SkyWAAtch

The Pinwheel

Olivier Prache took this image of M101 in Ursa Major, the Pinwheel Galaxy, using an ML-16803 CCD camera behind a Hyperion 12.5" at F/8. It shows the H-II regions, which are a notable feature of the Pinwheel and are suggestive of active star formation. Several supernovae have been recorded in M101, most recently in August 2011.

At nearly 160,000 light years in diameter, the Pinwheel is more than half-again as large as the Milky Way. At 17.5 million light years distant, it still shows an angular diameter of almost 30 arc-seconds (about that of the full moon). This leads to a low surface brightness, making M101 a challenging visual object for small scopes under suburban skies.

Events for July 2012

WAA Lectures

There will be no WAA lectures in July or August. Lectures will resume in September.

"Member Presentations Night"
Friday September 7th, 7:30pm
Miller Lecture Hall, Pace University
Pleasantville, NY

WAA members will showcase their astrophotos, equipment and other insights. Let us know if you have something to show or tell. Please email the club with a brief idea of what you will be presenting. Free and open to the public. Directions and Map.

More Upcoming Lectures
Miller Lecture Hall, Pace University
Pleasantville, NY

On Friday October 5th our speaker will be Mr. Al Witzgall. His talk will be entitled "The End of the World--but Don't lose Any Sleep On It." It will provide his response to the Mayan and other 2012 doomsday predictions. On Friday November 2nd our speaker will be Dr. Caleb Scharf, who is the Chairman of the Astrobiology Department at Columbia University. His talk will be entitled "Planets, Stars, Black Holes and the Quest for Our Cosmic Origins" and will elaborate on the subject of his latest book, *Gravity's Engines*. Lectures are free and open to the public.

Starway to Heaven

Saturday July 14th, Dusk
Meadow Picnic Area, Ward Pound Ridge Reservation, Cross River

This is our scheduled Starway to Heaven observing date for July, weather permitting. Free and open to the public. The scheduled rain/cloud date is July 21st. Participants and guests should read and abide by our General Observing Guidelines and Disclaimer. Directions

New Members. . .

Pio Mangiacotti - Irvington
Seth Sullivan - Bronxville

Renewing Members. . .

Donna Cincotta - Yonkers
Ruth and Eugene Fischer - Pleasantville
Charlie Gibson - Scarsdale
Jon Gumowitz - White Plains
Glen & Patricia Lalli - White Plains
Arthur Linker - Scarsdale
John Paladini - Mahopac
James Peale - Bronxville
Michael & Angela Virsinger - Seaford
Steve Petersen - Briarcliff Manor
Sushil Khanna - Katonah
Andrea Anthony - Yorktown Heights
Barry Feinberg - Croton on Hudson

WAA Club Picnic

Saturday July 14th, 2pm
Trailside Museum, Ward Pound Ridge

The event is for WAA members and their guests only. Club members are encouraged to bring side-dishes, salads and desserts. Tell the guard at the gatehouse you are going to WAA Picnic. Further details will be provided by email blasts. Directions.

WAA APPAREL

Charlie Gibson will be bringing WAA apparel for sale to the WAA picnic. Items include:

- **Caps, $10** (navy and khaki)
- **Short Sleeve Polos, $12** (navy).

Call: 1-877-456-5778 (toll free) for announcements, weather cancellations, or questions. Also, don't forget to periodically visit the WAA website.

Articles and Photos

The WAA Transit of Venus Expedition to Hawai'i
by Larry Faltz

Having barely managed to see the 2004 transit from Larchmont, I wasn't going to take any chances with the 2012 event. So last summer Elyse and I planned a vacation around the Sky & Telescope transit tour, which promised a high likelihood of clear skies for the complete 6½ hour transit from Mauna Kea on the big island of Hawai'i.

Even though the organizers planned to make telescopes available, I wanted to be able to view and photograph through my own equipment. We decided to take scopes we could carry on the plane, putting tripods and mounts in our checked duffels. Elyse used our trusty pre-Meade Coronado 40mm f/10 Hα scope on a battery-operated iOptron Cube mount, while I observed and photographed through a Stellarvue Nighthawk 80mm f/6 refractor with a Baader aluminized mylar filter, using the flip-mirror device I wrote about in the April 2012 newsletter. A manual Astrotech Voyager mount provided a stable photography platform.

