

GENERAL TOPICS

From: Marc Weihrauch <marc.weihrauch@student.uni-halle.de>

Dear shadow-chasers, I have yet another question regarding the pinhole crescents:

When I know the diameter of the pinhole, its distance to the "screen" (cardboard or ground or whatever), and the apparent angular diameter of the sun respective the solar crescent, how can I calculate the diameter of the crescent image? Probably it's a very simple calculation, but I haven't got an idea. Best regards, Marc

From: Cees Bassa <c.g.bassa@phys.uu.nl>

Hoi Marc, It is rather simple indeed. The only thing the hole does with the sunlight is letting it go through it. It doesn't magnify it or anything like that. Since it works like a camera obscura effect the only thing that is important is the size of the hole. If you make it too small you will get a dim image, if you make it too large you will get a fuzzy image.

So the only thing to influence the diameter of the projection is the distance between your cardboard and the screen you project it on. The sun has an angular diameter of half a degree in the sky, so the diameter of the projected image will be something like:

$$2 * \pi * 0.5^\circ / 360^\circ * d$$

with d the projection distance. For example, distance of 1 meter will produce an image of 9 mm in diameter.

I hope I didn't make very large errors in my reasoning above. Regards, Cees Bassa

From: Assoc Prof J R Huddle <huddle@usna.edu>

Cees is correct, but to put it another way, the angular diameter of the image as seen by the pinhole is the same as the angular diameter of the object, also as seen by the pinhole.

Since I am DESPERATELY trying avoid working, I did the experiment: Two pinholes in aluminum foil mounted on a cardboard frame, one made with an un-bent paper clip and the other with a ball point pen both formed images of just less than 1 cm when the pinholes were 1 meter from a white paper screen. The image formed by the larger hole was brighter, but fuzzier, than the image formed by the smaller hole.

Doing this experiment made me think of a suggestion: If you want to make a sign (e.g., "Lusaka 06-21-01") and photograph it, you have to figure out how far apart to make your pinholes. The images will be the same distance apart on the screen as the pinholes are on the aluminum foil. This doesn't depend on the distance between the foil and the screen. If your pinholes are 1 cm apart and if your foil is 1 meter from the screen, then the images will be 0.9 cm in diameter and separated by 1 cm, so they will just be resolved - that is, the images won't overlap. I suggest that you make such a sign now, and practice with it, and adjust it until you like it. Once you like it, make a template on paper, because aluminum foil won't transport very well. Then, on Eclipse Morning, you can smooth out your aluminum foil, place the paper template over it, poke your pinholes, and mount it on a cardboard frame, any you're ready to go! You should also practice the photography now, not only so that you get the exposures correct (certainly, you'll bracket exposures), but because it is a bit tricky to hold the foil and camera at the same time - clearly, you'll need a helper. Jim Huddle

From: <Rayabrooks2@cs.com>

It is even easier than that. The image is in focus one hundred pinhole diameters away just as the sun is one hundred diameters away. So if the hole is 0.1 inches diameter then the image is best focused ten inches away.

From: Mike Zon <rigoletto@table.jps.net>

Some years back, Kodak had a pretty thorough booklet on pinhole cameras. It gave the details of the aperture size, image size, f/ ratios &c. Mine fell through the cracks.

I found this site, which gives some of the details:

www.pinhole.com/resources/FAQ/

Part 4 is "What is the best size for the pinhole?"



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Part 5 is "How to determine the exposure time"

It gives the optimum diameter as $d=0.0073*\sqrt{\text{focal length}}$ (inches)

It also gives details on how to make a good pinhole (don't just punch through).

One of the hard parts was accurately measuring the diameter. I didn't have a microscope with a reticule, so I mounted the pinhole in a 35mm slide holder and projected the image. It was fairly easy to measure the image of the hole on the screen and width of the slide, so I could get at least 2 significant figures. I used regular household aluminum foil.

I think a problem is going to be making the exposure: while the eclipse is going on, you need to open the shutter, time the exposure, and close it again. Most people are going to be busy doing other things.

A pinhole camera will have an f/stop of 400 or so. The paper above gives an example: A scene in bright sunlight works out to f/16 at 1/ASA Sec, which translates to (for ASA 100 film) about 1/3 S - not too bad. The example they give assumes B&W photographic paper, about ASA 6, or 85 S, probably a little long for eclipse work.

For the serious technophile, there is a Palm calculator at www.stanford.edu/%7Ecpatton/palm/pinhole.htm

and he even has a Video pinhole page: www.stanford.edu/%7Ecpatton/vp.html

and a few more details on the calculations: www.stanford.edu/%7Ecpatton/pinholemath.htm

Here's a physics page that goes into the details of the optics : www.pinhole.com/resources/articles/Young/ He gets $d = 0.047*\sqrt{f(l)}$, which is close to the earlier result (and probably more accurate).

This paper seems to be most detailed. It references a Scientific American Amateur Scientist column by Jearl Walker, "The pleasure of the pinhole camera and its relative the pinspeck camera," Sci. Am. 245 (11), 192-200 (1981). That might be available at a large library. Mike Zorn

From: Glenn Schneider <gschneider@mac.com>

A quick note on a simple twist on "pinhole" projection.

Wherever I set up for an eclipse there seems always to be a large crowd of casual (though INTERESTED) spectators. For partial phases, rather than passing around filters (or as a supplement to that) I always bring along a small optically flat (~ 1/4 wave or better) front-surface mirror, e.g., like a secondary mirror from a small Newtonian telescope). I use this to project, by simple reflection, an image of the sun over a long-throw distance. This is just a reflective "pinhole" if the size/distance ratio is small enough.

Mike Zorn's suggestion of the "optimum" size for a transmissive pinhole of:

$$d=0.0073*\sqrt{\text{focal length}}$$

is equally applicable for a reflective one. Though, I think this is overly conservative for the purpose of projecting a fairly large image which dozens (or hundreds) of people can see at the same time. It really is a question of image sharpness vs. brightness, and that criterion may be different for someone who wants to photograph a pinhole image, rather than just casually view one.

In the case of a mirror reflection, I typically throw the image about a hundred feet. The above "optimum" formula suggests a diameter of about a quarter inch in that case. This is true for sharpness, but the image contrast will be awfully low if you are projecting on a wall or other surface (though it gets better as the partial phases progress and the ambient light level decreases). I have found a good compromise is a reflective diameter of about an inch (for 100 feet) IF you are projecting onto a surface which is shaded.

The nice (and easy) thing about this is you really don't have to decide what is "optimum" ahead of time. Bring along your spare 2" minor-axis flat (they usually are elliptical), and just stop it down with a covering piece of paper until you are happy with the compromise between sharpness and brightness.

When I had done this in 1998 I was located far forward on the front deck of a large cruise ship, and projected a bright (though just a bit fuzzy) image of the sun on the forecastle of the ship high above and in shadow. After a few minutes the "crowd" caught on, but not knowing where it was coming from the reaction was quite amusing, but very much appreciated. Glenn Schneider

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From: Assoc Prof J R Huddle <huddle@usna.edu> To: <SOLARECLIPSES@AULA.COM> Cc: Assoc Prof J R Huddle <huddle@arctic.usna.edu> Sent: Friday, May 04, 2001 7:25 PM Subject: [SE]

Thermochron

Using a Thermochron to Measure Temperatures During a Solar Eclipse: A Preliminary Assesment

Thanks are due to Solar Eclipse E-mail List member Stephen McCann (UK) for making me aware of this instrument. Made by Dallas Semiconductor, the Thermochron ("TC") is an elegant solution to the problem of measuring temperatures as a function of time during an eclipse. You can find more details at <http://www.ibutton.com/>, but briefly, the TC is (1) cheap, (2) easy to carry, and (3) easy to use. Some disadvantages will also be described below, as well as solutions to a few problems. Finally, some suggestions will be given for using TCs during the total eclipse that will be visible from southern Africa on 21 June 2001.

1. **CHEAP:** The first one costs US\$26.15, add more for \$11.15 each.

Here is a parts list with prices in US\$. You can find photographs of each item by surfing DalSemi's on-line catalog at <http://store.ibutton.com/>.

PART NO.	DESCRIPTION	PRICE
DS1921L-F52	Thermochron	10.35
DS9093F	Fob	0.80
DS1402D-DR8	Blue Dot Receptor	5.00
DS9097U-009	Serial Port Adapter	10.00
DS1921K	Instruction Sheet	Free

If Thermochrons with the part number above are sold out, get the DS1921L-F51. The -F52 is accurate between -20 and +85 C. The -F51 is only good down to -10 C, which should be good enough for most eclipses. The price is the same. The fob is a holder for the TC. It provides a convenient way to attach the TC to things; you need one for each TC. You only need one Blue Dot and one Serial Adapter to connect your TCs to a PC for programming, so adding more TCs costs just \$11.15 each. DS1921K is really the part number of a kit DalSemi sells for \$25. You just need the instruction sheet from that kit. (If it becomes a hassle, I'll fax you a copy.) The kit includes a model (-F50) of the TC that was never released for sale. I asked DalSemi to give us a discount on a package including the hardware and 4 TCs, but they declined to do so.

2. **EASY TO CARRY:** Each TC adds only 6 grams to your luggage.

