

The Refractor

The Bulletin of the Eastbay Astronomical Society
Founded in 1924 at Chabot Observatory, Oakland, California

Volume 81
Number 3
January 2005

January 2005 talk:

Pizza and Planetology Party

Saturday, January 22, 2005, 6:30 pm

Host: Dave Rodrigues

Chabot Space & Science Center

Soda Board Room, Dellums Building

Please note—special conditions for this month’s meeting:
We MUST ENTER VIA WIGHTMAN PLAZA and WE MUST
BE OUT OF THE BUILDING BY 10 PM.

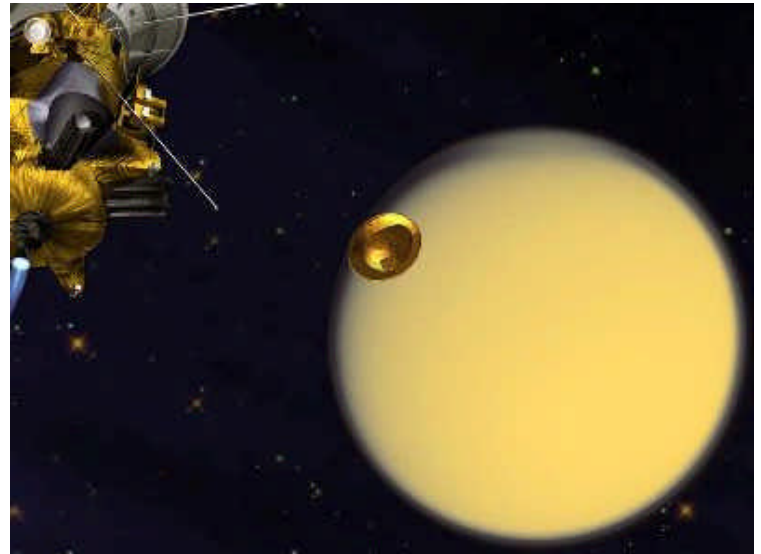
This month, the EAS will have a Pizza and Planetology Party in the Soda Board Room to celebrate (we hope!) the successful (we hope!) landing of the Huygens probe on Saturn’s Moon, Titan. The landing should occur at around 3 am PST, Friday, January 14. Images should be received Friday afternoon, our time.

Not only we will be celebrating but your Program Director will also host a round table discussion by our in-house experts on what the preliminary results of the mission mean. We will play various NASA, JPL, and Exploratorium tapes, animations, and web casts describing the mission.

Titan is a very strange world, the only moon known to have an atmosphere, which is twice as dense as the Earth’s and bathes the moon in an eerie orange light, something like Los Angeles on a really bad day in early October. The probe is expected to break out of the extremely dense, orange clouds at an elevation of ~30 miles above the surface, if it has a surface.

We will then see a literally unearthly landscape for the first time. Looking out in all directions to a horizon about 300 miles away we will see a landscape of frozen methane, ethane, and ammonia. It is thought that it rains and there are lakes, rivers, and seas on Titan but they aren’t made of water—they’re made of hydrocarbons. The probe is designed to float in hydrocarbons and should transmit for up to an hour after touchdown! This ought to be a very exciting mission - if it works! So come and join us for the fun or to commiserate.

We can only fit about thirty folks in the Soda Board Room, so please RSVP Dave Rodrigues at 510-483-9191 by Friday the 21st (please leave a message on my machine if I’m not in) so I can know how many people are coming and how much (and what type) of pizza to buy! ★



You are invited...

*The Eastbay Astronomical Society
2005 Annual Awards Dinner
with special guest speaker
NASA Astrobiologist
- Chris McKay -
on the Cassini-Huygens
Space Probe Mission to Saturn
Sunday, March 13, 2005
(Registration form coming in February!)*

**There will be no
Dinner with the
Speaker this month,
because we’ll all be
having pizza with
the speakers, at the
meeting, instead**

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The Holocene Acceleration: Is the rate of Global Warming Increasing?

By Jim Scala

Venus and Mars are just within the limits of our sun's continuously habitable zone (CHZ) where life can evolve and thrive. However, if life ever emerged on either planet, it's not thriving now. There's apparently more to planetary life than just distance from the sun.

Venus, cloaked in heat trapping clouds, has evolved into a planetary furnace where any living thing not fried would be crushed by the atmospheric pressure. Indeed, "Hell" appropriately describes Venus.

