The Objective View

January 2005

Newsletter of the Northern Colorado Astronomical Society

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Next Meeting: January 6 7:30 PM
The Kansas Cosmosphere, by Dan Laszlo

Elections

NCAS Business at 7 PM
Meeting directions Discovery Science Center
703 East Prospect Rd, Fort Collins
http://www.dcsm.org/index.html
In Fort Collins, from the intersection of College Ave and Prospect Rd, head East about 1/2 mile. See the Discovery Center sign to the South. Enter the West Wing at the NE corner. From I-25, take Exit 268, West to Lemay Ave, continue West 1/2 mile, see Discovery Center on the left.

NCAS Dark Sky Star Party Dates
January 1, 7, 8
Cactus Flats site is on undeveloped parcel of prairie about 6 miles West of Briggsdale. Take Colo Hwy 14 East from I-25 (Exit 269). Go 19 miles East to Ault. Continue 18 miles East of Ault. At County Rd 65 (Milepost 170), turn North, go one mile. Site is through the wire gate on the right, no road, close gate and set up. Beware of the cactus. The site is now officially wheelchair accessible, but there are no facilities so bring essentials. Call **Tom Teters,** tomt@starmon.com **,** with questions about star party status or dates, 482-5702.

Starwatch at Discovery Science Center
703 E Prospect Ave, Fort Collins
January 14 6:30 pm

Other Events

Little Thompson Observatory Star Night, Berthoud
January 21 Star Night
http://www.starkids.org

Cheyenne Astronomical Society
January 21 7 pm Cheyenne Botanical Garden
Please RSVP to 635-5944 for Members Christmas Party
http://home.bresnan.net/~curranm/

Open House, Chamberlain Observatory, dusk to 10 pm
Jan 15, Feb 12, Mar 19, Apr 16 303 871 5172
http://www.du.edu/~rstencel/Chamberlin/

Longmont Astronomical Society
Jan 20 7 pm 550 Coffmann St
http://longmontastro.org/

December 2 Program
Astrobiology 101, by Dr. Dan Laszlo
NASA has recently promoted astrobiology as an organizing theme. In the agency's vision, astrobiology seeks to understand the origin of the building blocks of life, how these biogenic compounds combine to create life, how life affects - and is affected by the environment from which it arose, and finally, whether and how life expands beyond its planet of origin. For the first time since they were posed, these questions may now be answerable. Astrobiology seeks to provide a philosophical and programmatic underpinning whereby life's place in the universe can be explored - at levels of inter-related complexity ranging from molecular to galactic. A vast array of scientific and engineering disciplines involved, but that the intersection points between these disciplines are often novel. These questions are posed:
--How do you get from simple chemistry to self-replicating life forms?
--How do you assess a planet's life history?
--How do life and its world affect each other over time
--Does life in extreme environments model the origin of life on Earth and elsewhere?
--How do large scale planetary impacts cause ecosystem damage? How does it recover?
--How do we avoid an undesirable interplanetary mix of life forms?
--Searching for and communicating with extraterrestrial intelligence
The progression from simple chemistry to the simplest life forms is a major mystery. Protozoans, bacteria and archaeans, and mycoplasma are progressively simpler free-living forms, but too complex to arise spontaneously. Viruses are obligate parasites of other cells, not independent organisms. Prions are malformed proteins which can induce other proteins to change shape and aggregate, so they require existing cells to propagate. DNA requires proteins to replicate, and proteins are made to a DNA blueprint, a chicken-or-egg problem. A solution may be found in the work of Thomas Cech. He has found RNA molecules which can catalyze reactions, so the role of biological catalysts is not restricted to proteins. Systems of organic molecules which cycle through episodes of building and degradation are under study. We still have a large black box between self-replicating molecules and the simplest cell. Another intriguing aspect of astrobiology is research on life in extreme environments. A can of irradiated beef was found spoiled. It was home to the most radiation-resistant organism yet found, D. radiodurans. Its DNA repair ability is extraordinary. It can recover from 1.5 million rads as gamma radiation, which is 3000 times a lethal dose for a