The TC itself is 16 mm in diameter and 6 mm thick and weighs 3.3 grams. Inside is a temperature sensor, microprocessor and battery, and enough memory to store 2048 data points consisting of date, time and temperature. The TC is so small that you need a plastic "fob" to attach it to things. Together, TC and fob weigh less than 6 grams. And that's all you take to Africa: As explained in the next section, you program the TC before you leave home and it starts automatically, so you don't need to take the computer or the Blue Dot or the Adapter. This feature will be especially attractive to eclipse chasers.

3. **EASY TO USE:** If you can download software from the WWW and connect a device to your PC's serial (or COM) port, you can use a TC.

Download the free software from www.ibutton.com/ds1921k.html/. It runs under Windows 95 or later. Connect the Blue Dot Receptor to your PC using the Serial Adapter. Snap the TC into the Blue Dot. The software includes a "wizard" (increasingly common in Windows software) that guides you through the 8 steps required to program (or "mission") the TC.

The wizard lets you set the number of minutes the TC waits between taking data points. For eclipse work, you'll choose the minimum, 1 minute. The wizard also allows you to set a "Mission Start Delay" of up to 45 days. This means you can mission the TC before you leave home, and on the day and at the time you choose, it will automatically start collecting 2048 data points. In another step, the wizard lets you enable "roll-over" by clicking your mouse on a check-box. If you do not enable roll-over (and you shouldn't), once the TC has 2048 points, it will pause and wait (up to 10 years) for you to snap it back into

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the Blue Dot and upload the data to your PC. You must be careful to leave that box unchecked, because if you do enable roll-over, then after it has collected 2048 points, the TC will continue to take data, writing the new data over your eclipse data.

DalSemi does not supply Macintosh software, but there is a TC users e-mail list. I have not looked into the matter, but I'm told that there is some Mac software available from members of the TC list. Oh, and get this: There's even an outfit in Mexico that sells TC hardware and software for Palm computers!

Also attractive to eclipse chasers is the fact that the Thermochron is "fire and forget". Once it is missioned and set up, it needs no attention until you take it down after the eclipse, and then it will wait until you get home to read the data. And it is reusable; its battery will last up to 500 cycles of being missioned and read.

DISADVANTAGES: The TC was not designed for eclipse work, so some disadvantages are to be expected. (A) It is only accurate to +/- 0.5 degrees C. (B) The internal clock isn't very accurate. (C) TC can't take data more rapidly than once per minute. (D) The DalSemi software doesn't allow you to save the data in a format readable by Microsoft Excel.

(A) **TEMPERATURE ACCURACY:** Those with professional interests in such data would prefer better accuracy, but I can't complain about the half-degree accuracy DalSemi claims. Doing a rigorous calibration of a thermometer is never a trivial matter, but the TC suffers further because it cannot be boiled. Extended exposure to temperatures over 85 C can destroy it. But I wonder if you can measure outdoor air temperatures much more sensitively than half a degree, anyway?

(B) **CLOCK ACCURACY:** The TC's clock is not very accurate, but you can calibrate the clock by introducing recognizable signals into the data at measured times. Before you leave for Africa, mission your TC to start measuring temperatures once a minute beginning 30 hours (for example) before totality. Sometime after 29 hours before totality, when you're sure the TC has started taking data and you are ready to set it up for eclipse day, drop it into an ice-water bath and leave it for 5 or 10 minutes, noting the times you put it in and take it out. Repeat this when you recover the instrument after the eclipse, again noting the times. You can use the known times to calibrate the TC's clock.

(C) **DATA FREQUENCY:** One would like to have several data points during totality. The TC can take data no more frequently than once per minute, so with a little over 3 minutes, you may get as many as four data points during totality, if you get lucky. (At my location, totality is 2:58, so I'll get three points unless I'm rather unlucky.) It would be nice to be able to take data twice as frequently. It would also be nice if you could see evidence that the TC is working, but that is only possible when the TC is connected to a PC. But it is hard to complain at these prices.

(D) **READING DATA INTO MICROSOFT EXCEL:** MS Excel uses the more popular space-delimited format, DalSemi uses comma-delimited, so you have to diddle the data in order to read it with spreadsheet and graphing software like Excel and Origin. It's no problem, really, you just have to copy the data into a word processor (like MS Word), replace all the commas with spaces and save it as a spreadsheet. Then you can open the data with that spreadsheet and plot it.

SUGGESTIONS FOR USE: As the Sun is occulted by the Moon during an eclipse, it becomes noticeably cooler. Afterwards, it is interesting to find out how much cooler it really got, and how much of that shivery feeling you got was due to the magic of the eclipse. Some professional scientists go further, measuring changes in temperature, humidity, wind speed, barometric pressure, and even concentrations of various chemical species in the air. The TC has isn't perfect, but it can play a role in eclipse atmospheric science. I'll leave it to the pros who would use the data to describe experimental protocols, but there are some standard things meteorologists do to make it easier to compare data:

(I) **Protect against "insolation"** by direct rays from the sun: You always want to measure air temperatures in the shade. You can use a little paper umbrella like they put in tropical drinks, or see the suggestion in the last paragraph of this e-mail, or better, do it your own way.

(II) **Standard heights above the ground:** Meteorologists study the exchange of energy between the Earth and its atmosphere by measuring air and ground temperatures. In such studies, one thermometer is usually placed 1.5 meters above the ground. SE list member Marcos Penaloza (Venezuela) uses a model that also requires temperatures to be measured 30 cm above the ground, on the surface of the ground, and 5 cm deep into the soil. Be sure you write down where you placed each one of your

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TCs; they can be identified by serial numbers that are both laser-etched onto their casings. Marcos says you should note the condition of the ground (grass, bare soil, sand, etc, and color of same) and of the surroundings (trees, buildings, etc). Photos will be useful.

No one wants to carry a lot of hardware to mount their TCs on. Here is one solution, but you are encouraged to find your own: Tie one end of a light rope or cord to the branch of a tree. Anchor the other end of the cord to the ground with a rock. Use tape to attach TCs to the cord by their fobs. The tree will provide some protection against insolation, but you can also make little paper hats for your TCs as follows: Cut a 3-inch square of heavy paper. Cut a slit to the center, perpendicular to an edge. Slide the cord into the slit, then pull the edges together to form a shallow cone, and secure your "Instant Anti-Insolator" with tape. One could also use a rock and a balloon to suspend a string in a small lake, and hang TCs at several depths. Is it easier to model the energy exchange between the air and a lake? I don't know. Please, would one of the pros suggest depths at which to hang TCs? There's a nice shallow lake at the Protea Lodge near Chisamba, north of Lusaka, but I'll be elsewhere.

Best wishes for clear skies and a magical eclipse, Jim Huddle

From: Harvey Wasserman <onsite@gate.net>

FYI - Excel is capable of importing a delimited file using just about any delimiter. When you open the file, make sure the 'file type' is 'prn, txt, csv'. This sets up the importer. It is helpful to have the extension on filename be one of these, as well.

The 'Text Import Wizard' will start. Choose the 'delimited' option vs 'fixed length' button. Click 'next'.

The 'Tab' option is the default, but you can check the 'Comma' button, and you will see the columns line up in the 'Data Preview'.

By choosing 'Next' you have some formatting options. "Finish" imports the data into a spreadsheet.

It is possible that some very old versions of Excel won't do this, but I believe that they all will, though the exact sequence used may vary a bit. I remember doing this with a file quite a few years back.

Anybody having problems with this is free to email me, and I will do my best to help. I will also convert the data for you, if need be. Sincerely, Harvey Wasserman

From: F.Podmore <podmore@science.uz.ac.zw> To: <solareclipses@aula.com> Sent: Saturday, April 14, 2001 2:19 AM Subject: [SE]

WHY does Moon orbit precess??

Perhaps not such a beginner question...

I read that the 'eclipse year' is 19 days shorter than a 'normal' year, because the plane of the Moon's orbit precesses (slowly) once every 18.6 years. But WHY does it do this? And WHY in the direction to make the eclipse year shorter? Why couldn't it precess the other way?

Answers on the back of an envelope to..... No, either a email explanation (you'll have fun typing any relevant equations!!, or I'll have fun deciphering what you type), or a reference to a readily available book, or journal article. If I can't find it 'readily available', I'll squeak for someone to kindly mail/fax me a photocopy of relevant pages.

Many thanks. [There'e LOTS to know about eclipses. isn't there?] Francis

From: Jean Meeus <JMeeus@compuserve.com>

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Yes, the lunar nodes move in the retrograde sense, while the perigee moves in the opposite, the direct sense.

I fear that explaining why the directions are so, cannot be explained with "words". It needs a mathematical proof. However, in a small but *excellent* little book, published during the first half of the 19th century, the British astronomer Airy explained a lot of facts on celestial mechanics (including the motion of the lunar nodes) by rather simple geometric considerations. That book was re-published about 30 years ago by "Neo-Press" (of which I never heard more). The title of the book is "Gravitation : An Elementary Explanation of the Principal Perturbations in the Solar System" -- a little jewel! Jean Meeus

From: <Rayabrooks2@cs.com>

To Francis: I love the question of why the Moon's orbit precesses. By now some of you must know I love the math but I always need the warmth of a physical model (Victoria Secret model will do nicely) to feel I understand it.

Question: Why precess?

Answer: Because the Moon's orbit is like a motorcycle front wheel.

