

The Objective View

Newsletter of the Northern Colorado Astronomical Society

November 2003

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Next Meeting: November 6 7:30 PM

**Our Sun: A "Typical" Star That We Know,
But Don't Understand**

Dr. Greg Kopp, LASP, CU-Boulder

NCAS Business at 7 PM

Discovery Center Skywatch on Nov 7 and 8

**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.

More on Thursday's program from Dr. Greg Kopp,
Instrument Scientist at the Laboratory for Atmospheric and
Space Physics at the University of Colorado at Boulder

Our Sun is a typical, 30-something star: past its active adolescence, and expected to be pretty constant until it runs low on energy in its cantankerous old age. Yet even in its current "constant" state, minor variations in its regular heartbeat can have significant impact on the Earth. And as a typical main sequence star, the Sun is an observational laboratory showing us phenomenal detail of what other stars are like. Half-century old solar telescopes show details on the Sun with 5000 times better spatial resolution than today's best adaptive optics telescopes can hope to achieve on the nearest stars; newer ground- and space-based solar instruments are even more impressive.

What does this level of detail provide? We have superb observations of solar storms, and are improving solar activity forecasts. We have long time series of the Sun's variability, and are linking these to the Earth's climate. We even have the ability to "see" inside the Sun, hoping to understand its

heartbeat. These current observations of the Sun are improving our understanding of some major solar puzzles of the last few decades.

Bio: Astronomy is a great excuse to build instruments, and solar physics has some of the most demanding applications of optical systems. Throughout his varied career (PhD at Stanford Univ. & NASA/Ames Research Center, postdoc at the National Solar Observatory, Director of R&D at Meadowlark Optics, Sr. Systems Engineer at Ball Aerospace, and Research Scientist at the Univ. of Colorado), Dr. Kopp has enjoyed building solar instruments and observing with them at facilities such as NASA's Kuiper Airborne Observatory, Kitt Peak, Sac Peak, Mauna Kea, Mauna Loa, Haleakala, and NASA's recently launched *SORCE* spacecraft. Along the way, he's inadvertently learned a bit about the Sun too...

Starwatch at Discovery Science Center

November 7, 8 6:30 pm
January 30 6:30 pm
February 27 6:30 pm

NCAS Dark Sky Star Party Dates

November 14, 15, 21, 22

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. Our standard nights are the weekend of the New Moon, sometimes a weekend before and after. 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.

NCAS Meetings

December 4 Members Show and Tell
January 2 Apollo 13, Jess Hughley

Other Events

Little Thompson Observatory Star Night, Berthoud
November 21 Star Night 7 – 10 pm
<http://www.starkids.org>

Cheyenne Astronomical Society, Cheyenne Botanical Garden
November 21 7 pm
<http://home.bresnan.net/~curran/>

Open House, Chamberlain Observatory, dusk to 10 pm
Nov 8 eclipse, Dec 27 303 871 5172
<http://www.du.edu/~rstencel/Chamberlin/>

Longmont Astronomical Society
Nov 20 7 pm Longmont Christian School, 550 Coffman St
Nov 1, 29 Flanders Park Public Starwatch, sunset
<http://laps.fsl.noaa.gov/cgi/las.cgi>

Global Net of Astronomical Telescopes Needs You

Dr. Culver has short-period variable star candidates which need monitoring. If you can contribute CCD images of selected 15th to 18th magnitude stars, please call Dr. Culver in the Physics Dept, CSU, 491-6206 for more information.

October 2 Program: Very Low Frequency Radio as a Probe for Energetic Events, Gamma-Ray Bursters & More

By Dr. Joseph DiVerdi
XTR Systems, LLC & NCSIDO

In contributions to the Society for Amateur Scientists, Joe is recently promoting Internet-accessible scientific data. He has provided magnetometer data in real time which is available via the Internet. He is now initiating a novel project. Very Low Frequency radio waves emitted from detected by earth-bound transmitters and receivers can be used to probe the ionosphere and detect energetic, extra-terrestrial events, such as solar flares and even Gamma Ray Bursts (GRBs). The transmitter and receiver are located sufficiently far apart to permit only "over-the-horizon" communication where the radio waves are "reflected" (actually refracted) by the ionosphere, hence revealing its structure. The Earth's atmosphere is divided into the troposphere, stratosphere, ionosphere, and magnetosphere. The ionosphere extends from 50 to 150 km above the surface. Altitude of the F layer, an electron concentration within the ionosphere, moves higher at night. This, (plus dissipation of the lower D and E layers) is responsible for the extended range of AM radio stations at night.

Transmitters are provided by the major Navies of the world which take advantage of the unique propagation features of the VLF radio waves to communicate with submarines operating at depth. A small rooftop whip antenna is needed to monitor the intensity of the signal. Receivers, based on analog circuitry and capable of monitoring a single frequency, are commonly set up by amateurs and variously forwarded to the AAVSO-SID group for compilation. Joe showed schematics and hardware for antenna preamp and receivers. He then illustrated typical plots of his data. He was fortunate to have local collaboration from Rodney Howe, and they were able mutually confirm several events. He then showed graphics of several transmitting antenna installations, typically approaching or greater than 1 km across.

The Northern Colorado Sudden Ionospheric Disturbance Observatory (NCSIDO) was created to continuously monitor the ionospheric structure and dynamics by monitoring *multiple* radio transmissions using Software Defined Radio (SDR). SDR is a class of techniques which replaces many of traditional analog functions with digital and software processing components. The VLF range (3-30kHz) is especially convenient for the application of these techniques. In Joe's example, the antenna and preamp fed a buffer amp, which feeds a Complex Frequency Translator. A local oscillator provides a 50 kHz signal to the CFT. Output

from the CFT feeds a PC sound card, and 0+/- 24kHz complex amplitudes are analyzed. Joe demonstrated GNU-Radio building blocks, and results of analyzing the WWVB signal. He then showed his plots with the amplitude of the Cutler, Jim Creek, and LaMoure site frequencies. Lualualei, Hawaii and Aguada, Puerto Rico signals were detected. A minimal computer investment is sufficient for this. Joe concluded with a demonstration of the extreme flexibility of Software Defined Radio, a fertile field for amateurs who wish to experiment.