We stopped outbound for a couple of days in Los Angeles, where Elyse has family. When we're in LA, we like to stay at the Inn at Playa Del Rey, a spacious and comfortable B&B bordering the Ballona wetlands south of Marina Del Rey and just 5 minutes from the airport. Playa is a quiet beach town with a couple of good restaurants and it's got efficient access to the freeway system. It's close to Venice and Santa Monica, two of our favorite LA places. In addition to dinners with family, we spent some time at Zuma Beach in Malibu and visited the Getty Museum, an architectural masterpiece in the hills above the 405 freeway.

We flew directly from LAX to Kona on the big island and drove the north road towards Hilo. Elyse had found a lovely B&B on the ocean, the Palms Cliff

House Inn, 14 miles north of Hilo. We were based there for 4 days on our own and explored the windward side of the island.

Part of the Getty Museum from its garden

View from the Palms Cliff House Inn veranda

The big island has more climate zones than any other place on earth, but fundamentally the east side of the island is very rainy while the west side is very dry (although clouds often form). Two enormous volcanoes divide the island in half and separate the climates. Mauna Kea, which is dormant, reaches to 4,205 meters (13,795 feet) and Mauna Loa, which is an active volcano (its last lava flow was in 1984), is just 35 meters lower and, when measured from its base on the sea floor, is considered the largest mountain on Earth. On the south side of Mauna Loa are two currently active eruptions, Kilauea Crater and Pu'u O'o. Massive lava flows from Mauna Kea, Kilauea and Pu'u O'o are visible on the west and south sides of the island and the vast areas of devastation make for remarkable scenery. We walked on recent lava flows, including a flow that closed the Chain of Craters road in Kilauea National Park just 15 years ago (and wiped out a couple of residential communities as well). Kilauea National Park was so fascinating that it drew us back three times in four days. It's only about 35 minutes from downtown Hilo, on a straight and well-paved road.

Kilauea Caldera emitting sulfur dioxide

An overlook provides an excellent view of the Kilauea caldera, which spews vast quantities of poisonous sulfur dioxide steam. Fortunately the winds take the cloud to the south, but as a result the loop road around the crater had to be closed, making a close-up view impossible. At night, the lava lake deep in the caldera (too low to be seen directly) illuminates the smoke, giving it a bright orange glow (photo next page).

Driving down the Chain of Craters road is an amazing experience. You cross lava flow after lava flow, eventually descending to the coast and reaching the impassible 1996 flow. From that vantage point, you can see smoke coming from Pu'u O'o if the rain clouds aren't present. While the rain might make some of the distant viewing difficult, it can create bright late-afternoon rainbows. We had an inspiring view of an intense double rainbow and the moon one afternoon. The main bow went from horizon-to-horizon, too wide even for my 18-mm camera lens to encompass (see photo 2 pages further on).

On the Saturday before the Transit, while still based near Hilo, we drove up to scout out the Mauna Kea Visitor's Information Station and the Onizuka Center for International Astronomy, named after an astronaut who died in the Challenger accident. This facility, at 9,300 feet, does a huge amount of astronomy outreach, including nightly star parties using some fairly hefty scopes (up to a 16" SCT) as well as organizing a caravan to the summit each Saturday and Sunday to visit the research observatories.

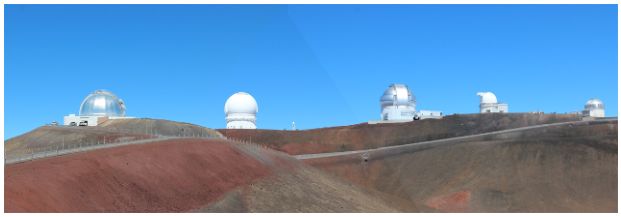
A real “lava lamp”: Smoke from Kilauea Caldera lit from the lava lake below its edge. The stars just above the clouds are, from the center to the right, α Centauri, β Centauri and the Southern Cross (Hawai’i is at 19º N latitude)

A public road goes to the top of the mountain, but 4WD is required for the tour, so we hoped we might be able to hitch a ride. We had brought our 40mm Hα scope for a test run, and this attracted the attention of Andy Green, a British astronomer and Fellow of the Royal Astronomical Society who also does a monthly astronomy show for the BBC and lectures on astronomy on Cunard cruise ships. Andy was kind enough to offer us places in his Jeep. After viewing an hour-long film on the observatories (and their struggles with some Hawaiians who view their presence on the mountain as trespassing on sacred land) and hearing dire (but appropriate) warnings about possible health problems at high altitude, we embarked.

