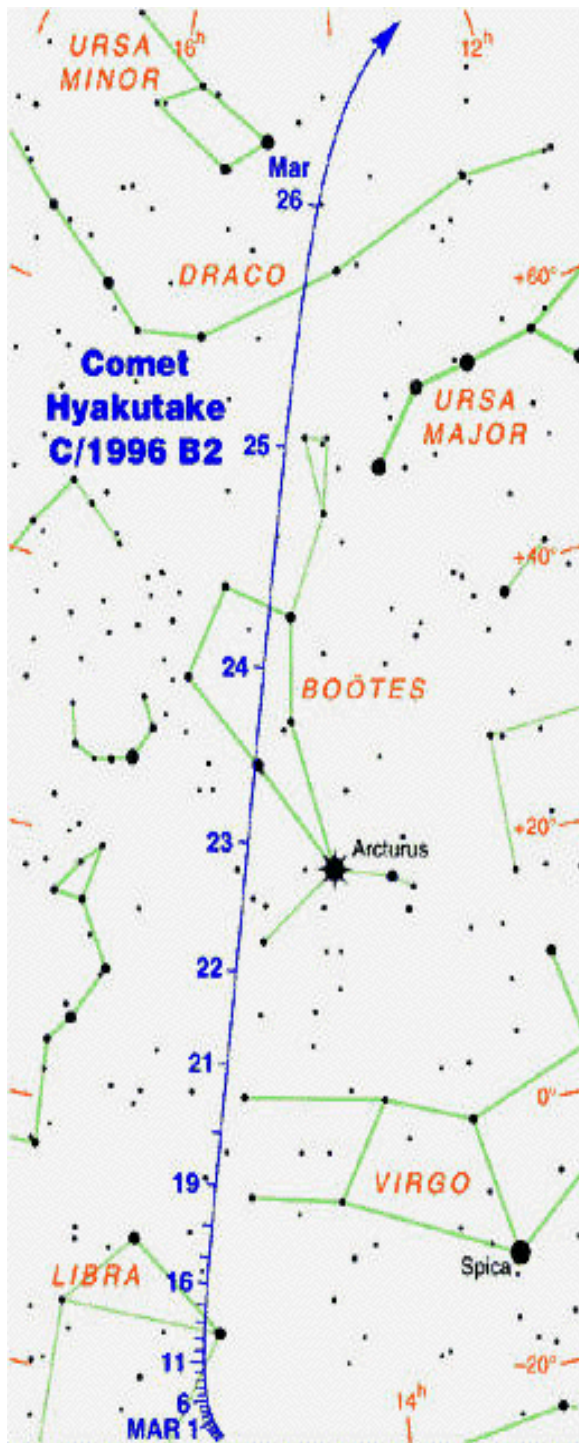


Comets Comets Everywhere



On January 30, 1996, Yuji Hyakutake in Japan discovered a new comet using 25x150 binoculars. The comet was designated **Comet C/1996 B2 (Hyakutake)**. As subsequent observations of the new comet were obtained, Brian Marsden from the IAU Central Bureau was able to compute the comet's orbital elements, and these computations indicated that the comet will pass as close as 0.10 AU (9.3 million miles) from the Earth on March 25, 1996! The comet is expected to become a bright object in March, April and May of this year, and may become a naked-eye object. It will probably become the brightest comet since Comet West in 1976.

(See page 7 for detailed positioning information for March & April)

Other relevant Cometary Entries (from the Space Calendar):

- * Mar 01 - Comet C/1996 B2 Hyakutake Crosses the Orbit of Mars
- * Mar 25 - Comet C/1996 B2 (Hyakutake), Near-Earth Flyby (0.10 AU), Possible Naked-Eye Comet
- * Apr 05 - Comet Hale-Bopp's Closest Approach to Jupiter (0.7711 AU)
- * Apr 11 - Comet C/1996 B2 (Hyakutake), Near-Venus Flyby (0.23 AU)
- * Apr 24 - Comet Mueller 1 Perihelion (2.74 AU)
- * May 01 - Comet C/1996 B2 (Hyakutake) Perihelion (0.230 AU)
- * May 08 - Lunar Occultation of Comet Hale-Bopp

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The Centre

The Newsletter of the Kingston Centre of the Royal Astronomical Society of Canada

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ascii or most major word processors (WP6.1 for windows preferred) via email or 3.5" DOS floppy disk

Our Web page can be found at:

<http://crp.kingston.on.ca/rasc/rasc.htm>

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Secretary: John Baker
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National Council Rep: Cathy Hall
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Honourary President: David Levy

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Observing:	Peggy Torney	613-
Light Pollution:	John Baker	
GA:	Peggy Torney	613-