Quite possibly, Mars supported life before its atmosphere dissipated along with its once abundant water and the planet became "freeze dried." Traces of methane in the sparse Martian atmosphere suggest that any remaining Martian life is just *hanging on*. But with a little work Mars could easily be a livable planet.

Comfortably deep in the CHZ, life has persisted on Earth for almost four billion years and the major catastrophes it regularly faced have increased life's abundance and tested its tenacity. Earth's temperature began slowly rising 250 years ago and recently has begun rising faster, which some say is a catastrophe in the making. Reviewing the past can give us useful perspective on this current warming and help us understand if it's a danger sign.

The *Snowball Earth* extinction and Earth's first major global warming.

In 1986, Caltech's Joe Kirschvink proposed that about 700 million years ago Earth had become a planetary snowball. In 1998, Paul Hoffman, a Harvard geologist, confirmed Kirschvink's theory as the only explanation for the geological evidence and life's almost complete absence at that time. Hoffman and colleagues explained why the deep freeze occurred and how Earth emerged. Other scientists' computer simulations indicated it was the second deep freeze in Earth's early history. In fact, the *snowball extinction* 700 million years ago was probably the worst extinction in Earth's history.

Don't confuse *snowball Earth* with an ice age that lasts tens of thousands of years in a single hemisphere. Abundant free water remains during an ice age enabling survival and adaptation. In contrast, *snowball Earth* lasted over a million years and the small amounts of open water at the equator were barely sufficient to keep limited life going.

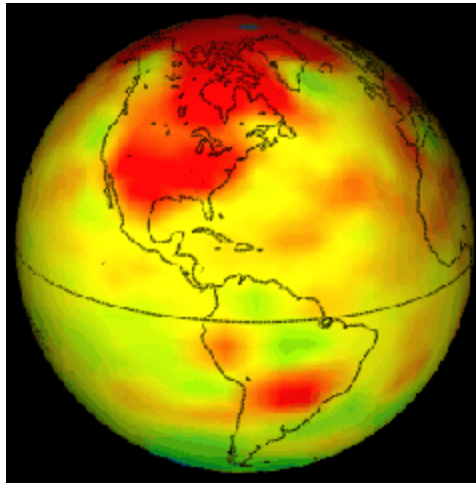
Volcanoes and continental drift spewed carbon dioxide

into the atmosphere initiating a slow, general warming trend that nudged Earth from its deep freeze. As the thaw progressed, surviving organisms faced an empty Earth. Enormous amounts of carbon dioxide that couldn't be absorbed by oceans or processed by the sparse algae entered the upper atmosphere. This formed a heat-trapping blanket and a feedback loop that accelerated the temperature rise and more water evaporation.

***Greenhouse Earth*, an extreme that indirectly favored the rise of humanity.**

Under this heat-trapping, carbon dioxide, water-vapor atmosphere, Earth became a global greenhouse. Life entered this Neoproterozoic period as single celled organisms, including primitive algae, that survived the snowball extinction. The first protozoan soon appeared in one of the empty niches.

Then, other complex cells appeared along with the Ediacaria, large strange looking plants. This 50 million year block of time has appropriately been named the Cambrian Explosion because myriad life forms all seemingly burst on the scene at once. By about 600 million years ago, life had settled in on most of the body forms now present. If the *snowball Earth* extinction hadn't set the stage for *greenhouse Earth*, the Cambrian Explosion wouldn't have occurred and Earth might have been trapped in a single cell cul-de-sac for eons. Indeed, recall how the Cretaceous extinction just 65 million years ago, only moderately devastating by *snowball Earth* standards, ended the dinosaur's



250 million year dominance. This allowed mammals, ultimately man, to explore the newly created safe places. Now we jump forward to the current millennium.

The Maunder minimum ends in 1715 and modern global warming begins.

A second prolonged sunspot minimum of the current era, the Maunder Minimum, known as the *Little Ice Age*, lasted from 1645 to 1715. During these 75 years, Earth was about 4° centigrade below its normal average; this sounds trivial, but it was damn cold. Glaciers covered large areas, prolonged drought and persistent storms were common and the harsh extremes even caused some societies to fail. In 1715, the sun returned to its 11-year cycle and ever since then, Earth's temperature has been slowly rising. So, we have been in a global warming trend for 250 years.

