The Celestial Mechanic

The Official Newsletter of the Astronomy Associates of Lawrence

Volume 31 Number 08 **August 2005**

Calendar of Events

FRIDAY/SATURDAY
AUGUST 12/13
ALCON 2005
OVERLAND PARK

PUBLIC OBSERVING
Sunday August 28
9PM, Memorial Stadium
September Meeting:
Friday, Sept. 16
1001 Malott, 7:30 PM

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From the Officers

Report From the Officers on the JULY Meeting:

First, sorry for the delay in getting this out prior to the start of the month; travel plans required the editor to be out of town the last two weeks in July. With the start of the school semester, we should be back to our regular schedule of meetings, observing sessions, and timely newsletters. Speaking of observing sessions, we have a tentative date for our first public observing at Memorial Stadium—Sunday August 28. If you have an interest in some stellar viewing or just want to help out, feel free to come by. If the latter is the case, as always, contact Bruce Twarog at btwarog@ku.edu so we know who will be available to help. The schedule for the rest of the year will be set by the time of the September newsletter so look for it or check the club web site over the next couple of weeks.

Hopefully, the Fall semester will be more supportive, weatherwise, of our efforts to do some public education on the sky than the summer was. Of our four attempts to run observing sessions after the band concerts, only one proved successful due to the cloudy conditions. Again, many thanks to those of you who volunteered to help and/or bring your equipment out. We know that your schedules are busy and that giving up an evening in the hope that the skies will be clear can be frustrating when those hopes are dashed, even by thin cirrus.

If you have an interest in observing at some truly fine sites and spending some time interacting with other amateurs, check out the web sites for two upcoming regional star parties: Icstars 2005 in Warrensburg, MO over the Labor Day Weekend or the Okie-Tex Star Party in Kenton, OK in Oct. The info is listed in the box below. Of more immediate importance, we have no meeting this month due to the ALCON 2005 national meeting in Overland Park on Aug. 12/13. It should be an impressive arena for

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PBS: NOVA

In case you missed it the first time around, PBS is rerunning the 4-part series: Origins

The schedule is as follows:

Origins: Earth is Born - Tuesday, August 23 at 8 p.m.
Origins: How Life Began -Tuesday, August 30 at 8 p.m.
Origins: Where Are the Aliens? - Tuesday, September 6 at 8 p.m.
Origins: Back to the Beginning - Tuesday, September 13 at 8 p.m.

Other Regional Events:

Icstars 2005 Star Party: Sept. 1-5, Warrensburg, MO
Web Site: www.icstars.com/Ranch/starparty/2005starparty/index.html
22nd Annual Okie-Tex Star Party: Oct. 1-9, 2005, Kenton, OK
Web Site: www.okie-tex.com

INSIDE THIS ISSUE

From the Officers, continued

seeing the latest in technology and techniques for amateurs. As noted many times in the past, all club members are members of the Astronomical League and part of your annual dues go to this organization. So, this is your chance to get some direct benefit from your membership. See the poster on pg. 5 for more details.

While on the topic of membership benefits, we received an offer from Workman Publishing on the new edition of Hartmann and Miller's *The Grand Tour: A Traveller's Guide to the Solar System.* The book is an up-to-date overview of the contents of the solar system and includes some spectacular graphic art. For orders of 10 or more, we would get a 40% reduction from the retail price of $19.95, I.e., we would pay **$11.97** each, plus 5% shipping and handling. (Note, the list price is $29.95; Amazon.com sells it with a 34% discount for $19.95; we would get an **additional** 40% off). If you have any interest in ordering a copy, let me know (btwarog@ku.edu). If I can get 5 or more orders, I'll place an order for 10.