Centre Address

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PO Box 1793
Kingston, Ontario
K7L 5J6

Upcoming Meetings/Events:

1996 March 8th (Friday 8:00pm): Jim Towgood "The India Eclipse"

**1996 April 12th: CHANGE OF LOCATION TO:
Grant Hall, Queen's University**

David Levy "Astronomy at the Millenium: The latest Discoveries and What They Mean"

Abstract: The universe is revealing more of its secrets than ever before. As new technology enables us to look further outward into space, discoveries are being reported every week with equal fanfare and equal importance. This talk will seek to put some order into the waterfall of recently announced finds with the Hubble Space Telescope on other telescopes. Starting with what I believe to be the most important find of last year -- the dark pillars of the Eagle Nebula -- I will also discuss new planets, the Kuiper Belt, and other finds to put them into perspective.

May 9th:

June 14th:

July 12th:

August 9th:

September 13th:

October 11th:

November 8th:

December 13th

Regular Meetings of the Kingston Centre are held on the 2nd Friday of each month (unless noted otherwise) at 20:00 local time in Room B-201, Mackintosh-Corry Hall at Queen's University (parking available off Union Street at Frontenac).

Special Events:

1996 March 18th (Monday 8:00pm): Queen's Physics Department Public Lecture

1996 April 20th (Saturday): Astronomy Day display at the Cataraqui Town Centre

June: Trenton Air Show Display

Regulus is published 6 times per year. Views and opinions expressed herein do not necessarily reflect the official position of the Royal Astronomical Society of Canada or its officers and members.

Subscriptions: Members of the Kingston Centre receive Regulus as a benefit of membership. Non-members may subscribe for \$10 per year.

Advertisements are free to members of the Centre. Commercial advertising is \$25 per half page, \$50 for full page and must be camera ready copy.

Contributions are more than welcome. Submitted material may be edited for brevity or clarity.

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From The Editor

This issue and the preceding one are now available on the Web. From the home page of the Kingston Centre follow the links to Regulus. It took a couple of hours to translate across from the word processors but all in all it doesn't look half bad.

Quotes on the Nature of the Universe:

Unknown: "Astronomers say the universe is finite, which is a comforting thought for those people who can't remember where they leave things."

From the Prez

"Message from the President"
submitted by Peggy Torney

Hello again,

I've been asked to submit something for this newsletter. So far things have been going well. If the President's job remains this easy, I would recommend it to everyone. We have some talks in the planning (but not confirmed yet) and I will make up the one I missed as soon as possible.

Don't miss next month. Dr. David H. Levy will be speaking at Grant Hall on April 12th. It should be a good one.

Astronomy Day is coming up. The Kingston Centre will have a display at the Cataraqui Town Centre on Saturday, April 20th. Come on out, join the fun or just say "hello". And if you have something to display, contact our Astronomy Day Co-ordinator, I'm sure Cathy would be glad to hear from you.

We need to create a new banner for the Centre, so if you have some ideas, please let me know. (Mice ate our old one).

Astronomy is more fun to share. If you

are interested in sharing your interests, please let the Education Committee know. If you've never done a talk for children or interested adults, don't worry, we'll lend a hand. The hardest part is getting yourself there to do the talk.

Clear Skies, Peggy Torney

GA COMMITTEE REPORT

There will be a G.A. Committee meeting on Saturday April 13th in Sharbot Lake. So if you are interested in joining that one, let me know and I'll pass on the details.

National Rep News

The publisher of SkyNews magazine, Wendy McPeake, has asked us to consider bundling SkyNews with our existing publications. We have been offered a very favourable bulk purchase rate, as follows:

1. Each copy will cost \$0.99, for a total of \$5.94 per year per member. Assuming a membership of approx 3000 members, the total cost will be \$17,850. The cost to insert SkyNews with our publications will be \$0.06 per copy. For comparison, the individual subscriber rate is \$17.95 for the first year, and \$20.95 for renewals.

2. SkyNews will provide the RASC with one half page of free advertising space in each issue of SkyNews, to use as we see fit. The 4X insertion rate for B&W ads is normally \$1,900 per issue. According to SkyNews, each issue is read by more than 20,000 amateur astronomers. This would be an excellent opportunity to advertise membership in the Society and to advertise our publications such as the Observer's Handbook.

3. The Editor of SkyNews, Terence Dickinson, has also offered to mention RASC events in the editorial material, and consider RASC-related articles

for publication.

4. The publishers would be willing to provide free copies of SkyNews for the RASC to distribute at special events.

5. The initial agreement would last for one year, at which point we can re-evaluate. SkyNews has indicated that they plan to expand the magazine, and they would be willing to offer us a full page of free advertising in each issue at that time.

