

IN MEMORIAM: BILL PATTERSON



OCA offers its condolences to the family of Bill Patterson, who passed away suddenly on March 14th. More details about this valued member of the club inside. He will be dearly missed!

OCA CLUB MEETING

The free and open club meeting will be held April 9th at 7:30 PM in the Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange. This month, Gary Peterson of San Diego State University will discuss 'The Enigmatic Satellites of Saturn'

NEXT MEETING: May 14th

STAR PARTIES

The Black Star Canyon site will be open on April 10th. The Anza site will be open on April 10th and April 17th. Members are encouraged to check the website calendar, for the latest updates on star parties and other events.

Please check the website calendar for the outreach events this month! Volunteers are always welcome!

You are also reminded to check the web site frequently for updates to the calendar of events and other club news.

COMING UP

The next session of the Beginners Class will be held on Friday, April 2nd at the Centennial Heritage Museum at 3101 West Harvard Street in Santa Ana.

GOTO SIG: TBA

Astro-Imagers SIG: Apr. 20th, May 18th

Remote Telescopes: Apr. 28th, May 24th

Astrophysics SIG: Apr. 16th, May 21st

Dark Sky Group: TBA

President's Message

By Craig M. Bobchin

Welcome to the April issue of the Sirius Astronomer. One of the hardest things to do is to lose a club member.

On Sun. March 14th 2010, the club lost a valued member of the club and Astroimagers SIG. Bill Patterson passed away of a heart attack while biking on Mt. Baldy. I want to extend my condolences as well as those of the club to Bill's widow Pam and the rest of his family.

Barbara Toy has written a very touching article that touches on some of the ways Bill touched the members of club. I for one will miss him and his smooth southern drawl. I learned a lot from Bill in the AI sig that has made me a better astroimager. Goodbye Bill; you will be missed.

In other news, the recent rains have had a couple of effects out at Anza. For one the wet weather is going to mean a very big bloom of flowers and other flora. While they make for a very pretty drive out to the site, these plants will wither and die and will create a fire hazard. So we must be vigilant and proactive in weed control on the site this spring and summer.

The other area that nature has affected at Anza is the roads into the site. The long road in has been graded by our neighbors and is smoother than I've seen it in years. The direct road however is a different story. At the March star party it was deeply rutted and tricky to traverse. Hopefully our neighbors will take care of that as well and if you see them Please offer a word of thanks and if you feel some gas money.

On other Anza issues, I've heard from several members about conditions at Anza house. For starters we all must keep in mind that Anza house is shared by all members and we are all responsible for its upkeep and maintenance. If you see a problem and can fix it please do so, If not Alert the board, Steve Condrey (who is the Anza House Custodian) or Don Lynn who does a lot of work keeping Anza going. Take your trash with you when you leave as we do not have any trash service at the site and any left in Anza house is going to attract rodents and insects.

Another thing to be aware of is that we have only one table at Anza house and a lot of people using it. Please be courteous to others and if you are using a laptop at the table and people want to eat please move the laptop to a chair or couch so there is room at the table. This will also help in keeping the house clean since it is far easier to clean up a table rather than spilled food from the carpet and chairs.

Messier Marathon

The March Star Party was the first opportunity to run the Messier marathon; the Astronomical equivalent to the Olympics. It is a chance to see all 110 Messier Objects in one night. Those of us who were out there, had to contend with clouds that blocked us from seeing the 1st part of the marathon. The clouds cleared around 8:30 to 9:00. The temperatures dipped to the 30's and any dew froze out. But then the winds kicked up and made viewing and imaging difficult at best. But don't dispare if you didn't get a chance to partake this month April offers another couple of chances. Since the new moon falls in the middle of the week, we have two star parties that month and thus two more chances for the marathon. We will also have the same opportunity in the fall.

RTMC and Kudos to Bob Buchhiem

RTMC is fast approaching and there is a major change this year vs. prior years. Instead of happening over the 3 day Memorial day weekend as it has in the past the organizers have moved the conference to Wednesday, May 12 through Sunday, May 16, 2010 to coincide with the new moon. So if you plan on going to RTMC make your plans accordingly. We would like to have a booth there as we have in years past, but we need volunteers to help manage the booth. Contact myself, Karen Schnable, or Bob Buchheim if you can help out at RTMC this year.

Speaking of Bob, I'm pleased to announce that he as been chosen as the 2010 recipient of the G. Bruce Blair award. The G. Bruce Blair Medal is awarded annually by the WAA (Western Amateur Astronomers) to an individual who has made truly outstanding contributions to amateur astronomy.

Bob joins such luminaries as David Levy, Chris Butler, Patrick Moore, and many others. The award will be given to Bob on Sat. night at RTMC.

Also don't forget the annual SAS Symposium on Telescope Science will be held again at the Northwoods Resort in May 2010, just prior to RTMC.

Club Fund Raising

I wanted to put a reminder out that we have several opportunities to help bring income into the club. We have two ways to increase our income, once is via the Amazon.com link off the Club's main page. So if you are going to make any purchases from Amazon, please remember to go through the link on OCA webpage and help out the club.

The other way we have of raising funds is through the OCA web store at CafePress.com. We have a lot of cool items including hats, shirts, Mugs, clocks and more. The club gets a cut of the purchase price and it helps us fund club activities. The OCA store can be found via the link on the web site or at <https://www.cafepress.com/oastore>.

Clear skies and see you next time

Craig

Bill Patterson Remembered

By Barbara Toy

This last March may be remembered for many things, but for a lot of us it will be remembered most for the shock and grief of losing Bill Patterson, a long-time club member, excellent astroimager, and good friend to many in the club. I still find it hard to believe that I won't hear him tell any more stories in that charming drawl he had, see him take any more images from his observatory near Idyllwild during an AstroImage meeting, see any more of his presentations on processing or other aspects of imaging, or just have a chance to chat with him and get his views on topics of the day. The world is a sadder place indeed with his passing out of it.

