Hamilton Amateur Astronomers

Event Horizon

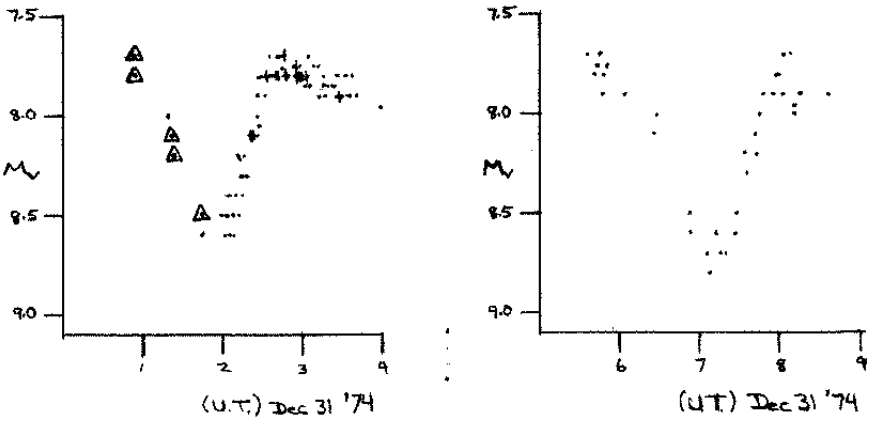
April 2000 Volume 7 Issue 6

My Encounter with Eros at Age 16

Memories of those nights come back at strange times. It was the night before New Year's Eve, 1974. The sky around her was filled with stars. She drifted slowly through my field-of-view. Unlike most others I had seen, she was svelte and tumbled in a most enticing way. She may have been 4 billions years old, but she had the body of a 3 billion year-old. Only this year did I learn how heavily cratered she was ... that sweet minor planet, 433 Eros.

It all happened 26 years ago. Fellow Ottawa RASC Observer's Group members Rolf Meier, Rob Dick, Rob McCallum, Doug Somers, Jon Buchanan and I had gathered at the North Mountain Observatory with its (for then) behemoth 16-inch f/5 telescope. On that long winter night, we estimated the brightness of Eros against the "known" brightness of nearby stars from the SAO (Smithsonian Astrophysical Observatory) catalogue. At the time, its 250,000 entries made it the largest star catalogue and it was complete to nearly 9th magnitude!

A non-spherical, but otherwise symmetric minor planet will result in a lightcurve with two minimum and two maximum brightnesses per rotation period, as you can easily convince yourself by rotating a potato in front of you. The two pairs of extrema are not necessarily of equal amplitude. In the accompanying lightcurve, our estimates have a gap in time and we see the same deep minimum separated by one rotation period.



433 Eros was once a very important asteroid. Before the days of radar-ranging in the solar system, the value of the "AU" (a. k.a. astronomical unit), was most accurately determined by observations of minor planets which came unusually close to the earth. As the largest and earliest discovery of this class of object, Eros was THE object to study to set the scale of the solar system. (The basic idea was: the closer an object is, the more accurately you can determine its distance by triangulation, since your angular measurement error is fixed. Therefore, you want to measure objects which come close to the earth.)

On February 14th of the year, the NEAR spacecraft rendezvoused and went into orbit around 433 Eros. We then got our first, close look at this banana-shaped world. More images and information about the NEAR spacecraft and its encounter with the minor planet 433 Eros can be found at: ***http://near.jhuapl.edu/***

inside...

Chair's Report

Ah, Spring! Thoughts of flowers and birds, and dreams of the long sunny days ahead ... and no time to revel in them because every group is finishing its season! April is the time of concerts, exams, and visitors. Except for the exams, which don't affect me personally so I shouldn't even mention them here, all the activities are pleasurable, but they certainly make it difficult to write a lengthy and cohesive Chair's Report. Please accept my apologies for the following snippet which must pass as my report!

This is a wonderful time for deep sky observing. The nights, although still quite long, are relatively warm and therefore somewhat more comfortable for observing than those chill winter ones. Most of the Messier objects are visible this time of year, which makes it a great time to fill in your Messier lists. So dig out that lovely new Christmas telescope that has decorated the livingroom all Winter, dust it off, and head out to the Binbrook Conservation Area with your friends.