In July, we showed the second part of a 2-part video presentation of a series produced by the National Geographic Society on the nature of potential life on planets beyond our solar system. The discovery of extrasolar planets (over 160 are now known) has heightened the interest in the conditions under which life can originate, survive, and evolve. The graphics on this series are quite spectacular and the second focused more on the creatures that can occupy the atmospheric heights of the planet. The question of planets has been in the news again this week with the discovery of the so-called 10th planet. The issue of what constitutes a planet is featured in the article on pg. 7-8. At the high mass end, the definition of a planet is tied to the origin of energy within the object. If the object undergoes nuclear fusion, it is classified as a star. At the low end, where do "planets" end and "asteroids" and "comets" begin? For those associated with KU and Kansas, this is not a minor issue because Pluto, the smallest planet, was discovered by Kansan and KU alumnus, Clyde Tombaugh. Past attempts to reclassify Pluto as a trans-neptunian object have met with strong and vocal objections from a significant fraction of those involved in solar system research and fans of Clyde Tombaugh. The new discovery of an object larger than Pluto beyond the orbit of Pluto has resurrected the issue and may require a resolution from the official organization of the worldwide astronomical community, the IAU. We'll try to keep you informed about this if anything happens.

The Astronomical League has many activities to encourage amateur astronomy including Observing Clubs. The Observing Clubs offer certificates of accomplishment for demonstrating observing skills with a variety of instruments and objects. Each Club offers a certificate based upon achieving certain observing goals. These are usually in the form of a specific number of objects of a specific group with a given type of instrument. Occasionally there are multiple levels of accomplishment within the club. There is no time limit for completing the required observing, but good record keeping is required. When you have reached the requisite number of objects, your observing logs are examined by the appropriate authority and you will receive a certificate and pin to proclaim to all that you have reached your goal. Many local astronomical societies even post lists of those who have obtained their certificates. This month we feature the details on the **Earth Orbiting Satellite Observers Club.** This observing program is designed to get those new to satellite observing familiar with the terminology, and techniques of tracking satellites. The list of objects required for the basic award include targets that can be easily tracked using the unaided eye or binoculars, including the space shuttle, the international space station - Alpha, several operational vehicles, and numerous rocket bodies. Eventually, an advanced observing program will be created that picks up where the initial observing program leaves off, and will challenge the observer to locate and track more difficult targets such as GPS (Global Positioning System) satellites, Russian Molniya spacecraft, and even geosynchronous/geostationary satellites. Many of the observing targets in the advanced program will require telescopes and/or photographic techniques to identify. The specifics of the EOSOC observing program are listed on the EOSOC Tutorial page (http://www.csastro.org/eosoc/tutorial.htm), and are also on the downloadable observation report forms. We also offer a free propagation program tailored for the needs of EOSOC participants called EOSOC Tracker (http://www.csastro.org/eosoc/tracker.htm).

If you have any suggestions for talks, speakers, or public events, please feel free to contact us, particularly Rick Heschmeyer (rcjbm@sbcglobal.net), the events coordinator for the club. ALL for now.

About the Astronomy Associates of Lawrence

The club is open to all people interested in sharing their love for astronomy. Monthly meetings are typically on the second Friday of each month and often feature guest speakers, presentations by club members, and a chance to exchange amateur astronomy tips. Approximately the last Sunday of each month we have an open house on Memorial Stadium. Periodic star parties are scheduled as well. For more information, please contact the club officers:Hannah Swift at hkswift@ku.edu, Gary Webber at gwebber@ku.edu, our faculty advisor, Prof. Bruce Twarog at btwarog@ku.edu. or our events coordinator, Rick Heschmeyer at rcjbm@sbcglobal.net. Because of the flexibility of the schedule due to holidays and alternate events, it is always best to check the Web site for the exact Fridays and Sundays when events are scheduled. The information about AAL can be found at

