The Denver
OBSERVER
APRIL 2013

COMET PANSTARRS SETS OVER THE ROCKY MOUNTAINS OF COLORADO

Beautiful comet PanSTARRS sets over the Rockies on March 19, 2013. Note the fan-shaped tail with several streamers (the dust tail), and the straight tail on the right (the ion tail). This image was stretched very hard to show the faint outer parts of the tail. Roger used his Canon 1D Mark IV 16-megapixel digital camera with a 300 mm f/2.8 L IS lens at f/2.8. He made 15 two-second exposures from a fixed tripod and combined in two ways: 1) averaged images aligned on the comet, and 2) averaged with no following of the comet to show the mountains. The two averaged images were then combined. 30 seconds total exposure at ISO 1600. The mountains were lit by the 1st quarter moon. Follow Roger at *clarkvision.com*.

Image © Roger Clark

Calendar

2.....Last quarter moon

10.....New moon

18..... First quarter moon

25.....Full moon

Inside the *Observer*

APRIL SKIES

by Dennis Cochran

Crater cups itself in the south just west of that easy-to-spot constellation, four-sided Corvus the Crow.

They are both part of a story by Ovid that is too silly to recount, one that makes Apollo seem stupid and also includes Hydra the Water Snake, the constellation below them, which is the largest in the sky. Meanwhile, a bit higher in the sky, the wonderful Virgo galaxy cluster advances into prominence behind Leo who is straight south of the zenith in the late evening. A brilliant moon washes over all of this in the early twenties of the month, so look another time.

To get to the Virgo cluster via the scenic route from the top of Corvus slide north about 3/4 of the crow and a bit east to 12^h40^m -12 to tarry awhile at M104, the Sombrero Galaxy. You've seen pictures of this almost edge-on spiral that show its dark dust lane cutting across the large, bright nucleus, and now you can see it for yourself. Continuing on, the heart of the Virgo Cluster is way north of that, around $12^h25\text{-}30^m$ +15 and contains the three big elliptical galaxies M84, M86 and M87. My *Peterson's Guide to the Stars and Planets* (2nd Edition) has a detailed map of the cluster as Chart 27A on page 261. If you're a faint-fuzzy fan you could go crazy in this corner of the sky. Captain Picard never had this much fun! Well, maybe he did.

Meanwhile Comet PanSTARRS slides to the north as its brightness fades. It will become a morning and evening object at the end of March into April. **Photo ops:** it will pass M31 on Thursday, April 5, in the morning hours, and later in the month the western end of Cassiopeia. Also in the solar system, we're starting to lose Jupiter as an evening object even as we gain Saturn. The Ringed Planet rises around 9:00 P.M. at the first of the month and at sundown towards its end. If you start observing early

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PRESIDENT'S CORNER

by Ron Hranac

The new officers and E-Board members were installed during last month's 2013 Spring Banquet. A sincere thanks to outgoing members Chuck Carlson, Dennis Cochran, Naomi Pequette, and David Shouldice. Thanks, also, to Ron Pearson for serving as the Society's president for the last three years (Ron remains a member of the E-Board as Immediate Past President). The contributions each of you has made to the success of the DAS are very much appreciated.

A big welcome to our new E-Board members, John Barela, Digby Kirby, Scott Leach, Dena McClung, and Ed Scholes. In the officer department, Lisa Judd and Brad Gilman were reelected Vice President and Treasurer respectively. We have two new officers this year: Dena McClung picked up the votes for Secretary, and yours truly was elected President.

Another Ron for President? The previous administration insisted I had to carry on the tradition. I'm still reading through the bylaws looking for that clause that says one must be named Ron to be the DAS President. Allow me to introduce myself: My name is Ron Hranac, also known as Ron #3. I'm the guy who often sets up a meteorite and "meteor-wrong" display in Chamberlin during our monthly open houses. For those of you who don't know your new DAS President, here's a little background.