It's also a great time to start planning our Fall speakers' series. In the past, I have relied on members' recommendations and never been disappointed, so please let me know who you want to hear during the 2000/2001 season.

Ann Tekatch has been working feverishly to get the membership list up to date, but we're missing a number of e-mail addresses. Please let me know your address by writing me at ***grant.dixon@home.com***. Thanks!

With those thoughts of summer beginning to spring up with the grass and flowers, it's a good time to check your camping gear in anticipation of our spring and summer getaways. That means restocking your supply of DEET as well as waterproofing the tent, cleaning the cooler, and replacing the batteries on your clock drive. Come on Summer!

Grant Dixon, Chair
grant.dixon@home.com

(Please note my new e-mail address – if you send a message to my old NetAccess address, I won't get it.)

Editors Report

I'm sure you will agree that this issue of **Event Horizon** is filled with some exceptional articles. Thank you to all the authors who submit articles. If you're interested in submitting an article for next month, the deadline is May 5th.

Rosa Assalone

HAMILTON AMATEUR ASTRONOMERS

Event Horizon is a publication of the Hamilton Amateur Astronomers (HAA).

The HAA is an amateur astronomy club dedicated to the promotion and enjoyment of astronomy for people of all ages and experience levels

The cost of the subscription is included in the $15 individual or $20 family membership fee for the year. Event Horizon is published a minimum of 10 times a year.

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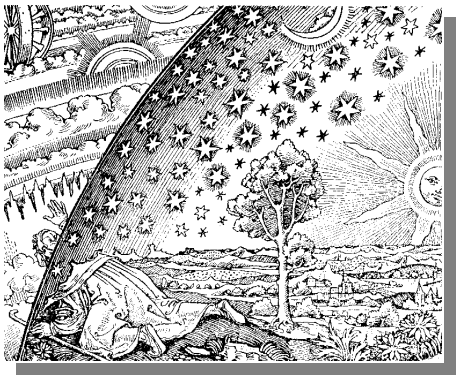


When Worlds Align: Total Solar Eclipses : 2000 to 2020

Ray Badgerow

A total solar eclipse is one of nature's most spectacular wonders, something that should be seen at least once during your lifetime. Having seen my first total eclipse last August from Turkey, I can highly recommend it. There are 4 partial solar eclipses during the year 2000 including one on Christmas Day, but more on that later in the year. Here is the list with dates, path descriptions, and the maximum duration of totality for each:

June 21, 2001
4m56s
The path of this eclipse starts in the South Atlantic where it reaches its longest point, crosses Angola, northern Zambia, Zimbabwe, Mozambique, and southern Madagascar before leaving the Earth in the Indian Ocean. I'm booked to go to Zambia. More on this one next year.

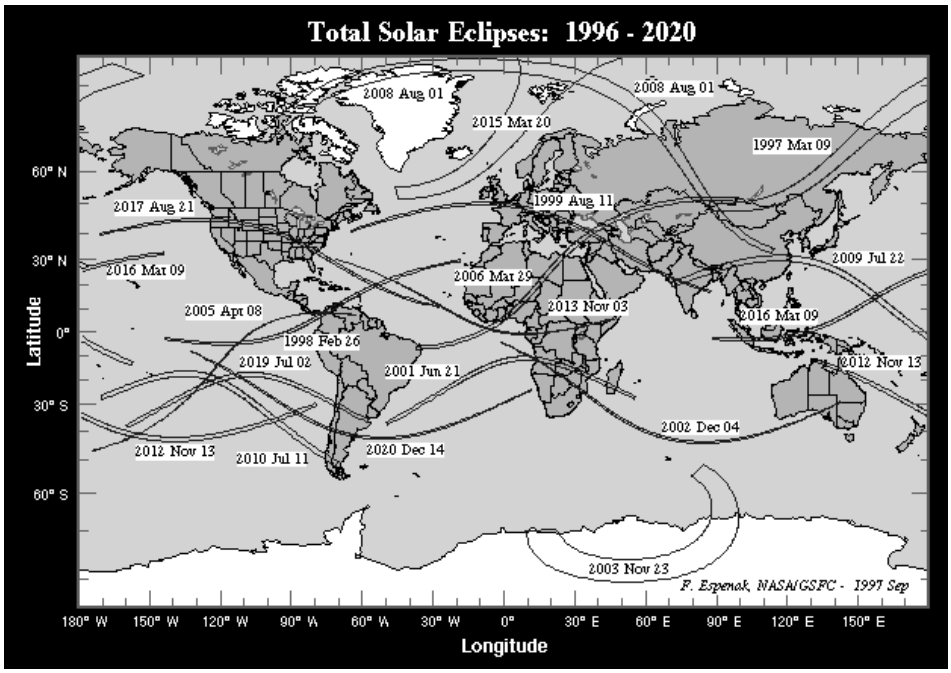
December 4, 2002
2m04s
It is rare that the path of one solar eclipse crosses the path of another, but 18 months after the 2001 this happens. The umbra touches down off the coast of Angola during the morning, cuts across southern Zambia & Zimbabwe just missing Victoria Falls (ouch!), South Africa, Mozambique, and ending in South Australia at sunset.