Imagine riding down the road at 50 MPH and you suddenly (instantaneously) turned the handlebars 90 degrees to the right (yeah you'll crash but anything for a physics experiment). Consider the point on the top of the tire at the instant you turned it. It still wants to continue doing 100 MPH (bike speed plus wheel speed) straight down the road. Well since you just turned the handlebars 90 degrees, straight down the road now means to the left side of the wheel. So the bike leans left when you try to turn the handlebars right. This is precession effect.

At very low speeds the bike (pedal bikes are always in this mode due to very low front wheel angular momentum) goes left due to going out of linear balance - a completely different effect. If the bike were almost all angular momentum (fast spinning front wheel with hardly any remaining weight to the rest of the bike) then the precession effect would occur at lower speeds.

OK now to the Moon. The orbit is the front wheel and we are now lying down on our right side on the plane of the ecliptic looking at the top of the wheel (the orbit). We have positioned our-self so that the ascending node is facing us (this is now the top of the motorcycle front wheel). The Moon is 90 degrees past ascending node so it is above the plane. The Moon's position is at the front of the wheel and the axis of the motorcycle fork is running through the nodes of the orbit.

Now for some action: The Moon is pulled down toward the plane of the ecliptic due to net effect of attracting bodies not liking things to go out of the plane, just like turning the handlebars. We saw that the top of the wheel (ascend node in our model) on the bike moved left which in our Moon model is up from the ecliptic. So if the ascending node is now tending to become the new high point above the ecliptic plane that means the system has moved back, CW as viewed above the ecliptic which is counter to the Moon's motion: Nodes regress!

From: Harvey Wasserman <onsite@gate.net>

Oh baby! I am way too asleep to read something like this! Just when things are fun, someone sends something that you have to think about to understand! Have they no decency? Have they no mercy? Nah! And this is the easy version. I've got a girl in France! Love, 'Rubaby

From: Harvey Wasserman <onsite@gate.net>

Oops... lol?!? Harvey



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From: <Rayabrooks2@cs.com> To: <SOLARECLIPSES@aula.com> Sent: Thursday, May 17, 2001 10:27 AM Subject: [SE]

TSE and EYE/BRAIN SYSTEM

I completely agree with all Glenn and Eric said about not distracting yourself by taking pictures but rather watching....and listening and taping the experience - the audio seems to have the best historical/playback value because the fidelity of all - every - any - each photo is quite poor compared to the eyes. I showed my two daughters the best digital multi-composed photos (a quantum leap over earlier methods) ever made of eclipses about 20 minutes after the Aruba eclipse in 1998...."Gee, Dad, that's not even what we saw!" There is no comparison to the eye. Eclipses are very cool - kinda like you can't really take a picture of God - it won't develop.

The eye/brain is the best photo-optical device for this experience.

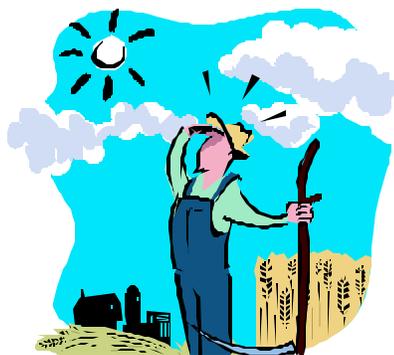
To add to Glenn's words about putting on the eye patch: The human optical system is very dynamic. Not just opto-chemically at the retina but also at the lateral geniculate and how the visual cortex uses the rest of the brain to figure things out. The brain is always base-lining inputs Take off a heavy backpack at the end of the day and you feel like you are floating. Same is true visually. Optical illusions use this baseline effect like looking at a spinning multi-spiraled figure for a minute then look at your hand and it seems to spin in the opposite direction. The brain after a while baselines CW spinning as "normal". Sensory deprivation tanks (removing all baselines) right up to C2 would change the totality experience but you would miss out on the opening act.

So do not look at objects in motion just before the eclipse. I firmly believe I can see movement in the corona naked eye. Not particle motion - 1 million MPH is only one solar diameter in one hour which is clearly not fast enough "angular velocity" for the eye. Can anyone report on this too? Perhaps it is an illusion on my part but I could easily see it during 1991 and 1998. So I thought it might perhaps be magnetic phenomena.

Glenn is correct about dark adapting. For something this bright, 30 minutes is fine. To see something near the limit of visibility like the Horsehead nebula without filters, 3 hours is noticeably more effective and adaptation is reduced in about 5 seconds just by the dim nebula (IC433?) emitting behind the Horsehead. The eye patch makes sense and it works!! 3 to 7 photons are needed to fire a retina neuron, depends on wavelength.

I do not think the issue of dominant eye is important. The brain rasters what it perceives as important detail from both eyes and merges the two images. If one eye (for someone who does not wear distance glasses) is a better distance (infinity) eye then cover that eye. The brain cannot merge a detail if it is not picked up in the poor eye because it is blurry or in the good eye because it is not dark adapted. Eye dominance is only a priority function for "are these two items lined up visually?".

I am very interested in anyone who also thinks they can see motion in the corona. Ray Brooks



COSTA RICA

From: Michael Gill <eclipsechaser@yahoo.com> Sent: Saturday, May 19, 2001 7:43 PM Subject:

Annular Eclipse Images Wanted For Eclipse Publication

Dear All, Alejandra León Castellá in Costa Rica is preparing a publication for the December 14th 2001 annular solar eclipse that will be observable from Central America (including Costa Rica).

This will be along the same lines of the publication produced for the July 11th 1991 total solar eclipse (Eclipse Total De Sol. Costa Rica, 11 De Julio, 1991).

I've targeted you all initially, as I know you have photographed annular eclipses. If further images are needed I may widen the appeal via Patrick Poitevin's eclipse listserv.

If you have any images, primarily of annular eclipses, that are suitable for publication then Alejandra would be delighted to hear from you at: leonale@racsa.co.cr

Images will be returned after use, and any images used will be credited to you in the publication. Unfortunately, no funds are available for payment so this will be for personal satisfaction only.

If you are able to provide images, then can you please include any technical information (film speed, exposure time, focal length of instrument used, type of filter) that is applicable to your photograph. Could you also state which annular eclipse you photographed (year) and from where (country, state, city).

Images can be got to Alejandra in the following ways:

An Express mail service (in Miami) can be used to send images to via snail-mail. Or, they can be sent electronically.

Due to file sizes and disc constraints, please do not send digital images without prior consultation with Alejandra. Many thanks for any assistance you can provide. Michael Gill.

From: Alejandra León <leonale@racsa.co.cr> To: <SOLARECLIPSES@AULA.COM> Sent: Sunday, May 20, 2001 10:11 PM
Subject: [SE] Annular Eclipse in Costa Rica

Hi! I am writing to you from Costa Rica, where we are preparing a Campaign for the Annular Eclipse and I have been reading carefully all the pros and cons that you all have been expressing about Annular Eclipses.

I will be here, so I don't have to weigh that many other issues. Our organization was very successful in preparing the country for the Total Eclipse in 1991 and the Partial in 1989. Our people have a good memory of these events and will be looking forward to this next one. We hope many of you decide to come and get in contact with us.

Now, regarding some other pros:

- . You don't need all the vaccines you are getting for the African experience.
- . Traveling is much safer here, even though sophisticated equipment in cars is a temptation.
- . Costa Rica is a beautiful country (my humble and subjective opinion) where you have the opportunity to cross from the Pacific Ocean to the Caribbean Sea in just about 4 hours.
- . We have an extensive system of protected areas where you can learn more about subtropical fauna and flora. In that same line, because we are a thin connecting strips between the north and the south, we have an immense amount of living species. . The northern part of our country - the province of Guanacaste- has some of the most beautiful pacific beaches. This is the region where we foresee a clearer sky for December.

Last... We would like your support in identifying interesting materials, like the mentioned audiovisuals that could aid us in using the eclipse as a stimulus for science and math education in the schools.

Our section on the Annular Eclipse has not been growing at the speed we would want (it is under construction), but we hope to expand it in the coming weeks. Right now you can visit it at: <http://cientec.or.cr/astro/astronomia/eclipse/eclipse-cr.html>

Hope to hear from you, Alejandra León Castellá, Fundación CIENTEC

>Daniel Fischer wrote: There are a few excellent video tapes of this phenomenon around, but they are rarely displayed outside the IOTA community (where such tapes are recorded in an attempt to measure the diameter of the Sun at extreme precision). The best one ever I saw was shown during the after-annular-eclipse party in Geraldton, Australia, in 1999, shot by an American with extreme magnification: Dozens and dozens of BB's appeared in rapid succession, to finally merge with the crescent itself. Daniel www.astro.uni-bonn.de/~dfischer/aus99/first.html has some pictures of not nearly the quality mentioned above (but with the chromosphere, too).

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From: Olivier "Klipsi" Staiger <olivier.staiger@span.ch> To: <SOLARECLIPSES@AULA.COM> Sent: Saturday, May 12, 2001 3:48 PM Subject: [SE]

a bright comet for June 21 ?

will we see a bright comet during the eclipse ?