I'm married, have three grown children, and five grandkids. Denver's southern suburbs are home, and have been since our family moved to Colorado in the early 1980s. My better half is a semi-retired school teacher, who maintains her kid fix these days by substitute teaching. My day job is in the telecommunications engineering field, a career I've enjoyed for the past 40 years. No plans to hang up my hat just yet—my wife says I'm not allowed to retire until I'm 85. That edict has something to do with her definition of retirement—"Twice as much husband, half as much money."

Like many of you, I was bitten by the amateur astronomy bug early on. When our kids were growing up, I used to set up a small telescope in the driveway for casual observing. The neighbor kids would come over, too, and all of us would enjoy looking at the night sky. I'm a visual astronomer, with an emphasis on the public outreach side of things. Joining DAS several years ago merely confirmed a passion for sharing daytime and nighttime telescope eyepiece views with others. Indeed, up until a couple of years ago I was a regular on the park lawn during monthly open houses.

One cloudy open house weekend, I decided to forego setting up a scope and hoping for a clear sky. Instead, I brought a few meteorites and tried an informal show-and-tell inside the observatory for open house attendees (blame Day Wray for my interest in space rocks). That went over so well with the public that I have continued with the open house meteorite display. It has been expanded somewhat to include the

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DAS SCHEDULE

APRIL

5-8 **EGK Dark Sky weekend (Messier Marathon—Alternate)**
12 **E-Board Meeting at Chamberlin (Begins at 7:30 P.M.)**
20 **Open House at Chamberlin Observatory (Begins at 7:00 P.M.)**
26 **General Membership Meeting at Olin Hall (Begins at 7:30 P.M.) Speaker: Fran Bagenal, Juno mission co-investigator, University of Colorado, Boulder: *The JUNO Mission to Jupiter: What's Inside the Giant Planet?***

MAY

10-12 **EGK Dark Sky weekend**
11 **Space Day @ DMNS w/solar telescope viewing, details coming**
18 **Open House at Chamberlin Observatory (Begins at 7:30P.M.)**
24 **General Membership Meeting at Olin Hall (Begins at 7:30 P.M.) Speaker: Tom Field: *Amateur Astronomical Spectroscopy***
31 **E-Board Meeting at Chamberlin (Begins at 7:30 P.M.)**

Public nights are held at Chamberlin Observatory every Tuesday and Thursday evenings beginning at the following times:
April 9 - October 1 at 8:30 P.M.
October 2 - April 8 at 7:30 P.M.
Costs to non-members are: $3.00 adults, $2.00 children.
Please make reservations via our website (www.denverastro.org) or call (303) 871-5172.

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The Executive Board conducts the business of the DAS at 7:30 p.m. at Chamberlin Observatory. Please see the Schedule of Events for meeting dates. All members are welcome.

www.denverastro.org

APRIL SKIES

(CONTINUED FROM PAGE 1)

enough you'll see both of the gas giants. Next, on we go to the galaxies of Leo, Virgo (mentioned previously), Ursa Major and Draco. What a great time to be observing!

The Three Leaps of the Gazelle, a line of three widely-spaced visual doubles introduced in last month's "Skies," are at the zenith these evenings. Just east of the gazelle's tracks is the two-star constellation Canes Venatici, a pair of hunting dogs associated by Hevelius with Boötes the Herdsman. Right above the middle of the line connecting these alpha and beta stars lies the spiral galaxy M94. East of that, about one alpha-beta distance is M53, a globular cluster. These two objects are at 12^h52^m +41 and 13^h15^m +42 respectively. The more famous globular cluster, M3 (photo at right), is way south in the Canes Venatici space in the middle of nowhere at 13^h42^m +38, a position that could also be described as due east of the beta star at the corner of corner-shaped Coma Berenices. This constellation, or Bernice's Hair, encloses the very widespread naked-eye star cluster Melotte 111. It also includes the Galactic North Pole at 12^h50^m +27, around which are gathered galaxies on all sides. Back up at Canes Venatici, two faint galaxies are located just past the beta, or upper star, and above that in another bunch of tiny galaxies is big and bright spiral M106 at 12^h30^m +47.