As a brief account of some of his club activities, he chaired the AstroImage SIG for several years, and provided the group with a meeting location at Source Refrigeration up to the time he took an early retirement and left the company. He continued to chair the group for a while after that, and remained active in the group even after he decided it was time to turn that position over to someone else – he said he really enjoyed being a participant and audience member at the meetings again.

He was heavily involved in organizing AstroImage 2002 (our most ambitious and longest imaging conference) and AstroImage 2004 (also an excellent conference) – each one took a tremendous commitment of time and energy for at least a year before the conference actually took place, culminating in the exhausting and exhilarating days of the conferences themselves. Although he didn't have that time and energy to devote to AstroImage 2006, he gave us a lot of information, advice, moral support, and other assistance along the way to help make that conference a success, as well.

I expect that all of us who knew him have favorite memories of him. One of mine is getting a tour of his then-new observatory at Anza near the end of a star party – he'd actually been closing it down but (he was always a gracious host) he kindly opened it back up to let me take a look, as I wasn't able to get down to the observatory level earlier because it had been a busy night up at the Kuhn. Besides telling me his plans for the observatory, I remember him talking about his wife and her work as an attorney with Public Counsel in Los Angeles – he was obviously very proud of her achievements, and showed his love for her and for the other members of his family then and whenever he talked about them.

Another favorite memory – I'm afraid we teased him unmercifully over this one – occurred during the hands-on imaging session at Anza that was part of the AstroImage Bootcamp that he helped organize. We got clouded out, but it cleared up after a couple of hours and the planned activities got under way. When we tried to find Bill (who was to help the new imagers during the session) we discovered that he had left for his new property near Idyllwild, thinking that the clouds were there to stay, so he missed out on the training session that he had helped set up. He was very apologetic when he learned how things had gone – but it became a classic bit of AstroImage lore.

You can see a lot of Bill's past images on our website Image Album (look for Bill Patterson among the OCA Photographers on the drop-down menu under the Image Gallery tab under the header). He has more images, including a section on his project to image all of the globular clusters he could find, on his website: <http://www.laastro.com/>, though I don't know how long this will remain available. Even though we've lost his company and his expert advice, which he gave freely, his many beautiful images remain to remind us of his skill and passion for imaging the night sky.

We'll really miss you, Bill.

TOP TWENTY THINGS AN ASTRONOMER SHOULD SEE

18 Jupiter's Moons, Including Moon Shadows

By Helen Mahoney

With Galileo's small telescope, he was able to observe other things, in addition to the rings of Saturn that we mentioned last time. It was known in his time that Jupiter was not an ordinary star. Instead of moving with the background "fixed" stars, Jupiter and a few other celestial objects, including the sun, the moon, Mercury, Venus, Mars, and Saturn, had separate motions along a path we call the ecliptic. They were named "planets," a word meaning "wanderer." Except for the sun and moon, the planets did not move consistently eastward. In the age of an Earth-centered universe, their back and forth retrograde movements prompted theories involving motion along spheres within spheres.

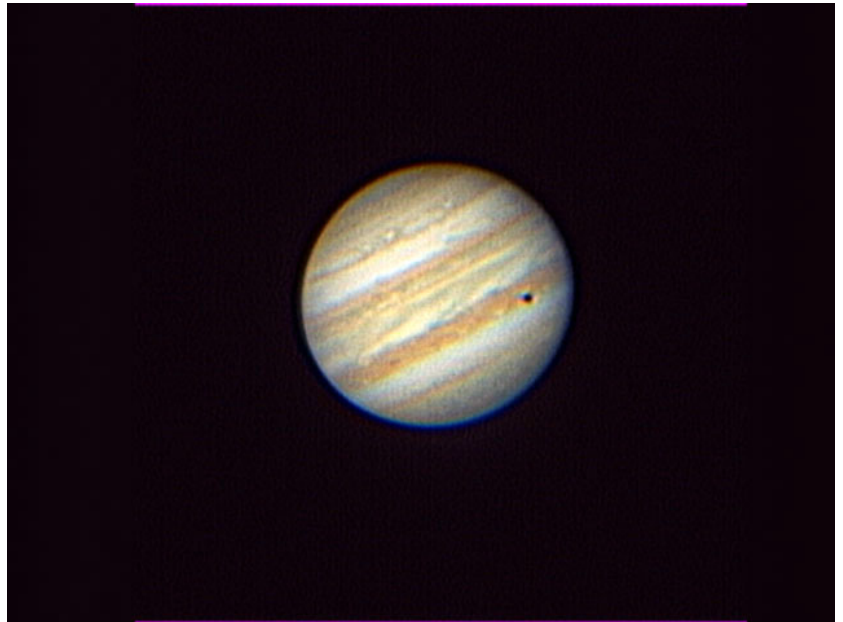
When Galileo viewed Jupiter, he saw four small stars in a line near the planet. The next time he viewed it, the little stars were in different positions. He plotted the positions over several days, and the movements strongly suggested that they were objects orbiting Jupiter. The fact that Jupiter could have bodies orbiting it gave strong evidence that the Earth-centered theory of the universe was flawed, and the sun-centered solar system proposed by Copernicus was correct.

It is easy to duplicate Galileo's observations of what we call the "Galilean moons" of Jupiter. They are bright enough to see from even a light-polluted sky, and with inexpensive equipment. Even a set of 10 x 50 binoculars will show you the moons, and a small telescope or 20 x 80 binoculars will give you enough resolution to plot their positions the way Galileo did.