Information and observations can be found at
<http://xtrsystems.com/vlf>

NCAS Business, October 2 2003

President Dan Laszlo called the meeting to order. Local Mars-watching and starwatching events were announced, including Max Moe's talk at LTO on the Astro League convention. Tom Teters reported volunteering at Observatory Park. Even with clouds, Discovery Center Marswatching attracted 40 visitors. Treasurer Nate Perkins circulated an updated membership list. Max Moe announced upcoming NCAS programs.

[FRAC] Cactus flats report

Date: Sunday, October 19, 2003 2:23:22 PM
From: gary30views@earthlink.net

The cactus are alive and well and living on the high plains. You have to watch out for them in the dark kneeling to move scope around I seem to find some. It was a no brainer to pick such a great nickname for our dark sky site at Pawnee National Grasslands..

Steve L ,Dave D, Greg M. , Tom T. and myself showed up for another star session but very poor seeing at times and not so transparent skies with less than perfect contrast, but that did not stop us. Dave D said it well with my worst night star gazing is better than my best day working, or was that my worst day fishing is better than my best day working??? fishing story line, anyway, I am always glad just to get away from house, phone,TV and city lights, as I venture to the stars in my short trip away.

The dark sky marines all found the two new comets up, with help from Tom Teters and lap top computer. the comets were both very small and faint about 10 and 11 magnitude I would say. Mars was good only briefly and Saturn and rings were somewhat good between boiling seeing. Veil nebula, and Orion are always good even in bad seeing nights.I would have to say it was worth the trip to high plains.

Several huge meteors were seen with trails that were slow to vaporize lasting more than two seconds, always a rare treat to see such cool bonus views of meteors through out he night. Makes me long for another Leonids super shower of two years ago at the Flats. bye, aperturemon

Fantastic Mars Site from Tom T:

I'd give this page ****, beauty & science The images look very artistic with scientifically valid data. Including Animations, these are Mars Orbiter Laser Altimeter (MOLA) renderings. These are visualizations of Mars in ancient, today's and future settings. Made with DEM15.6 and Terragen 8.11 and 8.44.
http://www.space4case.com/mars/mars5/mars_5.html

Colorado Aurora is Astronomy Picture of the Day:

<http://antwrp.gsfc.nasa.gov/apod/ap031030.html>

Aurora in Colorado Skies

Credit & Copyright: Jimmy Westlake (Colorado Mountain College)

Mars Drawings from Lick 36" Refractor

<http://mtham.ucolick.org/public/TwoWeeksOnMars/drawings/>

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Forwarded from Andrea Schweitzer:

A local (Boulder) astronomer and colleague of mine from the Southwest Research Institute has a new book coming out, and he will be speaking at the Boulder Book Store.

Monday, November 17, 7:30 p.m.

DAVID GRINSPOON will speak & sign "Lonely Planets".

Forwarded message -----

philippe_bridenne@mentorg.com>

Subject: The Mars Rovers are Landing!

The Denver Museum of Nature & Science will offer several opportunities in the coming months to take you and your families in-depth into these historic missions. Join us we delve into the fascinating Red Planet!

Public Lecture November 5

Landing and Roving on the Red Planet: Mars Pathfinder and the Mars Exploration Rovers

Dr. Matt Golombek, chief scientist of the highly visible Mars Pathfinder Mission, is a research geologist at the Jet Propulsion Laboratory, California Institute of Technology, the lead NASA center for planetary exploration. In his talk at the Museum, Dr. Golombek will recap the results of the Pathfinder mission, discuss how the MER landing sites were selected, and preview what we can expect as the MER missions write the next chapter in the exploration of the Red Planet.

Wednesday, November 5

7:30 p.m.

Ricketson Auditorium

\$10 member, \$13 nonmember, \$8 student

Reservations required: 303-322-7009

Coming December 6!

MARSAPALOOZA: The Inside Scoop on the Mars Exploration Rovers

NASA, the National Science Foundation, and the Denver Museum of Nature & Science have teamed up to take you and your family "behind the scenes" to see and hear firsthand stories from the men and women who worked on the Mars Exploration Rovers (MERs).

Six scientists and engineers who built and will operate these amazing robots after landing are traveling to five U.S. cities, and Denver is one of their stops! These women and men will share the inside scoop on MER-how the spacecraft were designed, built, and tested, how they will be controlled, what results are anticipated, and personal stories of how they came to be involved in this ambitious exploration of the Red Planet.

Saturday, December 6

7:00 p.m.

Phipps IMAX Theater

\$10 member, \$13 nonmember, \$5 children 6-12 years

Reservations required: 303-322-7009

New URL for Clear Sky Clocks for Colorado

http://cleardarksky.com/csk/prov/Colorado_clocks.shtml

Total Lunar Eclipse November 8

Moon rises in partial eclipse. Totality from about 1806 to 1831 MST. End of partial eclipse about 2010.

Best Looks

Moon	By Mars 11/2 and 3 By Saturn 11/12 and 13 By Jupiter 11/18 and 19 By Venus 11/25
Mercury	Low in SW end of month, eves
Venus	low in WSW at sunset
Mars	Bright in SE after sunset
Jupiter	High in E predawn
Saturn	Near overhead predawn
Uranus	In Aquarius evenings
Neptune	In Capricornus evenings

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TO: