



THE APPULSE

Official Newsletter of the Philippine Astronomical Society

PROPELLING ASTRONOMY EDUCATION TOWARD THE ACHIEVEMENT OF SCIENTIFIC EXCELLENCE AMONG FILIPINOS

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AUGUST 2008

IS THERE LIFE ON JUPITER'S MOON EUROPA? FINDING SIGNS OF CURRENT GEOLOGICAL ACTIVITY ON A FROZEN WORLD

ScienceDaily (Aug. 7, 2008)

With average temperatures of minus 260 degrees Fahrenheit, an almost nonexistent atmosphere and a complex web of cracks in a layer of ice encompassing the entire surface, the environment on Jupiter's moon Europa is about as alien as they come. So are the enormous forces behind the surface display, namely an ocean beneath the ice nine times deeper than Earth's deepest ocean trench and gravitational affects from a planet 318 times the mass of Earth.

For nearly a decade, it has been Simon Kattenhorn's passion to understand the amazing surface features on Europa and how they are formed. And supported by new grants from NASA, his research may provide clues to one of Mankind's biggest questions—is there life outside of Earth?

Kattenhorn—an associate professor of geology at the University of Idaho—delights in dissecting the beautiful and complex web of cracks, faults and ridges on the surface of Jupiter's fourth largest moon. The first of his two recent grants totaling \$358,000 will allow him to study

the most recent geological features on the highest resolution photos NASA has to offer of Europa. These subtle cracks will reveal if there is any current geological activity on the distant moon, which would also be the best place to look for signs of life.

“In order to really get at the issue, ‘Is there life out there?’, we have to know the best place to look,” said Kattenhorn, who is also currently authoring a chapter for a book on the moon. “And in the case of Europa, the best place to look is where cracks on its icy surface are active today.”

But finding signs for current geological activity is no easy task. Kattenhorn can tell a lot about fractures because they form very specific patterns that allow him to unravel their relative ages. His goal in this project is to find the youngest fractures and compare them to the tidal forces that Europa would be experiencing today to see if the features and recent forces match up.

Although there is some debate over how thick Europa's outer shell of ice is—some say over 20 miles and some claim only a few—it is

generally agreed that it covers an ocean more than 60 miles deep. This means that although Europa is only about the size of our moon, it has more water than Earth.

As the moon orbits Jupiter, it gets closer and further from the giant planet, changing the amount of gravitational pull it experiences. The result is that the moon is constantly being squeezed and released like a balloon full of water, which causes cracks and fissures, raising the question of the possibility of geysers, like the ones recently spotted on Saturn's moon Enceladus.

Recent photos from the Cassini spacecraft passing by Enceladus revealed stunning plumes of water-ice jetting out into space. The discovery sent a flurry of excitement and activity through the academic community, including Kattenhorn, whose second recent NASA grant will allow him to apply what he's learned from Europa to studies on Enceladus.

The discovery also led to a renewed vigor to study and explore Europa in order to find out if similar, active processes might be occur-

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SEPTEMBER Celebrants

- | | | | | | |
|----|--|----|--|----|--------------------------------------|
| 4 | Luz C. Bagamasbad
Erwin T. Donado | 11 | Ian Mark F. Allas
Avelyn Caigan | 28 | Melvin B. Dordas
Louniza P. Napay |
| 5 | Mariel Hazel Arambulo | 12 | Julie C. Tan | 29 | Fritz Barroquillo |
| 6 | Jocelyn A. LLarinas
Sean Patrick Y. Si | 15 | Matthew C. Esteban
Benjamin S. Jaramilla | | |
| 7 | Marjorie L. Escano | | Manolo A. Motos
Megan Mariel Quines | | |
| 8 | Melisa O. Bata | 16 | Ghian Moreno | | |
| 9 | Dallay Annawi
Giovani G. Ang
Sergio Creencia
Yen H. Chen
Dalia Pascual | 18 | Karina Yvette L. Parrenas | | |
| 10 | Emilia Agustin
Ronald B. de los Reyes | 19 | Mhian de los Reyes Dorado | | |
| | | 20 | Antonio E. Gonzales | | |
| | | 22 | Frances Faje Margaret Cardona
Conchita A. Sarmiento | | |
| | | 23 | Aurora M. Bautista
Hernan M. Dizon | | |



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ring today.