THIS is unexpected ! Comet C/2001 A2 (LINEAR) is in outburst ! that comet is supposed to be mag 11.3 today, but is mag. 5.3 right now. Only visible in southern hemisphere, brightest expected moment should be June 21-22 !!! What a coincidence ! I love it ! It was calculated to get to mag. 9.9, on June 21-22-23, but it is undergoing a great outburst as the nucleus split in two ! So will we see a bright comet during the eclipse ? No, because even if it stays bright, the comet will set before the eclipse (it will be in the "tristate area" between Cetus, Eridanus, Fornax) . However we will be able to see the comet before dawn, in the east. Let's hope that it stays bright, so we'll have another good reason to travel to Africa ! check out <http://encke.jpl.nasa.gov> for latest images and finder charts and info .

From: Olivier "Klipsi" Staiger

with Cybersky www.cybersky.com you can do an animation of the eclipse as seen from any point. Get the precise coordinates for Kamilonga and see it (without the sunspots, however !) Latest news from comet C/2001 A2 (LINEAR): mag 5.1 now, faint naked eye (better w/binoc) in southern hemisphere. Peter Tiedt, Francis Podmore, have you seen it ? It is close to M79 today after dusk.

Patrick, is it okay to discuss the comet on your site, in conjunction with the June eclipse ? We know that the comet will not be visible during the eclipse, but we will certainly watch it in the night when we are in Africa (U2, I'm sure !) Olivier "Klipsi" Staiger , Geneva Switzerland

From: B Yen <byen00@earthlink.net> To: <SOLARECLIPSES@AULA.COM> Sent: Tuesday, May 08, 2001 2:34 AM Subject: [SE]

astro equipment into Zambia?

I (like many other eclipse goers) will be carrying a lot of telescope gear to Zambia: many cameras, telescopes, equatorial mounts. Is there any special forms to fill out, for allowance of this type of gear? (In Curacao for '98, the government had such a form, which I filled out beforehand. Otherwise, I would have been hit with an import-duty penalty!)

I will have my items (camera serial #'s) registered by US Customs, to prove that I am bringing the items in with the intent of returning *with* them. I did this in '99 for Turkey eclipse, with no problem. byen

From: Joel M. Moskowitz, M.D. <moskowi@attglobal.net>

The lodge operator where I am going states to have a list (with serial numbers) of all your cameras, optics, and electronic equipment to hand to customs on entry. This is supposed to satisfy the requirements. This was confirmed by the US Embassy in Lusaka. Also, the official word is that the customs officials have been told to be VERY nice to tourists for the eclipse. I am also bringing a load of equipment, so this is the info that I got. Joel M. Moskowitz, M.D.

From: <Jay.M.Pasachoff@williams.edu>

I have checked on with the American Embassy in Lusaka about Mr. Yen's and Dr. Moskowitz's query about important of equipment temporarily duty free to Zambia. The recommendation is to send a list of your equipment to

Mrs. Agnes Seenka
Chief Executive, Zambia National Tourist Board
PO Box 30017
Century House
Lusaka Square
Lusaka 10101
tel: 260-1-229087 or 229090



(Continued on page 60)

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fax: 260 1 225 174

e-mail: zntb@zamnet.zm

website: www.zambiatourism.com

I met with her on my March trip to Lusaka and I know that she is head of the Eclipse Committee and is concentrating on making the eclipse experience a good one for everyone coming to Zambia.

Jay Pasachoff as Chair of the Working Group on Eclipses of the International Astronomical Union, jay.m.pasachoff@williams.edu

From: John Leppert <johnleppert@peoplepc.com>

Dear Jay, Some of us are traveling to Harare and then into Zambia to view the eclipse and then are returning to Zimbabwe. Some will as well be only traveling to Zimbabwe and viewing it there. Does anyone know what the requirements may or may not be for those viewing the eclipse in Zimbabwe or for those who are simply traveling through Zimbabwe and vie wing it in Zambia? John Leppert Bismarck ND

From: <JohnLX200@aol.com>

Wow, that's a nasty problem I haven't started dealing with yet. I suppose the same thing applies to Great Britain, South Africa, Zimbabwe, and Zambia for me. Not to mention the return to the USA with a load of equipment.

When I returned from Aruba in 1998, my only proof of ownership of my equipment was a copy of an insurance rider application listing the equipment. The Customs guy made it very clear that if he hadn't believed every bit of my story, I would have been detained for quite some time due to the lack of the Customs forms verifying having previously had the equipment in the USA.

So for starters, I plan to definitely visit US Customs, fill out their forms, and drag my equipment to them to verify that I have them in my possession in the USA before leaving.

Then I guess Zambia is my next priority, followed by South Africa and Great Britain due to overnight stays there. Last would be Zimbabwe in my case, as I'm just in transit passing through from the Vic Falls airport to Livingstone and back on my days of flight.

I guess another option would be to deal with the paperwork for just US Customs and Zambia, and ship the equipment directly to Livingstone, Zambia and back home rather than bring it on my flights through the 3 other nations. Then again, that would have the disadvantage of being in Cape Town with Mars just past opposition at the zenith ... and no scope. John Hopper

From: Joel M. Moskowitz, M.D. <moskowi@attglobal.net>

For re-entry into the US, I always carry copies of the original purchase receipts. That is enough proof of ownership. For the other countries, I once used (and will probably use again) an ATA Carnet. You get this from the US Council for International Business. It is sort of a passport for your equipment. You show it to customs upon entry and leaving a country to prove that you left with what you brought in, and serves as proof of ownership, and bypasses any import duties. Not every country accepts it. The list of countries is at their website. Zambia and Zimbabwe are not on the list, but South Africa is. Almost all Western countries are. Even if a country does not accept the carnet, reasonable customs will accept it as proof and good faith to legally import and re-export the equipment. Joel M. Moskowitz, M.D.

From: Jean-Paul Godard <jean-paul.godard@noos.fr>

Any advices for customs concerning Zimbabwe? Cordialement / Regards, Jean-paul.godard@noos.fr

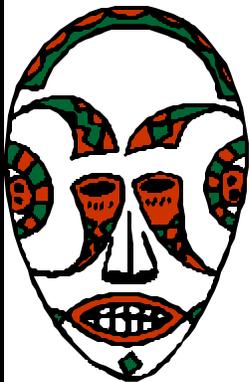
From: <Rayabrooks2@cs.com>

This issue does not make much sense to me. Can you really buy a Zeiss lens or a GPS unit or a Questar in Africa as a tourist. The key here is "as a tourist". Certainly a resident could get anything delivered, but as a tourist it does not make sense? We have never encountered this problem globally (South America, Caribbean, Moscow, Siberia, Europe) with even less esoteric equipment like an 80 mm set of binoculars.

From: Assoc Prof J R Huddle <huddle@usna.edu>

When I went to Zim in March 2000 and then again when I went to Zim & Zam last June, I took a backpack full of video and optical equipment. I had no trouble at the airport in Harare and no trouble at the Zim/Zam border, which we crossed by auto-

(Continued on page 61)

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mobile. As I always do, i took with me copies of the invoices and/or credit card slips for each of the major items. Nobody asked to see them, but that doesn't mean the won't ask the next person. Jim Huddle

From: Cliff Turk <cliffturk@yebo.co.za>

Yes, you really can buy things in Africa. We are not quite so backward as most people seem to imagin. However the mathematics are a bit crazy. Let's take an example which should convince even Customs people that no-one would buy astronomical equipment in Africa:- A Celestron Ultima 2000 is priced at 3499 pounds in UK and about the same number of dollars in the States. Converting those prices to SA Rands at R8 = \$1 or R11 = 1 Pound gives R 27 992 to buy the thing in USA or R 38 489 to get it in UK. Wow! And you can buy it in South Africa for R49 750 !!! I wonder how many tourists are likely to do their buying in South Africa - and similar conditions will apply in other southern African countries. Those of us who

live here can't even buy in the States and have the thing shipped over as the manufacturers say we HAVE to buy through their SA Agent. That's why we prefer to buy used equipment - at least we don't get ripped off so badly. I have used Celestron as the example, but Meade is just the same. We can't win.

From: Kidinvs@aol.com

Hello, all.... this topic is becoming a bit old, and I think that it is because people may be missing the point of what is actually happening here.

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Firstly, I am not suggesting that people do not carry receipts to show value of goods, or even to prove that the goods are yours. But here is the deal..... Assuming you leave the US with a lot of goods, no one here will really care. When you arrive in London, for a possible layover, it is unlikely that anyone there will be concerned with your possible importation of goods. But when you arrive in Africa, in say, Zimbabwe or SA, it is a fact that these goods that you are carrying are worth a lot of \$\$\$\$. It is a known fact that the cost of goods in these countries is HIGHER than where you have brought them from. Their concern, at customs, is that you are going to sell these goods locally, and thereby, avoid the duty charges that should be levied on these goods if they were for import and sale. So, these countries may impose a duty charge for you to bring them in. I would hope that with the eclipse, they will understand that it will take forever to impose these charges.... only to refund them upon your departure from the country. If you are forced to pay any import duties, YOU NEED TO GET an itemized receipt for every item that you have paid duty on. When you depart, you will need to show that you are leaving with these same items... proving that you have not sold them. DO NOT loose the receipt. Possible problem..... DO NOT LOOSE the goods. If they are lost, you will not be leaving the country with them...no refund. In my travels, I have heard stories of crooked customs agents actually arranging to have goods STOLEN from the tourist's hotel room after import duty was "deposited", making it impossible for the

tourist to leave with them. Upon the tourist departure, there is no claim for a refund. The agents pocket the money!!!! I am making no ill reference here at all... only attempting to clarify what these duty charges are for, and where you may expect to see them. Have a great trip..look for me in the Victoria Falls Safari Lodge... June 12-20. Ill buy anyone a Corona!!!! Eric Brown

From: Harvey Wasserman <onsite@gate.net>

Perhaps I am missing the point of this discussion, but it seems to me that all we are saying is that these countries have high import tariffs on these commodities. The same can be found pretty much anywhere, the only difference being what industries a given government decides to protect, or which consumers it tries to gouge. JMHO, Harvey

From: Odille Esmonde-Morgan <analog6@ozemail.com.au>

Dear Folks, I am not going to the eclipse - our dreadful dollar precludes at the moment! BUT . . . it seems to me the experienced eclipse travellers are trying to do everyone a good turn by describing what to do to avoid big charges and, I can visualise, in extreme cases, prosecution for illegal imports or some such thing, and some of you are ARGUING!