This offer deserves serious consideration by Council. Since this magazine is clearly targeted at the general public and novice amateur astronomers, it would be an excellent vehicle for recruiting (and keeping) new members. Therefore:

It is moved that SkyNews magazine be included with the Society's regular publications for a period of one year, beginning with the first issue of 1997.

General Comments:

This issue was first raised at the last NC meeting. The idea is that "SkyNews" would be complementary to "Astronomy Canada" since it targets the general public and the novice amateur astronomer. There is the potential that this arrangement could boost the RASC's membership. Despite the very favourable rate offered to us, the cost to the RASC would still be significant. The proposal is to try this for a year and see what happens.

Any comments you might have would be most welcome! Be sure to pass your views on to your Centre's NC Rep as well.

Doug George

Quotes on the Nature of the

Universe: Ray Bradbury: "We are an impossibility in an impossible universe."

Dear Fellow Members of the RASC,



It is with regret that I write to inform you that our Executive Secretary, Miss Rosemary Freeman, has submitted her resignation effective June 30, 1996. Rosemary has served The Society since 1972. For almost a quarter-century, she has looked after membership matters, has dealt with publishers and bankers, has provided an essential link between The Society and the general public, has provided continuity and guidance as National Councils have come and gone, and has done countless other things for us which we could not imagine. I encourage all of you to attend GA'96 in Edmonton, and to join us in thanking Rosemary for her years of loyal and effective service.

With Rosemary's departure, important and difficult decisions will have to be made soon regarding her replacement and the structure of National Office. Those decisions may be linked to the important decisions which must be made -- also VERY soon -- with respect to publications.

It is important that all Members return the pre-addressed postage-paid cards which were included in the prototype issue of 'Astronomy Canada'. Please, remind Members of your Centre to drop those cards in a mailbox NOW! The decisions as to whether, or not, to replace The Journal and The Bulletin with 'Astronomy Canada' will be made by National Council, but it is desirable that National Council act in accord with the clearly expressed wishes of a substantial majority of all Members.

I remind you that 1996 is an election year for The Society. As of July 1, 1996, you will have a new President, 1st Vice-President and 2nd Vice-President. They will be leading The Society into a new era: without the valuable support which I have enjoyed from Rosemary; and, perhaps, with a new publication which will present a new and very different 'face' to the

astronomical community.

Given all of the above, I strongly encourage you to send your National Council Representative to the next meeting on March 23, 1996, and to the meetings which will be held at GA'96. (I expect that the decision on publications will be made at the March 23rd meeting of Council.)

Again, I especially encourage all Members to attend GA'96 in Edmonton for astronomy, fun, tough decisions ... and for that 'Thank You' to Rosemary.

Doug Hube, National President

Astronomy Day

Saturday April 20, 1996

Coord: Cathy Hall

On Saturday April 20th, Canadian astronomers will be joining with colleagues around the world to celebrate International Astronomy Day. This will be the 20th year in which this event has been celebrated in Canada. It has always been a special time to share with the public our interest in space and the stars. This year the theme of the R.A.S.C. displays across the country will be 'Canadian discoverers'. Kingston will be hosting an all-day display at the Cataraqi Mall - with telescopes, displays on easels, table displays, information handouts, and lots of members to talk to the public, and answer questions. For those interested in helping out, please contact me at 613-828-8807, or by e-mail at 72732.3246@compuserve.com. We are interested in telescopes and bright, colourful displays that can be seen from a distance. Specialized items, such as sky globes and models, are always popular with children! The display will be on the lower level of Cataraqi Mall, in front of Cataraqi Dental (right under the location that

we had last year). The easiest access door (for items that can be transported by escalator) will be the one beside the Bank of Montreal on the upper level, with doorbell. Larger items must be brought in through the service entrance on the lower level. Setup time for displays will be from 8.00 a.m. to 9.15 a.m.. The mall opens at 9.30 a.m. and the display will be on all day, until 6.00 p.m.. Astronomical attire is encouraged! Details of an observing session afterwards - weather permitting - will be posted at the display. If you are planning to help out, or contribute material, please let me know as soon as you can. We encourage as many as possible to participate! Astronomy Day is always a lot of fun - and a great opportunity to spread the word about our R.A.S.C. Kingston Centre activities!

Quotes on the Nature of the

Universe: Fred Hoyle: "There is a coherent plan in the universe, though I don't know what it's a plan for."

General Submissions

"Kington Centre encourages its members to write in with news of astronomy in their area and/or updates on their recent observations..."