“This research feeds that need that I have as a geologist and as a person to be the explorer, to be the adventurer, to see things that no one else has seen before and figure out things that no one else has figured out before,” said Kattenhorn of his research into the two moons. “And out in the solar system is a great place to do that, because there are some things—like the plumes on Enceladus—that we really are seeing for the very first time.” Only a few decades ago, nobody would have believed any form of life could exist on or in an icy moon like Europa. But recent discoveries of amazingly adaptive bacteria in some of Earth’s harshest environments have led to the speculation that it is possible.

“Europa has the potential for something very similar to hydrothermal systems we have here in our oceans,” said Susan Childers, head of the geomicrobiology research team at the University of Idaho, who studies life in extreme environments. “Very ancient organisms that thrive on oxidized metals could potentially be centered on one of these oases formed by heat and metals seeping from cracks in the ocean floor.”

The search for extraterrestrial life has long guided NASA’s choices in mission planning. Currently, NASA is in the process of choosing its next flagship mission; the most ambitious, long-term programs that often provide the most data. The choices include sending a satellite to explore Saturn’s moon Titan, Europa

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Clumps And Streams Of Dark Matter May Lie In Inner Regions Of Milky Way

ScienceDaily (Aug. 7, 2008)

Using one of the most powerful supercomputers in the world to simulate the halo of dark matter that envelopes our galaxy, researchers found dense clumps and streams of the mysterious stuff lurking in the inner regions of the halo, in the same neighborhood as our solar system.

“In previous simulations, this region came out smooth, but now we have enough detail to see clumps of dark matter,” said Piero Madau, professor of astronomy and astrophysics at the University of California, Santa Cruz.

The results, reported in the August 7 issue of the journal *Nature*, may help scientists figure out what the dark matter is. So far, it has been detected only through its gravitational effects on stars and galaxies. According to one theory, however, dark matter consists of weakly interacting massive particles (WIMPs), which can annihilate each other and emit gamma rays when they collide. Gamma rays from dark matter annihilation could be detected by the recently launched Gamma-ray Large Area Space Telescope (GLAST), which UCSC physicists helped build.

“That’s what makes this exciting,” Madau said. “Some of those clumps are so dense they will emit a lot of gamma rays if there is dark matter annihilation, and it might easily be detected by GLAST.”

Juerg Diemand, a postdoctoral fellow at UCSC and first author of the *Nature* paper, said the simulation is based on the assumptions of “cold dark matter” theory, the leading explanation for how the uni-

verse evolved after the Big Bang. In a separate paper that has been accepted for publication in the *Astrophysical Journal*, the researchers used their findings to make specific predictions about the gamma-ray signals that would be detectable by GLAST. The lead author of this paper is Michael Kuhlen, a former UCSC graduate student now at the Institute for Advanced Study in Princeton, N.J.

“There are several candidate particles for cold dark matter, and our predictions for GLAST depend on the assumed particle type and its properties,” Diemand said. “For typical WIMPs, anywhere from a handful to a few dozen clear signals should stand out from the gamma-ray background after two years of observations. That would be a big discovery for GLAST.”

Although the nature of dark matter remains a mystery, it appears to account for about 82 percent of the matter in the universe. As a result, the evolution of structure in the universe has been driven by the gravitational interactions of dark matter. The ordinary matter that forms stars and planets has fallen into the “gravitational wells” created by clumps of dark matter, giving rise to galaxies in the centers of dark matter halos.

