

When Astronomy Became a Science: The Museum of Alexandria

February 26th, 2008

Doors open at 6:45 p.m.

Concord Police Association Facility 5060 Avila Road, Concord

When did the ancient astrologers become astronomers in the true sense of being scientists? Join us on February 26th when John Dillon, Science Curator of San Francisco's Randall Museum, explores this question.

It's usually said that Astronomy became a science 400 years ago with the revolutionary observations and discoveries of Copernicus, Kepler,

and Galileo. But those men credited their insights to being able to "stand on the shoulders of giants". The "giants" they alluded to were ancient Greeks who worked nearly 2,000 years before, primarily at the great Museion of Alexandria and its legendary Library. The astonishing Antikithera device which made recent headlines is only one expression of the intellectual fervor that marked that time and place.

Dillon will explore the work of several generations associated with Alexandria's Museum and show why what they did was more than just nature philosophy and fully meets our modern standards of science. He

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Upcoming Programs:

March 25: Dr. Vassilis Angelopoulos, JPL and UCLA, The search for the origin of space storms with NASA's THEMIS mission

April 22: Ryan Wyatt, California Academy of Sciences, Plans for the new Morrison Planetarium.

GLAST A different kind of telescope.

by Steve Jacobs

What do you think a telescope is?

- 1) Lenses in a long tube (classic spyglass telescope or camera lens)
- 2) Mirrors in a tube (Newtonian telescope)
- 3) Combination (classic Schmidt-Cassigran)

Well GLAST is something different. First, to be able to understand this telescope, we need to have a physics lesson. Gamma Ray is very high energy electromagnetic wave (defined as above 10,000 electron volts).

From radio waves to microwaves to infrared to visible light to ultraviolet to x-rays to gamma rays are all electromagnetic waves (photons) in a continuous range. As the energy of the electromagnetic wave increases, the wavelength decreases and the frequency of the wave increases. The most energetic would be x-

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Correction

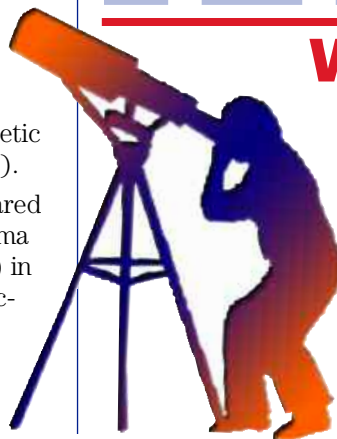
SPECIAL REQUEST FOR FEEDBACK

An error was made in Jim's email address.

Here is the corrected email address and please keep on sending Jim feedback and thoughts—Our newsletter would not be without Jim's efforts in writing superb and provocative observations, essays and articles.

JamesScala2@Crystal-Serenity.com

Thank you



What's Up

by Michael Kran

Michael Kran, will be speaking about remote astrophotography.

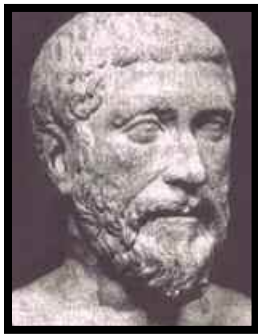
President's Corner

Measuring The Universe Through Geometry

By Nick Tsakoyias

Before the beginning were the Babylonians and the Egyptians with their mathematics, but not until the Greeks came along did mathematics and especially geometry begin, and with it the foundation and language of all mathematics, I'll explain.

The ancient Greeks were the first to codify the study of space and shape into a systematic language of geometry. Pythagoras, his students, and later his disciples known as Pythagoreans were the first organized group of mathematicians 2500 years



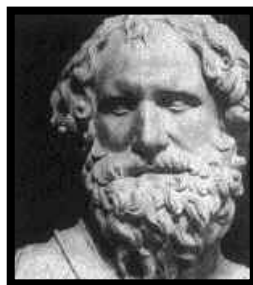
Pythagore

ago. They formed a mysterious community, with secret and strict edicts which required them to be vegetarians, spiritually purified, and participate in a communal sharing of property and knowledge. Greek law forbade women to attend public meetings, yet the Pythagoreans were more open-minded on this issue, and women like Perictione and Theano were also involved in their mathematical activity.