November 23, 2003
1m57s
This is an eclipse for those who are truly desperate as it crosses only one continent: Antarctica! The path starts in Enderly Land adjacent to the Atlantic Ocean, hooks eastward across the American Highlands before heading out into the Indian Ocean well south of Australia. The only inhabited spot is the Russian research base at Mirnyy. Qantas is sponsoring an over flight, and there may be a criuise ship, but personally I'm watching the webcast.

April 8, 2005
0m42s
This is one of the rare hybrid or annular-total eclipses. The path starts out as annular ESE of New Zealand, becomes total for 42 seconds in the eastern Pacific, then annular again for southern Costa Rica, Panama, Columbia, and Venezuela.

March 29, 2006
4m07s
The path of this eclipse starts in eastern Brazil crosses the Atlantic Ocean at the equator then comes ashore in Central Africa curving through Ghana, Togo, Benin, Nigeria, Niger, Chad, Libya, Egypt, and crosses the Mediterranean to Turkey, Russia, and ending in northern Mongolia. I'm going.

August 1,2008



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When Worlds Align ....

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2m27s
This is the first North American eclipse of the 21st Century. It starts in the Eastern Arctic before crossing northern Greenland, the Arctic Ocean, Russia, Mongolia, and ends in northern China near the Great Wall.

July 22, 2009
6m39s
This eclipse which is the longest of the 21st century starts off the coast of India, travels through Nepal, Bhutan, Burma and south-central China (Chengdu, Chongquing, and Shangai) before heading out into the Pacific Ocean.

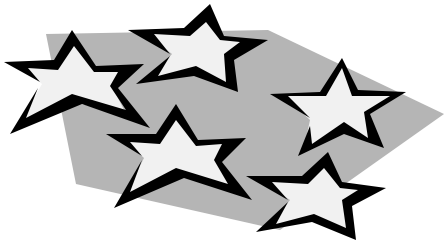
July 11, 2010
5m20s
This is another eclipse made for fish. The umbra touches down in the Pacific some 1000km NE of New Zealand then ENE toward its greatest point which is halfway between New Zealand & South America. Turning SE,

the shadow passes over Easter Island for 4m44s before leaving the Earth in southern Argentina.

November 13, 2012
4m02s
This eclipse is another one that passes mostly over water. It starts in NE Australia then heads quickly out into the South Pacific before exiting the Earth some 500 km off the Chilean coast.

November 3, 2013
1m40s
This is another annular-total eclipse similar to 2005,but it has a much longer total portion over most of its length. The shadow touches down 700 km off the Carolina coast then passes south of the Cape Verde Islands before curving southeast ward parallel to the African coastline. Greatest eclipse (1m40s) occurs some 400 km off the Liberian coast. The shadow then comes ashore into central Africa passing through Gabon, Congo, Zaire, and Uganda.

March 20, 2015
2m47s
This eclipse follows a watery path through the North Atlantic. The shadow touches down off Southern Greenland, and winding its way counterclockwise between Iceland & the UK. First landfall comes in the Faeroe Islands north of Norway.