As Earth's temperature rose, glaciers slowly retreated and waterways that had frozen over in winter remained open year round. In general, the warming trend and mild weather helped commerce thrive. However, some experts point out that the temperature rise has changed in recent decades and could be called the *Holocene Acceleration*. Indeed, some say this acceleration is dangerous and if it doesn't stop, things could get pretty hot. *Continued on Page 4*

Editor's News 'n Views



Happy New Year, Astro Fans! Yes, another year chock full of goodies from all over the place! We've got **Comet Machholz**, visible to the naked eye (from a dark-sky site) happening right now; the **Messier Marathon** (March 10 is new moon, the best time to try); the

EAS Annual Awards Dinner with NASA astrobiologist Chris McKay on Sunday, March 13 (**late breaking news**: our usual caterer, *Harry's Hofbrau*, is renovating their facilities, so we have to find another caterer for the event— we'll have it all figured out by February, but when we make the announcement, **DO NOT DELAY!** Get your registration form filled-out and sent in); then there's a *hybrid* total eclipse of the Moon which occurs on April 3 (it changes from annular, to total, and back to annular during the course of its path from New Zealand to the northern reaches of South America—how cool is that?); **Astronomy Week** (April 11-17) and **Astronomy Day** (April 16 - did you know Astronomy Day was first conceived by Doug Berger, EAS member and President of the AANC back in 1973, and that it has since grown to be recognized internationally?); a **penumbral lunar eclipse** on April 24 ((the moon will just darken); one of the world's highest star parties at **Barcroft Station** (at 12,500') in the White Mountains (exact time to be determined); an **annular solar eclipse**, visible from Africa, Europe, and western Asia on October 3; a partial lunar eclipse on October 17th, and of course the fabulously eternal planets, Sun, Moon, stars, nebulae, galaxies, and clusters. Mark your calendars, save your pennies, and plan ahead to prepare for these events.

We're famous (again): National Geographic's online issue of their magazine had a really nice picture of several EAS members in front of Rachel's dome. (That's it in the lower-right corner of this page.) **Paul Hoy** is on the far left, **Terry Galloway** and **Steve Mathews** occupy the middle part of the picture, with **Alan Roche** up the ladder in the center-right, and **Bruce Skelly** on the far right. The National Geographic photographer, Mark Thiessen, really knows light; how to use what's there, and how to supplement it, to create some really eye-catching images. How he managed to get the people, domes, and background city lights to all be correctly exposed in the one picture is a mystery to me!

Here's a weird one for you: the months of February and March are exactly the same, except for the total number of days (February only has 28 days, while March has 31). Everything else is exactly the same! The first day of the month for both months is Tuesday, which means all the other day/dates line up and duplicate each other. I never noticed this before! Weird.

Last month, on December 4, Carter and I volunteered to add the vast resources of the EAS (i.e., me and Carter) with *Chabot Space and Science Center*, and *The Friends of Sausal Creek*, to help out on a decidedly non-astronomical project—the preservation of this shrub or bush with the

unlikely moniker: the *Pallid Manzanita*. (Kind of a wimpy sounding name—*Pallid Manzanita*. Kind of scrappy looking, too; but also kind of pretty, in an odd sort of way.) But, it's endangered, and, ever suckers for lost causes and hopeless battles, Carter and I threw in our lot to help out. This poor pallid plant was getting choked off from the sunlight and space it needs to flourish by other, non-endangered or even non-native plants (how dare they!). So, our mission was to snip away to give them more space and light. It was actually very enjoyable; tramping around in the woods, hacking and a hewing our way through the poison oak (yes, we both caught it—nothing too serious, but always annoying). In the end, we helped a fair bit. A couple of kids from the Galaxy Explorers showed up to help, too. Next time, I'm going in dressed in a hot papa suit (you know, those things that workers in nuclear power plants or radiation medical labs wear). Wheee!

That's it for now. See you – IN THE FUTURE! ☆



▲*The unique UT New Year's Event at Chabot has been gaining in popularity ever since they first did it back in 2003. What a great idea: celebrating the new year at the much more civil hour of 4pm PST, when the first time zone marked by the Greenwich Observatory in England passes into the next year.*



Examples of the Holocene acceleration are fairly common.

