SJAA EPHEMERIS

SJAA Activities Calendar

Jim Van Nuland

February (late)

13 Dark Sky weekend. Sunset 5:45 p.m., No moon, really. Henry Coe Park's "Astronomy" lot has been reserved.

19 Houge Park star party. Sunset 5:52 p.m., 32% moon sets 11:28 p.m. Star party hours: 7:00 until 10:00.

27 **General Meeting** at 8 p.m. Our speaker is Rogelio Bernal Andreo, speaking on astrophotography from local skies.

March

5 Houge Park star party. Sunset 6:06 p.m., 64% moon rises 12:21 a.m. Star party hours: 7:00 until 10:00.

6 Dark Sky weekend. Sunset 6:07 p.m., 54% moon rises 1:20 a.m.

13 Dark Sky weekend. Sunset 6:13 p.m., 3% moon rises 6:31 a.m. Messier Marathon at Coe Park, dusk to dawn. Henry Coe Park's "Astronomy" lot has been reserved.

14 DST returns, 2 a.m. Advance clocks one hour.

19 Astronomy Class at Houge Park. 7:30 p.m. Topic is Moon?

19 Houge Park star party. Sunset 7:19 p.m., 19% moon sets 11:34 p.m. Star party hours: 8:15 until 11:15.

27 **General Meeting** at 8 p.m. Our speaker is Dr. Constance Rockosi of UC Lick, speaking on The Structure of the Milky Way.

April

9 Astronomy Class at Houge Park. 7:30 p.m. Topic is TBA.

9 Houge Park star party. Sunset 7:38 p.m., 26% moon rises 4:34 a.m. Star party hours: 8:30 until 11:30.

10 Dark Sky weekend. Sunset 7:38 p.m., 10% moon rises 4:59 a.m.

17 Dark Sky weekend. Sunset 7:45 p.m., 15% moon sets 11:33 p.m. Henry Coe Park's "Astronomy" lot has been reserved.

23 Houge Park star party. Sunset 7:50 p.m., 78% moon sets 3:49 a.m. Star party hours: 8:45 until 11:45.

25 **Auction XXX. Open at noon. Selling 1:00 to about 5 p.m. in the hall at Houge Park**

The Board of Directors meets before each general meeting at 6:30 p.m. All are welcome to attend.

24 hour news and information hotline:
(408) 559-1221
http://www.sjaa.net

The Shallow Sky

The pull of the planets

Akkana Peck

Mars, just over a month past opposition, rules the March nighttime sky, and there's plenty to look at.

On the first weekend in March, Mars presents Olympus Mons face on, with Maria Sirenium and Cimmerium showing in the south, Erebus and Arcadia challenging smudges in the north.

Last month's suspense over NASA's Spirit rover is now resolved: sadly, the rover drivers were unable to free the little rover's stuck wheels, and Spirit will remain where it is, near the northeast edge of Cimmerium, as a stationary research platform.

It's been put into hibernation mode, where it is expected to survive the winter. NASA already has some ideas for cutting-edge research Spirit can do in the spring. One project involves studying the Martian core: by tracking the position of Spirit very precisely, NASA can measure tiny wobbles in Mars's movement which may reveal whether the planet's core is liquid or solid.

By the 13th, Solis Lacus and the "eye of Mars" is front and center, with Margaritifer starting to show to the east, and Mare Acidalium visible on the southwest edge.

On the 20th, Mars' southern hemisphere at 9 p.m. will offer a great view of Margaritifer with all its complex bays, as well as Sinus Meridiani and Sinus Sabaeus. Meanwhile, Mare Acidalium dominates most of the northern hemisphere, with Nilokeras hanging off to the east near the terminator. By now the planet should be starting to look noticeably gibbous.

Finally, on the last weekend of the month, Syrtis Major dominates the southwest as Margaritifer and Sabaeus disappear behind the terminator.

Southward of Syrtis Major is bright Hellas, looking deceptively like a south polar cap — but the real south polar cap is tilted away from us and, since it's autumn in Mars' southern hemisphere, probably not big enough to be visible.

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The northern hemisphere features are more subtle: look for Utopia as a dark area around the polar cap, and Nilosyrtis and Protonilus as small subtle dark features in the northern temperate zones.

A bit of Acidalium should still be visible on the terminator in the northeast.