If the world was a perfect place it would not be necessary to do these tedious tasks to safeguard our equipment, money and reputations, but it 'aint'. Just do the necessary and leave the list free for real eclipse stuff! Happy and successful eclipse to you all. Odille Esmonde-Morgan, Canberra, Australia

From: Henrik Glintborg <Henrik@tycho.dk>

Hi Jean-Paul Godard, As mentioned before, I returned from Zimbabwe last thursday and had no problems at all at the customs. I carried a big professional digital camera, digital video and laptop computer, and they didn't even look at it. Henrik Glintborg

From: Pierre Arpin <parpin@hotmail.com> To: <SOLARECLIPSES@AULA.COM> Sent: Tuesday, May 22, 2001 7:38 PM Subject: [SE]

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Beware !!!

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Solar eclipse chasers should see where they will put their instruments on eclipse site. Read this Snake swallows new born infant, Zambian TV reports LUSAKA,Zambia. A python swallowed a baby minutes after it was born near the central Zambian town of Serenje, state television reported yesterday.

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Heavily pregnant Joyce Mibenge was on her way to plough fields two kilometres from her home when she went into labour, ZNBC reported. Halfway home, she was overwhelmed by labour pains and retreated into a nearby bush to rest.

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"She gave birth there on her own. After a few moments when she had recovered enough to hold her baby she saw a happy python licking the legs of the baby with the rest already swallowed," ZNBC said.

C

The traumatized Ms. Mibenge pulled herself to her feet, fled to her home and raised the alarm, but searching villagers were un-able to find the snake.

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She did not even know whether she had had a boy or girl. Reuters Pierre "IQ89" Arpin

From: Joel M. Moskowitz, M.D. <moskowi@attglobal.net>

For those planning on giving birth in Zambia, I will be there. I am an Obstetrician. I will make sure that no snake, or other predator, gets your baby! :) Joel M. Moskowitz, M.D. 7 (total) eclipses and counting

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From: Brian Garrett <mgy1912@home.com>

I'm not sure where you got this, but if it was from the "News Of The Weird" section of the Reuters website, please be informed that Reuters does not apply the same standards of journalism to such items as they would to more pressing news--a polite way of saying that they don't care whether the item is true. In at least one case they've posted what was clearly an urban legend--a story that supposedly took place in Germany, where a man sitting on his front porch was not recognized as having died for weeks after the death. The complete lack of names and only vague details of place and time were a tip-off to the story's apocryphal nature, but it was nonetheless disturbing to read such on the Reuters website, rather than in a supermarket tabloid where such stories belong.

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This story about the snake does contain a name, at least, but I'm still suspicious; I guess it's time to get Googleing and look up Jan Harold Brunvald's Urban Folklore site and check whether this has already been "documented" in another place and time.

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To get back on topic: yes, African wildlife can be intimidating, but eclipse chasers have more to be concerned about--weather conditions, positioning on the centerline, proper observational equipment and technique, etc.--than dubious tales about baby-killing reptiles. Brian

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From: Nello Soldà <n.solda@eclipse2001.it> To: <solareclipses@Aula.com> Sent: Thursday, May 24, 2001 1:26 PM Subject: [SE] **conferences**

Hi, will any conferences about the eclipse be in the world from 9 to 19 June? Has someone thought to organize them? Best regards

From: Kidinvs@aol.com To: SOLARECLIPSES@aula.com Sent: Wednesday, May 23, 2001 4:20 PM Subject: [SE] **Important news...**

Check out this website for some information I found... <http://www.brknews.com/news/sundepleted.html> Eric Brown

From: Evan Zucker I came across this last month (shortly after April 1) and printed it out for my 8-year-old son. He read it and got very upset, which made me feel a little guilty. Evan H. Zucker

From: Stefano Rosoni <stefano@ascu.unian.it>

It is a very great problem. The Sun, with its cycle hydrogen-helium will be turned off, and therefore it will be very very cold on the earth. While we are waiting in the cool (brrrrr!!!) for the new burning-cycle helium-carbon (the "carbon cycle"!) perhaps some heat could be recovered from underground, where volcanic activity burns. We have to excavate very much under the floor! Good luke to everyone! In this case also our expeditions for next TSE 2001-06-21 would be more difficult to organize Stefano Rosoni

From: Jean-Paul Godard <jean-paul.godard@noos.fr> To: <solarECLIPSES@AULA.COM> Cc: Martine TLOUZEAU <tlouzeau@noos.fr> Sent: Thursday, May 31, 2001 5:54 PM Subject: [SE]

Calculate Locally your Local circumstances

If you plan to take your laptop with you, for TSE20010621, Don't forget to download the shareware for local circumstances calculation <http://mapage.noos.fr/eclipses>

(It should work...but keep looking for the eclipse)

I hope to find time to produce a PocketPc version before leaving to zimbabwe....

It's shareware... So, if you want to send "eclipses stamps", "used eclipses phone cards" "eclipses coins", "Eclipse first day cover envelope", to Martine TLOUZEAU, here you have our adress.....

Martine TLOUZEAU and Jean-Paul GODARD, 22 allée Anne de Baujeu, 75019 PARIS FRANCE

Jean-Paul GODARD 48,879N 2,375E : jean-paul.godard@noos.fr

From: Glenn Schneider <gschneider@mac.com>

Jean-Paul's S/W will be much appreciated by the Windoze world. Just a quick reminder for Mac users, so you won't feel left out, you CAN use "Umbraphile" freeware for computing local circumstances as well.

<http://balder.prohosting.com/stouch/UMBRAPHILE.html> Cheers, Glenn Schneider

From: Chris O'Byrne <obyrne@iol.ie>

My eclipse calculator works on any type of computer that has a javascript- enabled browser. And, it makes a stab at correcting for the lunar limb.

I don't know which or how many palm-sized computers have such a browser - but if you point your computer at <http://www.chris.obyrne.com/Eclipses/calculator.html>

and find that you are able to do calculations, then you are onto a winner!!! You can save the page to your local hard disk and use it in the field on the day without being connected to any network.

I used similar software in Bulgaria in 1999, and judging from the voice recording I made of the event, the software correctly predicted the instant of the 3rd contact diamond ring to well within a second. It's great to listen to the computer go "beep, beep, beep, beep, beep, BEEEP" and hear me shout "DIAMOND RING" at the instant of the BEEEP. But that is not a guarantee of future performance... :) Chris.

From: Peter Tiedt <Peter.Tiedt@npc-eagle.co.za> To: 'SEML' <SOLARECLIPSES@AULA.COM> Sent: Friday, May 11, 2001 1:33 PM Subject: [SE]

Driving in Africa - Border Crossings, Security and Driving Tips

There have been a number of posts recently concerning those who will be hiring vehicles and making their own way around. This is great - as you will see things that the normal tourist groups do not, and gain a vastly deeper insight into Africa. (This may or may not be an enjoyable experience) :-))

For those who are driving themselves, the links below, published by the local Land Rover Club are highly recommended (if not essential) reading.

Border crossings in Africa are completely different to those in the rest of the world and this is a MUST read. We are NOT talking about Europe here - we are talking about Africa.

The article on Security is important as well, and the safe driving is worth a read.

http://users.club.co.za/landrover/border_crossing.htm

<http://users.club.co.za/landrover/secuirty.htm>

http://users.club.co.za/landrover/safe_driving.htm Clear skies - 40 days (remember that song) to go! Peter



From: <bdenton2@csc.com.au> To: <eclipse@hydra.carleton.ca> Sent: Thursday, May 03, 2001 11:06 PM Subject: Re:

[eclipse] June 21: Mars @perigee + a solar eclipse + summer solstice!

Its been a long time since I exercised my intellect and math (we call it maths in Australia) in probability and I am intrigued by this exercise.

What I am wondering is when we calculate the result using days and it is about 1:120,000 and then this gets interpreted as once in 120,000 years. Did I miss something here due to my lack of math practice or is the result about once in 329 years. Regards, Bob Denton

From: <Skywayinc@aol.com>

This is from the Dome-L internet list. It figures that only Jean Meeus could come up with some kind of answer for this question! -- joe rao

Kevin Conod, Astronomer at The Newark Museum's Dreyfuss Planetarium writes:

Bill McClain of the Newark Museum noticed that the upcoming June 21 eclipse not only falls on the summer solstice but also on the date of perigee for Mars. I just cringe at these sort of coincidences because someone inevitably makes a mountain out of a mole hill and then asks "When did this event last occur?"