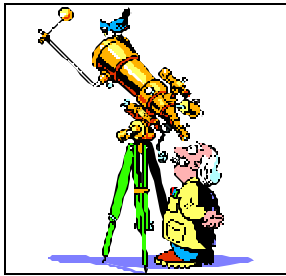
Share The View by Hank Bartlett, Newburgh.

As amateur astronomers our view of the night is vastly different from that of those who fall in love under rather than with the stars.

I remember as a young boy in Vancouver wanting to get involved in star watching. However as we all know information and telescopes in those days were not as readily available as they are today. As well there was the stigma that astronomy was for



humanerds.



The movies of the 50's portrayed space as full of wonder and adventure, now I wonder about the adventures, they tried to lead us on. The youth of today is lucky that the media tries to be much more accurate in many ways and these adventures often have shreds of credibility. Personally I felt misled by those movies, and let down by the predictions that never came true. It would be a shame for this to happen to the "next generation".

Today our children are bombarded with information about space. I fear it becoming common place or passe to many, such that they don't pay proper attention to what they are hearing or seeing.

That is why in 1995 I accepted an invitation from two teachers (Sally Grossuti and Ron Wheeler) at Newburgh Public School. My intention was to convey to the students the true vastness of space and to warn them of the traps I had fallen into. Much to their dismay I told them that shows like the ever holy "Star Trek" are just entertainment. My advice was not to put any trust in these false idols, for they may never be true! I'm sure that a few effigies of me were secretly neutralized or transported to some distant corner of the galaxy. I was delighted though with the attention I received from most of the students. I also found their inquisitive-ness and understanding of the facts rewarding.

For 1996 I decided not to shatter their

idols, I now just relate my past experience and let them make their own assumptions and judgements. While warning them to keep all they are told in context. I do try to encourage even those with the most borderline interest to look **out** into the darkness.

This year the students wrote questions I could group into topics and research answers for. This allowed them to design the subject matter we discussed and held their attention longer. Questions ranged from who was the first person in space, is there really a storm on Jupiter, to are there any space ants in space? It has again been a rewarding and learning experience for us all, plus we enjoyed some astronaut ice cream. As was done last year we will, when possible top things of with some safe solar observing.

With the dawning of the age of the HST we may now be in danger of repeating some of the errors of those old movies I spoke of earlier. We must take care to inform budding astronomers that this is not the way the human eye sees the wonder of space. If you and I are awed by these images, imagine how they look to others. I have found that students expect they would see full colour images if they buy a telescope. They must however, be encouraged to seek out these wonderful views even if many are basically monochrome.

Honest contradictions such as, the colour imaging, space is too vast to travel yet we can see two million light years with the naked eye, space is a near vacuum but filled with some kazillion objects, all that we see may be only 1-10% of all the matter that is really out there, may be just as damaging, as not enough information, if we don't try to help them understand in simple terms. The youth of today needs to be guided better than many of

us were, and helped to understand to take what they are told about space, as how it is known today only.

So whether it is for an informal lecture, a mini course, or a one time viewing session, contact your local youth clubs (scouts or guides etc.), church groups, or school. Invest some time in educating others in a hobby that we all hold dear and "**Share the view!**"

Hank Bartlett.

Quotes on the Nature of the

Universe: Edward P. Tryon: "In answer to the question of why it happened, I offer the modest proposal that our Universe is simply one of those things which happen from time to time."

Telescope status:

The telescope is out circulating with the members. At last count Doug Angle was waiting out the clouds for a chance for a real "first light" with the refinished mirrors.

"Veni, vicidobsonus, vidi..."

(I came, I got a large aperture Dobsonian, I saw...)

Quotes on the Nature of the

Universe:

John Andrew Holmes: "It is well to remember that the entire universe, with one trifling exception, is composed of others."

Internet Tidbits:

NEW TYPE OF ASTRONOMICAL OBJECT DISCOVERED IN OUR GALAXY

NASA astronomers have discovered a new type of object towards the center of our Milky Way galaxy exhibiting a combination of behaviors never before seen in the 35-year history of gamma-ray astronomy.

During the first day it was observed, the source produced over 140 powerful bursts of gamma-rays; since then, it has settled down to a daily rate of about twenty bursts, and it is currently the **brightest source of hard X-ray/gamma-rays in the sky.**



The discovery will be announced tomorrow in a paper published in the scientific journal "Nature" by scientists from NASA's Marshall Space Flight Center, Huntsville, AL; the University of Alabama in Huntsville; the Massachusetts Institute of Technology in Cambridge, MA; and the University of Amsterdam in the Netherlands.