typical organism. It is believed this resistance is a side effect of its tolerance for extreme dehydration, which can also fragment DNA. Frozen moss from Siberia has been revived after 40,000 years. Heat tolerant microorganisms have been recovered from the Potomac River, but the current record holder, Geobacter strain 121, came from the Juan de Fuca Ridge in the Pacific. Chimney-like vents 4 stories tall spew superheated water. Its growth at 121 C lets it survive a hospital sterilizer. It can grow by reducing the iron in rust. Antarctica is host to researchers with ice-probing robots. These are precursors for cryobots to be launched to explore Jupiter's icy Europa. Nearer home, Yellowstone National Park is the site where several thermophilic bacteria live. An enzyme from T. aquaticus is critical for the PCR reaction, now used in industry to build DNA sequences in a cycling process. It is fun to speculate about intelligent extraterrestrials. Seti Institute's Seth Shostak has used engineering practice to model E.T.'s appearance. Capability implies complexity, and requires a certain minimum size. Excessive size would preclude tool use. An eye would be good on a sunlit world, two better for depth perception. Ears should help. Two to six limbs would give efficient locomotion. A humanoid appearance would be surprising, since most animals on Earth don't look like us yet are close genetically. He believes we will most likely encounter a long-lived, artificially intelligent probe which is looking for life forms like us. Our own hunt for the building blocks of life in the universe has spread to comet particles, with the Stardust mission. A trap with aerogel has captured material from Comet Wild, and will return to Earth in a year. Modeling of habitable zones around stars has pointed to Sun-like stars favorable for relatively large zones. The short lifetime of stars much over 2 solar masses rules them out. Smaller, cooler stars like 61 Cygni or Proxima Centauri are common and long lived, but have a limited range of orbits which would favor liquid water. With the terrestrial planet finders under discussion, we may some concrete prospects to investigate in the foreseeable future.

NCAS Business, December 2 2004
President Dan Laszlo called the meeting to order. The treasurer's report was given by Nate Perkins. Members were reminded about the upcoming Jupiter occultation, Geminid meteors, and Comet Machholz.

Forwarded by Andrea Schweitzer
Amateurs Detect Possible Exoplanet Ringlike Structure
by Robert Naeye
http://skyandtelescope.com/news/article_1419_1.asp

December 29, 2004 | Amateur astronomers may have discovered a ring-like tructure around an extrasolar planet. The Hubble Space Telescope will eveal whether the observations and analysis represent a landmark discovery or an as-yet unexplained systematic error. But regardless of the outcome, collaboration showcases the growing capabilities of amateurs to acquire and analyze high-quality data, form networks, and engage in cutting-edge research.

Iapetus Flyby Animation

If you have more bandwidth than you know what to do with (or lots of patience to download 76M), check out this movie from JPL. Happy New Year! Andrea

http://www.spaceref.com/news/viewsr.html?pid=14935

Cassini's flyby of Saturn's icy moon Iapetus is set for Dec. 31, 2004. Iapetus is Saturn's two-faced moon -- one side is very bright, and the other is very dark. One scenario for this striking difference is that the moon's surface is being resurfaced by some material spewing from within.

Thoughts on the Mars Rovers
Some fun reading by David Grinspoon who lives in Boulder! Andrea

Gifts From the Gods of Space
David Grinspoon, a planetary scientist at the Southwest Research Institute in Boulder, Colo., is the author of "Lonely Planets: The Natural Philosophy of Alien Life," just published in paperback.

One year ago today, an alien craft screamed out of a pink, dusty sky and bounced down on the rocky floor of the giant Gusev Crater on Mars. Spirit, the first of NASA's two golf-cart-sized Mars exploration rovers, had landed. Despite our requisite public confidence, in private many of us in the planetary science community were crossing our fingers. A previous Mars lander had failed totally in 2000, and nobody really knew what had gone wrong. And the scrappy, innovative and ambitious (but terminally underfunded) British Beagle had disappeared without a trace while attempting to land on Christmas Day, 2003.