In *Sky and Telescope* and *Astronomy* magazines, there are diagrams to help you identify the moons and show you what you can expect to see. Those and other publications and web sites will also inform you of times when you will be able to see moon shadow transits. Frequently, the orbits of the moons will cause them and/or their shadows to move across the face of Jupiter. The shadow of the moon will appear as a small black dot that slowly moves across the planet. It is difficult to see the actual moon when it passes over the bright surface of Jupiter, but I was able to follow one once through a 16 inch telescope. The shadow is much easier to see, and quite fascinating.

Observing the motions of Jupiter's moons was important in 1780. The observations were a vital tool used by surveyors to accurately map our new country. Before the age of GPS systems, and before he was our first president, George Washington was a surveyor. To find your longitude on the earth, you need to know the angle of the sun or a known star, and exactly what time it is. In 1780, they did not have accurate transportable clocks. (The marine chronometer was invented in 1765, but they were extremely expensive, so few could afford them.) Washington instead used Jupiter's moons to determine accurate time. He watched Jupiter's moon disappear, either in front or behind the planet, and compared these observations to a published ephemeris which predicted when these events would occur by Greenwich, England time. He then set his watch to that time. If he then observed the sun with a sextant at local noon, the time on his watch would show the difference in time between Greenwich noon and his location. This difference could be transferred into degrees East or West of Greenwich, since the earth moves at about 15 degrees per hour. Thus he would know his location in longitude.

The remarkable thing is how easy it is for us to recreate one of the greatest pieces of scientific work. You can grab a small telescope, a sketch pad and pencil, and make your own observations of the Galilean moons of Jupiter. You can thus duplicate drawings that revolutionized astronomy—and caused mankind to change the way he looked at his place in the universe. ■



This image of Jupiter during an Io shadow transit was created by Bruce Waddington from Laguna Beach on June 21, 2006, using a Meade 10-inch LX200 with a Phillips ToUCam Pro webcam. Bruce stacked 1200 frames to create the image.



Western Amateur Astronomers Board Meeting Notes

by Tim Hogle

FLASH: Bob Buchheim Selected as 2010 Recipient of G. Bruce Blair Medal

This is my annual report on the activities of the Western Amateur Astronomers (WAA), an umbrella organization of astronomy clubs in the western states and Hawaii, of which OCA has been a longstanding supporting member. As an umbrella organization, WAA's purpose is to promote communication between astronomy clubs for their mutual benefit, to give awards for recognition of outstanding achievement in the world of amateur astronomy and to promote astronomy in general. Once again the WAA Board met in February at John Sanford's home in Springville, at the southern foothills of the Sierras. John was several times president of OCA and a very active member of the club for many years before retiring and moving to Springfield where he built Starhome, his dream observatory.

WAA's most well known function is annually awarding the prestigious G. Bruce Blair Medal to an individual who has made truly outstanding contributions to amateur astronomy. As I announced at the March meeting, this year's award recipient is our very own Bob Buchheim. Bob is a twenty-five-year veteran of OCA who we all know as the current club secretary and projection system operator at the club meetings. The Blair award selection recognizes his many years as an enthusiastic promoter of serious amateur astronomical research with small telescopes, publications of asteroid light curves and double star astrometry, author of *The Sky is Your Laboratory*, a book instructing amateurs on small telescope research projects, his extensive public speaking history and involvement not only with OCA but also with the Society for Astronomical Research. Congratulations Bob!

The Blair Medal has a history back to 1954 and recipients are listed on the WAA web site at <http://www.waa.av.org>. The list includes three other OCA members (John Sanford, Msgr Ron Royer, and Chris Butler) in its list of very well known individuals. As in the past several years, this year's award is to be presented at the Riverside Telescope Makers Conference.

WAA is still looking for a replacement for their logo (pictured above), an effort that has been ongoing for some time. With no offerings so far that seem to really stand out we have simply cleaned up the old one and may do some minor modifications. Although we have stopped short of actually having a logo contest, there is an incentive of \$50 to be awarded to the creator of a selected design, and full credit will be given as well. If you have any ideas or would like to try your hand at logo design, contact me (see back of the Sirius Astronomer) to further discuss what is desired or to submit entries.

WAA will again have an information booth at RTMC this year, probably near the snack bar. Stop by and say hello. For more info about WAA, log on to the Web site shown above. ■



A one-day old Moon as imaged by Jeff Malmrose, March 18, 2010. Jeff's equipment included a TMB 115mm telescope and a modified Canon XT imager.