Since 1976, arctic ice has, on average, become four feet thinner. Year round snow that normally covers Mt. Kilimanjaro and other peaks has become so thin it will completely disappear in less than a decade. A few years ago a patch of clear water almost a mile wide appeared at the North Pole. Areas of permafrost have begun to thaw, glaciers are retreating and spring appears about three weeks to a month earlier than before in the cold northern climates. Recently an iceberg larger than Rhode Island broke off Antarctica. Tropical diseases such as malaria and the West Nile virus consistently appear in temperate zones.

Could this acceleration be the result of greenhouse gasses entering the atmosphere? Does it relate to the aftermath of the *snowball extinction*? Some say it does; others deny it's anything serious. Does history provide a perspective?

The Holocene acceleration has its roots deep in human history and modern life.

We don't know when man learned to control fire. Besides holding back the night, fire provided several quantum leaps in human survival. Fire is simple, it's about the way carbon combines with oxygen, releasing heat and carbon dioxide. Although present technology would be magic to the cave men that first used fire, we've only changed the details because our basic dependency on the carbon-oxygen chemistry hasn't changed.

Sure, we fly all over the world at incredible speeds and drive SUVs while speaking on cell phones, but the energy that makes it possible is mostly derived from the process cave man used. Energy we derive from hydro, nuclear, wind, solar and tidal sources is impressive, but it doesn't compete with the freedom of movement and economic power yielded by controlling the carbon-oxygen combination. For example, a 747 flying from San Francisco to London relies on the same chemistry cave men used except the surrounding technology is infinitely more sophisticated. Today, the amount of carbon dioxide and particulate matter released on just one trip is measured in tons. How many similar trips are made daily?

Methane is another greenhouse we can't ignore. While it's produced by many natural, mostly biological processes, its main modern source is ruminant husbandry. In a world in which people increasingly ask, "Where's the beef?" methane gas going into the atmosphere is important and calls for our attention.

Similarly, nitrogen oxide, the number three greenhouse gas, is derived from combustion processes. What really counts is the net amount of greenhouse gas. That's the amount above and beyond what forests and algae can process through photosynthesis and, in general, what the environment can absorb. For example, in this century the net greenhouse gasses from USA emissions have increased over 20 percent. Most affluent countries follow this example which is proportional to population increase, commerce and land paved over.

Is the Holocene acceleration about the search for a better life?

Ho Chi Minh City, Vietnam typifies the drive behind the Holocene acceleration in many cities and countries. In 1990, every Ho Chi Minh street was crowded with bicycles; by 2003, the bikes were replaced with even more motor scooters. The scooters run on gasoline that spews carbon dioxide and particulates into the air more than cars do on the LA freeways. More, the once vegetarian Vietnamese society consumes increasing amounts of meat as the appearance of hamburger emporiums indicate.

Ho Chi Minh City typifies many of Earth's 6.3 billion people in increasingly more affluent countries. Our free enterprise economic engine and technology is being emulated wherever conditions permit. In less than two decades there will be eight billion people, many of whom will strive to emulate this example. This trend will continue and through technology transfer will accelerate regardless of the carbon dioxide, methane and particulate matter the atmosphere must absorb. According to some, unless something serious is done to slow the *Holocene acceleration*, it will actually accelerate.

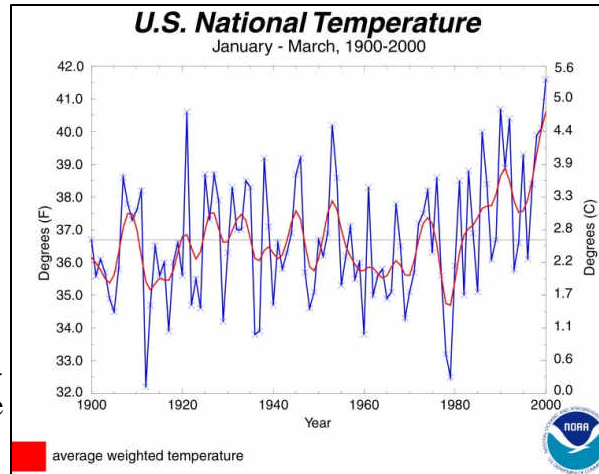
Hydrogen is one clear way out of the dilemma.