The Pythagoreans are famous for pioneering the mathematical physics of music, having discovered the relationship between the length of a taunt string and the note it makes when plucked. Newton pointed out that they also discovered an inverse-square law, which related the tension and the length of the string, each of which affects the octave of the note produced when the string is plucked. He also noted that the Pythagoreans had used their musical discoveries to build a cosmology in which these same relationships were

ascribed to the planets, whose various sizes and orbital distances were imagined to have the same ratios as those between various notes and the associated lengths and tensions of the plucked strings-ratios that produced the so-called music of the spheres. It was an interesting conception, unlike the practical, objective experiments on music, because the Pythagoreans had no idea what the actual planetary measurements really were. It would take another 300 years for realistic, mathematically and experimentally based cosmic measurements to be made. Newton was nevertheless made to wonder, in a more mystical than logical way, whether his own cosmological inverse-square law had been known to the Pythagoreans. Whether gravity was in fact, simply a manifestation of the ancient and beautiful idea of cosmic harmony.

In the study of geometry, the Pythagoreans are famous for Pythagoras's theorem about right-angled triangles: "The square of the hypotenuse of a right-angle triangle is equal to the sum of the squares of the two adjacent sides"-a result which mathematicians of other cultures had already discovered, notably the ancient Babylonians. But what the Pythagoreans' successors handed down was a logical PROOF of this theorem; in fact, in their uniquely systematic study of geometry, the Greeks, and most notably Plato, developed methods of mathematical proof we still use today- methods which are surprising, given their largely geometric origin, because they are based on language rather than geometric drawing.



Archimedes

Calculating the size of the earth and proving the world is round, is another thing that the ancient Greeks were able to discover by using geometry. As viewed from the Earth, the Sun and the Moon are circular in shape, as is the Earth's horizon, but while most ancient peoples took for granted that the Earth was flat, the Greeks assumed all these bodies to be spheres rather than flat circular disks. This was probably a metaphysical con-

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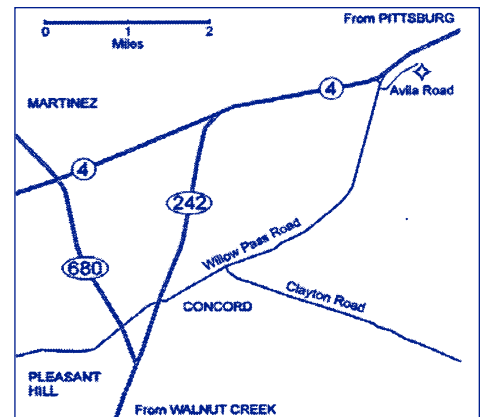
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MDAS meetings are held on the fourth Tuesday every month, except on the third Tuesday in November and December. Refreshments and conversation are at 6:45 p.m. What's Up? at 7:15 p.m. Speaker at 8:00 p.m. The Concord Police Association Facility at 5060 Avila Road is at the top of the hill east of Willow Pass Road, just south of Highway 4. Everyone is invited.

Please consider receiving *the Diablo Moonwatch* by email instead of the Postal Service. Saving in printing and postage is more than \$5.00 per member. You will receive your issue sooner, view it in color, and if you wish can be printed as well on your own printer. Please send a request by email to inquiries@mdas.net.

clusion, initially – example, Pythagoras considered the sphere to be the most perfect shape – but later Greeks, like Eratosthenes, gave correct and astronomical arguments for

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President's Corner *continued from page 2*

this traditional belief. In 230 BC, Eratosthenes had based his argument simply on noon shadows cast by the sun at two different places on the summer solstice. By simply measuring the distance between the two places and using geometry, he was able to measure the circumference of the Earth. He was off by less than 5%.

Eratosthenes used simple geometry to imagine the Earth and show just how large it is. Yet it was another Greek mathematician by the name of Aristarchus who had already used some relatively elementary geometry to give an entirely new perspective on the Earth's place in the heavens, by estimating the relative sizes, and distances apart, of the Earth, Sun, and Moon. (Newton later used such an estimate of the distance between the Earth and the Moon in his derivation of the inverse square law of gravity.)