The lowest part of the road is paved, but then there’s a long, steep, twisty, unpaved, washboarded stretch (probably kept that way to discourage traffic) before regaining pavement just below the summit. On top, we were greeted with a remarkable sight: a dozen major observatories ringing a ridge just below the actual (and very sacred) summit, which is located on a cinder cone a couple of hundred yards to the east. Dominating the view to the west are the white domes of the two 10-meter Keck telescopes. South of them is the silver dome of the Japanese Subaru 8.3-meter scope. On the north-east ridge are the 8.1-meter Gemini North telescope and four scopes ranging from 2.2 to 3.8 meters, and just below the ridge are a clutch of submillimeter instruments. A couple of miles down the road, sitting all by itself, is a 25-meter radio dish which is a member of the world-wide Very Long Baseline Array.

Andy Green and Elyse in front of Keck 2

It was cold (45ºF) and fairly windy on top. After about an hour we definitely began to feel the effects of altitude: some fatigue, a mild headache and a general sense of unease. All of the scopes are operated remotely (we visited the Keck headquarters in the Hawaiian cowboy town of Waimea at 2,000 feet elevation several days later) and no one stays on the ridge at night unless there is an unusual technical problem. The altitude is just too imposing.



A composite of 2 images of the Northeast ridge of Mauna Kea. From L to R: 3-meter NASA Infrared Facility, 3.6-meter Canada-France-Hawaii telescope, 8.1-meter Gemini North, 2.2-meter Univ. of Hawaii telescope, 3.8-meter UK Infrared telescope

The S&T program was based at the Waikoloa Beach Marriott Resort on the (western) Kona coast. It started on Sunday evening June 3rd with a cocktail party. There were over 100 attendees, most of whom seemed to be avid amateur astronomers and eclipse-chasers. There was a good deal of delicious gearhead talk throughout the event, but also lots of other wide-ranging and interesting conversations as we met people from around the country and even from England and Australia.

My dome between those of the Subaru and Keck telescopes.

Double rainbow and Moon (upper right) from the end of the Chain of Craters road

The scopes on Mauna Kea as seen from 26 miles away (and 13,750 feet below)

On Monday, we heard about conditions at the top of the mountain. The organizers, taking no chances that we'd be unprepared or disappointed, reported the possibility of very high winds and even precipitation at the top (at night, the clouds drop as they cool, leaving most nights completely pristine for the research scopes, but day conditions are much more variable). They suggested possible alternative viewing sites and discussed how decisions would be made on Transit day. They also mentioned that the final hour or so of the transit was not visible from the VIS because of an intervening cinder cone, and we'd have to make a decision about where to go to see third and fourth contacts (we already knew this from our scouting trip).

Bob Naeye, Editor of S&T, then gave three lectures. The first was an expanded version of his NEAF talk this year on the Transit, with a thorough discussion of orbital dynamics and marvelous descriptions of previous Transit expeditions. After lunch came two lavishly illustrated talks on the Cassini mission to Saturn, one on planetary studies and the other on Saturn's moons. In the evening, we took our 80mm refractor out for a quick look at the Omega Centauri star cluster, which at Hawaii's latitude was nearly 20º above the horizon. It was easy to find, but undistinguished because of the full moon and the hotel's lights.

On June 5th, Transit Day, weather reports coming down from the mountain at 7 am were favorable for viewing at altitude and so we left at 7:30 am in a 16-person van, one of 7 engaged for the 1-hour trip to the VIS. The route initially passes through lava fields on the coast and then heads inland, gaining elevation through vast open tracts of the Parker Ranch. Most of this area was once a single gigantic forest, but cattle were introduced in the late 18th century after Captain Cook "discovered" Hawaii and their grazing wiped out much of the native flora, leaving thousands of acres of whitish grass. The narrow and twisty Saddle Road, built by the US Army in 1942 for defensive response to an anticipated Japanese invasion, gives way after a few miles to a new road, making climbing up to the 6,600-foot elevation of the "saddle" between Mauna Loa and Mauna Kea easy. A twisty but modern road climbs to the VIS where a host of staff directed traffic for tour vehicles and private cars.