M3 (NGC 5272)

Messier 3 is one of the largest and brightest globular clusters. It is made up of around 500,000 stars. It is about 33,900 light-years away from Earth and thought to be around eight billion years old. Joe used his SBIG ST-2000XM CCD camera on an 18-inch Newtonian telescope. He made 10 minutes each LRGB exposures with one-minute sub exposures, binned 1x1. He shot this on June 11, 2010 at Rocky Mountain Star Stare 2010 in Gardner, CO.

Image © Joe Gafford

That other bunch of galaxies is the Ursa Major cluster in the below-the-tail region of the Big Bear, which lies north of Canes Venatici. This longer-than-expected-for-a-bear tail is the handle of the Big Dipper asterism. In the complicated origin myth of the bears, Zeus hurled them into the sky and their tails got stretched in the process. Hmmm. After scanning around for fainter galaxies in the M106 region, one could go north up almost to the gamma star in Ursa Major, the bottom-left corner of the dipper bowl, to find barred spiral M109, with NGC 3953 easily spotted south of it. And as we mentioned in an earlier "Skies," over at the western corner of the bowl is the M108-M97 pair, a galaxy and a round planetary nebula known as the Owl because of its two dark spots where its eyes would be. Other galaxies are scattered across the bowl. This away-from-the-Milky-Way area is galaxy country. Above the Dipper is Draco the Dragon's tail, with its own cluster. This end of the dragon separates the Big from the Little Dipper, with the dragon's galaxy cluster at 12^h20^m +75. And while you're up there you should go for the famous M81/82 pair of galaxies. Traditionally this is found by extending the dipper bowl diagonally northwest one bowl's worth; moderns will want to dial up 9^h55^m +69.

As the northern hemisphere warms and the nights get shorter, get out to take a walk under the other half of Nature, the night sky. You won't be disappointed. ★

ABOUT THE DAS

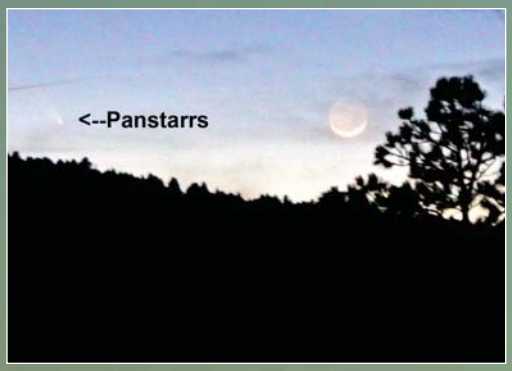
Membership in the Denver Astronomical Society is open to anyone wishing to join. The DAS provides trained volunteers who host educational and public outreach events at the **University of Denver's Historic Chamberlin Observatory,** which the DAS helped place on the National Register of Historic Places. First light at Chamberlin in 1894 was a public night of viewing, a tradition the DAS has helped maintain since its founding in 1952.

The DAS is a long-time member in good standing of the **Astronomical League** and the **International Dark Sky Association.** The DAS' mission is to provide its members a forum for increasing and sharing their knowledge of astronomy, to promote astronomical education to the public, and to preserve Historic Chamberlin Observatory and its telescope in cooperation with the University of Denver.

The DAS is 501 (c)(3) tax-exampt corporation and has established three tax-deductible funds: the Van Nattan-Hansen Scholarship Fund, the DAS-General Fund and the Edmund G. Kline Dark Site Fund.

More information about DAS activities and membership benefits is available on the DAS website at *www.denverastro.org.*

C/2011 L4 PAN



PRESIDENT'S CORNER

(CONTINUED FROM PAGE 2)

given to terrestrial rocks and some manmade things like slag that are commonly mistaken for meteorites. Kids and parents have a ball trying to find the real meteorite hidden among two dozen or so meteor-wrongs.