Meanwhile, Saturn rises after 9pm and is visible the rest of the evening.

The rings are tilted nearly 4 degrees at the beginning of the month, but close to 2.8 degrees by month's end. Always a good target!

All the other planets are too near the sun for good observing. Mercury and Venus move into the morning sky — barely — by the end of the month, while Jupiter, Uranus and Neptune stay hidden in the sun's glare.

Pluto is still there in the early evening, but it's low enough that it'll be very tough to catch such a dim target.

Hey, that's a lot of planets over in the direction of the sun, Mercury, Venus, Jupiter, Uranus, Neptune, all pulling together, with Mars almost directly opposite them. Quite a syzygy!

That's a great word, isn't it? "Syzygy" comes from the Latin syzygia, "conjunction," from the Greek συζυγος (syzygos). It means basically the same thing as "conjunction" though it's less specific: it's basically any time when multiple planets are lined up.

Sometimes people get all excited about planetary alignments or syzygies.

Astrologers attach great significance to some of them. But nobody seems to be excited about this year's, so we have it all to ourselves.

Whenever somebody comes to me asking about the influence on us of a planetary alignment, I start wondering how tiny the extra gravitational forces must be.

So just for fun, I calculated some rough numbers.

For this month's lined-up planets, I tabulated elongation (the angle between the Sun and the planet, as viewed from Earth), distance from us, and mass.

Then I calculated Earth's approximate gravitational acceleration in the direction of the sun due to each planet, using the equation: G*m/r^2 * cos(E) where m is the mass of the planet, r is its distance from Earth and E is its elongation.

Acceleration is in m/s^2 * 10,000,000.

planet	distance(AU)	elongation	mass (kg)	acceleration
Mercury	1.37	-9.9	3.30e23	0.00516
Venus	1.66	12.2	4.87e24	0.05148
Jupiter	5.98	-2.3	1.90e27	1.58221
Uranus	21.06	13.3	8.68e25	0.00568
Neptune	30.98	-15.7	1.02e26	0.00305
Total:			1.64758	

Okay, .000000164758 meters per second squared? What does that mean?

Sounds small, but it's hard to visualize. So, for comparison, I calculated the acceleration from the sun:

Sun	1.0	0	1.99e30	59308.333810

In other words, the gravitational pull of all those planets lined up in a syzygy is roughly 1/36,000 the pull the sun has on us all the time.

Tell that to your friends the next time they get all excited about the cosmic influence of a planetary alignment.

Directions to Houge Park

Houge (rhymes with "Yogi") Park is in San Jose, near Campbell and Los Gatos. From Hwy. 17, take the Camden Avenue exit. Go east 0.4 miles, and turn right at the light, onto Bascom Avenue. At the next light, turn left onto Woodard Road. At the first stop sign, turn right onto Twilight Drive. Go three blocks, cross Sunrise Drive, then turn left into the park.

From Hwy. 85, take the Bascom Avenue exit. Go north, and turn right at the first traffic light, onto White Oaks Road. At the first stop sign, turn left onto Twilight Drive. You will now be passing the park. Turn right at the first driveway, into the parking lot.

Building a Case Against Ozone

Patrick Barry

When it comes to notorious greenhouse gases, carbon dioxide is like Al Capone—always in the headlines. Meanwhile, ozone is more like Carlo Gambino—not as famous or as powerful, but still a big player.

After tracking this lesser-known climate culprit for years, NASA's Tropospheric Emission Spectrometer (TES) has found that ozone is indeed a shifty character. Data from TES show that the amount of ozone—and thus its contribution to the greenhouse effect—varies greatly from place to place and over time.

"Ozone tends to be localized near cities where ozone precursors, such as car exhaust and power plant exhaust, are emitted," says Kevin Bowman, a senior member of the TES technical staff at the Jet Propulsion Laboratory. But the ozone doesn't necessarily stay in one place. Winds can stretch the ozone into long plumes. "Looking out over the ocean we can see ozone being transported long distances over open water."

Unlike CO_2, ozone is highly reactive. It survives in the atmosphere for only a few hours or a few days before it degrades and effectively disappears. So ozone doesn't have time to spread out evenly in the atmosphere the way that CO_2 does. The amount of ozone in one place depends on where ozone-creating chemicals, such as the nitrogen oxides in car exhaust, are being released and which way the wind blows.