The unusual object in the southern sky was discovered in early December 1995 by researchers using an instrument known as the Burst and Transient Source Experiment, aboard NASA's Compton Gamma Ray Observatory spacecraft. Since December 2, the new burster has produced more than 1,000 hard X-ray bursts.

BRIEFING DIRECTLY LINKING SOLAR STORMS TO DISRUPTIONS ON EARTH

The findings are the result of data from the Japan/U.S. Soft X-Ray Telescope on board the Yohkoh spacecraft and studies from the power industry. Among the significant results being reported:

* Scientists using data from the Yohkoh satellite have been able to draw a direct link between a dimming process occurring in the Sun's corona which results in huge flares causing electrified particles to wash over Earth. Scientists predict they can now provide as much as 50 to 70 hours advance warning of these solar storms. That warning can give industries time to prepare vulnerable systems for the solar storm.

* The power industry has been able to directly link major geomagnetic storms with severe disruptions at power plants from Maine to California. This correlation could allow the industry to monitor the beginnings of storms on the Sun and prepare transmitters and power grids for the onset of these storms on Earth.

* Ionized oxygen is the culprit in creating huge energized rings in Earth's ionosphere just before the onslaught of a geomagnetic storm. Knowing the composition of these highly energized rings is allowing scientists to better

understand when they occur in the 11-year solar cycle and to anticipate periods of high energy activity.

Mir Watch by Tom Dean

Satellite predictions for the next 30 days for Mir (the brightest of man-made satellites). The satellite elements on which the predictions are based are updated weekly but Mir does "move" a lot on it's own, hence predictions may not be as accurate the farther into the future they are. Over the next 30 days there are 50 visible passes, but most are marginal. The following table is the best of the passes:

LTLSTN SatTrack V3.1 Orbit Prediction

```
Satellite #16609 : Mir Complex (Mir 18)
Data File       : tlex.dat
Element Set Number: 424 (Orbit 57177)
Element Set Epoch: 21Feb96 04:59:46.251 UTC
                  (12.5 days ago)
Launch Date/Time : 14Mar95 06:11:00.000 UTC
Orbit Geometry   : 391.54 km x 398.81 km at
51.647 deg
Propagation Model : SGP4
Ground Station   : Kingston, ON, Canada ---
                  FN149G
Time Zone        : EST (-5.00 h)
```

VISIBLE PASSES:

Date (EST)	Rise	Time (EST) of Peak	Set	Peak Elev
Thu 21Mar96	04:45:44	04:50:54	04:56:12	69.5*
Sat 23Mar96	04:30:51	04:36:02	04:41:20	63.3*
Sun 24Mar96	03:35:16	03:40:27	03:45:45	70.1*
Tue 26Mar96	03:20:24	03:25:34	03:30:52	63.0*
Wed 27Mar96	02:24:49	02:30:00	02:35:18	70.7*
Fri 29Mar96	02:09:49	02:15:07	02:20:25	62.6*
Tue 02Apr96	04:53:58	04:59:08	05:04:26	47.5*

Quotes on the Nature of the Universe:

Max Frisch: "Technology is a way of organizing the universe so that man doesn't have to experience it."

The Electronic Age

The Kingston Centre maintains an email address which will allow you to send messages to all members of the executive who have email. This address is:

rascexec@cliff.path.queensu.ca

We also have a one way mailing list which allows the Executive to send out announcements to the General Membership. Everyone listing an email

address on their membership application form have already been added to this list, called *rascmem-l* (that's an 'el' for 'list') and should have received via email instructions on how to use or disconnect themselves from the list.

If you are not a member of the list and wish to be (and have a valid email address), send a message to: listserv@cliff.path.queensu.ca and in the message body put: *help*

Space Calendar

The Space Calendar covers space-related activities and anniversaries for the coming year. This Calendar is compiled and maintained by Ron Baalke. Please send any updates or corrections to baalke@kelvin.jpl.nasa.gov.

You can find this on the web at:

<http://newproducts.jpl.nasa.gov/calendar>

This Month in Space History -

Last Updated Monday, March 04, 1996 at 08:46

March 1996

Mar 01 -[Feb 27] Comet C/1996 B2 Hyakutake Crosses the Orbit of Mars

Mar 04 - 215th Anniversary (1781), Herschel's Discovery of Uranus

Mar 06 -[Mar 01] Jupiter Occults Magnitude 5 Star in Sagittarius

Mar 08 - Asteroid Massalia at Opposition

Mar 12 - Asteroid 62 Erato Occults 9.7 Magnitude Star in Libra

Mar 14 -[Feb 28] Galileo, Orbital Trim Maneuver #3 (OTM-3), Perijove Raise Maneuver