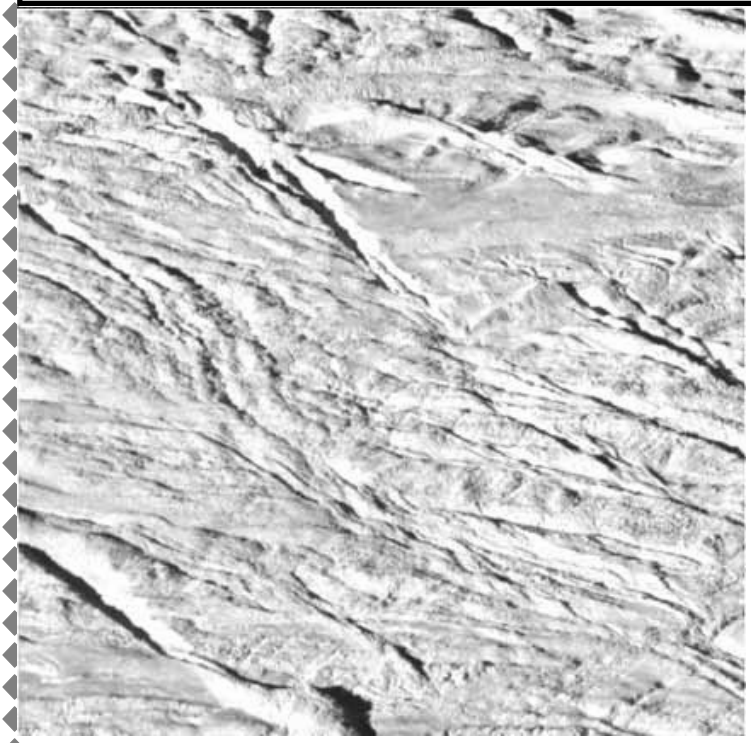
http://www.ku.edu/~aal.

Copies of the *Celestial Mechanic* can also be found on the web at

http://www.ku.edu/~aal/celestialmechanic

Frozen Wasteland

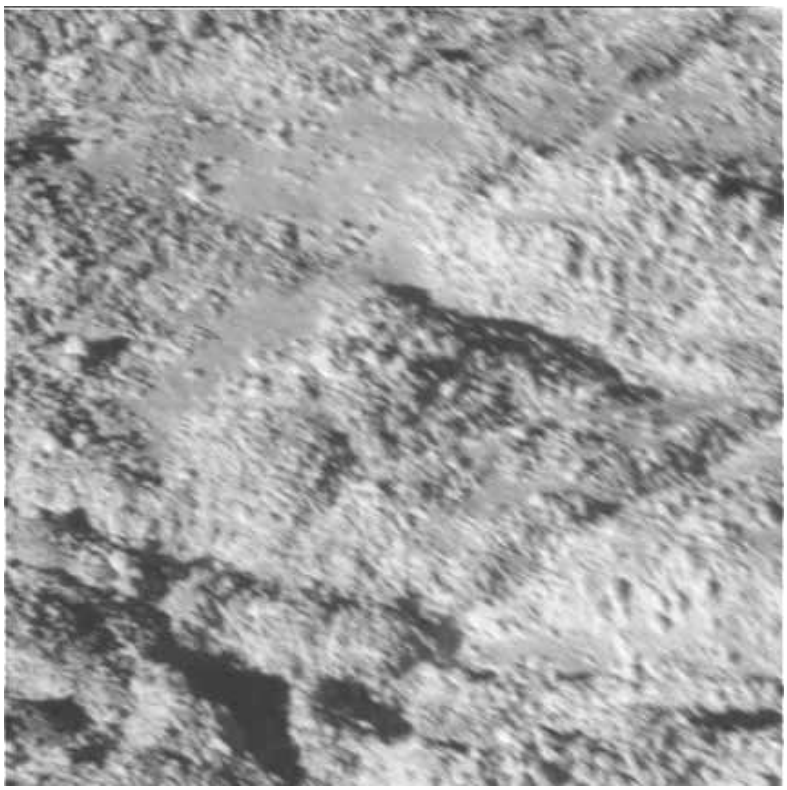
Skypub.com



On July 14th the Cassini orbiter made its closest pass yet of Saturn's icy moon Enceladus. The craft flew past the satellite at a distance of only 175 kilometers (109 miles).

This pair of raw images, shot from 210 kilometers away, reveals the frozen landscape in stunning detail. The image left, shot with the craft's wide-angle camera, has a resolution of about 37 meters (120 feet) per pixel. The narrow-angle camera image below reveals features with a resolution of only 4 meters per pixel. With that clarity, house-size rocks are distinguishable.

Fully processed images will be available in the coming weeks, as will explanations of what these views have taught scientists about the geology, history, and evolution of Enceladus.