Crossing the Arctic Circle ,the next landfall is on the isolated Svalbard island group. The shadow continues to hook counterclockwise to the NW and ends at the North Pole at sunset on the first day of spring.

March 9,2016
4m10s
The shadow touches down in the eastern Indian Ocean, then crosses Indonesia passing over the islands of Sumatra, Borneo, Sulawesi, and Halmahera before heading out into the open ocean. The eclipse ends at a point some 1400 km NE of Hawaii.

August 21, 2017
2m40s
After a drought of 38 years the continental United States experiences it first total solar eclipse since 1979.The umbra first touches down in the northern Pacific halfway between the Aleutians and Hawaii. It quickly comes ashore in Oregon and then slices diagonally from northwest to southeast. The shadow crosses Oregon, Idaho, Wyoming, Nebraska, Kansas, Missouri, Illinois, Kentucky, Tennessee, North

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Constellation of the Month - Virgo

Margaret Walton

Virgo is the second largest constellation and the sixth zodiacal constellation. It straddles the equator and its midnight culmination is April 13th.

Elements of Virgo date back as far as Assyro-Babylonian culture. It has always been considered female and associated with the tension between fertility and purity. It has been linked with the Goddess Ishtar (also known as Ashtoreth or Astarte), the forerunner of Saxon fertility and the spring goddess whose festival is the origin of Easter. Ishtar descended into the underworld to recover her dead lover, the harvest-god Tamnuz. She became imprisoned and brought blight into the world, forcing the gods to release her.

The Egyptian goddess Isis is also associated with Virgo. Spica is the sheaf of corn dropped by Isis as she fled from a monster.

The Greeks identified Virgo with Persephone, the daughter of Zeus and his sister Demeter. Hades, Zeus' brother and god of the underworld, spied Persephone picking flowers one day, fell in love with her, and carried her off to his realm. Demeter frantically searched for her daughter and at last discovered her location. Hades would not return Persephone and in her grief Demeter (goddess of agriculture) failed in her duties and nothing would grow. Famine resulted, people died, and Zeus stepped in to intervene. Hades agreed to return Persephone provided she had eaten nothing while in the underworld. Before she left, he tricked her into eating some pomegranate seeds. Because she ate the seeds, she had to return to the underworld for four months each year. Demeter was glad to have her daughter back and restored the fields, but during the four months of the year that Persephone is in the underworld Demeter grieves and winter rules.