According to the cold dark matter theory of cosmological evolution, gravity acted initially on slight density fluctuations present shortly after the Big Bang to pull together the first clumps of dark matter. These grew into larger and larger clumps

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Perseid Meteor Shower Observation

by Victoria Evarretta

The Perseids have always been an elusive meteor shower for PASers. I still have to meet someone who says that he or she has seen a spectacular display of the Perseid celestial spectacle as what we had for the Geminid watch last December 14, 2007. The Geminid was a blast and an experience I'll never forget.

Braving the night that began with strong rains, we went to the Manila Observatory roofdeck last August 13 purposely to watch the peak of the Perseid meteor shower. It's supposed to be the finest for the year with expected meteors of 80 to 100 per hour - bright, quick, but with trains and possible earthgrazers.

So even when it was very cloudy and there seems to be no chance of the weather getting better especially after the rain, I packed myself with so much expectancy for the event. Hernan was filled with doubts all along, but I kept suffusing him with positive notes. Edna, Engr, Dennis were there too, followed by Ronald and the RTU students who came at about 11 PM.

We wanted to see earthgrazers; so as early as 9PM, Edna, Hernan, and I already positioned ourselves at the roofdeck.

At 10PM though when the constellation Perseus was supposed to peek at the eastern horizon, there was no let up in the heavy cloud. Our hope seemed to fade especially when the clouds cleared and yet there was no real meteor shower in sight. Oh we reasoned out it must be the glare of the gibbous moon that obliterate the sighting of the meteors.

"Anyway," I said to them, "the moon is supposed to set at 2 AM,

which will throw the night into darkness and when it's just the right time the shower is at its heaviest."

It was a most beautiful sight though up there at the MO roofdeck overlooking Pasig, Antipolo, Quezon City, etc. and all its night lights. Under the moonlight and surrounded by the gorgeous view all around, Ronald, Engr, and I talked about universities, politics, government, etc., while Edna dozed off to prepare for the 2 AM watch and while Hernan was enjoying the view.

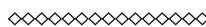
Oscar Oida (?) of GMA had an appointment to come at 11 PM and to cover the meteor shower. However, when he called to check, Engr. told him not to come anymore.

Although the skies cleared by 2 AM and although the moon has set and we started seeing and identifying the constellations; unbelievably, we all saw just one meteor, and the few others were sporadic and unimpressively light and small.

Considered to be the finest for the year? And the peak supposedly after midnight to dawn? It had all the right ingredients for the perfect observation; but sad to say, the Perseids eluded us again.

One good note about astronomical events, there's always next year. In 2009, I'll watch the Perseids in the province, no more Manila. I remember the weather has always been the same problem here in Manila at this time; and I remember too that the weather was always clear back home.

Until next August 13, better luck next time.



Maximum Of Perseid Meteor Shower, August 12 -13, 2008 ScienceDaily (Aug. 8, 2008)

The evening of the 12th August and morning of the 13th August is the annual maximum of the Perseid meteor shower.

At its peak and in a clear, dark sky up to 80 'shooting stars' or meteors may be visible each hour. Meteors are the result of small particles entering the Earth's atmosphere at high speed and in the case of the Perseid shower these come from the tail of Comet Swift-Tuttle, which was last in the vicinity of the Earth in 1992. To the eye, the meteors appear to originate from a 'radiant' in the constellation of Perseus, hence the name Perseid.

Although the Perseids peak on the 12th August, the shower can be seen for some time either side of that date and it is worth looking out for them the night before (i.e. from the evening of 11th August). To see the meteor shower, look towards the north-eastern sky from 2200 BST onwards. In clear weather and away from the light pollution of major cities, it should be possible to see a meteor at least every few minutes, with most appearing as brief streaks of light. The waxing gibbous Moon will be in the evening sky but will have set by 0130 BST on the morning of the maximum so its light will not interfere with the view after that time.