Mar 17 - Asteroid 6 Hebe Occults 8.8 Magnitude Star in Taurus

Mar 20 - Vernal Equinox

Mar 21 - Asteroid 137 Meliboea Occults 8.9 Magnitude Star in Scutum

Mar 22 - Mars Passes 1.3 Degrees North of Saturn

Mar 23 - Mercury Passes 0.3 Degrees North of Saturn

Mar 23 - Mercury Passes 0.9 Degrees South of Mars

Mar 25 - Comet C/1996 B2 (Hyakutake), Near-Earth Flyby (0.10 AU)

Mar 28 - Asteroid 517 Edith Occults 6.3 Magnitude Star in Scorpius

Mar 31 - Asteroid 1990 VA, Near-Earth Flyby (0.225 AU)

Mar 31 - Asteroid Bacchus, Near-Earth Flyby (0.0678 AU)



Mar 31 - Asteroid Eunomia at Opposition
 Mar 31 - Venus Reaches Greatest Elongation (46 Degrees)

April 1996

Apr 01 - Chiron Closest Approach to Earth (7.457 AU)
 Apr 02 - Kuiper Belt Object 1994 JR1 Occults 10.7 Magnitude Star
 Apr 03-04 - Lunar Eclipse
 Apr 05 - Comet Hale-Bopp's Closest Approach to Jupiter (0.7711 AU)
 Apr 08 - Moon Passes 1 Degree South of Asteroid Ceres
 Apr 08 - Trojan Asteroid 617 Patroclus Occults 7.3 Magnitude Star
 Apr 10 -[Feb 28] Uranus Occults 9.2 Magnitude Star SAO 163583
 Apr 11 - Comet C/1996 B2 (Hyakutake), Near-Venus Flyby (0.23 AU)
 Apr 11 - Asteroid Harmonia at Opposition
 Apr 18 - Asteroid Pallas at Opposition
 Apr 18 -[Feb 28] Asteroid Laetitia Occults 9.0 Magnitude Star in Aquarius
 Apr 20 - Astronomy Day
 Apr 20 - Lyrids Meteor Shower
 Apr 22 - Mercury At Its Greatest Elongation (20 Degrees)
 Apr 24 - Comet Mueller 1 Perihelion (2.74 AU)
 Apr 28 - Asteroid Flora at Opposition
 Apr 30 - SAX (X-ray Astronomy Satellite) Atlas Launch

May 1996

May 01 - Comet C/1996 B2 (Hyakutake) Perihelion (0.230 AU)
 May 04 - Venus At Greatest Brillancy (Magnitude -4.5)
 May 05 - Eta Aquarids Meteor Shower
 May 07 - Asteroid Vesta at Opposition
 May 08 - Lunar Occultation of Comet Hale-Bopp
 May 12 - Comet West-Hartley Perihelion (2.13 AU)
 May 18 - Asteroid 1991 JR, Near-Earth Flyby (0.1087 AU)
 May 22 - Pluto at Opposition
 May 22 - Asteroid Parthenope at Opposition

InterNet Tidbit

Aim your web browser at:

http://www.gemini.edu/gallery/construction/daily_pic.html

This shows daily construction activity at the new Canadian Gemini Telescope on Mauna Kea, Hawaii!

Cover Story

Ephemeris (with perturbations) for Comet 1996 B2 Hyakutake Ref. orbit No. 6, by D.K. Yeomans, Feb. 12, 1996

**Closest Approach to Earth Date (TDB) 1996 Mar 25.31170
 Distance (AU) 0.10185**

1996 Date

0 hrsUT R.A.J2000 Dec. GeoDist HelDist Mag
 Mar 9 14 54 38.64 -19 34 28.8 .553 1.367 5.6