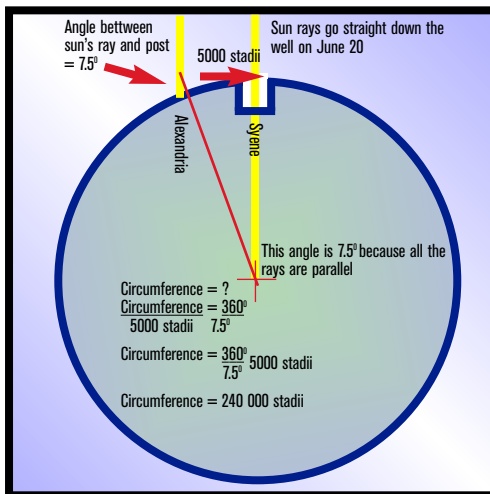
Aristarchus used a method of geometrical ratios, involving the radius of the Earth, which he had calculated from the formula for the circumference of a circle, using an earlier (less accurate) estimate of the circumference of the Earth and an estimate of the value of Pi, to calculate both the diameters of the Moon and Sun and their distances from Earth. From this he also hypothesized that we were in a heliocentric solar system and not geocentric solar system. Though Aristarchus's results were nowhere near as accurate as

Eratosthenes's because the measurements at his disposal were inaccurate, but his method was correct. Using geometry to provide even a rough idea of the size of the solar system was quite an amazing achievement, and with his method, Aristarchus improved on the geometrical attempts of earlier Greeks to "measure" the cosmos.

Greek ideas fell into disfavor after the Roman conquest of the Greek world,

the Romans being more interested in engineering, administration and law than in pure mathematics or speculative science, and the Romans themselves believed in a flat Earth. Later around the 4th century AD when the eastern part of the Roman empire became the Byzantine empire Greek scholars preserved the best they could their ancestors writings though much had already been lost. The 9th century AD, spelled the beginning of the end of the Byzantine empire, beginning with Muslim invasions and conquest of the old Byzantine empire. Greek scholars introduced Greek ideas to the Muslim Arabs who in turn translated into Arabic and studied them.

Around the same time some Greek scholars (though a little later) left Byzantium to avoid the Muslim onslaught for Italy, and there introduced Greek writings which were later translated to Latin, and at that point the flat Earth idea began to be universally challenged. These Greek ideas helped fuel what started the renaissance, with it Christopher Columbus set off on his epic voyage to America, inspired by ancient Greek 'round Earth' maps. In the next century, Copernicus began to develop



Eratosthenes measures the Earth, June 20th many years ago.

his heliocentric cosmology after discovering Aristarchus's work, and Kepler referred to the reintroduced work of Apollonius and Archimedes for his understanding of the mathematics of ellipses. Kepler, Galileo and others also used some of Archimedes's and Apollonius's work to lay mathematical foundations for calculus, which even-

tually came to being in the work of Newton and Leibniz. But it was not realized until the 20th century, when a long-lost Archimedes manuscript was discovered, just how close Archimedes himself had come to the 'integral' branch of 17th century calculus.

The Greeks started the process of thinking about geometry in terms of systematic language, and they used it to

visualize the cosmos in a remarkable way. However, it took mathematicians another 2000 years to make the intellectual transition from basic proofs about lines and shapes to a truly transcendent way of imagining the universe.

Mark your Calendars!

Schedule for 2008 Spring Starparties:

We always are in need of telescopes for these rewarding events:

- Jan 30: Country Club Elementary, San Ramon ** Only 2 signups so far **
- Feb 12: Tassajara Elementary, Danville
- Feb 20: TOTAL LUNAR ECLIPSE **many locations** Don't miss it!
- Feb 21: John Baldwin Elementary Science Fair, Danville (maybe just booth and 2 scopes)
- Mar 3: Bentley High School, Lafayette
- Mar 12: Hidden Hills Elementary, San Ramon
- Apr 9: Westwood Elementary, Concord
- May 17: Muir Heritage Land Trust Fernandez Ranch, Martinez
- May 29: Diablo View Middle School, Clayton
- June 10: Richmond Elementary, Richmond

2008 Public Program

Month	Date	Moon Phase
March	8	New Moon (7)
April	26	Last Quarter (28)
May	10	First Quarter (12)
June	7	First Quarter (10)
July	5	New Moon (3)
August	2	New Moon (1)
September	6	First Quarter (7)
October	4	First Quarter (7)

2008 Society Nights

Month	Date	Moon Phase
February	9	New Moon (7)
March	1	Last Quarter (Feb 29)
April	5	New Moon (6)
May	3	New Moon (5)
June	28	Last Quarter (26)
July	26	Last Quarter (25)
August	12	Special Permission Perseid Meteor Shower
August	30	New Moon
September	27	New Moon (29)
October	25	New Moon (28)
November	1	New Moon (Oct. 28)
November	29	New Moon (27)
December	20	Last Quarter (19)
December	27	New Moon

A Special Kind of Telescope

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rays and gamma rays. A single high energy gamma ray (photon) can have the energy of a fast pitch baseball.