Triple-Star Planet

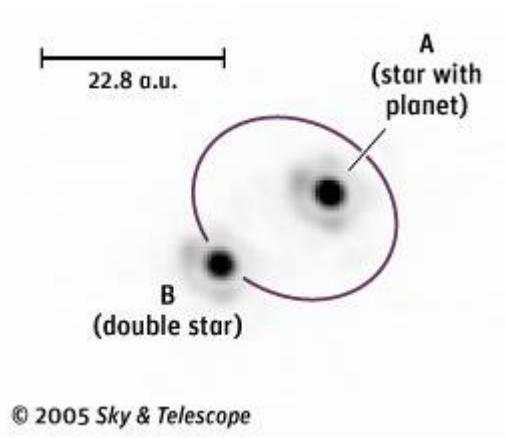
By Robert Naeye, Skypub.com

Can multiple-star systems support life-bearing planets? This is an important question for astrobiologists because more than half of all stars in our galaxy belong to binary, triple, or higher-order systems. Astronomers have found several giant planets orbiting one member of widely separated binary systems. But a recent discovery, if confirmed, shows that tighter multiple-star systems can also have planets.

Artist Robert Hurt depicts the Jupiter-mass planet (upper left) in the HD 188753 system as seen from a hypothetical moon. The planet orbits the bright, yellow star that is setting behind the distant peaks on the right. Two companion stars, which form a tight binary in the far background, lie to the upper left of the host star. Click on the image to view a larger version. *Courtesy NASA / JPL-Caltech / Robert Hurt.*

In the July 14th *Nature,* Maciej Konacki (Caltech) reports a planet orbiting the triple-star system HD 188753 in Cygnus. Konacki employed a novel technique that he developed to find planets around binary stars. He used the 10-meter Keck I Telescope to tease out the gravitational wobble caused by a planet with at least 1.14 Jupiter masses in a tight, 3.35-day orbit around the primary star, a *G* dwarf nearly identical to the Sun. The primary, in turn, has two stellar companions (a *G*-dwarf and a *K*-dwarf) a little less massive than the Sun that orbit each other as a binary pair. The primary star and the two secondary stars, in turn, go around each other in an elongated orbit that ranges from about 6 to 18 times the average Earth-Sun distance, or about from Jupiter's to Uranus's distance from the Sun.

"The environment in which this system planet exists is quite spectacular," says Konacki, who likens it to Luke Skywalker's home planet Tatooine in the *Star Wars* saga. "With three suns, the sky view must be out of this world, literally and figuratively."



This near-infrared image from the Keck II Telescope shows the HD 188753 system. A newly discovered planet closely orbits the primary star (A), which is virtually identical to the Sun in mass and luminosity. The secondary star (B) is actually two stars that are so close to each other that they cannot be individually resolved. Both of these stars are slightly less massive than the Sun. The A and B components are separated by a distance that ranges from 6 to 18 astronomical units. The oval shows the projected orbit of component B, assuming a fixed position for the primary star (A). In reality, components A and B orbit a common center of mass that is actually closer to B, since the combined mass of the two stars is greater than the primary's mass. *Courtesy Maciej Konacki / W. M. Keck Observatory.*

The existence of a "hot Jupiter" planet in such a tight triple-star system poses challenging questions about how planets form. Theorists have long thought that hot Jupiters form much farther from their host stars and migrate into tight orbits through gravitational interactions with their circumstellar disks. But it's highly unlikely this could have happened in HD 188753. The disrupting gravitational influence of the secondary pair of stars would have truncated the disk around the primary, severely limiting the amount of available material to make a giant planet.

Theorists Alan P. Boss (Carnegie Institution of Washington) and Jack J. Lissauer (NASA/Ames Research Center) think the planet probably formed at a greater distance from its host star and was flung into its current orbit during complex gravitational interactions that should occur as multiple-star systems evolve from unstable to stable configurations. This game of cosmic billiards may have involved other stars that were once bound to HD 188753 and were subsequently ejected, or interloping stars in the crowded cluster environment.