Let's see—telecommunications engineering, amateur astronomy, meteorites—your new prez. sounds like a bit of a nerd. Guilty as charged. Other interests include ham radio, rock collecting, and some occasional dabbling in photography. Heck, I still have a penny collection I started with my grandfather when I was about 10 years old. I also enjoy freelance writing, having penned and published hundreds of telecommunications-related articles and papers during the last 28 years. Oh, yes, I'm a Star Wars fan. Some non-nerd interests include four-wheeling (the Jeep kind) and drag racing.

Now that you know a bit more about Ron #3, you might be curious about what's on my plate for DAS. In the short term I plan to work with the E-Board to conduct what is called a SWOT analysis of the organization: strengths, weaknesses, opportunities, and threats. The outcome of what I anticipate will be a very productive brainstorming session will provide us with, among other things, an idea of what we're doing well and what we might be able to do better. Naturally, if you have ideas or suggestions, please feel free to pass them along to me or any other member of the E-Board. After all, we're here to serve you. ★

STARRS!!!

COMET SHOOTING SUCCESSES

Beginning around March 7 and on-going, DAS members have been out trying to catch a glimpse or photo of the sometimes elusive comet C/2011 L4 PanSTARRS. Photos counter-clockwise from the top (Page 4) of this two-page spread: Don Lynn, Ron Pearson, Greg Wimpey, Darrell Dodge and Ron Hranac. Background image shot by Darrell Dodge. Many more photos (along with tech. specs.) are posted on the DAS website special collection at: *http://www.denverastro.org/panstarrsL4.html*

ECLIPSE AND SOUTHERN SKIES TRIP REPORT

Article and photos by Lisa Judd

Seeing the southern sky is a treat, with or without optics, but a total solar eclipse makes the experience tenfold. We all know the north circumpolar area whose stars never set and an equally big circle where stars never rise; Ursa Major has plenty of galaxies, but the far south is more interesting—the clumpiness in Sagittarius that runs under the Scorpion's tail gets clumpier through the Eta Carinae region, the Southern Cross with its big, black Coalsack, across Alpha and Beta Centauri, and up into Canis Major; the Magellanic Clouds are two more bright clumps in a darker part of sky. This was my third trip south, and air travel with delicate optics takes planning, so I made a carrying case for my 6-inch Edmund from a gazebo case with wheels. On past trips I had a different 6-inch in a carrying bag I made out of an old World War II pup tent, with bubble wrap sewn on the inside and a strap so I could "wear" it. I had done Caldwell Gold and Southern Skies Binocular awards, but was one object short of Southern Skies Telescopic—so after an African eclipse and a star party in South America, this eclipse was my excuse to see New Zealand, Australia and the South Seas.

The path of totality was mostly at sea, with one tip of the shadow path falling on Cairns, Australia at sunrise. The point of max eclipse was south of New Caledonia, so this was also my first cruise. All the luxury didn't sit well with me, but I was interested in passage to a particular latitude and longitude, not massages and wine tours. The cruise sailed from Hilo but I didn't trust the crew or oceanographic weather to give dark-site conditions, so I planned a week on my own with the scope and embarked downline in Fiji. I've always been curious about New Zealand, and the cruise was going to make some later stops on the north island before ending in Sydney, but I wanted to see the south island too. The obvious destination: Lake Tekapo, a village of 300 in the Southern Alps – the country's year-round astronomy hub and wintertime ski resort.

SCOPING AT LAKE TEKAPO

Lake Tekapo is in Mackenzie county, known for a zero-waste policy separating all trash and extremely strict lighting controls. Even with dim garden lights, the B&B where I stayed allowed gorgeous views of the sky and often hosted annual visits from northern astrophotographers. It's home to Mount John Observatory, run by the University of Canterbury as a main research facility for professionals in New Zealand. There are other astronomy guest sites on the north island, but this was the place for hard-cores.

