diablo Moonwatch
Mount Diablo Astronomical Society

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Cosmic Origins: How Unseen Forces Led to the Rise of Stars, Planets, and Carbon-based Life

MDAS January Meeting - Main Speaker

Marni Berendsen

Join us on January 26th to kick off the new year by going back in time. Dr. Andisheh Mahdavi of San Francisco State University will take us on this journey.

Nearly a century ago, Albert Einstein wrote down equations that allowed us to do the unthinkable: to calculate the physical conditions of the entire universe at the very beginning, and to predict its unfolding through cosmic time. When we square up these audacious calculations with data from ground- and space-based telescopes, we come to an unsettling conclusion: the evolution of matter in the universe has been governed by gravitational agents we do not fully understand.

The mysterious "Dark Energy" is tearing the universe apart, while the unseen "Dark Matter" tries to hold pieces of it together. Together these dark forces constitute 95% of the gravitational energy of the universe, and only a tiny 5% of it is made of the atoms that make up stars, planets, and people.

Moreover, the destiny of the atoms depends on the properties of the dark forces. This has led to suggestions that the existence of carbon-based life is tied to the unique mixture of dark energy and dark matter in our present universe.

Dr. Mahdavi is an observational and computational astrophysicist focusing on clusters of galaxies, the largest gravitationally bound cosmic objects. He specializes in marshalling data from orbiting X-ray satellites and ground-based optical and radio telescopes to understand the physics of dark and ordinary matter in clusters.

Mahdavi received his PhD (2001) from Harvard University. He is currently Assistant Professor of Physics and Astronomy at San Francisco State University.

Mark your calendar for January 26th and delve into the dark forces of the universe.

Total Solar Eclipse in the Pacific Ocean July 2009

MDAS January Meeting - What's Up?

Robert Minor

Bob Minor and his wife Jeanie traveled by cruise ship to view and photograph the Total Solar Eclipse of July 11, 2009. Their trip included stops in China, Korea and Japan.

The highlight of the trip was viewing the eclipse near the island of Iwo Jima. Weather was an issue on every day of the trip except on Eclipse day!

The presentation will include photographs of the eclipse, and information on future eclipses.

Some of the photos can be previewed at: http://www.flickr.com/photos/rhminor/sets/72157621935596358/show/

and in the November issue of the MDAS newsletter.

President's Corner

A Cosmic Coincidence December 18, 2009: Over Southeastern Nebraska (!?)

Liede-Marie Haitsma

The article in Spaceweather.com, December 18, 2009 caught my attention regarding the possible correlation between earthquakes and lightning-like phenomena called earthquake-lightning or pseudotachylites.

On December 16th at 9 pm CST, a very bright meteor (or small asteroid) hitting Earth's atmosphere lit up the overcast sky in south-eastern Nebraska. It lasted about two seconds followed by sonic booms and an earthquake. (But note: There was a registered 3.5 earthquake near Auburn, Nebraska at 8:53 pm. The earthquake preceded the fireball).

Drs. David Finkelstein and James Powell in a November 21, 1970 article in Nature (issue #228 (pgs 759-760)) stated the ball-lightning, stroke lightning and sheet lightning are, at times, seen with earthquakes. It is possible that the often seismic strains of the earthquake causes an electric field in the air called seismoelectric effect. But these are usually occurring with over magnitude 6.0 earthquakes.

Dr. Eric Ferre', assistant professor of SIUC, believes that earthquake lightning can be used as an early-warning network based on electrical currents, which travel at the speed of light. It could give "near-real-time" warning of a quake whose waves are still many minutes away from hitting a city. Scientists have detected minute increases in electrical activity just before or during large quakes.

Dark veins are found in rock (thin sheet-like veins resembling glassy black volcanic rock called tachylite—named pseudotachylites). Dr. Ferre' calls them the "black boxes" of earthquakes.

Pseudotachylites are usually more highly magnetized due to their exposure to a strong magnetic field when formed. Earthquake lightning: electrical currents generate magnetic fields. In their molten phase they act as conduits (like lightning rods) for electrical currents generated by earthquakes.