AstroSpace Update

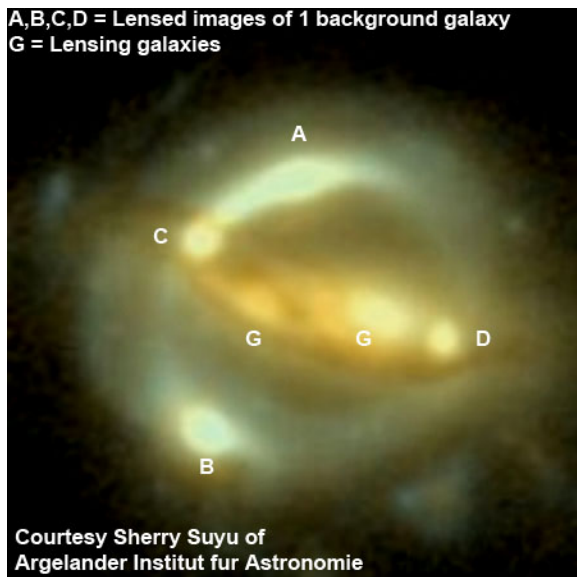
April 2010

Gathered by Don Lynn from NASA and other sources

Chandra (orbiting X-ray Observatory) has studied several elliptical galaxies and failed to find the X-ray emission expected from Type Ia supernovas. It has been generally accepted that Type Ia supernovas occur in 2 ways: 1) a companion star dumps material onto a white dwarf star until its mass exceeds what can be supported, and the star core collapses, or 2) a closely orbiting companion star collides with a white dwarf, far exceeding the mass limit, and the star core collapses. The first way is known to produce significant X-rays, but the second produces little, so the conclusion of this new study was that most Type Ia supernovas occur by the second method (collision). This is in contradiction to what most supernova experts believe (that most Ia's are the first way). Further work will be done on spiral galaxies to see if the same X-ray result holds. This result contradicts at least 2 well-supported observations, so will require extraordinary proof before being accepted. The consistency in the brightness of Type Ia supernovas implies that most have the same mass, and therefore occur by method 1, not 2. The small number of close binary white dwarfs known implies few collisions (method 2) will occur.

Primitive black holes – A survey using the Spitzer infrared space telescope of very distant quasars found that 2 of the 21 observed had no signs of dust falling into the supermassive black hole at the heart of each quasar. Dust is produced steadily by stars, so quasars of any substantial age always have dust falling in. We must be seeing these 2 very soon after they formed. The 2 are also the least massive of any yet observed, another indication that we are seeing them soon after they formed. By their red shift, we know that the 2 quasars are so distant that we are seeing the light that left there over 13 billion years ago, quite early in the history of the Universe.

Blazars (quasars whose brightness varies wildly) dominate the gamma-ray sky. As nearby matter falls into a supermassive black hole, some of this energy is sprayed back out as a jet of particles. The prevailing view of how these jets form was called into question by a recent year-long series of observations made in many wavelengths of one particular blazar, 3C279. A 20-day flare occurred in gamma rays, and changes in polarization of visible light were observed at the same time. This implies that the visible light and the gamma rays are emitted in the same area of the jets, because if they were in different areas, one of the changes would be delayed from the other. The location within jets where visible light is emitted is well established to be far up the jets from their base near the black hole. So the conclusion is that the gamma rays come from there, not from the base of the jets, as theoretical work predicted. The base of the jets is 1-2 light-days from the black hole, while the visible light is believed to come from about 1 light-year out the jets. The new polarized light observations indicated that the jets must be substantially curved.



Gravitational lensing – Using a galaxy cluster as a lens to look at another galaxy, researchers have a newly precise way to measure the age of the Universe and how rapidly it is expanding. The new results confirm the age at 13.75 billion years, ± 0.17 , and confirm that the expansion is accelerating. It has been long known that these parameters could be measured from gravitational lensing, the bending of light by massive objects per general relativity, but this is the first time the measurement has been performed with the precision comparable to other methods of determining these. A system was observed that produces 4 images of a distant galaxy behind a nearer massive object. Measurement of arrival times of changes in brightness in the 4 different images yielded the precision needed. More than 20 gravitational lensing systems are known that are suitable for this type of analysis, so work will continue on these.

Star formation – Galaxies long ago gave birth to stars at a rate at least 10 times what we see today. Why the rate was so high was an open question. New observations using a radiotelescope millimeter interferometer in France show that the cold gas content in galaxies was high enough about 3-5 billion years after the Big Bang to cause the high rate of star formation. The gas content was found to remain high over fairly long periods of time, so gas lost during this time must have been replenished, probably by falling in from the halo.

Great Red Spot (GRS), that long-lived huge storm on Jupiter, has been imaged in the greatest detail yet seen in infrared by several ground-based telescopes. The most intense color in the central part of the GRS was found to be 5-7° F warmer than the surroundings. Though this temperature difference does not seem like much, it is enough to cause the area to move weakly clockwise, while the rest of the storm rotates counter-clockwise. This is the first time that a definite link has been established between temperature and color of the GRS. It is still not known for sure which chemicals or processes are causing the color. Dark lanes near the edge of the GRS were found in these images to be where gases are descending.

Cassini (Saturn mission) was extremely precisely tracked during 4 recent flybys of the moon Titan, and from this data scientists have determined where mass is distributed inside the moon. Titan does not have a rock core, but instead its rock is mixed in with

(continued on page 8)

RTMC Astronomy Expo - 2010

By Barbara Toy

One of the highlights of our local astronomical year is the RTMC Astronomy Expo, which historically has happened over Memorial Day weekend at Camp Oakes near Big Bear City. This year starts a different schedule for this annual event – it's to be the dark sky weekend before Memorial Day (actually, they're starting it on a Wednesday, for those who have the time and desire to maximize the experience). The actual dates this year are Wednesday, May 12 through Sunday, May 16. That's going to be a busy weekend – along with RTMC, we have our Anza star party and Explore the Stars set that Saturday night and our May general meeting is that Friday night.

For those of you who may not have discovered the pleasures of RTMC yet, it's an event that features talks on a wide variety of astronomical topics during the days along with vendors, exhibitors and other activities on Saturday and Sunday (assuming they keep to a similar schedule as in past years), star parties at night with a chance to see what equipment from various vendors can do under a dark sky and to look through a lot of interesting telescopes (the "Yard Scope," an enormous Dobsonian with a 3 foot primary mirror, has been a regular feature for several years, and there are others that return regularly, as well an ever-shifting array of home-built telescopes).