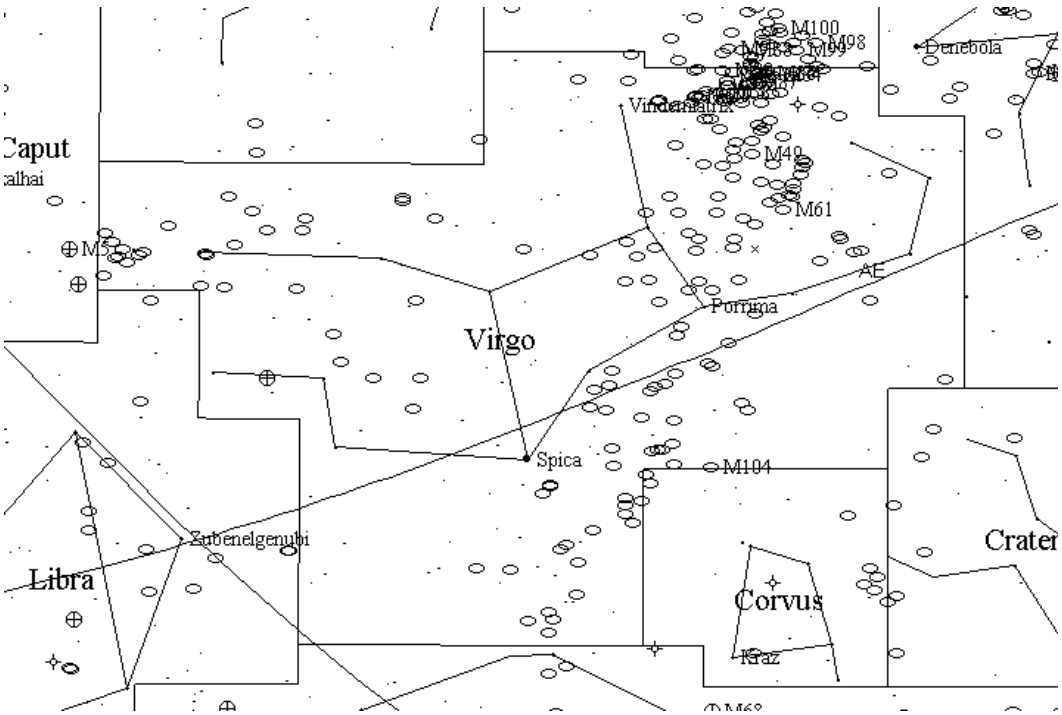
Stars

Spica: Spica is bluish white, 260 light years away, and 2000 times as luminous as the sun. It is the 16th brightest star in the sky with a magnitude of 1.0. It has a very close binary, not detectable through the average telescope. Spica is the Virgin's Spike and marks the ear of wheat in Virgo's left hand.

Gamma virginis: This is the finest visual binary. The stars are almost identical in brightness and colour. By 2007 their separation will decrease enough so that they will appear as a single star.

Objects

Virgo is packed with galaxies and it is worthwhile just aiming your scope at the Virgo/Coma Berenices border and just having a look around. The following is just a list of the brightest and/or most interesting objects in Virgo, but there are hundreds more visible through an average telescope.



Virgo Galaxy Cluster: Covering parts of Virgo and Coma Berenices, this is an incredible area of the sky packed with galaxies. Over 3,000 have been identified on photographs and over 100 are within the range on an 8" telescope.

M49 (NGC44772): This is one of the largest elliptical systems known. It is very large, bright, round and is surrounded by other galaxies. Magnitude is 8.4.

M58 (NGC4579): A compact, barred spiral of magnitude 9.8

M59 (NGC4621): A bright,

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Virgo ...

(Continued from page 5)

large elliptical galaxy of magnitude 9.8.

M60 (NGC4649): A very bright, large elliptical galaxy of magnitude 9.6.

M61 (NGC4303): A very bright, large face-on spiral. Magnitude is 10.1.

M84 (NGC4374): A bright, large, round galaxy of magnitude 9.3. It forms a pair with M86.

M86 (NGC4406): A bright, large, round galaxy of magnitude 9.2. It forms a pair with M84.

NGC4388: This galaxy forms an equilateral triangle with M84 and M86.

M87 (NGC4486): This is a giant elliptical galaxy and a strong source of radio emissions. It is bright, large, round and has a magnitude of 8.6.

M89 (NGC4452): A bright, small elliptical galaxy of magnitude 9.8.

M90 (NGC4569): A bright, spiral galaxy of magnitude 11.0.

M104 (NGC4595). The Sombrero Galaxy: This is an edge-on spiral with a large central bulge and a prominent dust lane. It is a remarkable object and its magnitude is 8.6.

NGC4030: A bright, large, slightly elongated face-on spiral with many arms. Magnitude is 10.6.

NGC3976: A bright, large, elongated edge-on spiral with two main arms and a bright nucleus. Magnitude is 11.5.

NGC4124: A bright, large, very elongated galaxy with a small, bright nucleus. 11.3.

NGC4216: A very bright, large, very elongated edge-on galaxy. 10.0.

NGC4235: A bright, large, elongated, edge-on Seyfert galaxy. 11.6.

NGC4339: A bright, large, round galaxy in a group of 3 galaxies. 11.4.

NGC4365: A very bright, large, elongated galaxy with a bright nucleus. 9.6.

NGC4429: This is a bright, large, elongated galaxy. It has a bright nucleus with a dark crescent. 10.2.

NGC4435. The Eyes: This is bright, large, round galaxy with a very bright nucleus. It is interacting with NGC4438. 4438 is a bright, large, slightly elongated galaxy with a small, bright nucleus and a dark lane. Magnitudes are 10.9 and 10.1.

NGC4442: A bright, large, round galaxy with a very bright nucleus. 10.5.

NGC4496: A pair of faint, large, colliding galaxies. 11.9.