Now that we know that gamma rays are very short, very energetic electromagnetic waves, let's build a telescope. But there are a few problems:

The earth's atmosphere is very effective in stopping wavelengths above ultraviolet. This is a good thing since we would be bombarded with x-rays and gamma rays which would cause radiation issues (because they are very energetic, they could disrupt cell mechanisms and DNA and cause cancer or death). Therefore to find gamma rays we need to move outside the atmosphere (i.e. a satellite).

Gamma rays are so energetic they would pass through mirrors without bouncing or through a lens without bending. But gamma rays will interact with metals and turn into matter. Einstein's famous equation $E=MC^2$ states mass can be turned into energy (in an atomic bomb or nuclear power plant, for instance). Likewise, energy can be turned into mass when a gamma ray interacts with a metal (nucleus of metal). We can detect gamma rays by detecting the matter created by the gamma ray. To do this, GLAST uses the same type of particle detector as used in high energy physics (such as used at CERN or Fermilab). When a gamma ray photon hits metal it turns into an electron and a positron (the anti-matter equivalent of an electron). The electron and positron each having a charge, are easy to detect.

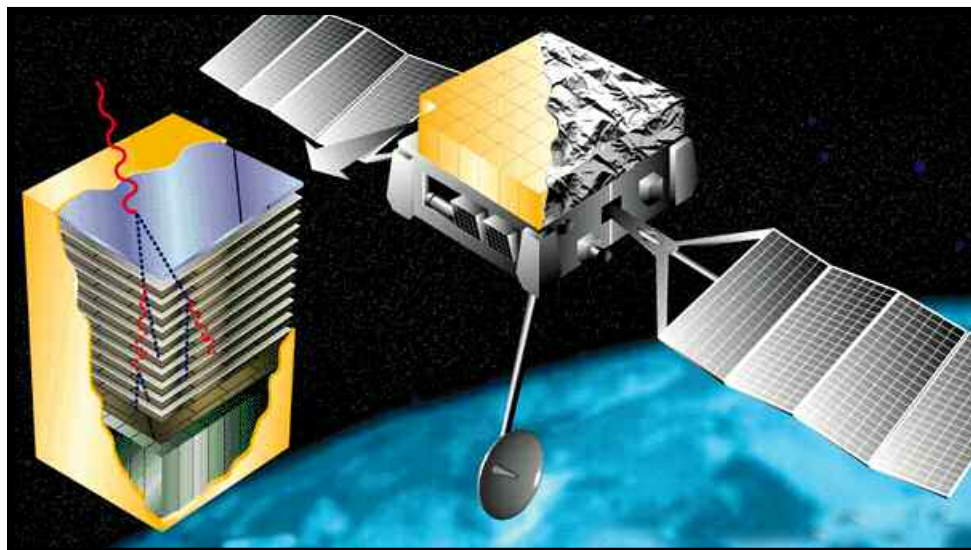
The particle detector used to detect gamma ray interactions also detects other high energy particles – Cosmic rays. Ok, what is a cosmic ray? Well, despite their name, they are not part of electromagnetic spectrum. It turns out that Cosmic rays are high energy particles (usually atomic nuclei) and there are a lot more cosmic rays than gamma rays (by as much as a million to one). Therefore GLAST will need a way to

eliminate (filter out) the cosmic rays. This is done with a cosmic ray detector (called anti-coincidence detector) which detects cosmic rays but not gamma rays (the anti-coincidence detector has no metal so gamma rays pass right through). Every incidence of both the gamma ray detector and cosmic ray detector going off will be cancelled, leaving only the gamma rays.