This short lifespan also means that ozone could be easier than CO_2 to knock off.

"If you reduce emissions of things that generate ozone, then you can have a quicker climate effect than you would with CO_2," Bowman says. "From a policy standpoint, there's been a lot of conversation lately about regulating short-lived species like ozone."

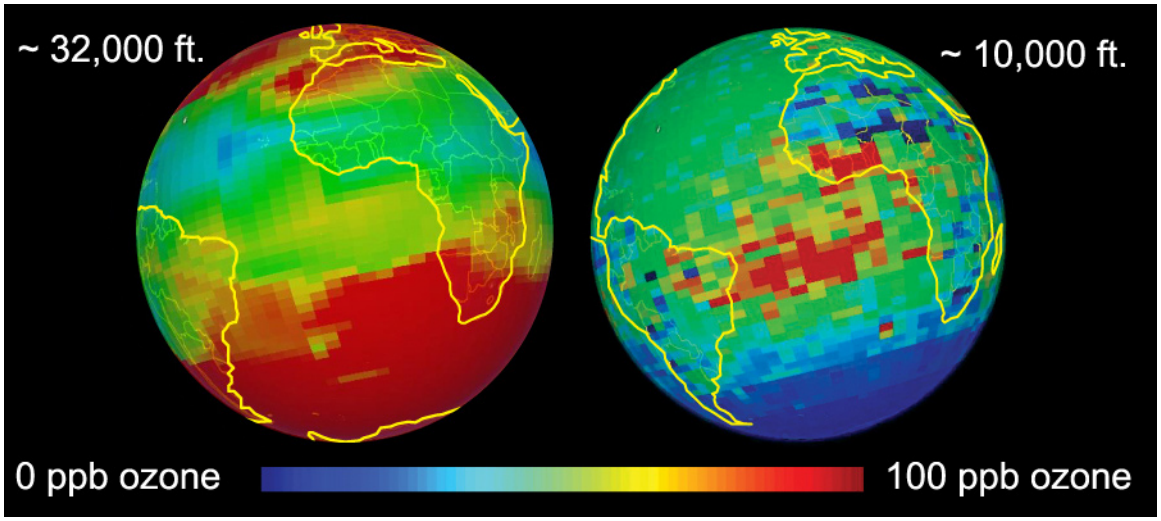
To be clear, Bowman isn't talking about the famous "ozone layer." Ozone in this high-altitude layer shields us from harmful ultraviolet light, so protecting that layer is crucial. Bowman is talking about ozone closer to the ground, so-called tropospheric ozone. This "other" ozone at lower altitudes poses health risks for people and acts as a potent greenhouse gas.

TES is helping scientists track the creation and movement of low-altitude ozone over the whole planet each day. "We can see it clearly in our data," Bowman says. Countries will need this kind of data if they decide to go after the heat-trapping gas.

Ozone has been caught red-handed, and TES is giving authorities the hard evidence they need to prosecute the case.

Learn more about TES and its atmospheric science mission at tes.jpl.nasa.gov. The Space Place has a fun "Gummy Greenhouse Gases" activity for kids that will introduce them to the idea of atoms and molecules. Check it out at http://spaceplace.nasa.gov/en/kids/tes/gumdrops.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



These images are TES ozone plots viewed with Google Earth. Colors map to tropospheric ozone concentrations. The image on the left shows ozone concentrations at an altitude of approximately 32,000 feet, while the one on the right shows ozone at approximately 10,000 feet. The measurements are monthly averages over each grid segment for December 2004.

Editorial

NASA No Go for the Moon

Paul Kohlmiller

President Obama has announced the cancellation of the moon landing program that would have put astronauts back on the moon by 2020. This might be seen as good news/bad news. The bad news is that a key inspiration for the next generation will be lost. It means some NASA employees will be laid off.

The good news is that more money will be going to scientific missions. That means that NASA Ames will have few if any layoffs because of this change. The overall funding will be increased by $6 billion dollars over five years bringing the NASA budget to about $20 billion per year.

The increase will be used to research new propulsion technologies, developing on-orbit fuel depots, and more robotic missions. NASA administrator Charles Bolden said "We will pursue a more sustainable, affordable approach to manned exploration, and facilitate the growth of a new commercial industry." Strong endorsements of the new plan came from former astronauts Sally Ride and Buzz Aldrin.