Part of the crowd at the VIS

We set up our scopes as directed in the parking lot of the VIS, among a host of both private and commercially-supplied instruments. Scopes supplied by the Onizuka Center and by a number of private companies ranged up to 16" and there were many 8-inch SCT's, 3-4 inch refractors and reflectors up to 10", a few with funnel projectors (recently described in S&T). Direct-vision scopes supplied by the tour all had Thousand Oaks glass solar filters, which give an orange hue to the white-light image, while amateurs were split between glass and Baader aluminized mylar filters. The largest refractor I saw was a gorgeous Astrophysics Starfire 130 EDF (f/6) on a DiscMount brought by an amateur from Connecticut. A Baader Herschel Wedge provided the filtering, and this scope gave a contrasty, detailed visual image, the best that I saw. The owner told me he was on the waiting list for this scope for 8 years! Patience gets rewarded in this hobby. Many people used DSLR's with long focal-length lenses and mylar filters and there were a dozen or more PST's. Cardboard eclipse glasses with mylar filters were ubiquitous; Venus was

barely resolvable with the naked eye, but I suspect people younger than me had an easier time seeing the planet.

Displaying the sun with a "Funnel projector"

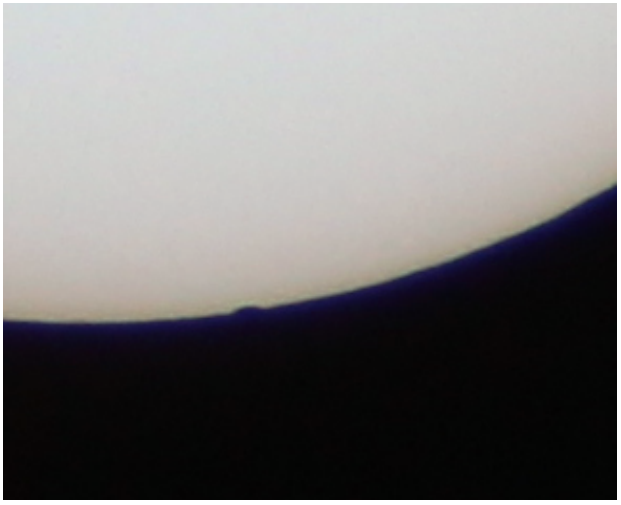
Using a PST and a video camera, a group near us from Preston, England, broadcast the event over the Internet to their hometown, which is right next door to Much Hoole, the site of Jeremiah Horrocks' first sighting of the Transit in 1639. As the morning wore on and first contact grew nearer, the crowd enlarged, with more people, more scopes and more anticipatory excitement. The blue sky was remarkably clear, with excellent seeing and transparency. All the clouds were below us. The temperature was about 60º F with a moderate breeze.

The business end of my setup: flip-mirror, 18 mm Plossl eyepiece on helical focuser, Canon T3i with angle finder

A very extensive set of sunspots made the disk interesting and aided focusing. This was a major contrast to the 2004 Transit, where the solar disk was completely blank.

Elyse (wearing her WAA cap) talking to S&T Editor Bob Naeye

First contact was called out around 12:10 pm local time, and within a minute or so everybody could see a tiny indentation on the solar disk. As Venus moved onto the disk, Elyse made out the thin rim of refracted sunlight in the Cytherean atmosphere with her Hα scope, but I couldn't see it in the white-light scope and the focal length I was using for photography wasn't capable of resolving it. Second contact brought the famous black drop effect. It was clear why measurements of the exact time of second and third contact would be impossible. The effect was seen in scopes of every size and quality.