To do more science the telescope also needs a way of determining the energy (wavelength color, if you will) of the gamma rays. Neither filters or a spectrograph would work because the gamma rays would go right through these. To do this, GLAST has a calorime-

Science expected to be accomplished by GLAST:

- 1) Understand the mechanisms of particle acceleration in Active Galactic Nuclei (AGN), pulsars, and Super Nova Remnants.
- 2) Resolve the gamma ray sky: unidentified sources and diffuse Interstellar emission from the Milky Way.
- 3) Determine the behavior of gamma ray bursts and variable sources.
- 4) Probe dark matter and early Universe. It may be possible to observe gamma rays above 30 GeV (trillion electron volts) which may be produced by dark matter interaction.



ter (fancy thermometer for measuring the energy of high energy particles created from the gamma ray interaction).

To "focus the image" the particle detector consists of 16 stacks of silicon strips which measure the path of the electron positron pair. GLAST has an array of 4 by 4 of these particle detectors and calorimeters, the whole array surrounded by anti-coincidence detectors.

I have just described one of two instruments on GLAST – the Large Area Telescope (LAT). The other instrument in GLAST is the GLAST Burst Monitor (GBM) measures gamma ray bursts over the entire sky). The LAT is a 3-ton telescope (detector) with a field of view of about 1/5 of the sky and angular resolution of about 0.1°

Gamma-ray Large Area Space Telescope--on the left is an exploded view of one of the forty-nine towers:

- 10 Layers of 0.5 rad length coverter (pb)
- 12 layers of XY silicon strips
- gamma rays
- positrons/electrons

GLAST is currently scheduled to launch mid-May 2008 aboard a Delta II Heavy launch vehicle.

There are many good web sites to read further on this interesting space instrument. One of the better ones is <http://www-glast.sonoma.edu/> from Sonoma State University. The official web site is <http://glast.gsfc.nasa.gov/> from Goddard Space Flight Center.

IMPORTANT REMINDER

Just a reminder to all MDAS members, when driving up or down Mt. Diablo State park for a Public Astronomy Event or a Society Night please obey the speed limit on the mountain which is 25 MPH. Not only will you get a speeding ticket if caught by the rangers it is also unsafe to exceed that limit, being that the mountain has a very winding road and exceeding that speed may cause a serious accident to yourself and others including wildlife. Thank you, Nicholas Tsakoyias, MDAS President

Solar System Notebook

An Equatorial Sunset in Cloudy Skies

By Jim Scala

I am cruising the South Pacific with Hong Kong as our final stop on March 15th. I had hoped to get some images of Southern Constellations and the Full Moon as seen by someone standing “upside down.” In spite of my good intentions, the sky has been generally cloudy. However, I have seen a few good sunsets and it brought to mind that we don’t take enough time to just enjoy the beauty that doesn’t require a large telescope and accessories. I hope you enjoy the following image as much as I did acquiring it.

In spite of clouds while at sea, the sky is generally clear or simply becomes broken when we are at an island. The snorkeling and diving is excellent. Add a simple snorkeling trip to an island’s beauty and anyone would conclude this planet is alive with unquestionable beauty that deserves our protection.

Sunset on January 31st when we were just East of Raiatea in French Polynesia



When Astronomy Became a Science. . . *continued from page 1*

will also show how that sophisticated knowledge was lost, regained, amended, and adapted to become the basis for the Copernican Revolution – and why that

“revolution” was anything but!

John Dillon did his graduate work at Duke University in zoology and philosophy and has studied history and philosophy of science at Cambridge and Oxford Universities. He has lectured for many

years at UC Berkeley and Santa Cruz Extensions and the California Academy of Sciences. John has also lead more than 40 international ecotourism programs, including 5 solar eclipse trips, and is Past President of the San Francisco Amateur Astronomers.

MDAS Astronomy Workshop, March 18th, 7:00 p.m.

Reserve your place to explore the Solar System

Amateur astronomers often provide a person with his or her first look through a telescope. Some of our favorite telescope targets to share with the public are the planets of our Solar System. The view of Saturn through the eyepiece can be a life altering experience.

Explore the Night Sky Network’s Solar System ToolKit which provides us with tools to show the structure of our Solar System, including models for sizes and distances, to connect what is seen in the sky with where the planets are in relation to Earth.



The many NASA missions, so well-reviewed by Ken Coates at our January meeting, that explore our Solar System serve as an inspiration to children and adults. This ToolKit provides an introduction to the many ways we can explore, learn, and discover: fly-bys, orbiters, landers, probes, sample returns.

Mark your calendars now for the second in our series of astronomy outreach workshops, which will be held the evening of Tuesday, March 18, 2008, 7:00 p.m.