Norman Augustine, the chairman of the eponymous Augustine commission said that the president's plan "does appear to respond to the primary concerns highlighted in our committee's report."

One key part of the new NASA budget is to continue support for the International Space Station until at least 2020. Previously, support for the ISS could end by 2015. The new plan also calls for more commercial ventures. The Augustine report says "The United States needs a means of launching astronauts to low-Earth orbit, but it does not have to be provided by the government." The Augustine commission also found that the previous plan required increases of $3 billion per year. Thus the president's plan saves $9 billion over 5 years and probably a lot more after that. In the meantime, there is the hope that commercial efforts and international cooperation will suffice for the next several years.

Wayne Hale on his NASA blog said "But if American astronauts are to ride to the international space station on a rocketship that NASA did not build, there will have to be a tectonic shift in NASA culture. Regardless of who builds the ship or operates it or what shape it takes, one thing is certain; NASA's role will have be different. That will take a tremendous amount of energy, and time must pass." (Jan, 22, 2010)

If NASA feels it is being punished then it has itself to blame. First, so many programs have exceeded budgetary constraints including the new Ares and Orion vehicles. Second, NASA acted like it was sitting around waiting for direction when it hitched its star to that of the most unpopular president in recent American history. Third, going to the moon had such a strong flavor of "been there, done that."

What should the plan for NASA include

Details of the new NASA plan are TBD. But one difficulty is going to be finding a way to present it to the American public. "Going to the moon" was a very clear objective. How do you make NASA's objective appear as clear when there is no heroic sound bite?

Vision, Reach, Grasp

Robert Browning said that "a man's reach should exceed his grasp, or what's a heaven/universe for?". To that we can add that a person's vision should exceed their reach. The space program can be seen as these three things: that which we can grasp, that which we can reach, and that which we can see.

"a man's reach should exceed his grasp, or what's a universe for?" - R. Browning (sort of)

We can see pretty far now and the James Webb Space Telescope will increase our vision. But improvements in resolution are slow. A sharp increase in our vision could come from a one light year baseline for parallax measurements. How could we do that? Let's take the speed that the Saturn 5 rocket achieved when sending the Apollo spacecraft to the moon, about 24,000 miles per hour. Let's call that speed 1 kranz in honor of the former NASA flight controller. The fastest spacecraft so far is the New Horizons spacecraft to Pluto which achieved 2 kranz. That's it for the last 40 years, 1 kranz to 2 kranz. Now imagine if we could speed that spacecraft up to .01c, 1% of the speed of light, call that a clark after Arthur C. That's 267 kranz. If we could do that then we could send one space-based telescope at 1 clark in one direction and another in the opposite direction at the same speed. Thus after 50 years the two scopes would be 1 light year apart. The upcoming Gaia satellite for the ESA will be able to measure angular differences down to 10 microarcseconds. Given that kind of resolution and a one lightyear baseline, parallax could be used for objects up to 300 million lightyears distant. A distance so vast that relativistic effects will alter the results and the necessary background stars will be dim.

After these spacecraft are sent on their way, a following

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spacecraft could be launched once every 10 years. The newer craft will probably catch up to the earlier models. But the real point of the following craft is to enable communications back to Earth. A big step for mankind's vision.

Reach should be robotic exploring craft. These have given us some of the greatest science. Examples are the Mars Rovers and the Phoenix and the Huygens lander on Titan. But orbital craft are robots of a sort as well such as Mars Explorer, Galileo around Jupiter and Cassini still around Saturn. Also, remember the flyby missions of Pioneer and Voyager designations and the current missions to Mercury and Pluto. The key robotic technology that needs to be on future missions is a drill. Such a device would be useful on the moon to find water, on Mars to find what lies beneath the surface, and on Europa to see if life of some form exists beneath its frozen oceans.

Grasp would then be whatever humans can do in space. At the moment, we have a pretty firm grasp of low earth orbit. Humans have occupied the ISS continuously for 10 years and before that the Mir for nearly the 10 years before that. That is likely to be the extent of our grasp for a while. The next likely step is the moon. The model for this should be McMurdo station (I got this idea from Christopher McKay at NASA). After learning how do to that, we should do the same on Mars. But there are many obstacles in the way. McMurdo Station doesn't have to worry about water, is only slightly worried about radiation, and is able (with difficulty at times) to return humans back home in an emergency. And it absolutely does not need to worry about running out of atmosphere. You can't get to McMurdo-building until these obstacles are solved. It's true that we could go to the moon with Apollo-like intent but the only point to do that would be to prove that we can (again).