During the 1973 oil embargo, Ries von Stigth Thans, a Dutch scientist, proposed building windmill generators in the North Sea to split water into hydrogen and oxygen to power the Dutch society with fuel cells. It was dropped when the Arabs released the oil, ending the embargo. His idea was resurrected during our recent presidential campaign when oil reached \$50 a barrel. Is economic necessity the mother of invention? Shifting from carbon-oxygen to hydrogen-oxygen chemistry would solve the energy problem and return pure water to the environment.

Could nature's proven track record indicate several motives?

On Earth just a few degrees centigrade warmer won't be pleasant and some say this trend could be more than a few degrees. Weather will be harsh, oceans will rise, smog will become widespread and environmentalists can take comfort knowing there'll be more marshland where they're currently living. Is discomfort sufficient incentive to get us off the carbon bandwagon and onto the hydrogen express train? I hope so.

Life's relentless expansion will take a quantum leap into the greatest niche of all when some pioneers leave Earth for good. Possibly an increasingly polluted, uncomfortable, crowded and more restrictive planet could be the right incentive. These adventurers could head for Mars which, with some work within our present technological grasp, could be an acceptable place to live. By comparison, the pilgrims who took a one way trip in 1620 went against odds that might have been technologically tougher. Are we entering a modern version of *snowball Earth* that will give life another boost forward? Will the next Cambrian explosion be man made on Mars? ★



Spare Shots

▶ Tom and Jeanne Buckingham donated an 8" newtonian to the EAS on 12/10/04 (shown w/Paul Zurakowski who evaluated the donation)



▲ This amazing image of Saturn and its six largest moons was taken by James Scala from his backyard observatory. Telescope: 228-mm refractor at F/27. CCD Camera: SBIG STL-11000. It is an LRGB image.



◀ Death by pruning!
Carter prunes the heck out of anything that interferes with the endangered Pallid Manzanita!



◀ Eric Havel also clearing the overgrowth in an attempt to get more sunlight to the grove of Pallid Manzanitas that are around the front of the Chabot Space & Science Center.

▶ Dave "The AstroWizard™" concocting a heady brew for the Telescope Operators' Holiday Party, and...



◀ Here, The AstroWizard™ conjures up a supernova, or meteor shower, or "something" while the kiddies learn astronomy without even knowing it!



That's it for this month!
★



Eastbay Astronomical Society

At Chabot Space & Science Center
10000 Skyline Boulevard • Oakland, CA 94619

January 2005
RETURN SERVICE REQUESTED

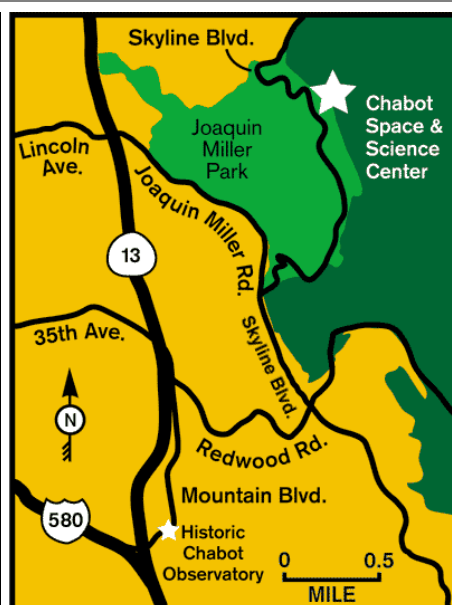
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Articles and photos for *The Refractor* are encouraged. Deadline for the February 2005 issue is February 5, 2005. Items may be submitted by mail to:
Editor - 3514 Randolph Avenue, Oakland, CA 94602-1228. Internet email address: donsaito@comcast.net Hm: (510) 482-2913.



FUTURE CONJUNCTIONS

Jan 13 EAS Board Meeting, Chabot, Soda Board Rm, 7:30pm
22 EAS General Meeting at Chabot, Soda Bd Rm, 7:30pm
Feb 10 EAS Board Meeting, Chabot, Soda Board Rm, 7:30pm
19 EAS General Meeting at Chabot, Soda Bd Rm, 7:30pm
Mar 10 EAS Board Meeting, Chabot, Soda Board Rm, 7:30pm
13 EAS Annual Awards Dinner

Join the Eastbay Astronomical Society

Regular, \$24/year Family, \$36/year
 Contributing, \$40/year Student, \$15/year (digital news-
 Sustaining, \$60/year or more letter, only)

Contact: Don Stone, EAS Membership Registrar
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Sign up online at <http://www.eastbayastro.org/>