Several astronomers have expressed caution about this reported discovery, noting the relatively low precision and small number of radial-velocity observations reported in the *Nature* paper.

ALCON EXPO 2005

KANSAS CITY
OVERLAND PARK
AUGUST 12-13, 2005

The Astronomical League is proud to announce the 2005 annual convention to be held in Kansas City, August 12-13, 2005.

The League's **Council meeting** will be held August 11 at the National Office, our first council meeting at the facility. There will also be an astronomical trade show and vendor exposition, a **Star-B-Q** at **Powell Observatory**, and a private exhibition at the **Linda Hall Library** where you can hold a Galileo first edition and read Herschel's journal. Our goal will be to increase participation by astronomers and companies and to make this the best trade show we've ever hosted.

The meetings, annual awards banquet, trade show, and speakers will all be held at the Overland Park, Kansas, **Sheraton Hotel and Convention Center**. For information about the hotel, call 913-234-2100, or toll free 866-837-4214. Be sure to mention the Astronomical League for a discount rate. For additional information, contact Mr. Carroll Iorg, 7241 Jarboe Street, Kansas City, MO 64114. Phone 816-444-4878 or e-mail Carroll at: Carroll-Iorg@kc.rr.com.

See also the ALCON 2005 Website at:
http://www.icstars.com/AlconExpo/

A

PRIME FOCUS
William Winkler

Review of the Book

THE BOOK NOBODY READ
Owen Gingerich, Harvard University
Walker & Co. N.Y. 2004

The broad intellectual era known as the Enlightenment could not develop until there was great improvement in communication of ideas. This happened with the invention of movable-type printing after 1450. A key piece of enlightenment emerged with Nicolaus Copernicus' On the Revolution of the Heavenly Spheres. The ferment produced by the some 1500 copies of the book printed in two editions (1543 and 1566) led to our first real understanding of our location in the solar system.

Because only 5 percent of the volume deals with Copernicus' heliocentric cosmology and the rest is dull and technical, including tables and a textbook of plane and spherical trigonometry, historians believe the book was widely possessed, but not seriously read. However, in preparation for the 1973 international 500th anniversary celebration of Copernicus' birth in Poland, Owen Gingerich and astronomy historians came to realize that some of the volumes had been hand-annotated by one or more famous owners. Tracking down these annotated copies enables us to understand more about the development and acceptance of heliocentric thinking, since not enough is known of this monk's life and times.

The Book Nobody Read is, in my opinion, three books. It is the story of Gingerich tracking down 600 important annotated original copies of Revolution, translating the Latin handwriting, and summarizing who wrote these comments and their historical significance. It is the story of the modern rare scientific book trade. It shows how international scientific/historical research is done.

Should amateur astronomers read this book? Most won't because its 306 pages try to do these three things in a loosely and chronologically disorganized way. If you read the whole book as I did, you are left hazy on detail. Gingerich tries to do too much in one book. Readers with very wide interests will find this book slow going but interesting.

But all astronomers should study the rich store of more than forty well-captioned illustrations including eight color plates. You see what certain pages of original copies of Revolution look like and what the Latin handwriting of various great early astronomers looks like (Bruno, Copernicus, his disciples, Brahe, Galileo, Kepler, Kepler's main teacher, etc.) in their annotations. You see pre-photography portraits of these people. You see parts of pages inked out because of censorship. Linda Hall library in Kansas City has an original volume.

Gingerich's book is especially good in outlining the struggle the heliocentric hypothesis had before acceptance. There were alternatives besides that of ancient Ptolemy. There was a sun-centered solar system where the planets still moved in epicycles. There was a solar system where the Earth was centered but the other planets revolved around the sun! It was argued that planets in circular sun-centered orbits gave predictions at least as good as the more complex Ptolemy system (Occam's razor?). Finally, separately influenced by Copernicus' work, Tycho's accurate-enough pre-telescope observations and Kepler's mathematics explained our sun-centered, elliptical-orbit solar system just as Shakespeare finished writing and the future United States got its first European settlers.