In 2003, Dr. Ferre' was awarded a grant to test his hypothesis along with his chief collaborator Dr. John Geissman. Scientists from Japan and France worked with Drs. Ferre' and Geissman. Research is continuing but what was seen is that the pseudotachylite samples were exposed to magnetic fields 40 times higher than the earth's magnetic field, thus they are similar to those rocks struck by lightning bolts.

In the spring of 2005, deep inside a South African gold mine, it was reported that during a magnitude 3.0 quake, an engineer close to the quake's focus saw a glow along the fault plane.

In August 2004, the European Space Agency launched Demeter, a satellite designed to see if variations in the atmosphere's electromagnetic field were linked to seismic activity. In December 2004 it was reported that big anomalies observed in the electromagnetic field coincided perfectly with the boundaries of the continental plates.

Whatever occurred over Nebraska…certainly was interesting!

Water Water Everywhere? Thoughts on Cabeus's Water

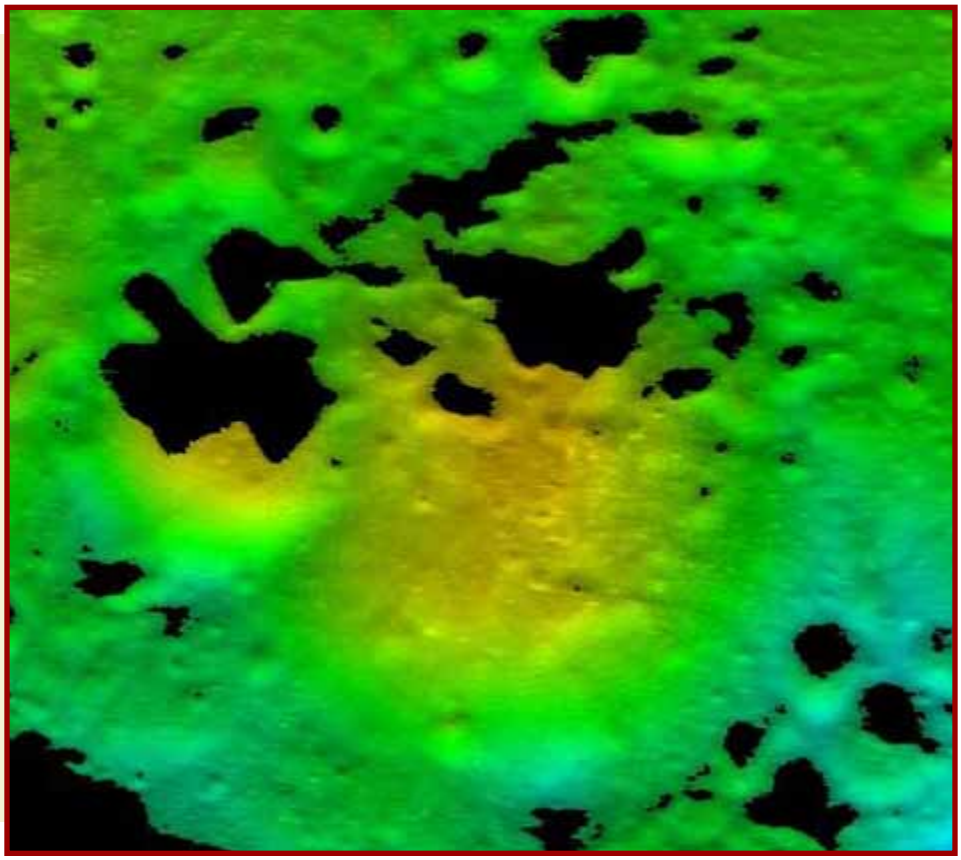
Jim Scala

LCROSS came from the North at high speed; had there been any atmosphere it would have been a streak of light that at some point would have exploded in a fire ball. But there's no atmosphere on the Moon and the small satellite hit Cabeus crater creating a smaller crater by kicking up about 200 to 400 pounds of lunar soil. However, the debris that took almost 20 seconds to appear was examined carefully by the Keck's eye on earth and Hubble's eye from space. Infrared spectra at 1.4 to 1.9 microns and UV spectra at 306 to 310 nanometers confirmed that about half of the kicked out material was probably water. Although scientists will analyze these data for years, simply finding water at the lunar South Pole confirmed much more than just the presence of water. What can that water tell us? Does it help us understand our solar system better?

