his experience as a grad student and fresh Ph.D. scientist working on the training of the Apollo astronauts who were preparing to explore the Moon. Another speaker who joined us by remote audio hookup was Sergei Khrushchev, son of Nikita Khrushchev, the leader of the Soviet Union at the time of the race to the Moon. Sergei was involved with the Soviet effort and brought a unique perspective on the (then secret) competition to be first to land a human on the Moon. Alexander Basilevsky, a Soviet scientist at the time, provided a detailed look at the Soviet Union’s program of robotic missions to the Moon that were supposed to be precursors to human landings.

The conference itself consisted of oral and poster presentations covering the latest research on all classes of objects in the solar system. Many talks reported on the latest results from numerous spacecraft missions. Other talks reported on the results of analysis of samples of meteorites and lunar material returned by the Apollo crews. I’ll talk a little about some of the talks I attended at our April meeting.

### Balloon-Bourne Observatories

**by Rob Landis, NASA**

Nearly four decades have passed since NASA has attempted observations of Solar System targets via balloon-borne platforms. Through the 1960s and early 1970s, the Stratoscope II and other telescopes lofted into the stratosphere made fundamental observations of the Moon, Venus, Mars, Jupiter, Io and Uranus. Nearly four decades have passed since NASA has attempted observations of Solar System targets via balloon-borne platforms. Through the 1960s and early 1970s, the Stratoscope II and other telescopes lofted into the stratosphere made fundamental observations of the Moon, Venus, Mars, Jupiter, Io and Uranus. For a fraction of the cost of a spacecraft instrument along with the recent developments of improved pointing devices [to compensate for balloon and gondola motion], a balloon-borne platform offers a unique vantage point from which new compelling planetary science observations can be accomplished.

Observations at ~38 km (~125,000 feet) and higher are above 99% of the Earth’s atmosphere. In fact, the air mass stability at this science ‘float altitude’ is truly a space-like environment in which diffraction-limited performance can be achieved (sans adaptive optics) at visible wavelengths – better than many ground-based facilities which house much larger aperture telescopes. After flying which amounted to a technology demonstration (BRISON- Balloon Rapid Response [for Comet ISON]) last year with mixed results, NASA’s Planetary Science Division is assessing the value of a balloon-borne observatory. (see accompanying image on back cover)
Up To The Minute:

The Astronews is a monthly newsletter of the Hawaiian Astronomical Society. Some of the contents may be copyrighted. We request that authors and artists be given credit for their work. Contributions are welcome. Send them to the Editor via email. The deadline is the 16th of each month. We are not responsible for unsolicited artwork.

Hawaiian Astronomical Society
P.O. Box 17671
Honolulu, HI 9681-0671

President
Chris Peterson
956-3131
chrisp@higp.hawaii.edu

Vice-President
Peter Besenbruch
peter@besenbruch.info

Secretary
Gretchen West
282-1892
gwest002@hawaii.rr.com

Treasurer
April Lew
734-2705
stardustlounge@hotmail.com

The Astronews Editor
Carolyn Kaichi
c.kaichi2001@gmail.com

Board Members at-Large
Otis A. Wikman
otisann49@gmail.com
Charles Rykken
ejrykken@gmail.com

HAS Webmasters
Peter Besenbruch
peter@besenbruch.info

Harry Zisko
harryz@pobox.com

School Star Party Coordinator
John Gallagher
gallagherj002@hawaii.rr.com

The Astronews is a monthly newsletter of the Hawaiian Astronomical Society. Some of the contents may be copyrighted. We request that authors and artists be given credit for their work. Contributions are welcome. Send them to the Editor via email. The deadline is the 16th of each month. We are not responsible for unsolicited artwork.

NASA Kids: Build Your Own Satellite

- Container: small juice box.
- Power source: battery made from a yellow sponge.
- Instruments: small plastic dish attached with a pick-up stick.
- Communication: Radio dish made with half a styrofoam ball, black construction paper, and a part of a pick-up stick.
- Orientation finder: star tracker made from a screw.
- Held together with: Scotch tape.

Volume 62, Issue 4

page 2

REDIFINING THE EDGE OF THE SOLAR SYSTEM

The Solar System has a new most-distant family member. Scientists using ground based observatories have discovered a dwarf planet that is believed to have the most distant orbit found beyond the known edge of our solar system. Named 2012 VP113, the dwarf planet’s observations were obtained and analyzed with a grant from NASA. The detailed findings are published in the March 27 edition of Nature.

This discovery adds the most distant address thus far to our solar system’s dynamic neighborhood map,” said Kelly Fast, discipline scientist for NASA’s Planetary Astronomy Program, Science Mission Directorate (SMD) at NASA Headquarters, Washington. “While the very existence of the inner Oort Cloud is only a working hypothesis, this finding could help answer how it may have formed.”

The observations and analysis were led and coordinated by Chadwick Trujillo of the Gemini Observatory in Hawaii and Scott Sheppard of the Carnegie Institution in Washington. They used the National Optical Astronomy Observatory’s 13-foot... (Continued on page 7)
BRRISON (Balloon Rapid Response for Comet ISON) launch sequence, Fall 2013. From bottom of the gondola on up to the apex of the balloon measures over 1000 feet — just longer than a Nimitz-class aircraft carrier. At altitude, the balloon expands to nearly the size of the Rose Bowl stadium. See more on BRRISON on Page 3. Courtesy: NASA/JHU/APL.

Hawaiian Astronomical Society
P.O. Box 17671
Honolulu, HI 96817-0671

VOLUNTEERS WANTED:
HAS needs members to staff our club table at IfA annual public event (see flyer below).
NO EXPERIENCE NECESSARY, JUST DESIRE TO INTERACT WITH KIDS AND FAMILIES.

UNIVERSITY OF HAWAI’I INSTITUTE FOR ASTRONOMY

ASTRONOMY OPEN HOUSE

Sunday, April 6, 2014
11:00 am – 4:00 pm
Activities for all ages
New discoveries
Displays & demonstrations
Robotics & LEGO
Hawaiian Astronomical Society
Maunakea Observatories
Bishop Museum
Pacific Aviation Museum
Open to the public. Free admission & parking.

Inside this issue:

President’s Message 1
NASA Space Place 4
Meteor Log 5
Oberserver’s Notebook 6
Calendar 8
Minutes 9
Star Parties 10
Treasurer’s Report 10

Upcoming Events:
strar

The next meeting is 7:30PM on Tues., Apr. 1 at the Bishop Museum.

Bishop Museum’s next evening planetarium shows are every Saturday of the month at 8:00 p.m.
www.bishopmuseum.org/calendar

The next Board Meeting is Sun., Mar 30 at 3:30 p.m. at the POST building at UH.