Silicon Valley Astronomy Lectures

Helen Quinn on March 10, 2010 at 7 p.m.

Andrew Fraknoi

Dr. Helen Quinn (of Stanford University) will give a free public lecture on "The Many Mysteries of Antimatter",part of the 11th Annual Silicon Valley Astronomy Lectures, in the Smithwick Theater, Foothill College, El Monte Road and Freeway 280, in Los Altos Hills, California.

No background in science will be required for this talk. Seating is first come, first served. Parking on campus costs $2.

Call the series hot-line at 650-949-7888 for more information and driving directions.

Antimatter is just like matter with all its properties reversed. But when antimatter meets a matching amount of matter, they destroy each other, both turning suddenly into energy. Scientists think there may have been equal amount of matter and antimatter in the early universe, and yet today we have lots of matter and very little antimatter. How and when that imbalance developed is one of the great mysteries in understanding the underlying properties of the universe.

Dr. Quinn, who is co-author of the definitive popular book on antimatter, will discuss the history of our understanding of antimatter and how we use the little bit of antimatter around today to study some of the highest energy processes among the stars and galaxies. One particularly interesting possible source of antimatter is the annihilation or decay of dark matter particles, mysterious material that is thought to make more of the universe than the regular matter we know and love. Dr. Quinn will discuss ongoing antimatter experiments that are helping to put limits on the nature and behavior of dark matter.

Dr. Quinn is Professor of Physics at the Stanford Linear Accelerator Center at Stanford and Assistant to SLAC's Director for Education and Outreach. She has been elected to the National Academy of Sciences and is a former President of the American Physical Society. Her book The Mystery of the Missing Antimatter (2008, Princeton University Press) is an engaging introduction to the world of particle physics.

The lectures are co-sponsored by:

* NASA Ames Research Center

* The Foothill College Astronomy Program

* The Astronomical Society of the Pacific.

* The SETI Institute

Past Silicon Valley Astronomy Lectures are now available in MP3 format at:

http://www.astrosociety.org/education/podcast/index.html

The Last Month In Astronomy

FEB-11-2010 ***SDO Launched*** The Solar Dynamics Observatory was successfully launched on February 11 aboard an Atlas 5 with a Centaur second stage. The SDO will be in earth synchronous orbit above its New Mexico ground station. The spacecraft will collect so much data that it can store it onboard and relay it during times when its orbit happens to be close to the ground station so the geosynchronous orbit solves that problem. http://www.nasa.gov/mission_pages/sdo/main/index.html

FEB-08-2010 ***Endeavour at the ISS*** The Endeavour Space Shuttle was launched on February 8 and docked at the ISS on February 10. This mission will add Node 3, also known as the Tranquility Node. It will also install a new observing area called the cupola. Both pieces were made by the Europeans. STS-130 is scheduled to land at KSC at 7:16 p.m. PST on Sunday, February 21. http://www.esa.int/esaHS/SEMY29XJB5G_index_0.html

FEB-08-2010 ***Enceladus Water*** Water has been found at Enceladus. You may have heard that before. But new observations by Cassini have shown the presence of negatively charged ions in that water. On Earth such ions are found where water is in significant motion such as ocean waves or at waterfalls. http://www.stfc.ac.uk/PMC/PRel/STFC/waterenceladus.aspx

FEB-03-2010 ***Asteroid Collision*** Hubble has apparently caught two asteroids in the act of colliding together. The debris field forms a kind of "X" pattern. David Jewitt of UCLA says "The filaments are made of dust and gravel ... some are swept back by radiation pressure from sunlight ... embedded in the filaments are co-moving blobs of dust that like originated from tiny unseens parent bodies." He goes on to say that this could mean that the debris is from the collision of previously unknown asteroid. The debris field is located 2 AU from the sun and 1 AU from Earth. http://jpl.nasa.gov/news/news.cfm?release=2010-040