Mar 10	14 54 53.33	-18 55 38.3	.520	1.348	5.4
Mar 11	14 55 05.60	-18 11 13.1	.487	1.329	5.2
Mar 12	14 55 15.13	-17 20 03.4	.455	1.310	5.0
Mar 13	14 55 21.53	-16 20 38.8	.422	1.291	4.7
Mar 14	14 55 24.29	-15 11 00.2	.390	1.271	4.5
Mar 15	14 55 22.75	-13 48 27.6	.357	1.252	4.2
Mar 16	14 55 16.03	-12 09 22.4	.326	1.232	4.0
Mar 17	14 55 02.92	-10 08 38.4	.294	1.212	3.7
Mar 18	14 54 41.71	-07 38 56.6	.263	1.192	3.4
Mar 19	14 54 09.84	-04 29 32.9	.233	1.172	3.0
Mar 20	14 53 23.40	-00 24 19.3	.203	1.152	2.7
Mar 21	14 52 15.93	+05 01 17.6	.175	1.131	2.3
Mar 22	14 50 35.96	+12 24 12.4	.150	1.111	1.8
Mar 23	14 48 01.00	+22 35 11.3	.127	1.090	1.4
Mar 24	14 43 39.95	+36 23 37.7	.111	1.070	1.0
Mar 25	14 35 06.44	+53 37 34.9	.102	1.049	.8
Mar 26	14 11 29.65	+71 48 49.6	.104	1.028	.7
Mar 27	10 40 48.60	+86 06 54.7	.116	1.006	.9
Mar 28	04 05 33.91	+78 48 46.9	.135	.985	1.1
Mar 29	03 32 31.21	+70 02 03.1	.159	.963	1.3
Mar 30	03 21 59.31	+63 31 41.5	.185	.942	1.6
Mar 31	03 16 45.96	+58 39 48.7	.213	.920	1.8
Apr 1	03 13 35.20	+54 56 09.8	.243	.898	2.0
Apr 2	03 11 23.48	+52 00 19.1	.273	.876	2.1
Apr 3	03 09 44.00	+49 38 41.5	.304	.853	2.2
Apr 4	03 08 23.46	+47 42 06.7	.335	.831	2.3
Apr 5	03 07 14.47	+46 04 15.2	.366	.808	2.4
Apr 6	03 06 12.58	+44 40 38.5	.398	.785	2.4
Apr 7	03 05 14.93	+43 28 01.7	.429	.762	2.5
Apr 8	03 04 19.53	+42 24 00.4	.461	.738	2.5
Apr 9	03 03 24.98	+41 26 45.1	.493	.715	2.5
Apr 10	03 02 30.21	+40 34 50.5	.526	.691	2.5
Apr 11	03 01 34.37	+39 47 09.2	.558	.667	2.5
Apr 12	03 00 36.75	+39 02 46.6	.590	.643	2.4
Apr 13	02 59 36.75	+38 20 57.1	.623	.618	2.4
Apr 14	02 58 33.82	+37 41 02.0	.655	.594	2.3



Apr 15	02 57	27.47	+37	02 27.4	.688	.569	2.2
Apr 16	02 56	17.21	+36	24 42.6	.721	.544	2.1
Apr 17	02 55	02.56	+35	47 18.9	.754	.519	2.0
Apr 18	02 53	43.06	+35	09 48.8	.787	.494	1.9
Apr 19	02 52	18.25	+34	31 44.5	.820	.468	1.8
Apr 20	02 50	47.67	+33	52 37.6	.853	.443	1.6
Apr 21	02 49	10.87	+33	11 57.6	.886	.418	1.4
Apr 22	02 47	27.41	+32	29 11.4	.919	.392	1.3
Apr 23	02 45	36.95	+31	43 42.0	.952	.368	1.0
Apr 24	02 43	39.25	+30	54 48.1	.985	.343	.8
Apr 25	02 41	34.29	+30	01 43.0	1.018	.320	.6
Apr 26	02 39	22.43	+29	03 35.4	1.050	.298	.3
Apr 27	02 37	04.63	+27	59 31.9	1.081	.278	.1
Apr 28	02 34	42.78	+26	48 41.4	1.111	.260	-.1
Apr 29	02 32	19.97	+25	30 26.4	1.140	.246	-.3
Apr 30	02 30	00.71	+24	04 37.0	1.165	.236	-.4
May 1	02 27	50.60	+22	31 45.7	1.188	.231	-.5

Explanation of Symbols

R.A. J2000 Dec. = Geocentric astrometric right ascension and declination referred to the mean equator and equinox of J2000. Light time corrections have been applied

GeoDist = Geocentric distance of object in AU

HelDist = Heliocentric distance of object in AU

TMag = Approximate Total magnitude = $5.5 + 5.0 \cdot \log(\Delta) + 10.0 \cdot \log(r)$

Quotes on the Nature of the Universe:

Kilgore Trout: "The universe is a big place, perhaps the biggest."

Papers

THE ORIGIN OF ICE AGES

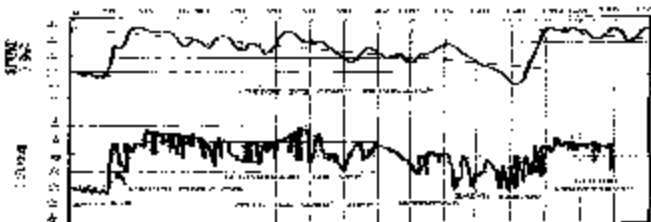
February 25 1996

Steven D. Manders

The origin of ice ages has been speculated on but every theory so far has many faults and fails to adequately explain the events. Changes in ocean currents, air pollution from volcanoes, an unstable Earth orbit, procession of rotation of the Earth's axis, asteroids crashing into Earth or the Sun, interstellar dust can all be eliminated with a careful and thorough in depth analysis. The Sun has also been proven to be stable in theory and in practice.