Lake Tekapo's main landmark is the Church of the Good Shepherd (background photo) and The 1848 Cooke Telescope at Carter Observatory (above).

To have the best weather chances between 3rd quarter and eclipse day, I booked six nights at Lake Tekapo, and also went to Wellington during the week to meet the club there and visit Carter Observatory. Too bad that night was one of three perfect ones, but a less-than-perfect one later still allowed some double stars. It's fun to re-orient in the southern hemisphere, as constellations appear to be upside down—the scorpion was straight vertical, sitting on his face with tail sprawling straight up. The Great Square sat "squarely" on the northern horizon across the lake, and the circumpolar Southern Cross swung from the 6:00 position to 9:00 at dawn like a big, double-slow hour hand. In late spring, sunset and astronomical twilight don't end until almost 11:00 p.m.

The time I had in Lake Tekapo allowed me to log all of the NGCs within the Small Magellanic Cloud, and about ¼ of the ones in the Large Magellanic Cloud (LMC). I hoped to redo some Caldwells that I hadn't logged accurately before, and an IC object on the Globular Cluster list would've been nice, but I ran out of time. My first attempt was the Dark Doodad—a neat little elongated smudge that ends in Globular Cluster NGC 4372 (C 108) in Musca—but no luck; I did split Alpha Centauri. C109's a planetary much like the Owl; wish I'd've had time. Caldwells are ordered by declination, so C109 is near the south celestial pole, halfway between Achernar and the Southern Cross.

WELLINGTON AND OTHER SOUTH ISLAND ADVENTURES

The trip to Wellington was great! The Wellington Astronomical Society is a jolly group, small but diverse, and they take loving care of the antique Cooke telescope at Carter Observatory that looks very much like Chamberlin. Built by the Cooke brothers in London in 1848, it's half the size but still uses a mechanical clock drive made by Grubb and transit scopes to do sidereal time service via an antique clock. It came to Carter around the turn of the century; Greenwich took over time service in 1905. There's a small gantry and it stands on a concrete pillar two stories down. The rest of Carter is a beloved city landmark, in the botanical gardens overlooking the city, and has a full space museum and planetarium.

Wellington is very vertical, and crammed skyscrapers go far underground with two floors difference between east and west sidewalk level. Everything is tiered, even rugby fields. This whole area sits on an earthquake-prone fault but they keep rebuilding, last time about 1910. Carter is accessible

Cable cars are necessary for the STEEP slopes in Wellington!

by cable car built for the steep gradient. When there's an eclipse in the area, guests come from all over the world and like to meet local clubs; there was a Canadian and a family that looked like they were from India. Afterwards, they go to McDonalds on the third floor of the next building for lamburgers. There are no hotels, just apartments; mine reminded me of the yuppie days, comfortable, stylish, small and several stories above the ground with a view of the window washers 10 feet away on the next skyscraper.

The next day I took the three-hour ferry that runs between the islands—since I never saw the majestic fjords on the extreme south island, I settled for the little ones on the north coast. Part of the KiwiRail system, the roll-on roll-off ferry that allows you to take a car over is fully equipped with a café, theater, playground, sun deck, and even a nap area. I took the Coastal Scenic railway back to Christchurch, passing sheep, kiwi fruit orchards and rocky beaches with seal habitats. Upon arrival I got a crash (!) course in how to drive a left hand rental car through a left-handed Burger King drive-through, and got back to Lake Tekapo in time for scoping. Later I drove south to see the amazing Moeraki Boulders—hollow, segmented spherical concretions that form in the sand cliffs, wriggle their way out, roll down the beach and sink in the sand. I took a picture of every five-footer on that beach! I didn't meet the Canterbury club, but noticed their impressive observing site.