Find out about – and maybe take home — some of the other ToolKits provided to our club by the NASA Night Sky Network <http://nightsky.jpl.nasa.gov/>.

The location of the workshop is Marni Berendsen’s home: 2466 Sky Road in Walnut Creek, 925-930-7431. If you would like to reserve a place at the workshop, be notified of future astronomy workshop meetings, and/or get access to the NASA Night Sky Network website, email or call Jim Head, our MDAS outreach coordinator, and he’ll send you more details: jamesnhead@comcast.net or 925-202-5345.

As with our club’s other Special Interest Groups, these workshops are offered free of charge for any MDAS member. New members through seasoned veterans have attended and you are invited to participate. No prior knowledge or experience is required.

Membership Demographic Adjustment Section.

To all members: If you have any questions or comments regarding your membership status, badges, addresses, and/or magazine subscriptions, please contact Tom Harris through www.mdas.net and/or email: memberinfo@mdas.net. Thank you!

Did A Comet Changed Human History 129 Centuries Ago?

The Younger Dryas Event

By Jim Scala

About 12,900 years ago Earth was steadily warming after the glacial minimum some 10,000 years previously (26,000 years ago). This warming was abruptly interrupted by a brief 1,000 year period named the Younger Dryas cold period.

The onset was very rapid; for example the temperature in England dropped 5° C in just a few years. Descendants of Cro-Magnon people had immigrated to North America across ice bridges connecting the East to Europe and the West to Siberia. The same Cro-Magnon people had settled Europe from Siberia long before that. So, when the Younger Dryas cold period started, North America had a Stone Age with roots in Europe and Siberia. This cold period albeit brief in geological time indirectly saw the large animals that these people depended upon disappear indirectly causing their demise and gave rise to new, far more diverse cultures. Importantly, after Younger Dryas, agriculture began its



Dryas Flower: This diminutive flower is used to determine climate history because it thrives in cold climates and is an excellent yardstick for climate history.

People identifies an emerging societal culture unique to North America.

“Dryas” is a genus of flowering plants, the mountain Avens that thrive in cold places; hence their record of appearances and disappearances helps geologists and anthropologists determine climate history. Two very widely

cold periods in which the flower appeared are appropriately named the “older” (furthest back in time) and the “younger” or more recent cold period which we are considering here. The Younger Dryas significantly impacted human history and extensive research has uncovered its spectacular and singular cause. While research continues, future find-

ings will probably change details, but the overall events are now in clear focus. My objective here is to discuss the general picture and its place in human history.

Did this catastrophic period have specific starting point?

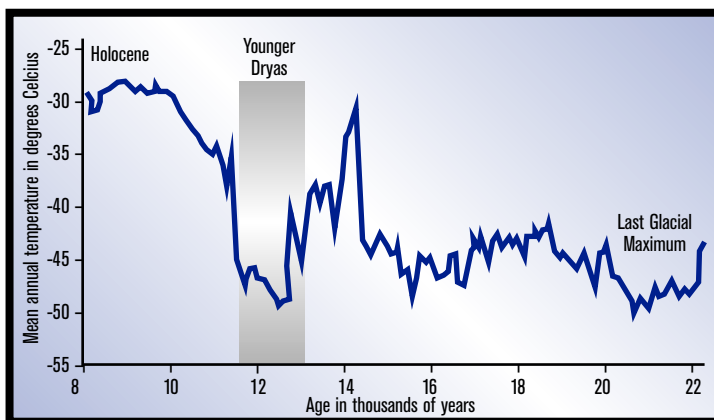
The Younger Dryas cold period was triggered by the atmospheric explosion of a comet somewhere over an area bounded to the south by Lake Ontario, James Bay to the north and Georgian Bay at its western corner with Prince

Edward Island to the east. Obviously this large 500 thousand square mile area indicates a high degree of uncertainty. Since no crater has ever been discovered, and much physical evidence suggests an air burst, the general consensus teaches that a comet exploded in Earth's atmosphere. It's unlikely the consensus will shift.

Comets generally consist of water ice and solid debris formed when the solar system coalesced from the solar nebula. Indeed large comets often have a large, solid nucleus that can be measured in several miles in diameter. In contrast, the Younger Dryas comet was estimated at four kilometers in diameter; hence it probably consisted of dirty ice and not a single large solid nucleus. By comparison the 1908 Tunguska comet was about 100 meters in diameter; it took out a 2,500 square mile forest and put much dust into the atmosphere. Scientists conclude its explosion was equivalent to about 20 megatons of TNT. Imagine a comet 40 times the Tunguska comet's size exploding in the upper atmosphere. What forces would be unleashed?