RTMC has a reputation as a great place to shop for interesting astronomical items and bargains, as a lot of the vendors have used it as a way to sell off items they've cleared out of their warehouses or off their sales floors, and there's also the RTMC swap meet (historically that's been on Friday, when RTMC started in the past, and on Saturday and Sunday mornings), where non-commercial people sell equipment, books and other things. I've heard great stories from different people over the years about wonderful finds they got for bargain prices through persistent searching and being able to recognize what a wonderful item their particular find was – alas, I must lack the necessary knowledge and persistence, as I've never made such a find myself (but – who knows? – maybe this year...).

The RTMC raffle has been a popular feature of Saturday and Sunday nights (this may be shifted due to the new schedule – I expect a lot of regular attendees who stayed Sunday night in the past because Monday was Memorial Day and therefore a holiday will have to be at work the Monday morning after this year's RTMC and therefore won't be able to stay for events scheduled Sunday night). The RTMC collection crews gather a lot of different prizes that are donated by the vendors, and everyone who attends the festivities in or around the meeting hall on the night of each raffle gets a free ticket – but you have to be present to win. Every year I've been there they've raffled off a lot of things that any of us would love to go home with (though I've never had that pleasure), including some very nice telescopes given as grand prizes. The array of prizes is different every year, and there's understandably a lot of interest in what the grand prize(s) in particular will be.

For a lot of us, the best reason to spend time at RTMC is more social. It's a chance to catch up with astronomical friends and acquaintances from outside our area, and spend some time with people we may see more often but don't get a chance to talk to much. It also gives us a chance to meet people in person that we may know through emails or postings on various groups, exchange ideas and information with folks outside of our usual circles, meet new people, and otherwise expand our horizons.

Our club regularly has a booth at RTMC, and we expect to have one again this year, though probably only on Saturday – do come by and say "hello" if you make it to RTMC this year! And, if you can spend some time helping with the booth, please let Craig Bobchin (etx_astro_boy@sbcglobal.net) or me (btoy@cox.net) know (we can always use some help!).

We have a long-standing tradition of taking a club picture at RTMC each year, gathering as many members who are around at RTMC at 1:00 on Saturday afternoon as possible – if that includes you, come on down to the club booth to take part in this memorable event! The more members we have for the picture the better, so do bring along any other members you can find, as well.

You can find more information about the specific plans for this year's RTMC, including directions on how to get there and the schedule of events, on the website, <http://www.rtmcastronomyexpo.org/>. I hope to see you there!

I am researching the life and work of Bill Kuhn Sr. for a biography. He never received a proper tribute and does not appear on Google or in a Wikipedia article. I have the cooperation of his daughter Katie and hereby ask for any anecdotes or information about Bill for incorporation in the work.

Thanks a lot. John Sanford starhome@springvillewireless.com

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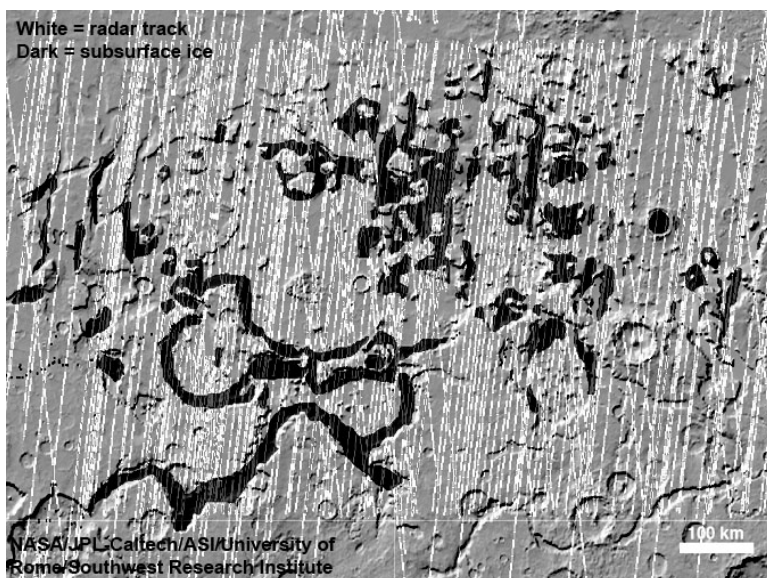
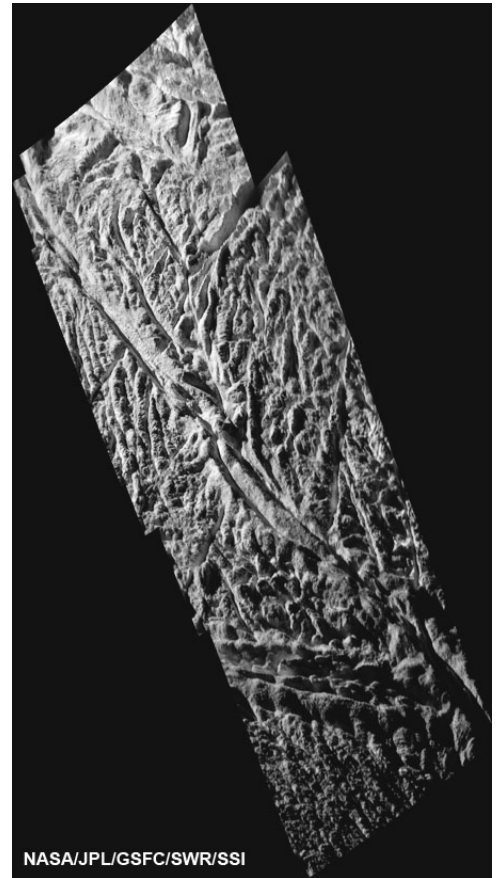
ice throughout most of the sphere. Only the surface layer, about 300 miles thick, has ice without rock mixed in. This means that when Titan formed, it never reached high enough temperature to completely melt ice, since that would have allowed the rock to sink and form a core. This requires Titan to have accumulated its matter over at least a million years in order for heat of formation to dissipate and keep the temperature down. The flyby results were not able to distinguish whether there is a subsurface layer of liquid water, though it seems likely due to other previous evidence.