I only got to spend an hour on Fiji due to a flight snafu, but saw from a cab that the way locals live is quite different from where the resorts are. The capital of Suva looks rundown and impoverished. Streets are lined with trash and thronged with smoky busses. Most food is purchased at outdoor markets. I almost missed the ship, which was delayed for a late shore excursion. On board were Steve O'Meara and Kelley Beatty, both dedicated "umbraphiles," and someone from the Los Angeles club. I found the gym, salon, library and acupuncture clinic, but never used them; besides the eclipse I never got around much on the ship. I heard there was good sky on the way down from Hawaii, but post-eclipse

it was too cloudy. Despite pre-negotiations, the crew only allowed two hours per night on deck with lights out—good for Jupiter but not fuzz-hunting.

E-DAY!

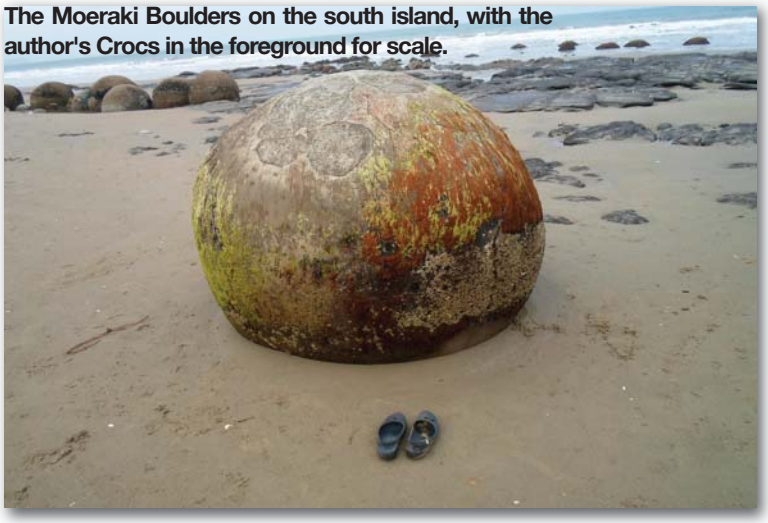
It's hard to describe an eclipse, much less image it. At a shipboard meeting, O'Meara said this phenomenon has stopped wars. Even if I had decent photography skills, there's only so much that a camera can show; it won't convey sudden temperature drops, animal behavior, air smell, panoramic sunset, or the feeling of being engulfed. You don't just look at totality, you experience it, and every second counts so you don't fiddle with equipment during partial phases. I hope I can come close to a description: fire and ice, or a nuclear bomb going off without the explosion—you just slip soundlessly into nuclear winter and three minutes later slip just as casually back into real life. I heard an account of a Caribbean eclipse where dolphins were jumping out of the water during totality; maybe they knew what was happening and wanted to see it too.

Strange things happen to your mind when you have night in the middle of the day. Experienced eclipse chasers scream involuntarily—and you don't know you're doing it until later when reviewing video. One guy couldn't figure out whether to laugh or cry, so he did both at the same time. The light around you is different—shadows get deeper, and since we're all used to living in white light, it's weird to be in silver light. People around you appear to be in film negatives, and I felt I was hearing the crowd noises underwater; I also felt an urge to spend $25,000 to see one in Antarctica just to see penguins in reverse video. When looking naked-eye, the big black hole in the sky is striking, but the corona's a lot smaller than in pictures or video.

Though I had my scope, I just enjoyed this one in a lawn chair with a solar filter held over binoculars (corona was more extensive). The partial phases darkened the sky, easily exposing Venus, then the second diamond ring looked like a very bright Venus against the deep-blue twilight. I didn't see prominences or shadow bands; people told me the bands were there but I don't think I know how to look yet—like learning to recognize zodiacal light. And, just like that, it was over. As the sun brightened back up, Beatty announced over the intercom that any first-timers were no longer "eclipse virgins," welcomed them to the other side, and thanked the captain for maneuvering to a clear spot. A total solar eclipse is something everyone should see at least once in their lifetime—if you've been waiting decades, it's only five more years until it comes to our neighborhood.