How this cataclysmic event probably occurred.

Clovis people in eastern North America; cousins of their Cro-Magnon ancestors who painted and sculpted bison in France's D'Audoubert cave would have first noticed the comet as a bright star in the early morning twilight. Maybe it had a diffuse halo because watchers would have seen it “head-on” with its tail stretched out behind. The collision with earth progressed, with an unimaginable sonic boom followed by a rapidly growing, deafening roar as it streaked through the far upper atmosphere leaving a luminous trail probably tens of lunar diameters in width. The flash of its explosion would have out shined the sun several times over and its heat would probably have incinerated all living things on the surface in a 250 mile radius; set trees afire possibly over 1,000 miles away. Shock waves could have destroyed eardrums in at least a 200 mile radius outside ground zero. The same shock waves, debris and possibly impact of pieces of the comet's dirty ice



Earth's climate from the last ice age showing the Younger Dryas Cold Period. It is important to note how abrupt and how short this period was.

rise. These North Americans Cro-Magnon people are more appropriately called “Clovis People.” Clovis Points, the unique spear points these people developed were originally discovered in New Mexico and have been found in most of North America. Clovis points were especially adapted to hunt very large animals such as Mastodons, Mammoths and the Giant Sloth. More, killing these large animals, and producing the unique spear points required a level of teamwork that characterizes societies. Hence Clovis

left scars that 12,900 years later silently testify clearly to earth's first encounter with an object that took human life and changed human history in North America if not Europe as well.

Although the main explosion occurred over Eastern Canada, many bays and lakes were created 800 miles away in South Carolina. Since little impact material has been found anywhere, it's likely that shock waves and possibly large chunks of dirty ice caused them; neither of which would leave large physical evidence. Lake Agassiz covered much of central North America at the time although the explosion took place nearer Lake Algonquin that included most of the great lakes and eastward to Lake Iroquois which was a much larger version Lake Ontario. In an instant the huge eastern ice dam that directed water southward from these lakes was obliterated and water flowed East to the North Atlantic ocean. Canada's Scarborough bluffs which delineate what's left of this dam indicates the water level was at least 100 feet above today's level; consequently an enormous amount of cold, fresh water was released very quickly. Simultaneously, an enormous amount of the Laurentide ice sheet was also melted and was directed south eastward into the draining lakes. All this water could only go into the North Atlantic ocean via the St Lawrence seaway.

The Topper Site in South Carolina tells another part of the story.

Topper, South Carolina was by Clovis People's standards a spear point factory site. Somewhat uncertain Carbon dating suggests it was used about 50,000 years ago; its location on the Savanna river made it ideal for both living and making excellent stone made spear points. Though the carbon dating is uncertain, the abrupt end of spear point production is not uncertain because four lines of physical evidence developed in diverse laboratories has confirmed the findings and conclusions of Alex Goodyear, the leading anthropologist. Goodyear had noticed an abrupt end of Clovis point and some time later the appearance of the "Redstone" points which are more suited to hunting small animals. Since Clovis Points had been found all over North America, Goodyear simply asked, "Where did these people go?"

Several compelling bits of data at the Topper site prove they met with an

abrupt; possible cataclysmic demise. Microscopic diamonds were found with the Clovis points at the site; none below and none above suggest they were produced by a singular high temperature event. This finding convinced scientists to test for Iridium; not surprisingly it showed the similar "none above and none below" pattern. Since iridium is found in material that's been orbiting the sun since the solar system began its presence strongly supported the comet explosion theory. Then fullerenes, unusual carbon compounds produced by high temperature on organic materials were confirmed. This was icing on the cake; the Younger Dryas cold period began at the same time the Clovis people disappeared from the Topper site and other sites. Does evidence indicate that this was a continent wide event? What about the rest of the world?

Do other findings support the Cometary Explosion?