Cassini's close flyby of the moon **Enceladus** in November yielded the best 3-D image of a tiger stripe (a fissure from which geysers erupt), the most detailed temperature map of a stripe, and images of new geyser jets and changes in known ones. Scientists are trying to get the best views of the southern polar area of Enceladus before it goes into darkness for about 15 Earth years with the change of seasons at Saturn. The new temperature map shows that the heat appears to be confined to a narrow region no more than 1/2 a mile wide along the fracture. Heat in this case means merely minus 135° F rather than the -370° found in surrounding territory. The flyby was the 8th at Enceladus, and was about 1000 miles above the surface.

Titan – Planetary scientists have been puzzling for years over the honeycomb patterns and flat valleys with squiggly edges evident in radar images of Titan. Now a geologist has found that the features resemble what is called karst terrain here on Earth, which is found in Utah, New Guinea, and China. On Earth, the features are caused by water dissolving layers of bedrock, leaving dramatic rock outcroppings and sinkholes. Because the temperatures on Titan are vastly lower, it has to be different materials, but acting the same way. Methane and ethane are liquid at Titan temperatures, and some of the rock there is actually a slurry of organic materials in place of Earth's minerals. Earth's karst terrain has caves, so they might be present on Titan too.

Martian channels – The debate as to how much water once flowed (a few billion years ago) on the surface of Mars continues. New detailed images from 2 orbiting spacecraft of one channel in the Ascræus Mons area of the planet show that much, if not all, of the channel's features were formed by lava, not water, as previous studies had concluded. Vents, lava tubes, and certain forms of terracing, some resembling Hawaiian and lunar volcanic features, were found in the new images. Much evidence for water-formed features elsewhere on Mars remains unaffected by the new study, however.

Martian dunes – 2 studies of dunes on Mars came to different conclusions for different areas. One study found that images taken just 4 months apart showed dune ripples had moved as much as 7 feet. Another study of dunes which were penetrated by impact craters in the Meridiani area (where rover Opportunity is) showed that dunes have not moved there in at least 100,000 years. It is believed that the inclusion of larger particles in the dunes there prevent the wind from being able to move them. The larger particles are the famously nicknamed "blueberries", so called because they appear blue in accentuated-color images and they are the shape and nearly the size of blueberries.



Mars Reconnaissance Orbiter (MRO) has completed 4 years in orbit and has surpassed 100 terabits of data sent to Earth, more 3 times the data from all other deep space missions (not just Mars) combined. Half the planet has been imaged at a resolution of 20 feet per pixel, and 1% at 1 foot per pixel. The ground-penetrating radar has sampled about half of Mars.

Martian ice – Extensive radar mapping by MRO of the middle-latitude region of northern Mars shows that thick masses of buried ice are quite common beneath protective coverings of rubble. The first hidden glaciers were confirmed by radar 2 years ago. The subsurface ice deposits extend for hundreds of miles in the rugged region called Deuteronilus Mensae. The common locations are around the bases of mesas and scarps, and are confined within valleys or craters. Probably the whole area was covered with an ice sheet in the past. When the climate changed, these deposits remained only where they were protected from evaporating by debris. The ice could contain a record of the climate at the time of deposition, making these an intriguing possible target for a future lander.

LCROSS (lunar impactor) – More results have been released: The flash from the impact was mostly buried, meaning the impact penetrated deeply. Deep penetration implies plenty of volatile materials. The impact plume spread outward mostly instead of upward, though some material reached 12 miles high. The vapor cloud reached 1800° F. Scientists were surprised by the variety of material ejected: molecular hydrogen, mercury, water ice, sulfur dioxide, methane, ammonia, methanol, carbon dioxide, sodium and potassium. The mineralogy in dust kicked up resembled chondrite asteroids. They have not figured out how the molecular hydrogen exists without evaporating, even at the lowest temperatures seen of only 72° F above absolute zero.

Sun has a pair of conveyor belts of moving hot gas in it, one each in the north and south, that transport material poleward on the surface, then dive down and return toward the equator far beneath the surface. The belts move 20 or 30 mph and take about 40 years to complete an entire circuit each. The surface speed can be measured by noting the movement of magnetic surface features, and removing other sources of motion. The speed of the subsurface motion can also be measured, by noting where sunspots emerge on the surface. It is thought that sunspots pop out above the point where magnetic fields exist at the bottom of the conveyor. A new study of 14 years of data from the SOHO spacecraft shows that the surface movement sped up starting in 2004, to a record high speed. The scientists doing this study think that the speedup caused the current lack of sunspot activity, though theoretical work predicted that a speedup would increase sunspot activity by stirring up magnetic fields within the Sun. And the big surprise: the subsurface parts of the belts slowed down while the surface sped up. No one has an explanation for this yet. It is thought that data from the recently launched Solar Dynamics Observatory may shed light on this.

Hot exoplanet – Scientists have figured out why the exoplanet Wasp-12b is so hot (about 4500° F), even hotter than its star should be heating it from only 2 million miles away. The temperature causes the planet to swell up, making it the largest exoplanet known. Tidal forces from being so close to its star distort the shape to roughly that of a football, and continuously change that shape enough to frictionally heat the planet. The star is actually pulling material off the planet at a rate of 6 billion tons per second. At this rate, the planet will be gone in about 10 million years. The material must form a disk about the star and slowly spiral inward. It appears from timing data that there is another planet in the same system. Astronomers calculated that both the disk and the 2nd planet should be detectable with current technology, so they will look for them.