THE REST OF THE TRIP

After two days at sea to come down from the e-high, the cruise made stops on the North Island. They offered a day of Maori culture at Rotorua, but I had pre-planned a trip to White Island, an active sulfur volcano. I needed another person and had asked before leaving if Steve and Donna O'Meara (both volcanologists) would like to go; we didn't meet up on that day, but a lady from Scotland was also alone and happy for a partner. Despite hard hats and respirators, I tasted sulfur for two days from crawling around in the steamy caldera, and got specimens that smelled up my luggage. It was like walking on Io, down to the detail of Tvashtar Catena. On the way back we flew over thermal mud pits where others were sitting to get super-soft skin while my hair got acid reflux.



The Moeraki Boulders on the south island, with the author's Crocs in the foreground for scale.

The largest telescope at Mt. Stromlo, lost in the Canberra wildfires of 2003.

Next, I visited the Stardome—headquarters of the Auckland Astronomical Society (AAS) and the Edith Blackwell telescope. It's designed for kids; two birthday parties were in progress and a third later, with playground observing pads outside. Their science-on-a-sphere was projected from inside, unlike those at DMNS and elsewhere from NASA. It seemed a bit suspicious to "adopt-a-star"—not really selling for profit, but supporting the museum. The next day others went there to chat with AAS, but I did the Auckland City Bridge Climb (similar to the better-known Sydney Bridge Climb offered at cruise end) from a bungee-jumping company. I only expected to walk up for the view, but one of the cruise personnel watched others jump and suddenly got the bug to do it. The guide was happy to switch gears—what the hell; it's only death, right? I went right off without hesitation, but on the way down in full weightlessness, the thought crept into my mind that maybe it wasn't a good idea. Then came "the yank," so I got bearings and bounced awhile.

When we disembarked in Sydney, four of us did a trip extension. I sneaked off to Canberra to see the Deep Space Network (DSN) station at Tidbinbilla outside of town, and toured the 2003 wildfire ruins of Mt. Stromlo on the way there. Vegetation hasn't come back much in the decade since, but there are some new domes, remote observing clamshells, and a new visitors center and café. The space center at the DSN is run by CSIRO's Glen Nagle, who has collected some precious space artifacts on his own time and built a top-notch museum out of what was originally a dorm. They're building two new antennas out there, and all cell phones must be off.

The first official part of the trip extension was to see Ayers Rock, now Uluru, at sunrise. The moon was now nine days old but I hoped to get in another night of scoping—high wispy clouds interfered, rare for this 120° F. desert. I did a little more LMC, but sacrificed more sleep than I would've liked. As in Canberra, the flies were vicious but the tour was good, and I'm glad I got to see the rock. Then it was off to a comfy luxury hotel in Cairns, with eclipse crowds now gone, and the first bathtub I had seen in weeks. We went to the Great Barrier Reef, which extends all the way up to New Guinea and is visible from the moon. A ferry took us to an offshore pontoon with loads of amenities (helicopter tour); wetsuits were required because of stinging jellyfish.

What a trip—three clubs, four observatories, four space museums, three scoping spots, four good nights of logging two clouds, five geological wonders, three minutes of weightlessness, and the greatest sky spectacle nature ever puts on. I watched the southern stars creep into view of the plane window on the way down, and now I was wishing them goodbye. I saw the Venus-Saturn conjunction reflected off the pacific with the Southern Cross on its side and the splendid Milky Way running through it vertically. I can't wait for the chance to return and see even more—both on land and in the skies. ★

COMET PANSTARRS AND THE CRESCENT MOON SET IN THE EVENING TWILIGHT OVER THE ROCKY MOUNTAINS OF COLORADO

Roger used a Canon 1D Mark 4 16-megapixel digital camera with a 300 mm f/2.8 lens This is a two-frame mosaic made at f/2.8, 1/5 second, ISO 800 at 7:53 P.M. MDT on March 12, 2013, from a fixed tripod and mirror lock-up.

Image © Roger Clark

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