I e-mailed Jean Meeus and his answer is attached....

Dear Kevin, Indeed, that is a rather silly question. A lot of similar questions could be asked!

I fear I cannot give a positive reply. Those *three* different events on the same day, that must be very rare indeed. We may try to find the mean frequency for such "triple" coincidences, as follows.

The (mean) synodic period of Mars is 780 days, so Mars' closest approaches to Earth occur at mean intervals of 780 days. On the other hand, there happen about 237 solar eclipses (of any type) per century, or at a mean frequency of 1 every 154 days.

Consequently, the probability that on the day of summer solstice there is a nearest approach of Mars *and* a solar eclipse is $1/780$ times $1/154$, or about 1:120,000. This means that the "triple" coincidence happen at a mean frequency once every 120,000 years!

So it would be hopeless to search when it was the last time that coincidence happened, as our lunar and planetary theories are not valid for such a long period! Best regards. Jean

From: Calclogger@aol.com To: eclipse@hydra.carleton.ca Sent: Friday, May 04, 2001 6:55 AM Subject: [eclipse] Re: The probability of the "triple" event.

Independent events are events such that the occurrence of one does not affect the probability of the other. Let the notation $P(X)$ = the probability of event X. For three independent events A, B, and C, the probability of their common occurrence is then $P(A \text{ and } B \text{ and } C) = P(A) \times P(B) \times P(C)$.

Let $P(\text{Mars at perigee on any given day}) = P(M) = 1/780$.

$P(\text{an eclipse on any given day}) = P(E) = 1/154$.

$P(\text{the solstice happening on any given day}) = P(S) = 1/365$.

Thus, $P(M \text{ and } E \text{ and } S) = P(M) \times P(E) \times P(S)$
 $= (1/780) \times (1/154) \times (1/365)$
 $= 1/43843800$

(Don't panic--I'll round later) This means a "triple" event every 43843800 days. But as anyone can easily compute, 43843800 days = 43843800/365 years = 120120 = years. On second thought, I'll let you have the fun of rounding.

Thank you. Tom Drouet tdrouet@aol.com

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From: Fabio Pettinati <fabio@best.com> To:
<solareclipses@Aula.com> Sent: Monday, May 07, 2001
7:02 AM Subject: [SE]

Greetings; two questions

Hi, I just subscribed to the SEML. I did go to Iran in 99 and was so overwhelmed by the beauty of what I saw, that decided right there to go to Africa and see some more. To get as much totality as possible, I've decided on Angola. The travel agency I am dealing with in Angola (Golden Afrika) told me of large group of travelers coming from Austria.

Q1: So, is there anyone on this mailing list that is also going to see the eclipse from Sumbe? If so please let me know off the list so we can discuss how we can help each other, and perhaps do some coordinated observations or experiments.

Q2: In 99 I took pictures using Koda Ektapress PJ100 (negative film) with mixed results. The Photo CD scan was marginal at best and couldn't capture all the density in the negatives, especially the grossly overexposed corona ones. This time I was thinking of using Kodak Supra 100 (negative film). Any comments? Is there anyone who is planning on using transparency film? What is the best way to deal with PhotoCD operators who are simply not used to seeing these "strange" images? Thanks, Fabio Pettinati, San Jose, CA US, fabio@best.com

From: Jeffrey Eccleston <jme2@student.open.ac.uk> To:
<SOLARECLIPSES@AULA.COM> Sent: Wednesday, May 02, 2001 8:58 PM Subject: [SE] **Lusaka social meeting**

Some weeks ago, there was a message about a social meeting during the evening of eclipse day in Lusaka. I think it was to be at the Intercontinental Hotel, but I did not download the message, and it has now dropped off my mailbox. Can anyone confirm this to me, and is there a dress code at this august establishment?

While I'm here, does anyone have one of the Reims eclipse T-shirts for sale? The kiosk in the park was raided in the morning and all the T-shirts were stolen, and I'd missed my opportunity the previous day. Nor did I come across the black market! Medium please; And/or the local special stamp cover issued? Many thanks, Jeffrey Eccleston

From: Stuart Holdstock <s.holdstock@ucl.ac.uk>

Yes I think the plan was to meet in the Intercontinental Hotel bar after the eclipse. Sounds like a good idea to me so look forward to seeing you there. Regards, Stuart

From: Olivier "Klipsi" Staiger <olivier.staiger@span.ch>

yes, it is the Intercontinental (I'll stay there). I don't think there is a dress code at the bar. I hope not. I for myself won't have formal dress anyway. Relax. If there is a dress code at the bar we'll go to my room and do a party there, a razzia on my minibar :) Olivier "Klipsi" Staiger, Geneva Switzerland

From: Mike Zorn <rigoletto@table.jps.net> To:
<SOLARECLIPSES@AULA.COM> Sent: Sun-
day, May 20, 2001 9:15 PM Subject: [SE]

Eclipse at observatory?

Does anybody know of an eclipse, recent or not, that happened at an observatory (large or small)? (A more or less permanent one - not one set up for the purpose.) Mike Zorn

From: Stig Linander <linander@worldonline.dk>
Mauna Kea, Hawaii 1991-07-11.

I've seen a beautiful multi-exposure photo of the eclipse with one of the domes in the foreground. Best regards, Stig.

From: Mike Simmons <msimm@ucla.edu>
A small, private observatory (24-inch reflector, I believe) used for private and public purposes at Goldendale, Washington, USA 26 February 1979. This was the second total solar eclipse of the 20th century for the location, the other occurring 8 June 1918 (long before the observatory was built). I was a few miles away.

Keck I (10-meter reflector, the world's largest!) on Mauna Kea, Hawaii, USA 11 July 1991. I was in La Paz, Baja California, Mexico for this one.

Mount Wilson Observatory had the largest and third largest telescopes in the world but just missed the eclipse of 10 September 1923. I wasn't around for this one. :-) Mike Simmons

From: <Jay.M.Pasachoff@williams.edu>
In addition to the 1991 eclipse over Mauna Kea and the 1979 eclipse over Goldendale, WA, the 1961 eclipse was total at the Haute Provence Observatory in France. So every 30 years or so may be typical for eclipses over a major observatory. There is a list of major observatories available in the Astronomical Almanac, if not elsewhere, so someone could probably run a program to check how many of them will be in totality in, say, the next 100 years. Jay Pasachoff

From: Carton, WHC <Wil.Carton@corusgroup.com>

The 15 Feb 1961 TSE was total at the Haute Provence Observatory in France, but also at the Arcetri-Observatory in Florence (Italy) and at the Simeis Observatory on the Crimea peninsula. Both Haute Provence and Arcetri enjoyed crystal clear skies, notwithstanding the low altitude of the sun

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(between 8 and 12 degrees). The totality belt in southern Europe enjoyed crystal clear skies from the Rhone-valley in France up to the eastern Balcan. Simeis (sun's altitude 28 degrees) enjoyed an artificial hole in the clouds, deliberately prepared by airplanes that seeded the clouds with Silverjodide crystals in the morning hours prior to the eclipse. I should like to know about their results, I asked Arcetri via e-mail two years ago, but got no answer. I suppose they don't want to open their archives to report to the interested (and taxpaying) layman. The 22 July 1990 TSE was total at the Helsinki Observatory of Reino Antilla in Finland, but very pity the sun's altitude was a mere one degree, so not usable for professional observations. Wil Carton (without senseless .html attachment, I hope).

From: Michael Gill <eclipsechaser@yahoo.com>
Andreas Dill, submitted a letter to Sky & Telescope (Nov. 1991 page 453) that did this.

Amongst his findings were the interesting eclipse of July 2, 2019 that will be total at Cerro Tololo and La Silla. The April 2024 event will be visible from Ohio's Perkins Observatory (and again in 2099). The 2099 TSE track will cross Wisconsin's Yerkes and Pennsylvania's Allegheny.

Others he found were:

July 2028 Siding Spring
April 2060 Byurakan
Apr 2061 Simeis
September 2081 Meudon
September 2090 Meudon

The letter lists an eclipse in 2098 as being visible from Zelenchukskaya. I believe this is incorrect and the correct date is April 21, 2088. Michael Gill.