JAN-29-2010 ***Cool, Man, Cool*** What may be the coolest celestial body bigger than a planet has been discovered using the United Kingdom Infrared Telescope (UKIRT). The object has the catchy name of SDSSS1416+13B and it is part of a binary star where the larger star is also a brown dwarf. The newly discovered brown dwarf is 400 degrees Fahrenheit, a temperature you can easily achieve with your kitchen oven. http://www.herts.ac.uk/news-and-events/latest-news/Astronomers-discover-cool-stars-in-nearby-space.cfm

JAN-26-2010 ***New Phase for Spirit*** The Mars Rover Spirit is mobile no more but save the tears. After 6 years on the Martian surface, the robot will enter a new phase of scientific discovery. "There's a class of science we can do only with a stationary vehicle that we had put off during the years of driving" according to principal investigator Steve Squyres. http://jpl.nasa.gov/news/news.cfm?release=2010-030

JAN-25-2010 ***Asteroid cracks WISE*** The first asteroid discovered by WISE is 2010 AB78. The spacecraft found it the old-fashioned way - look at the stars and see which one moves. But WISE can do this with incredible sensitivity using a telescope and camera cooled to near absolute zero with solid hydrogen. This combined with sensitive cameras covering 4 different parts of the infrared spectrum is expected to result in 200,000 new asteroid detections. http://jpl.nasa.gov/news/news.cfm?release=2010-028

JAN-15-2010 ***SOFIA Tested In Flight*** The Stratospheric Observatory for Infrared Astronomy was finally tested in flight. The flight took 6 hours. Stability of the scope was measured to show that it could keep a lock on an object. The telescope door was closed so it wasn't subjected to the full range of temperature changes that it will when in operation. More in-flight testing will be performed over the next several months. http://www.nasa.gov/mission_pages/SOFIA/status_update_01_20_10.html

JAN-12-2010 ***Betelgeuse Details*** Astronomers in France have created an unprecedented image of Betelgeuse. Three different telescopes were used along with interferometry to produce the image. The new image shows temperature differences of about 270 Kelvins. The surface temperature of Betelgeuse is about 3300 Kelvins. http://www.astronomy.com/asy/default.aspx?c=a&id=8970

JAN-10-2010 ***IYA 2009 Ends*** The 2009 International Year of Astronomy officially closed during a ceremony in Padua, Italy. IAU past president Catherine Cesarsky says that every goal of IYA2009 was reached except one - for every person on Earth to hear or see something about astronomy during 2009. Given that many projects started in 2009 are still ongoing, the goal may be reached in the future. For example, the 100 Hours of Astronomy event last April will be reconstituted for 2010 by Astronomers Without Borders. Efforts in other countries were nothing short of amazing. For example, in India, 52 programs on astronomy were broadcast in 19 different languages. http://www.skyandtelescope.com/news/81244702.html

It Must Be Astronomical ...

Loaners

The loaner program offers members a means to try scopes of various sizes and technologies before you buy. For more information please see the loaner program web page: http://www.sjaa.net/loaners

GSSP Info

The Golden State Star Party (formerly Shingletown Star Party) will again be held in Adin, California. Early registration is $60 and registration is now open. After March 30, the fee will increase to $70. On-site registration will be $75. For more information, see http://www.goldenstatestarparty.org.

Hot Dates

Golden State Star Party, July 10-14, Adin, California. See GSSP Info elsewhere on this page.

SETIcon - Aug. 13-15, Santa Clara. SETIcon will offer fascinating and fun panels about astrobiology and SETI research, with speakers ranging from SETI Institute scientists to science fiction actors. We'll have four simultaneous program tracks: general sessions, hard-core science, education/family activities, and individual sessions. In the individual sessions, you can pose your questions directly to speakers such as scientist Jill Tarter or actor Tim Russ. For more info go to: http://www.seticon.com/

CalStar - Oct. 7-10. http://www.observers.org/CalStar/

Q & A

Q: If we want to nudge the asteroid known as Apophis because it might hit the earth in 2036, what is the delta V (change in velocity of the asteroid) that is needed?

A: Simulations show that if the change is made before Apophis' near Earth approach in 2029, the necessary delta V is a few thousandths of an inch per hour. For many reasons a nuclear bomb would not work. ("Death From the Skies", Phil Plait, pg. 25)

"I am often amazed at how much more capability and enthusiasm for science there is among elementary school youngsters than among college students." - Carl Sagan

Publication Statement

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☐ **New** ☐ **Renewal** (Name only if no corrections)

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