Young exoplanet – A group of astronomers has found what they determined to be the youngest exoplanet yet discovered, about 35 million years old. The previous record was about 100 million years old. The difficulty in finding young planets is that their stars are young, which tend to have stronger magnetic fields and intense stellar flares and star spots, which play havoc with the Doppler methods of finding planets. The discovery group was able to disentangle active star effects from planet effects by gathering large amounts of observing data. The new planet is 6 times the mass of Jupiter and orbits its star more closely than Mercury is to our Sun.

Hubble Space Telescope (HST) – The Cosmology Survey Program has been granted the most ever time on the HST, 902 orbits of imaging. The project will look in 5 different directions to image more than ¼ million distant galaxies to construct the most comprehensive view of the structure and assembly of galaxies over the first 1/3 of the history of the Universe. The project will also study the earliest stages of formation of supermassive black holes and search for very distant supernovas. The Advanced Camera for Surveys and the newly installed WFC3 camera, using its infrared capabilities, will be used for the project.

Hayabusa (Japanese asteroid sample mission) is now on course to intercept Earth and return its possible asteroid sample in June (3 years late), after months of thrust using 2 broken ion engines hooked together to make one working unit. Only 1 reaction wheel is still working, so much of the spacecraft orientation has to be done by thrusting instead of reaction wheels. The heat shield to protect it during entry into Earth's atmosphere at 27,000 mph is 2 years beyond its design life, and may have been damaged by a massive fuel leak in 2005. It is only a "possible" sample, because the sample gathering mechanism is known to have misfired, but a little material from the asteroid may have been collected anyway. For more comprehensive lists of setbacks that Hayabusa has endured, see this report for March 2009 and January 2010.

(continued on page 10)

For Sale: Meade ETX 125 PE Astro with Meade 5000 eyepiece kit. Barely used, must sell! \$500. Contact Mark Hunter at 949-370-9300 or mrplant2000@yahoo.com.

Wanted: Old style 84-key AT keyboard for DOS/Windows PC (the kind with the function keys on the left instead of above the other keys). Tim Hogle timhogle@aol.com, (626) 357-7770.

For Sale: Celestron C8-SGT 8" Advanced Series Telescope (the C8 has XLT optics) with the latest version of hand control computer and includes a Telrad and the Celestron Auxiliary Port Accessory for firmware upgrades. \$975. Contact: Vance Tyree at 626-355-7210 or tyree@isi.edu

Observing Pad Lease for Sale! Location: Easternmost pad on top tier of Mars Hill. Largest Observing Pad at Anza, electricity, polar aligned pier, 2 work tables, adjacent parking, good neighbors. Contact: Tom Kucharski Cell: 949-683-8356

(continued from page 9)

Uncomet – The LINEAR sky survey discovered a comet (again), which has been named P/2010 A2 (LINEAR). But its orbit looks like that of an asteroid, not a comet. It's right in the asteroid belt. Images made with HST show that the comet nucleus is outside the comet head, which never happens. It also has a bright X-shape of material in it, again without precedent. Spectra from ground-based telescopes failed to find gas, and comets always emit gas. Conclusion: it's probably not a comet, but instead debris from a collision between 2 asteroids. The pressure of sunlight is pushing the debris into a tail, like it does to gas and dust emitted by comets. There is ample evidence that collisions occur between asteroids, but this is the first time they have been caught in the act.

WISE (orbiting infrared observatory) has discovered its first comet, which has been named P/2010 B2 (WISE), and its first near-Earth asteroid, now designated 2010 AB78. During its ongoing survey of the whole sky, WISE is expected to discover dozens of new comets and hundreds of thousands of new asteroids, hundreds of which will be near-Earth, that is, closer to us than the asteroid belt. A thorough search like that of WISE is expected to give accurate statistics on how common are near-Earth comets and asteroids of various sizes. Infrared brightness is well correlated with diameter, while visible light brightness is not well correlated. So WISE should provide good diameter estimates of all the asteroids that it observes. All asteroids, except those that come extremely close, appear too small to measure diameter directly, even with the largest telescopes. The new Comet WISE takes 4.7 years to orbit the Sun. It is actively shedding material to form its comet head. However, the spacecraft can detect even dead comets, which are not shedding material, since a comet nucleus can be seen easily in infrared light. WISE was launched in mid December and began operations in January.

Solar Dynamics Observatory (SDO) was launched February 11. It is the most technologically advanced spacecraft to study the Sun, imaging it more than once per second, and in high resolution every 10 seconds. It covers multiple wavelengths of light, concentrating on ultraviolet. Much of the Sun's variability in brightness, not yet well understood, occurs in ultraviolet. SDO will effectively look inside the Sun by analyzing the seismic waves on the surface (like analyzing earthquakes to learn of the Earth's interior).

International Space Station (ISS) – Space shuttle Endeavour visited ISS during February to deliver the 15-ton Tranquility module, the last major part of ISS. The module was attached during the 110th spacewalk that has been made from ISS. The cupola, a projection with 7 windows for a panoramic view, was attached to Tranquility. The weight of ISS (including Endeavour) exceeded 1 million pounds for the first time. Tranquility will house many of the critical life support systems for ISS, freeing up lab space that has been temporarily used. Only 4 missions remain, all to supply ISS, before the space shuttles are retired.