From: Olivier "Klipsi" Staiger <olivier.staiger@span.ch>
1999, Stuttgart Germany - but cloudy :-(
1991, Hawaii, clear skies at the observatory

Olivier "Klipsi" Staiger , Geneva Switzerland

From: F.Podmore <podmore@science.uz.ac.zw>

I'm surprised that Brian Sheen hasn't told everyone that ROSELAND OBSERVATORY was in the totality path for 11 August 1999 in Cornwall. I expect they have a website. Francis Podmore



From: Eric Pauer <pauer@bit-net.com> To: Solar Eclipse Mailing List <solareclipses@aula.com> Sent: Tuesday, May 22, 2001 7:56 PM Subject:

[SE] 2001 Total Solar Eclipse Live Via Satellite or Webcast

For those who are not traveling to the total solar eclipse next month, NASA, the Sun-Earth Connection Education Forum, and the Exploratorium (San Francisco) are sponsoring a live video feed via satellite or webcast of the eclipse from Luska, Zambia:

<http://www.museumecclipse.org>

"The live coverage can be presented via satellite using a satellite dish, or viewed through an Internet webcast. Either choice is free of charge " to museums, planetariums, and other institutions. It appears that they are still taking registrations from qualified venues/organizations. There is already quite a list of museums,

> planetaria, and other organizations registered to participate in the Eclipse 2001 event:

<http://www.museumecclipse.org/hosting/participating.html>

I'm among the few on the SEML not going to Africa, so I'll likely be watching the eclipse from one of the local venues. Regards, Eric

From: Patrick Poitevin <patrick_poitevin@hotmail.com> To: SE Mailing List <SOLARECLIPSES@AULA.COM> Sent: Thursday, May 24, 2001 11:45 PM Subject: [SE] Live webcast from Zambia

From: SPA SECTION NEWSLETTER, Volume VIII, Issue 55

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3. Total Solar Eclipse, June 21, 2001 - Live Webcast and Event from Zambia

From: "Karin Hauck" <karin@ssl.berkeley.edu>

Total Solar Eclipse, June 21, 2001 Live Webcast and Event from Zambia Sponsored by NASA and the Exploratorium

ENCOUNTER THE FIRST TOTAL SOLAR ECLIPSE OF THE MILLENNIUM!

The first total solar eclipse of the new millennium will occur across southern and central Africa on June 21, 2001. [~6:00am (PDT); ~8:00am (CDT); ~9:00am (EDT)] Not visible from the United States, this breathtaking occurrence will be streamed live from Zambia to the rest of the world by San Francisco's Exploratorium science museum, via satellite and high-speed Internet connections. An Exploratorium team will be on the ground in Zambia, capturing video images of the eclipse using specially equipped telescopes. Besides being streamed live on the web, these images will be webcast to over 70 participating museums and Girl Scout troops around the globe who are hosting eclipse events based on the live feed. Experience this celestial event by attending an early morning museum public gathering near you--or watch it yourself on the web. To see it on the web, or for a complete list of museums hosting events, go to <<http://www.exploratorium.edu/eclipse>>

This event is made possible by the Exploratorium with support from NASA, and is officially endorsed by the National Society of Black Physicists. The event will also feature scientists, including members of the NSBP (<<http://www.nsbp.org>>), to engage and excite young people about space science and technology.

This year's event focuses on the themes of solar maximum, habitability of space, and living with the Sun. A possible downlink from the International Space Station is planned and would include a conversation with astronauts Jim Voss and Susan Helms, and cosmonaut Yury Usachev, of the Expedition Two crew. The conversation will focus on how the Sun affects life in space: how solar flares and Coronal Mass Ejections can produce radiation bursts that affect everything from communications with Earth, to the health and safety of the astronauts themselves.

From: FRED ESPENAK <u32fe@lepvox.gsfc.nasa.gov> To: <SOLARECLIPSES@AULA.COM>; <eclipse@hydra.carleton.ca> Sent: Thursday, May 31, 2001 3:50 PM Subject: [SE] 2001 Live Eclipse Web Castes
On the NASA 2001 TSE web page, I have just added a new section called "Live Web Coverage ..."

The URL is: <http://sunearth.gsfc.nasa.gov/eclipse/TSE2001/TSE2001.html>

You'll find the "Live Web Coverage ..." section near the top of the page just after the introduction and map. Currently, it lists links to the Exploratorium and Olivier Staiger. Can anyone suggest links to other live web castes that should be added to this list? Thanks, Fred Espenak

From: Jeffrey Eccleston <jme2@student.open.ac.uk> To: <SOLARECLIPSES@AULA.COM> Sent: Wednesday, May 02, 2001 8:58 PM Subject:

[SE] Eclipse photo practice

I'm wondering if my ideas for practice make sense. In 1999 I was in Reims, where my photos (except one) showed no images of the sun, which was visible between the clouds until a micro second before 2nd contact. I must have had my camera at the wrong angle, and my sightline was obviously contorted.

It occurs to me that I should practise with the sun at the same elevation (32 deg) as it will be in Lusaka (at 16 deg S) at the time of the eclipse (13.10 UT on the solstice - which makes it easier to work out!) The overhead sun is now, by my reckoning, about 12 deg N. I'm trying to work out the right time of day to try in London, at 51.5 deg N, but unfortunately, I do not have access to a sextant, so will have to make an estimation or calculation from shadow lengths. At noon UT it is about 50-51 deg. Can anyone work out the exact time please for an elevation of 32 deg? I could then test my method and mark my camera appropriately. Is this reasoning correct, and are the calculations correct? Or should I take into account more than the degrees of latitude between the overhead sun and location?

I'm still glad I was in Reims, despite the clouds. I was in a park shaped as an amphitheatre, and the sudden darkness at noon was still a stunning experience. I'd avoided the concert, 1 km away, with Jessye Norman in the cathedral piazza, where apparently they

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experienced totality, but not the partial phase. She then sang 'summertime'!

Is there a weather predictions site up and running yet for the eclipse? With erratic weather such as recent permanent rain in France, are blizzards perhaps now anticipated in Lusaka at the time of the eclipse? More seriously(?) do medium range forecasts show signs yet of the occasional problems with air movements up the Zambesi valley? I understand this is the main risk, apart from possible effects of (artificial) bush burning. Many thanks for any help offered. Jeffrey Eccleston

From: <Rayabrooks2@cs.com> To: <SOLARECLIPSES@aula.com> Sent: Saturday, May 05, 2001 3:29 PM Subject: [SE] Eclipse practice runs

It is very worthwhile to do some practice runs before each eclipse.

Whether you are a neophyte or a veteran each eclipse offers different delights. It is amazing how fast 2 or 3 minutes goes by. I think it is very important even if you decide for a particular eclipse that you will simply use one photo-optic device, your eye.

Prioritize your desires and see if you can fit them into the predicted duration. Try not to cram too much into the time. You may need 20 practice runs to perfect it depending on your required activity. Decide what you want to observe and see how quickly the exact duration passes.

You will find your priorities change with each eclipse. But you must allow at least 30 seconds to look around and absorb the unpredictable psychological effects which are not the same with each eclipse. Try to remember to remember, it intensifies the memory.

This eclipse offers a very very thin Mercury crescent. Why would anyone waste precious time on that? It might be possible to glimpse it before C2 and not waste time at high magnification but it will only be mag 4.3, rather dim.

Try hiding the upper right of the sun 5 minutes before C2 to see the early corona. 3 minutes should be easy. I will be looking for naked eye lunar features this time.

From: Patrick Poitevin <patrick_poitevin@hotmail.com> To: SE Mailing List <SOLARECLIPSES@AULA.COM> Sent: Monday, May 14, 2001 9:59 PM Subject: [SE]

Toast on SENL editor

Dear All, I have removed Joanne's e-mail address temporary from the SEML... Please make sure we meet eachother for a drink. Joanne's birthday is June 13, but any drinks before or after will do...

We will camp out at Maramba River Lodge, about 7km from Livingstone in Zambia from 12 to 15 June and at Eureka Camping, just south of Lusaka for the remaining days till 26 June. Of course we will travel around daily. The eclipse will be observed from Kamilonga. Be there.

PS: Do I have to apologise to the SEML Owner for this rather off topic message or is this a compensation for all other off topics.... Lets toast on Joanne for all the work she does on the Solar Eclipse Newsletter. I will put her back on the list now... Best regards, Patrick

From: Cees Bassa <c.g.bassa@phys.uu.nl>

Hello List, Together with 9 friends I am travelling Zambia to observe my (hopefully) second total eclipse. We will arrive in Lusaka on the 19th of June and we will camp on Eureka Camping Park till June 22.

I was hoping that I could meet some members of this list staying on this campsite these 3 days. If you are staying on Eureka Camping Park on June 19, 20, 21 and 22 and would like to meet my group to share experiences, feel free to contact me either off list or on list. Regards, Cees Bassa

From: Patrick Poitevin <patrick_poitevin@hotmail.com>

Joanne and the kids Michael, Laura and I will be at Eureka Camp as well. See you all there. Best regards, Patrick

From: F.Podmore <podmore@science.uz.ac.zw> To: <solareclipses@aula.com> Sent: Saturday, May 12, 2001 6:13 PM Subject: [SE]

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Eclipse stamps from Zimbabwe

A set of three (very attractive) stamps to commemorate the eclipse was issued here on 24 April. A mint set (unmounted) costs ZWD57, (about US\$1 !!!) and a first day cover with the three satmps stuck on a commemorative envelope bearing a special cancellation and the Zim2001 logo (but no address as it is not sent through the post to prevent damage) costs ZWD64.

I have tried to send two .jpg files depicting the stamps to Eric Pauer and Fred Espenak to put on their websites so you can see them, but I don't know if I've been successful. They will tell you when/if they can display them. I know there are two other eclipse stamp websites - do you want these .jpg files too?

I have emailed directly those who have asked me to buy stamps for them, but if I overlooked your message, or anyone else wants some of them, let me know.

My apologies for not posting this information sooner.

Are any other countries producing special stamps for the 2001 eclipse? Best wishes, Francis

PS V QUICK UPDATE ON ZIMBABWE SITUATION. It is not good - the so-called war-vets are continuing to cause a lot of trouble on the farms and in town. I don't know if our eclipse committee has sufficient influence with our national Tourist Authority to make strong representations to the government and the police and ZANUPF not to cause trouble for many international visitors. And fuel is again in v short supply.