Water kicked out by the LCROSS crash had been laying beneath the lunar surface for about three billion years. In 1975 W. K. Hartmann and D.R. Davis writing in the planetary journal Icarus summarized a large scientific consensus. Their paper said that the Moon had coalesced about 4.5 billion years ago from a debris ring circling the Earth that was created by a glancing somewhat elastic collision-like two blobs of fairly hard clay-with a Mars sized object. The Moon, by most standards a small planet was a very smooth probably white sphere orbiting the then mostly dry hot Earth with its reducing atmosphere for up to another billion years when something-probably a passing star-perturbed the outer solar system's Oort cloud causing the release of many icy bodies; possibly millions that became a comet influx into the inner solar system. These comets left many Martian craters, provided much of earth's oceans and left the moon looking much like it does today. In contrast to the Moon, earth's thick atmosphere, moveable crust, and abundant water removed most of the craters even though the scars of some remain yet today. At the time of the comet flux the Moon was so close to Earth that our day was about 10 hours; over several billion years it slowly spiraled outward, so we now have a comfortable 24 hour day.

LCROSS's water confirms that the lunar polar orientation to the Sun and probably the earth as well has remained stable because if Cabeus had been exposed to the Sun its water would have sublimed and LCROSS would have come up empty. We can also conclude that Earth's geographic pole hasn't changed much either because any serious shift would have changed the lunar pole orientation as well. So, the water first hinted at by the Clementine satellite many years ago confirms the stability of our earth-moon system and indirectly confirms Armand Delsemme's Icarus paper concluding that over 50% and as he postulated upwards of 75% of Earth's water was delivered by the comets leaving a water planet and the spectacular lunar scars we enjoy observing today. Can it give insight into the structure of the outer solar system as well?

Cabeus's water probably also confirms why moon is gravitationally locked to earth with large Mara facing us. It appears that Earth's gravity pulled sufficiently on these large masses to help lock the Moon and keep them facing us. Cabeus's water indicates that it has probably been like this for about 3 billion years. Is this reading too much from LCROSS? Probably not, but only the fullness of time will tell.



Dave Jewitt, a noted UCLA Astronomer has focused much of his professional interest on the solar system's water. He's asked, how much? Where's it located? And where'd it come from? He's been dealing with the Oort cloud at 100,000 AU and the Kuiper Belt objects at about 100 AU. That's a lot of material because he estimated that the Oort cloud currently contains about 10 with 12 zeros behind it, objects! They range in size from small chunks of ice to objects approaching the size of Mars; all of which are mostly water ice. How many more objects did it contain when the comets were released? Jewitt's still working on that question. Wilde-2 from which we actually took samples started as an Oort object and since it had no impact craters Jewitt concludes its smooth surface probably indicates that Oort objects are smooth, mostly water ice and proves there's a lot of water in our solar system. He pointed out that Wild-2 also proved there's organic material, a host of minerals and more.

In contrast to the Oort cloud, Jewitt's studies indicate that the Kuiper belt was once a much larger comet cloud than it is today. He has shown that the ice belt- that's where water ice remains stable in our solar system-begins just inside Jupiter's orbit since some asteroids in that region appear covered with ice. So, a modern description of our solar system should include a "high water" mark. It should also recognize that by some interaction about 3.5 billion years ago myriad small and large water bearing objects were cast toward the inner solar system. What that interaction set in motion is fantastic.

Freeman Dysan theorized that life probably had several, if not many starts and thanks to the resulting shower of comets, life was able to thrive. Indeed, thanks to the abundance of water in our oceans, the mass of the Moon and its resulting tidal forces, stability of its orbit life could thrive and slowly convert a reducing atmosphere to an oxidizing atmosphere. Then, with this abundance of energy mobility could be sustained and life took its first tentative steps onto the land. We, with all our flaws and triumphs are the result. Now, we know that there's more of life's essential substance a mere 240,000 miles distant that we can use as we fulfill our destiny and become a space faring people. Once we learn how to extract the water in Cabeus crater, travel to Mars, with its even greater abundance of water will be a slam dunk.