In the mid 1800s European anthropologists found what's called a carbon mat in certain peat bogs in several areas that a large amount of atmospheric soot was thrown into the atmosphere. Similar findings in the British Isles, and Goodyear's findings at the Topper site raised the question, "Are they related?" It turns out the same "soot" and "algal" mat has been found in all the Clovis sites. Similar Iridium, micro-diamond, and fullerenes in the right stratum has been found in the Santa Barbara Channel Islands and other locations throughout North America. Other sites world wide indicates the same, consistent pattern; even in the Southern hemisphere. Hence the Younger Dryas cold period and the the Clovis culture demise were triggered by the same Comet Explosion over Eastern North America.

Was Carl Sagan correct?

The Younger Dryas comet explosion produced an enormous amount of dust and devastating continent wide forest fires that probably added more dust that probably extended over the entire northern hemisphere. Isn't this what Carl Sagan said could happen in a thermonuclear war. He postulated that enough atmospheric debris would reflect sunlight causing a serious temperature drop he named "Nuclear Winter." But there was more here because the water released from the ancient ice age lakes had a devastating global climate changing effect all by itself.

Unimaginable amounts of cold water

were dumped rapidly into what is now the St Lawrence Seaway shutting down the Gulf Stream causing the English climate to drop precipitously. Similarly currents such as the Japanese current that bring temperature stability to parts of the world shifted dramatically because it's all connected. These shifting currents set the warming trend back about 1,000 years. A single event that set in motion other events that had to simply run out their course and taken together it became the Younger Dryas cold period.

What did happen to the Clovis People?

We'll never know for sure what became of the Clovis People, but we can build a working hypothesis. Many were probably killed outright or succumbed to the fires; after all, if the explosion produced bays in the South Carolina Coast the explosive force was incredible. In addition, the large animals the Clovis Culture depended on disappeared very quickly after the event severely compromising the food supply for those who survived. Survivors were forced to use small animals (Redstone points appeared) for food. These events worldwide probably nurtured the rudimentary agriculture that slowly emerged with its ability to feed people consistently.

What can the Younger Dryas catastrophe teach us 129 centuries later?

Earth's Younger Dryas experience supports the concept expressed by James Lovelock that Earth is a living entity. It illustrates how this planet recoils from a disaster that abruptly alters its balance and then how it slowly recovers. Indeed, it shows how the "living and breathing" parts of the planet can be set back by disaster, but also how they recover and new opportunities appear. Aren't we faced with two major events taking place simultaneously in slow motion? One is global warming with its roots in the Milankovic cycles and the other is our human population closing in on eight billion people who treat Earth as an enormous dumping ground and other forms of life as generally expendable.

The Younger Dryas experience teaches that Earth will somehow recover from this slow motion catastrophe; the question is, "Will our leaders realize what's going on and set action in motion to stop it?" Or, will they just let things go and leave it to future generations?

GOLDEN STATE STAR PARTY

July 2 - 6, 2008

The Astronomy Connection (TAC) organizations of the San Francisco Bay Area, the Sacramento Area, and Southern California have officially announced The 2008 Golden State Star Party. This event will be held on four nights at their exciting new dark site near Aden, California from July 2 through July 6, 2008.

The GSSP has a long successful history that began with the first Lassen Star Party in 1994, followed by many years of first-rate star party events in Lassen and Shingletown venues. Over these years, the organizing committee has searched for the "perfect site" with ink black skies and no intrusive light domes, 360 degree horizons, minimal dust problems, and an area big enough to fully accommodate a large group of

avid astronomers and their gear. In 2007, this site was finally found in a ranch near Aden.

GSSP is one of the premier Star Parties in California, now featuring the darkest skies, plenty of room and accommodations for camping and RV's, on-site food services, showers, sanitary facilities, ice, and water. Off-site accommodations and services are also available in the nearby towns of Adin and Bieber. In addition to unparalleled stargazing at night, there are many daytime attractions and activities nearby as well. GSSP is 100% organized and run by astronomers for astronomers. At this new venue, and with the support of avid astronomers and the local community, GSSP promises to be an annual event

that will rival the top Star Parties in the country, including the Oregon and Texas Star Parties.

GSSP is intended for the pure enjoyment of all astronomers. Over the years, I have been to several of the TAC-sponsored Star Parties, and I have never been disappointed. I highly recommend this event to all the members of the Mount Diablo Astronomical Society.

Early Registration is now in full swing until April 15.

The all-inclusive registration fee is only \$45. For more information, visit the official GSSP website at <http://www.goldenstatestarparty.org> or contact info@goldenstatestarparty.org.

Richard Ozer

Diablo Moonwatch

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