NGC4504: A bright, large, slightly elongated galaxy with two strong arms. 11.2.

NGC4517: A bright, large, extremely elongated galaxy in pair with NGC4517a. 10.5.

NGC4526. The Lost Galaxy: This galaxy is bright, large and very elongated. 9.6.

NGC4527: A bright, large, very elongated galaxy with two main arms. 10.4.

NGC4532: This galaxy is bright, large and elongated. 10.4.

NGC4536: A bright, large, very elongated galaxy with two main arms. It is in pair with 4533. 10.4.

NGC4567, 4568. Siamese Twins: These are very faint, large, interacting galaxies. Magnitudes are 11.3 and 10.8.

NGC4586: This is a bright, large, elongated galaxy with a dark lane. 11.6.

NGC4593: A bright, large, elongated galaxy with two asymmetrical arms. 10.9.

NGC4508: A bright, large, round galaxy of magnitude 11.1 in pair with NGC4596 (10.5).

NGC4632: A bright, large, elongated galaxy with several arms. 11.7.

NGC4636: A very bright, large irregular/round galaxy. 9.6.

NGC4666: This is a bright, large, elongated galaxy with many arms and dark lanes. It forms a group with 4668 and 4653. 10.8.

NGC4684: A bright, large, elongated almost edge-on galaxy. 11.4.

NGC4697: This is a bright, large, slightly elongated galaxy with a bright nucleus. It is interacting with a barred spiral galaxy. Fainter galaxies surround it. 9.3.

NGC4698: A bright, large, irregular/round galaxy with two main arms. 10.7.

NGC4699: A very bright, round galaxy with many arms. 9.6.

NGC4753: A bright, large, slightly elongated galaxy with a bright nucleus and dark lanes. 9.9.

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NGC4754: A bright, large, round, face-on spiral in pair with 4762. 10.6.

NGC4762: This is a bright, extremely elongated, edge-on galaxy. It is one of the flattest galaxies known. It forms a pair with NGC4754. 10.2.

NGC4781: A bright, large, elongated galaxy in a group with 4784 and 4790. 11.1.

NGC4808: A bright, large, elongated galaxy with many arms. 11.7.

NGC4866: A bright, large, very elongated galaxy with a bright nucleus and dark lanes. 11.0.

NGC4900: This galaxy is bright and elongated with several arms. 11.5.

NGC4902: A bright, large, round/ irregular galaxy with a bright nucleus and several arms. 11.2.

NGC4939: A bright, large, round spiral galaxy. 11.3.

NGC5044: A bright, large, round galaxy in a group of galaxies. 11.0.

NGC5147: A bright, large, slightly elongated galaxy with two arms. 11.8.

NGC5496: A bright, very large, elongated edge-on galaxy with dust lanes. 12.1.

NGC5566: A bright, large, round galaxy with a dark lane. It is interacting with 5560 and 5569. 10.5.

NGC5634: Globular Cluster. This cluster is very bright, large and well resolved. 9.6.

NGC5713: A bright, large, round galaxy with an extremely bright nucleus. It is interacting with 5719. 11.4.

NGC5740: This is a bright, large round/irregular galaxy with several branching arms and magnitude 11.9. It is in pair with NGC5746, a bright, large, very elongated edge-on galaxy of magnitude 10.6.

NGC5846: A bright, large, round galaxy. It is the brightest in a group of galaxies. 10.2.

HAA Star Party

The HAA Spring Star Party, originally scheduled for June 2 - 4, will not be held this year. Instead, we invite our members to attend the following star party, which sounds very interesting. The web site is excellent.

Star Cruise 2000

The more than 530 members of the Amateur Astronomy Association of Pittsburgh (Pennsylvania) invite you to attend the second annual "Laurel Highlands Star Cruise", June 1 - 4, 2000.

Star Cruise 2000, as it's being called, will be held at the Tall Oaks Campground, in the Allegheny Mountains about Uniontown, PA. Guest speakers from NASA, regional universities and the AAAP; special activities; a swap table; and vendors are planned. This is a tremendous dark-sky site. Dark sky photos are available on our website for your perusal. There's a CHANCE to see Omega Centauri and Centaurus A from this site.