Perhaps best of all, and unlike many astronomical phenomena, meteors are best seen with the unaided eye, rather than through a telescope or binoculars and are perfectly safe to watch.



or the entire Jupiter system, meaning there is a two in three chance the next major mission will include Europa. This makes research detailing where to look—or maybe even land with a probe — that much more important.

But even if further exploration of Europa wasn't a possibility, Kattenhorn would still be eager to study the fascinating moon.

“We don't walk around on Earth with our eyes closed. We want to know what's going on; why things happen,” said Kattenhorn. “It's like Galileo looking through his telescope all those centuries ago and going, ‘Gosh! What's out there?’ It's that same spirit of exploration and I just get a real kick out of that.”



Solar Eclipse On The Morning Of August 1st

ScienceDaily (July 31, 2008)

On 1st August 2008 there will be a total eclipse of the Sun, visible from Canada, northern Greenland, Svalbard, the Barents Sea, Russia, Mongolia and China. From the whole of the British Isles observers will see a partial solar eclipse, with between 1/10th and 1/3rd of the Sun obscured by the Moon.

Total solar eclipses take place when the Earth, Moon and Sun are aligned and the shadow of the Moon touches the surface of the Earth. At

mid-eclipse, observers within the lunar shadow briefly see totality, where the silhouette of the Moon completely covers the Sun, revealing the beautiful outer solar atmosphere or corona.

At its broadest, in this eclipse the lunar shadow is only 237 km (148 miles) wide but the shadow describes a path thousands of km long, traced out as the Earth rotates. The path begins in northeastern Canada, where observers will see the eclipse at sunrise, and then crosses northern Greenland, the Arctic, Barents Sea, Russia and Mongolia before ending in China where the eclipse is visible at sunset. On the ground the maximum duration of totality is 2 minutes 27 seconds but observers away from the centre of the track and at either end will see a significantly shorter event.

Away from the path of the total eclipse the Sun is only partly obscured by the Moon. This partial eclipse is visible across a large part of the northern hemisphere, including much of Europe and the whole of the UK, where it will take place in the morning.

In London the partial phase of the eclipse begins at 0933 BST (0833 GMT). Maximum eclipse is at 1018 BST (0918 GMT) when 12% of the Sun will be blocked. The partial eclipse ends at 1105 BST (1005 GMT).

Further north in the British Isles, observers enjoy a better view. From Edinburgh 23.5% of the Sun is covered and from Lerwick in the Shetland Isles, the Moon obscures 36% of the solar disk.

Although eclipses of the Sun are spectacular events, they should NOT be viewed with the unaided eye except during the brief period of totality, which this time will not be visible anywhere in the UK. Looking at the partially eclipsed Sun without appropriate protection can cause serious and permanent damage to the eyes.

The partial eclipse visible from the UK can be safely studied using purpose-designed solar filters available from reputable astronomical suppliers. Without these, the only safe ways to observe the Sun are to use a pinhole or telescope to PROJECT the Sun's image onto card or to look at the natural dappled images under trees.

On 1 August, some amateur astronomical societies and public observatories will be running events where members of the public can safely enjoy the eclipse.

Eye safety during solar eclipses: University of Waterloo (Ontario, Canada) Professor Ralph Chou's article on eye safety during solar eclipses: <http://eclipse.gsfc.nasa.gov/SEhelp/safety2.html>