Defining 'Planet': Newfound World Forces Action

Robert Roy Britt, Space.com

"The word planet is simply not a scientific word, it is a cultural word."
- Mike Brown, leader of the "10th planet" discovery team

The claim Friday that a 10th planet has been discovered in our solar system has set off a fresh round of debate and international talks aimed at defining the most vexing term in astronomy: the word planet. A formal proposal could come within a week or two. But some astronomers see no easy resolution. Now, the guy who stirred the latest dust is trying to snuff the whole debate by repositioning planet as a cultural term that no longer has any scientific meaning.

"Scientists have for the most part not yet realized that the term planet no longer belongs to them," says Caltech's Mike Brown, who led the discovery of the new larger-than-Pluto object.

Brown's new view comes after contemplating six years of mostly fruitless scientific arguments that began when the public became outraged over a rumor that scientists planned to demote Pluto, a rumor rooted in the fact that some astronomers had already stopped calling Pluto a planet by the late 1990s.

"I finally realized the mistake we astronomers had been making all along," Brown told SPACE.com yesterday. "The word planet is simply not a scientific word, it is a cultural word. Once you get over that trap the rest becomes easy."

The problem

At the heart of the problem is small world that should never have been called the ninth planet when it was found 75 years ago. Pluto is small, its orbit very noncircular, and it travels 17 degrees outside the main plane of the solar system where the other planets roam. In recent years, several other round worlds at least half as big as Pluto have been found on similar offbeat paths, including two announced last week in addition to 2003 UB313, whose orbit is inclined a whopping 45 degrees.

Most astronomers view all of them, Pluto included, as members of the Kuiper Belt (other terms are used, too, to describe the increasingly complex outer solar system). The newfound object, temporarily named 2003 UB313, is perhaps 1.5 times the diameter of Pluto and appears to have a similar surface rich in frozen methane. So Brown called it the 10th planet in a hastily arranged teleconference with reporters Friday evening.

NASA, which funded the research, appeared to endorse the label by using Brown's terminology in its official press release. But yesterday, NASA's Paul Hertz said, "It's not NASA's job to decide what is and what is not a planet." Hertz, chief scientist in the agency's Science Mission Directorate, acknowledged the task falls to the International Astronomical Union (IAU).

"We anticipated there would be a difference of opinions," Hertz said in a telephone interview.

Wildly different, it turns out. If 2003 UB313 is a planet, one argument goes, then so are those other round things out there. So the new kid on the block would have to go to the back of the line, numerically. It might be No. 12 or No. 24, depending on whose scheme you like.

Proposal soon?

Efforts to craft an official definition have dragged on for years. The IAU, responsible for nomenclature of all things beyond Earth, has been mulling a planet definition since at least 1999. An IAU Working Group specifically set up to develop a recommendation has been stalled for the past six months. But most of the dozen members in the group were "exchanging a lot of email this weekend," said Alan Stern of the Southwest Research Institute, who is on the committee. The members have said they

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"want to get something done, pronto," Stern told SPACE.com. He said it's possible a proposal could be finalized in a week or two and made public. Still, group members have clearly different ideas in mind.

A synopsis of Stern's thinking: A planet is a body that directly orbits a star, is large enough to be round because of self gravity, and is not so large that it triggers nuclear fusion in its interior.

"I think there's a consensus moving in this direction," Stern said.

The actual definition will, at least, be more complex than that. Stern favors calling the smaller objects dwarf planets, for example. Other astronomers prefer the term minor planet. Another term bandied about is Kuiper Belt planets. Some don't like the idea of applying the planet label at all.

Let there be 8

Brian Marsden, who is also on the IAU Working Group and who runs the Minor Planet Center where data on objects like these end up, says a simple definition like Stern's makes sense from a theoretical point of view. If adopted, the wording would bring our solar system's tally of known planets to about two dozen, Marsden said. But practically speaking, Marsden, who expects it will take "somewhat more than a week or two to come up with a policy," prefers another approach.

"The only sensible solution is to accept that the solar system contains the eight planets known a century or so ago," Marsden said via email, "and to add new members only if they are larger than, say, Mars -- or maybe even the Earth."