We knew that the two new rolling robots had been more carefully designed and thoroughly safety-checked than either of these failed craft. We knew that the scary landing scheme, in which the precious cargo of instruments and transmitters hits the ground and bounces hard, cushioned by air bags, had worked once before, on the smaller and more compact Mars Pathfinder, with its tiny Sojourner rover, in 1997. We also knew that the reputation and the future of the Mars program were on the line.

So when Spirit's lander finally deflated its air bags and the rover extended its camera mast and took the first pictures of its new Martian home, we breathed a sigh of relief and thought "even if it dies tomorrow, at least we have these." And again, a few days later, when Spirit, fully awake and unfolded, rolled off its landing platform and made its first tracks in Gusev's red dirt, we thought "at least we have this." Spirit's landing was followed three weeks later by the successful bounce-down of its twin craft, Opportunity, on the opposite side of Mars, the Meridiani desert. In a fantastic stroke of luck, Opportunity hit an interplanetary hole in one, rolling to rest in a small crater with ancient, layered bedrock — just what we most wanted to study — staring it right in the face.

Each rover was supposed to last 90 days; each was meant to travel only half a mile. Now a year has passed and, incredibly, defying all expectations, they are both still crawling away from their landing sites, photographing new vistas on the Red Planet, grinding and sniffing the rocks and sorting through the deep past of Mars. What have we learned?

The primary goal of these craft was to look for signs of surface water in Martian history. We seek water intensely because we are water. As far as we know, alien life will also be water-based. Of course, "as far as we know" isn't very far, and that's why we explore. Though Mars today is too cold and its atmosphere too thin to support surface water (underground may be a different story), the planet sports what look like primordial riverbeds and lake beds. But we need ground truth: Rocks don't lie. Their chemistry and detailed textures reveal the story.

Opportunity hit the first real pay dirt of the mission. That convenient outcrop right where it landed turned out to be largely made up of finely layered, sulfur-rich salt deposits, apparently the remnants of an evaporated sea. This tells us that Meridiani was once soaking wet, and that Mars once had all the requirements for life as we know it. It also tells us that we must go back to Mars with equipment to look for fossils or chemical signs of past Martian life. (The next launch is set for 2009.) Before Opportunity, such a search would have seemed far-fetched; now it is not only reasonable but obligatory. The payoff would be cosmic perspective on our own evolutionary history. If Mars was wet but never "alive," then perhaps the conditions we believe to be necessary for life are not sufficient. In that case, dumb luck might have played a larger role in our existence than we like to think, and the universe might be a lonely place indeed for inhabited worlds like ours.

After thoroughly exploring the little crater where it landed, Opportunity set out across flat, eerily featureless plains toward the stadium-sized Endurance Crater. A month later, it arrived and paused at the rim, awaiting instructions. Should we let it enter the steeply walled depression? Would it be able to climb out again? Did it matter, if the buried treasures were valuable enough? The rover team risked the descent. It was the right decision. Endurance, with its layered cliffs and fissured surfaces, confirmed Mars' watery pastand provided clues, still being sifted through, to the precise nature of its changing environments. Now, after spending six months rooting about in the crater, Opportunity has just safely climbed back out onto the surrounding plains and headed south, seeking new terrain.

Spirit, which landed first but soon lost the limelight to Opportunity's dramatic discoveries and heroic exploits, has its own dogged story to tell. From space, Gusev Crater looked just like a dried-up lake bed. But what Spirit found was that the rocks on the ground were volcanic, not water-formed sediments. Spirit crossed two miles of desert toward the Columbia Hills, which showed up as bumps on the horizon in the first pictures the craft beamed home. Months later, sometimes dragging a bum wheel in the dust, it sent back the news: The hills, like the other side of Mars, were once soaking wet.

Nobody knows how long Spirit and Opportunity will be able to keep this up. We thought they would die when the solar panels that power them got covered in the ubiquitous Martian dust. But the dust is not accumulating on the panels. Indeed, some process, not completely understood, seems to be cleaning off Opportunity's panels. (If it is benevolent Martians with squeegees, they are not leaving any footprints.) We think that eventually they will succumb when some crucial part breaks down in the intense Martian cold. But for now the rovers' extended sojourns feel like gifts from the gods of space, who are often cruel or indifferent to our efforts.