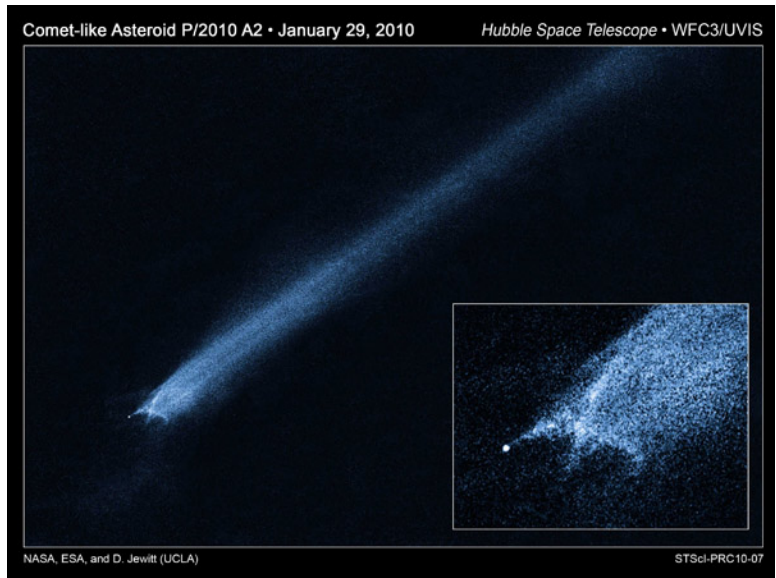
Planet collision – Astronomers announced that they have found warm dust, evidence for the collision of rocky planets, around a star called HD 131488. But the composition of the dust differs from the composition of rocky bodies in any other known system. Typically dust debris around stars is of olivine, pyroxene or silica, minerals commonly found on Earth. The dusty region is close enough to its star to have temperatures near that on Earth. The star also has a 2nd dusty region much farther from the star, comparable to our Kuiper Belt.

Dark matter – A project known as the Cryogenic Dark Matter Search has been attempting to detect WIMPs (weakly interacting massive particles) that are theoretically believed to constitute the non-baryonic dark matter of the Universe. The experiment is a 1/2 mile underground in Minnesota to shield it from cosmic rays. The latest analysis of 2 years of data, after weeding out other causes for effects seen in the detector, leaves 2 events that are likely dark matter. However, statistically, they would like to see at least 5 events before they have enough evidence to convincingly claim they have found dark matter. Stay tuned for a few more years.

Algol – Using a collection of radiotelescopes, astronomers have found a giant magnetic loop stretching outward from one of the stars in the binary system Algol. The system consists of a star about 3 times as massive as our Sun and a less-massive companion orbiting it only about 6 million miles away. The magnetic loop emerges from the poles of the less-massive star and stretches toward the primary star. The side of the secondary star with the magnetic loop always faces the primary as it orbits.

Instant AstroSpace Updates

Using new techniques to remove the effects of the Earth's atmosphere, astronomers using the 3-meter Infrared Telescope in Hawaii have detected constituents (carbon dioxide and methane) in the atmosphere of an **exoplanet** (one orbiting another star [HD189733]). This feat had been performed only with space telescopes before.



Teams of astronomers have discovered 2 more **tidal streams** in the Andromeda Galaxy, which are shards of dwarf galaxies that have been ripped apart. They were found by distinguishing red giants with particular velocities from apparently surrounding stars.

A new technique of **predicting solar flares** has been able to warn 2 to 3 days in advance when and where one will occur, better than any existing prediction method. It looks for breaking of magnetic loops inside the Sun by its effects on sound waves on the surface in sunspot regions.

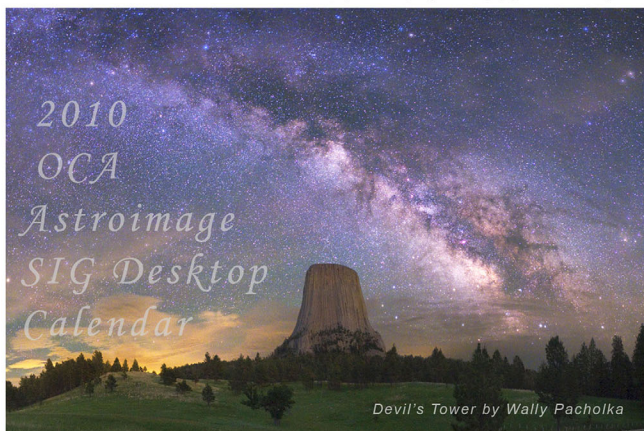
Amateur astronomers in Florida detected an outburst of the recurrent nova **U Scorpii**, an event that hasn't happened since 1999. There are only 10 known recurrent novae.

Astronomers have discovered the second most massive stellar-mass black hole, above 15 times the Sun's mass, in galaxy NGC 300. This is the **farthest stellar-mass black hole** known.

New analysis of the **Murchison meteorite** that landed in Australia over 40 years ago, using high-resolution structural spectroscopy, found the signatures of more than 14,000 different compositions, including 70 amino acids. Given the ways in which such molecules can be arranged, the meteorite should contain several million different organic chemicals.

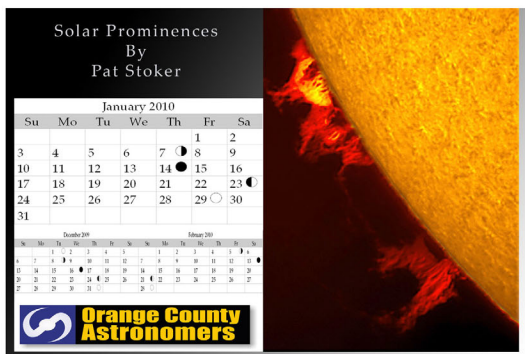
High pressure experiments with carbon, which is thought to be plentiful in the **cores of Uranus and Neptune**, show that those planets may contain liquid carbon seas with diamonds floating on them. This appears consistent with the strangely oriented magnetic fields that those planets exhibit.

2010 OCA Astroimage SIG Desktop Calendar - Now Available!



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