(Stern and others contend that such large worlds indeed await discovery.) The discovery of 2003 UB313 presents "the best chance to resolve the problem," Marsden said. "I doubt that all astronomers will be happy with the outcome, but I would hope that what is decided is enough of a compromise that most of them are."

Forget science

Mike Brown yesterday attempted to shift the whole debate away from science. In Brown's mind -- and he admits to changing it recently -- Pluto is too enshrined in our culture, from place mats to postage stamps, to strip it of planethood.

"Some astronomers have rather desperately attempted to concoct solutions which keep Pluto a planet, but none of these are at all satisfactory, as they also require calling dozens of other objects planets," Brown wrote on his web site this week. "While people are perhaps prepared to go from nine to 10 planets when something previously unknown is discovered, it seems unlikely that many people would be happy if astronomers suddenly said, 'we just decided, in fact, that there are 23 planets, and we decided to let you know right now.'"

Brown's team is taking a stand.

"We declare that the new object, with a size larger than Pluto, is indeed a planet," Brown wrote. "A cultural planet, a historical planet. I will not argue that it is a scientific planet, because there is no good scientific definition which fits our solar system and our culture, and I have decided to let culture win this one."

He advises the public to "ignore the distracting debates" of the scientists. It seems clear the IAU Working Group plans to ignore Brown, at least insofar as they expect to forge a scientific definition. Yet no matter what the group comes up with, you can bank on at least one more year of debate. For a definition to be made official, it must be voted on at an IAU General Assembly meeting. The next one is in Prague in August, 2006.

Newest Weather Sentry Takes Up Watch

by Patrick L. Barry

Today, we've become accustomed to seeing images of the Earth's swirling atmosphere from space every night on the evening news. Before 1960, no one had ever seen such images. The first-ever weather satellite was launched that year, kicking off a long line of weather satellites that have kept a continuous watch on our planet's fickle atmosphere—45 years and counting! The high-quality, extended weather forecasts that these satellites make possible have become an indispensable part of our modern society, helping commercial aircraft, recreational boaters, and even military operations avoid unnecessary risk from hazardous weather. But satellites don't last forever. Parts wear out, radiation takes its toll, and atmospheric drag slowly pulls the satellite out of orbit. Many weather satellites have a design life of only 2 years, though often they can last 5 or 10 years, or more. A steady schedule of new satellite launches is needed to keep the weather report on the news each night. In May 2005, NASA successfully launched the latest in this long line of weather satellites. Dubbed NOAA-N at launch and renamed NOAA-18 once it reached orbit, this satellite will take over for the older satellite NOAA-16, which was launched in September 2000."NOAA always keeps at least two satellites in low-Earth orbit, circling the poles 14 times each day," explains Wilfred E. Mazur, Polar Satellite Acquisition Manager, NOAA/NESDIS. "As Earth rotates, these satellites end up covering Earth's entire surface each day. In fact, with two satellites in orbit, NOAA covers each spot on the Earth four times each day, twice during the day and twice at night," Mazur says.

NOAA-18, the newest in a long line of weather and environmental satellites, launched May 20, 2005.

By orbiting close to Earth (NOAA-18 is only 870 km above the ground), these "low-Earth orbit" satellites provide a detailed view of the weather. The other type of weather satellite, "geosynchronous," orbits much farther out at 35,786 km. At that altitude, geosynchronous satellites can keep a constant watch on whole continents, but without the kind of detail that NOAA-18 can provide.In particular, low-Earth orbiting satellites have the ability to use microwave radiometers to measure temperature and moisture in the atmosphere—two key measurements used for weather prediction that, for technical reasons, cannot be sensed by distant geosynchronous satellites.With NOAA-18 successfully placed in orbit, the 45-year legacy of high-tech weather forecasts that we're accustomed to will go on.

Find out more about NOAA-18 and the history of polar-orbiting weather satellites at http://goespoes.gsfc.nasa.gov/poes. For kids and anyone else curious about the concept, the difference between polar and geosynchronous orbits is explained at http://spaceplace.nasa.gov/en/kids/goes/goes_poes_orbits.shtml .

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Celestial Mechanic August 2005

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