There are a lot of area attractions for the non-astronomer (detailed on our web site), so bring the whole family.

If you visit our website you'll see arrangements are still being finalized. But there's a ton of info there already.

Laurel Highlands Star Cruise Website: ***http://members.aol.com/lhstarcruise***

AAAP Website ***http://trfn.***

SKY & TELESCOPE DISCOUNTS TO HAA MEMBERS

The Hamilton Amateur Astronomers are registered with Sky & Telescope's Club Plan. This means that HAA members are entitled to a discounted subscription to Sky & Tel.

The regular subscription rate to Sky & Tel is $47.95 (U.S. funds) to Canadian addresses. Our members enjoy $10 (U.S.) off that rate: $37.95 (U.S. funds).

If you wish to take advantage of this offer, ***contact Ann Tekatch*** *- (905) 575-5433 or* ***tekatch@nas.net****.*

HAA members who subscribe to Sky & Telescope through our Club Plan are also entitled to 10% off all Sky Publishing books and products. An online catalogue can be seen at ***www.skypub.com****, or check out the ads in every issue of Sky & Tel.*

Did you know that...

the Hubble Space Telescope can resolve two objects separated by as little as 0.1 arc seconds. "That's equivalent to distinguishing between a car's two headlights from a distance of approximately Hamilton to Vancouver."

Rob Roy

ASTRONOMY MAGAZINE DISCOUNT TO HAA MEMBERS

Hamilton Amateur Astronomers are entitled to a discounted rate for subscriptions to Astronomy magazine. Instead of the regular annual rate of $50.00 U.S., HAA members pay only $40 U.S.!

(Astronomy magazine recently hiked its newsstand price per copy to $6.50. If you buy it off the rack, it'll cost you almost $84 Canadian annually!)

If you're interested in subscribing to Astronomy, contact **Ann Tekatch** @ (905) 575-5433 or ***tekatch@nas.net***.

When Worlds Align ....

(Continued from page 4)

Carolina, and South Carolina before heading out to sea and leaving the Earth at a point south of the Cape Verde Islands.

July 2,2019
4m33s
This eclipse is another watery one. The shadow crosses the width of the South Pacific similar to the 2010 event, but farther to the north. The shadow passes across northern Chile, and crosses Argentina where it leaves the Earth.

December 14, 2020
2m10s
This eclipse begins in the South Pacific, crosses through southern Chile & Argentina before crossing the South Atlantic and leaving the Earth off the coast of Namibia.

Where to go? There are plenty of places in Africa for 2001 and 2002, Turkey is the best bet for 2006. The Great Wall of China is a must for 2008, and the coast of that country or India in 2009. Easter Island is the only place to go in 2010, and northern Australia for 2012. For a radical climate go to the Faeroe Islands in 2015, and then head for Indonesia for 2016. You can take your pick of places in the US for 2017. After that it is Chile and Argentina for both 2019 and 2020.

Ray Badgerow

Links of the Month

I have three web sites for you to check out this month. The first one is a summary of space exploration news from around the internet and can be found at ***www.universetoday.com.*** The next one was created by an amateur astronomer and has lots of useful observing information. The URL is ***www.bluebirdobs.org***. The last one is a much improved doorway into the sketches by Jere Kahanpää. I gave the URL for Jere's site in Finland some time ago but the new location at ***www.skyrover.net/ds*** is on a faster server in the States plus the sketches and descriptions are much easier

CALENDAR OF EVENTS

- Tuesday, April 18, 2000 7pm

- April 28, 29, 2000 ~ 8pm
  May 5, 6 , 2000 ~ 8pm
- Friday, May 12, 2000 7:30pm
- Tuesday, May 16, 2000 7pm

HAJA - We will meet at McMaster University, in the Burke Science Building, room B148. For more information contact Rosa Assalone 540-8793
BINBROOK OBSERVING NIGHTS - For confirmation or directions call Bret Culver 575-9492, Marg Walton 627-7361, Rob Roy 692-3245
HAA GENERAL MEETING - At the Spectator Building auditorium.
HAJA - We will meet at McMaster University, in the Burke Science Building, room B148. For more information contact Rosa Assalone 540-8793