Water in Cabeus crater suggests that mars probably experienced at least a similar comet bombardment that brought water to the Earth Moon system. However, Mars being about 30 million more miles from the Sun held on to much of the water it received making mars a water bearing, if only a short lived water planet. Think of the things we'll learn as our exploration continues and it becomes an abode of human life.

NEW! Renew Your Magazines Online!

Marni Berendsen

You can now renew your **Sky & Telescope** and **Astronomy** magazine subscriptions online – **AT THE CLUB DISCOUNT RATE!**

The Astronomical Society of the Pacific has made arrangements with these magazines to allow members of the NASA Night Sky Network to renew at the club discount rate. All you need is a login for the Night Sky Network (NSN) through our club. If you haven't already registered your MDAS membership on NSN, complete the form here:
http://nightsky.jpl.nasa.gov/club-apply.cfm?Club_ID=51&ApplicantType=Member

Once you get your username and password, you can log into Night Sky Network and go to the Links page to find the "New and Renewal Subscriptions" link. Here's the direct page (you will be allowed to log in first when you click this link):
https://nightsky.jpl.nasa.gov/club/links.cfm

No more delays or uncertainties about getting your renewals in on time!

The MDAS Board is discussing setting up MDAS membership renewals online as well. Stay tuned.

Have You Seen Our Club Events on the Night Sky Network?

Marni Berendsen

Did you know you can:

- Get directions to our events from any address as well as a weather forecast, time of sunset, moon phase, and even a sky map.
- Log your volunteer hours
- RSVP to help out at events

All online through the Night Sky Network (NSN). You only need to log in. If you have not yet registered your MDAS membership on NSN, complete the form here:
http://nightsky.jpl.nasa.gov/club-apply.cfm?Club_ID=51&ApplicantType=Member

Check the page for our first public astronomy night in March as an example:
Log in and go to: http://nightsky.jpl.nasa.gov/club/event-view.cfm?Event_ID=14605
OR to just see the Public View: http://nightsky.jpl.nasa.gov /event-view.cfm?Event_ID=14605

For an overview of all the amazing features available free to us on the Night Sky Network:
http://www.youtube.com/watch?v=qw5CyNEYHks

Bookmark the login page on Night Sky Network:
https://nightsky.jpl.nasa.gov/login.cfm to have access to all these features.

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Meetings are held:
Fourth Tuesday every month, except on the third Tuesday in November and December.
Refreshments and conversations are at 6:45pm.
Meetings begin at 7:15pm.
Where:
Concord Police Association Facility
5060 Avila Road, top of the hill.
Take Avila Road from Willow Pass Road.
Directions to facility:
http://nightsky.jpl.nasa.gov/club-view-directions.cfm?Address_ID=18

MDAS Meetings and Viewing Events in January 2010

For the first time in this newsletter, we will be utilizing the calendar of club events generated by the Night Sky Network. Simply run your mouse over the event (calendar entry) and click. Your computer will take you to more information about that particular event. From contact information, location maps to Clear Sky Clocks. We hope that you find this useful.

< January 2010 >

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27	28	29	30	31	1 New Year's Day	2 Sunset: 5:01 PM
3	4	5	6	7	8	9 Society Observing Sunset: 5:07 PM
10	11 7:30 PM Board Meeting	12 9:00 AM Project Astro presentatio 7:00 PM Imaging SIG Mtg.	13	14	15	16 Society Observing Sunset: 5:14 PM
17	18 Martin Luther King, Jr. Day	19	20	21	22	23 10:00 AM L.E.A.D. - Scout Classes Sunset: 5:22 PM
24	25	26 7:15 PM Gen Mtg: Cosmic Origins	27	28 6:00 PM Pleasant Hill Elementary	29	30 Sunset: 5:30 PM
31	1	2	3	4	5	6

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