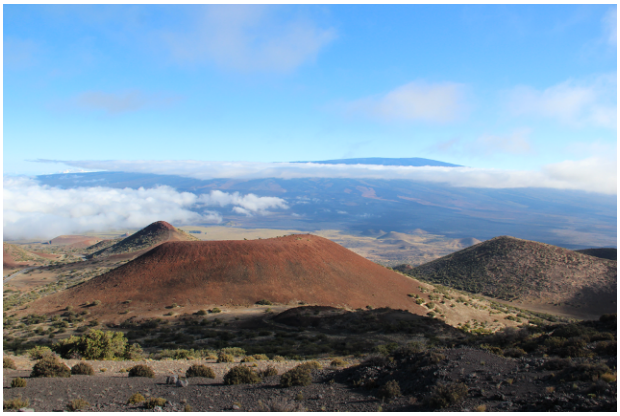
Just after first contact

The Black Drop effect at second contact

As the Venusian disk slowly crept across the sun, the crowd grew as many locals came up the hill for the well-publicized event. Many people stopped by our scopes, interested in the views, the equipment and the story of why we had traveled so far to see this phenomenon. Our "WAA Transit of Venus Expedition" signs (complete with WAA logo and web site address) helped start a number of conversations about the club and about the New York area, a place many of these people had never been to.

Near mid-Transit

By 4:00 pm, with the Transit almost 2/3 of the way through, we had to decide where we were going to go to see the third and fourth contacts. The obstructing cinder cone to the west would preclude observations after about 5:30 pm (third contact was at 6:26 pm with the sun less than 10º above the horizon). In addition, clouds frequently form in the afternoon on the west flank of Mauna Kea, and these could obstruct the view to the horizon. If we went up to the top, we would have to deal with cold temperatures, brisk winds and the brain-bashing effects of high altitude.



Looking down from near the top of Mauna Kea, with Mauna Loa in the distance.

Most of us opted to drive back to the hotel on the Kona coast, which is usually clear late in the day, and observe from there (and all the better to get to the celebratory dinner at a reasonable time). The van trip back took about an hour. With the sun now so close to the horizon, the seeing had deteriorated (as expected because of the low solar altitude) and there were a few thin clouds at times, which didn't obstruct the view and made for a few evocative photos). We had no problem seeing and photographing third and forth contacts. When the event ended, there was spontaneous applause from the group, and we were further rewarded with a gorgeous Hawaiian sunset.

Near third contact, from sea level

Sunset after the Transit

The next day we went to the W.M. Keck Observatory headquarters in Waimea (check out their fine web site, which has some very informative webcasts and podcasts). We had a superb introductory lecture on the telescope's optics (36 hexagonal mirrors kept precisely aligned by computer-driven servos), spectroscopy (we were each given diffraction gratings in 2x2 slide mounts to see emission lines from lamps filled with different gases) and the complex laser guide-star system that allows each Keck scope to have milli-arc-second resolution. We went to the Keck 1 control room and one of the resident astronomers told us how the scopes were operated and what a night's observing session entailed.

We learned that, sadly, funds for many of the Mauna Kea scopes are drying up, as astronomy projects compete for public and private money in a difficult world-wide economy with governments worried about national debt. The UK is looking to dispose of its two scopes, and unless another sponsor or group of universities is willing to take on their management and operations, the scopes may have to be dismantled, in which case their sites have to be returned to their primal, pre-telescope states. The optical interferometer that allows the two 10-meter Keck scopes to operate as a single 85-meter mirror is being mothballed because of trouble finding the $1 million a year that the complex device needs to operate (for comparison, consider that the federal Medicare program spends $1 million in just over a minute!). On the good side, an international consortium is planning the build the Thirty Meter Telescope on the mountain, although this fantastic instrument is still in the design stage.

It was sad to end such an exciting trip. So that we didn't shock our internal clocks, we stopped in San Francisco, where we rode the cable cars, ate a dim sum lunch in Chinatown and went to AT&T Park for the Friday night Giants-Rangers baseball game. The most exciting part of the game was not Josh Hamilton's towering three-run home run to center field, but a remarkable animal behavior phenomenon. Seemingly at the instant that the last out was made, about 500 seagulls flew in from adjacent San Francisco Bay and dived on the stands to devour the vast quantity of discarded hot dogs, fries, cotton candy, pizza and Cracker Jacks (they come in *bags* now! Egad!). How did they know the instant that the game was over? Believe me, they knew.

Although it was an effort to drag our equipment to Hawai'i and we had some plane-boarding anxiety on each of the 4 legs of the journey worrying that we wouldn't find space in the overhead compartments for the scopes (which turned out not to be a problem), we had an unforgettable (and unrepeatable) experience, saw some fantastic scenery, got to meet fellow astronomy enthusiasts and made some new friends.

Elyse and friend on the Punalu'u black sand beach on the big island's south coast

Crowd at Transit of Venus at Phelps Hospital

Courtesy of Mathan Gopalsamy

Courtesy of Doug Baum

Courtesy of Bob Kelly is this beautiful image of transit, shot through the clouds which plagued Westchester viewers of this historic event. Notes Bob: The Sun's light is filtered through clouds on two planets, Venus and Earth. The Earth's clouds make the iridescence on the right. (Canon XS at 250mm).

Almanac

For July 2012 by Bob Kelly

July 3 July 11 July 19 July 26

Now that we have your attention after the transit of Venus, what's left to look at in the sky? First, you can put those solar filters to work (mine just arrived on back-order). The solar cycle is ramping up and there'll be lots of sunspots. Check web sites like spaceweather.com to find when some spots will be large enough to see even with those solar eclipse glasses.

Back in prime time, our evening show starts late due to sunsets after 8pm EDT this month, but Saturn is waiting for you and your telescope. No matter what the size of your telescope, if the air is steady, start with a medium power eyepiece and take in Saturn, its rings and brightest moons. Then, just for fun, see how much power you can use without Saturn becoming fuzzy, even going beyond the rule of 'two times the aperture in millimeters'. But even our small scopes at modest power, the magnitude +0.7, 17 arc second-wide ringed planet is marvelous, especially during quadrature, which occurs at mid-month. Being 90 degrees from the Sun in the sky lets us see the shadow of Saturn on its rings, looking like a small black notch in the part of the ring next to the planet. Then look for Saturn's moons in the same field.

Mars finally quits Leo and sneaks toward the paring of Spica and Saturn, nicely framed in Virgo. This is a treat that needs no telescope. With salmon-colored Mars at magnitude +1.0 and 6 arc seconds wide, pour on the power and you'll see – well, only a slightly larger salmon-colored blob. You can't have everything! But the gang in Virgo will make a nice backdrop if your fireworks show is in the southwestern sky. The swelling Moon sails by from July 23 to 25.

Mercury rides off into the sunset in early July. The innermost planet is farthest out from this Sun in the evening sky the day before the month starts, but has already dropped over a magnitude to +0.5 on July 1. Ironically, Mercury is increasing in apparent size from 8 to 11 arc seconds as it disappears into the solar glare the second week in July. Early morning risers will be rewarded viewing the antics of our brightest planets, with Jupiter and Venus reprising their near-courtship we saw in the evening sky during the first half of this year. With sunrise running between 5:30 and 6am EDT in July, the best time to view Venus and Jupiter cavorting low in the east-northeast is before 4am, a bit later if you use binoculars. Sadly, Venus' rush to embrace Jupiter falls short by five degrees and she gets tangled up in the horns of Taurus. Jupiter seems to look on sympathetically, as if deciding whether to go and rescue Venus, but our lady is very bright and she untangles herself from the horns, placing herself as a lovely horn extension for the bull around the 16th. The Moon shows its horns as it joins the fun from the 14th to 16th. Compare the crescent Moon with the view in a telescope of crescent Venus and the oblate blob of Jupiter.

The new Moon takes on additional significance this month as its first sighting is the signal to start the holy month of Ramadan. It may be hard to see the first two days after the time of astronomical new Moon at 12:24am EDT on the 19th.

Earth passes through its farthest point from the Sun on July 4th around 11pm EDT. We'll be 3½ percent further from the sun than at perigee. Folks at local midnight near the Tropic of Capricorn get to be the furthest from the Sun than anyone else all year. However, I don't think there will be any tour groups going to the Southern Atlantic to experience this event. July's meteor showers get washed out by the late month maxed-out Moon.

The International Space Station is missing from our skies for most of July making its visible passes in the morning from July 18th through August 5th. The Chinese Tiangong 1, recently visited by three taikonauts, is visible in the morning sky from the 6th through the 19th and the evening sky from the 20th through August 3rd.

Want to go deeper? Look for that keystone pattern of stars overhead with a tiny fuzzball, M13, that becomes a ball of hundreds of tiny stars in a telescope. It's more fun when you consider that globular clusters are some of the oldest objects in the present universe. For a long time, calculations of the age of the universe made the universe younger than the stars in globular clusters, which can't be true, can it? (See http://map.gsfc.nasa.gov/universe/uni_age.html)

Bob's blog is at bkellysky.wordpress.com