An examination of ice cores from the glaciers of Greenland¹ the Antarctic² give a very detailed history of Earth's temperatures going back over 170,000 years. It can be deduced from the amount of O¹⁸ and deuterium isotope in the ice which is very dependant on the temperature at the source of the moisture that made the snow. In Figure #1, especially the Vostok ice cores, it clearly shows that ice ages end abruptly but generally begin slowly and the previous interglacial period had very erratic temperatures. We are presently enjoying a uniquely warm and stable period. There is no base line to the temperature. Most causes would produce a base line with either a rise or fall in temperature. This alone eliminates most causes. What is left?

Figure 1: History of World Temperatures



(Bottom scale: Years Before Present x1000 BP)

A study of the solar interior with respect to the density, temperature and mass at each level were then used to calculate the amount of heat stored in the Sun. If the

opacity of the solar interior is higher than currently believed, keeping heat in, and its value is quite speculative, then we could have the source of an ice age. The core could store a 113,000 year heat surplus by overheating only 2% which is almost identical to an ice age cycle. As the core heated and expanded, it would become unstable, invert, a new core would form and a new stable period would begin on which our present solar theories are based.

The solar convection layer rotates at a uniform speed with depth, fastest at the equator and the radiation layer below it rotates slower.³ There is a sharp interface between the two. It could have been caused by a large descending current interacting with the rising current at the very start of our Halocene interglacial period. Such a current from the core would be hotter than the old solar surface but adiabatic cooling would cool it as it rose.

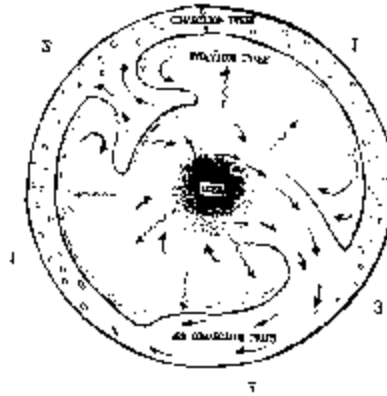


Figure #2: Ice Age Sun 15,000 BP

1) A weak convection layer and high opacity of the radiation layer does not transfer heat fast enough and the Solar core overheats while Earth freezes.

2) Periodic inversions of material overheated 1 to 2% in the radiation layer causes Earth to experience temperature rises for a few thousand years.

3) The core now overheated by 156,000 deg K and of lower density now inverts with the rest of the Sun. The rise in

temperature of the radiation and convection layer cause the radius of the Sun to increase from 680,600 km to 696,500 km and the surface temperature to rise 75 deg K to its present level. 4) The newly formed convection layer stabilizes temperature as never before.

Thus ice ages end abruptly and this huge hotter mass now outside the core would take long time to loose its surplus heat and the next ice age would generally begin slowly. This is best seen in the Vostok ice cores. Most of the short term temperature changes appear to have originated only a few hundred thousand kilometers deep where the density is very low. The over heating required to upset the delicate thermal equilibrium would be 156,000 degrees at the solar core, giving 7 degrees on Earth. Half of the increased heat on Earth is from an increase in Solar area and half from its surface now 75 C warmer (solar diameter increased from 680,600 km to 696,500 km). The equatorial current presently riding over the top of the radiation layer absorbs any smaller currents from below to moderate temperatures swings much as trade winds do on Earth. Such a mechanism nicely explains the temperature patterns as shown in the ice cores. Nothing else fits.

The solar neutrino deficiency is only a deficiency if we assume that the core is stagnant and that there is never any exchange of materials between it and the rest of the sun causing helium from the fused hydrogen to accumulate there.⁴ Neutrinos are subatomic particles generated by hydrogen fusion in the core of the sun. If the core itself periodically inverted its mass with the rest of the sun, then it would be rid of the helium and the present neutrino flux measurements are correct.

Jupiter has only 10 % helium, Saturn 6 % while the Sun presently has 25% which is evidence that the helium produced in the core does eventually circulate through the entire Sun.

This is at odds with the present solar model and the evidence of how stable the Sun is. A review of the literature also reveals that nearly every expert on the subject is not happy with the present solar model for it fails to explain far too many things such as Sun spots, their motion, magnetic cycles, flares and much more. Every other cause of an ice age can be eliminated by careful and objective analysis. This is the source of ice ages.

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