PAS July Meeting - Annual Elections

Rizal Technological University, Mandaluyong Campus



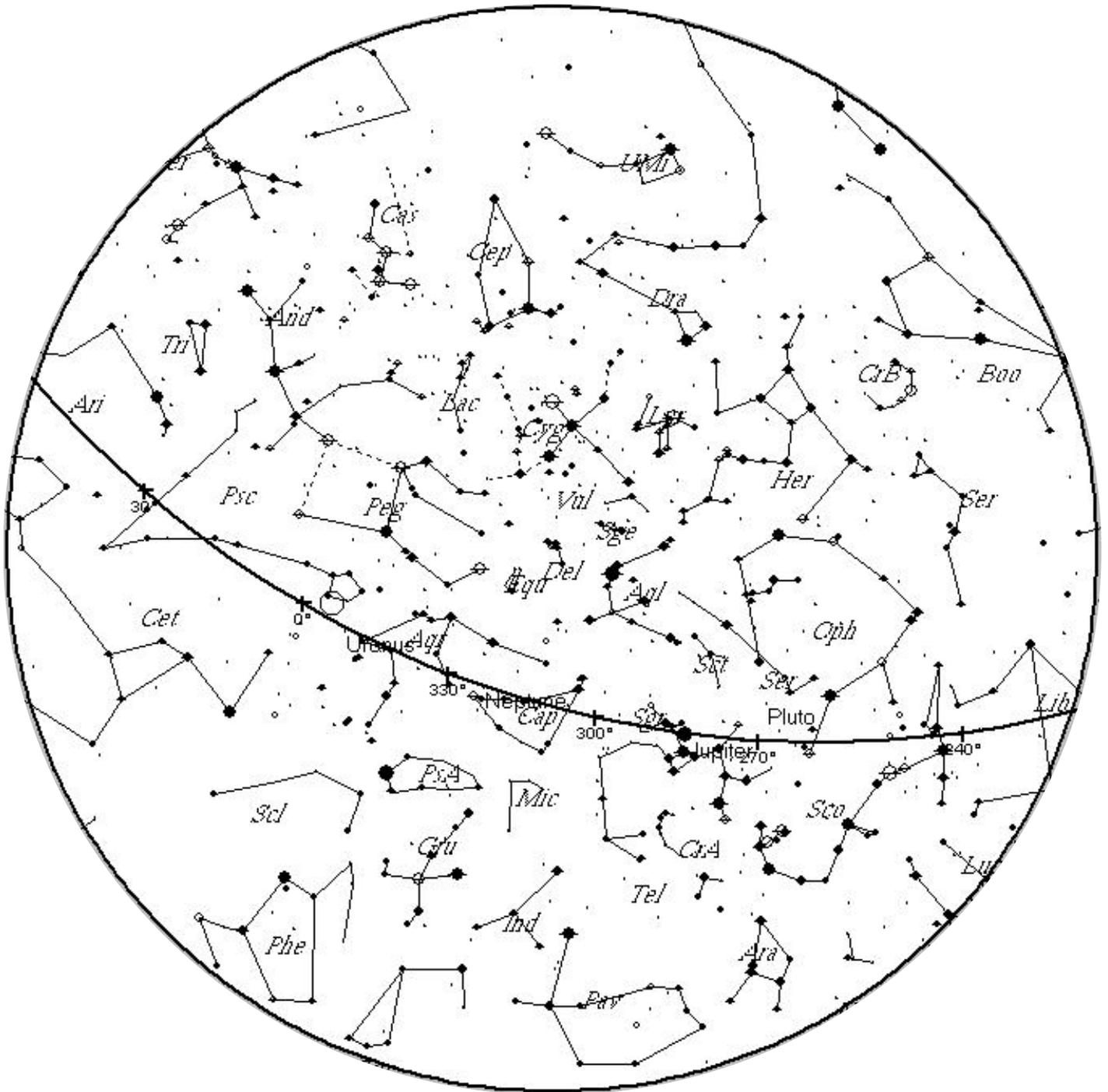
Induction of Officers for 2008 - 2009

Jesuit Residence, Ateneo de Manila University



Officers Meeting -
Dencio's Restaurant, Harbor Plaza

Monthly Star Map – September 2008



This map was prepared by the Observation Committee of the Philippine Astronomical Society using SkyMap Pro 9 software.

This map shows the sky at 9pm on September 15, 2008 as seen from the latitude of Metro Manila, Philippines with North on top and the zenith at the center. The large circle represents the horizon. Star limiting magnitude is 5.5. Deep sky limiting magnitude is 7.0.