I know that some people look at photographs of rover tracks crossing Martian plains and see a desecration of a pristine landscape, dune-buggy gouges on an unspoiled beach. To me, these are more like the trails left in the mud by whatever first ventured onto land from Earth's ocean eons ago.

The uncanny success of the rovers represents a triumph of technology and peaceful exploration and, perhaps, a step in the evolution of life. As much as anything else, it is our relentless curiosity that makes us human. And the rovers are our emissaries, a mechanical extension of that curiosity.

Maybe, like the fabled cat, curiosity will kill us. But if not, then we will keep exploring until we either find the Martians or become them ourselves.

From Tom Teters:
To: comets-ml@yahoogroups.com
Subject: [comets-ml] Digest Number 1129
Date: Mon, 3 Jan 2005 23:01:03 +0100
From: "Fabio Pacucci" <fabio.pacucci@libero.it>
Subject: Parallax of the Comet Machholz

Hi, I'm a 16 years old amateur astronomer from Italy and this is the first time I write to this mailing list. Currently I'm doing some researches about parallax measurements, you can see the first results of my work at: www.vialattea.net/eratostene (in Italian) where are shown the Sun-Earth and Moon-Earth distance calculations. Now I'm trying to measure the parallax of a minor planet, and the passage of the C/2004 Q2 Machholz would be a a very good chance for me. As you know, the comet is approaching the perigee, with a minimum distance of 52 million kilometres from the Earth. So, I'm looking for a foreign observer who could simply take a photo of the comet at the same time with other observers (some Italians and a Polish observer), probably at 20 UT of the 6th of January. We need a very long baseline to do accurate calculations. Is there anyone interested in participating\cooperating with this project? For any further information and for the times of the photos, please contact me at fabio.pacucci@libero.it. Thank you very much, Space Greetings.

Fabio Pacucci ("Isaac Newton" Obs., Taranto - Italy)

Best Looks

Moon	Near Jupiter 1/3 and 4; and 1/31
	By Mars 1/7; By Venus and Mercury 1/8; By Saturn 1/23
Mercury	In SE predawn first week
	By Venus first 3 weeks
Venus	Bright in SE predawn 1st 2 weeks
Mars	Low in SSE at dawn
Jupiter	In E predawn
Saturn	Overhead in middle of the night
Uranus	In Aquarius early evening
Neptune	In Capricornus early evening

From: Dan Laszlo
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TO:

International Space Station Passes Loveland - Fort Collins Jan 2005

Date	Magnitude	Start Time	Alt	Az	Max. Altitude Time	Alt	Az	End Time	Alt	Az
22 Jan	1.4	17:57:46	10	NNW	17:59:30	14	NNE	18:00:32	12	NE
23 Jan	0.5	18:25:42	10	NNW	18:28:13	26	NNE	18:28:13	26	NNE
24 Jan	0.1	18:53:48	10	NW	18:56:01	45	NW	18:56:01	45	NW
25 Jan	0.2	17:46:53	10	NW	17:49:35	30	NNE	17:52:12	10	E
25 Jan	1.8	19:22:23	10	WNW	19:23:57	22	W	19:23:57	22	W
26 Jan	-0.8	18:14:56	10	NW	18:17:57	84	SSW	18:20:22	14	SE
27 Jan	1.7	18:43:34	10	W	18:45:56	22	SW	18:48:19	10	S
28 Jan	-0.3	17:35:53	10	WNW	17:38:49	67	SW	17:41:47	10	SE
29 Jan	2.4	18:04:37	10	W	18:06:43	18	SW	18:08:48	10	S
07 Feb	1.8	06:18:37	10	S	06:21:01	23	SE	06:23:26	10	E
09 Feb	1.2	05:38:08	10	SSW	05:40:42	27	SE	05:43:17	10	ENE
10 Feb	-0.9	06:05:20	12	WSW	06:08:03	75	NW	06:11:00	10	NE
11 Feb	1.1	05:00:43	30	ESE	05:00:43	30	ESE	05:02:54	10	ENE