Keep watching whatever Zim news site you prefer.

The weather has been beautiful, but it's gone cloudy again now :(()) FP

From: FRED ESPENAK <u32fe@lepvox.gsfc.nasa.gov>

Thanks to Francis Podmore for emailing a jpeg of the new 2001 eclipse stamps from Zimbabwe. The stamps are now posted on my MrEclipse.com web site on a page devoted to the 2001 eclipse stamps:

<http://www.mreclipse.com/SEstamps/SEstamps4.html>

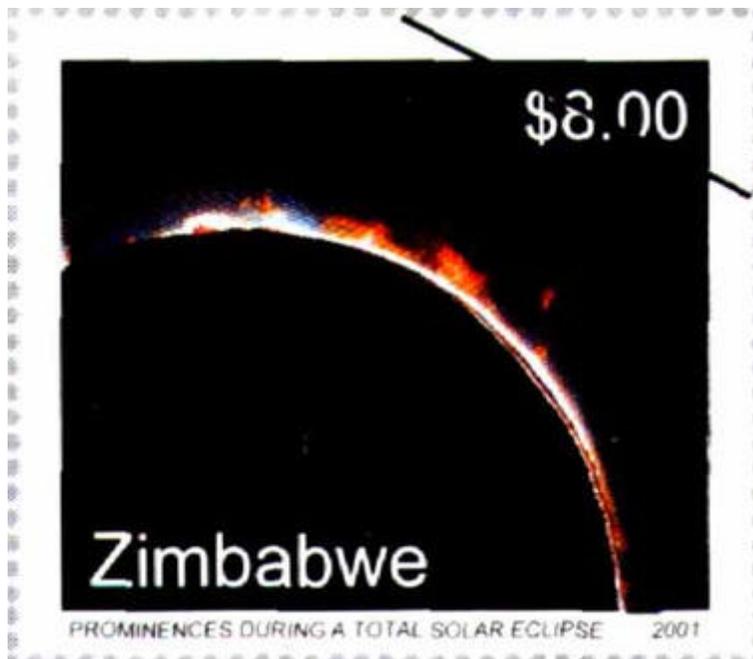
Hopefully, other countries will also be issuing stamps (or coins). Please let me know if you hear of anything I might want to add to the above web page. Thanks, Fred Espenak

From: F.Podmore <podmore@science.uz.ac.zw>

Eric Pauer writes as follows: Good news, Fred Espenak has put the Zimbabwe stamps on his site at: <http://www.mreclipse.com/SEstamps/SEstamps4.html>

I have also placed them on my site at: <http://www.bitnet.com/~pauer/eclipse99/elinks/elinks.htm>

Feel free to send an email to the SEML and others who would like to see what they look like. Eric



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On 24 April 2001, the Posts and Telecommunications Corporation of Zimbabwe will be issuing a special commemorative set of three postage stamps depicting a total Solar Eclipse which will traverse and partially cover the northern extremity of Zimbabwe. The stamps for this issue were designed and produced on computer by local artist Cedric D Herbert of Harare Zimbabwe.

Total Solar Eclipse 21 June 2001

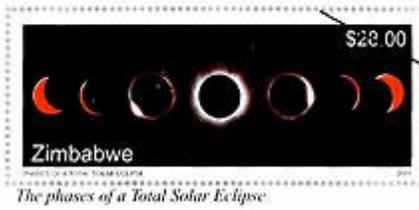
On 21 June 2001 a total solar eclipse of the Sun will be visible from within a narrow corridor that crosses Southern Africa. During a total solar eclipse the Moon blocks the light from the Sun causing a narrow shadow to sweep across the face of the earth. Observers along the centreline of this shadow path see the Sun completely covered by the Moon, an event called totality.



Prominences during a Total Solar Eclipse



The Eclipse path over Southern Africa



The phases of a Total Solar Eclipse

North eastern Zimbabwe will experience totality in a track that traverses the Zambezi escarpment from the Mana Pools region on the Zambian border to Nyamapanda on the Mozambique border. The partial phase of the eclipse is when the Moon's disk covers a portion of the Sun and on 21 June, 2001 the remainder of Zimbabwe will experience a partial solar eclipse.

The total duration of totality in Zimbabwe will be over three minutes for observers near the centerline of this narrow corridor, which is 160 km wide extending into neighbouring Zambia and Mozambique. Zimbabwe is an ideal destination for groups of eclipse watchers to witness this rare event.

A total solar eclipse of the Sun begins with the partial phase, where over a period of about an hour the Moon obscures a portion of the Sun, which appears as a narrowing crescent. In the remaining minutes before totality the sky gradually darkens. Up to one minute before totality the Sun's Corona begins to emerge.

The Corona is the outer atmosphere of the Sun and is visible only during a total Solar eclipse when the Sun's surface, the photosphere, becomes blocked out. The Corona is a ultra hot layer of the Sun reaching in the region of one million degrees celsius and which may extend several million kilometres from the Sun's surface.

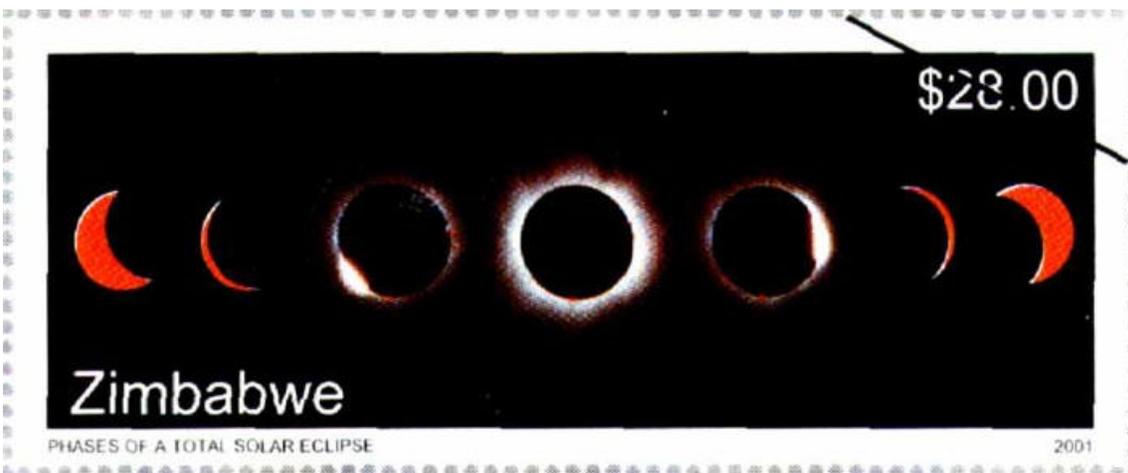
As the Moon moves into and out of totality the vanishing light from the photosphere forms a jewel-like necklace along the edge of the Sun called Baily's Beads. The Moon has covered the entire face of the Sun except for a few rays of sunlight passing through deep valleys at the Moon's surface creating the effects of jewels on a necklace. At the moment before totality one last bead flares out forming the Diamond ring effect. At the end of totality a second Diamond ring appears followed by Baily's Beads.

During totality the Solar Corona is visible together with huge outbursts of hot gases from the Sun's surface known as Prominences. These huge columns, which are due to the Sun's magnetic field, stream out from the surface at a height of up to 100 000 kilometres.

NASA astronomer and eclipse authority Fred Espenak, assisted the Harare Centre of the Astronomical Society of Southern Africa and the artist in the production of this issue of postage stamps, providing several diagrams and excellent photographs.



Specimen of the Cancellation Mark for the issue.



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From: Nick Quinn <nick@nquinn.demon.co.uk> To: <solareclipses@Aula.com> Sent: Thursday, May 10, 2001 11:39 PM
Subject: [SE]

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Films and X-rays

Dear All, Can anybody provide recent information on whether the airports listed below are happy for photographic film to be passed around x-ray machines and inspected 'by hand'?

Johannesburg

Lusaka

Harare

Victoria Falls

For the those people passing through London, both Heathrow and Gatwick refuse to do hand-searches and insist on everything going through the x-ray machines :-(Clear skies Nick Quinn, UK.

From: Mike Simmons <msimm@ucla.edu>

In 1994, I had a young gendarme at Orly in Paris grab my film bag from my hands and toss it into the x-ray machine when I argued for a hand inspection. Mike Simmons

From: Joel M. Moskowitz, M.D. <moskowi@attglobal.net>

This is a hot topic. However, Popular Photography did tests a number of years ago that showed that the Xray machines at the security gates are film safe. There are thos ethat argue about repeated exposure being cumulative. However, Pop Photo did multiple exposures with no visible effect. Undoubtedly, there is an effect. The question whether iit is visible. I know that I have never had any film get ruined by X rays. For those who are paranoid, use lead bags. They don't eliminate exposure, but they do decrease the intensity of exposure. There are sevrul fallacies about xray screening. One of them is that if the operator can't see through the lead bags, he will just turn up the intesity of the X rays. This is not true. The xray intensity is fixed. What they do turn up is the gaqin on the electronic image processing. There is one caveat. NEVER, NEVER, NEVER, allow your film to be checked. Always hand carry. This is because the x ray machines used to look at checked baggage uses xrays that hve a higher intensity. There are now new machines that act likt a CAT scan and will use intensed focussed beams on anything that may look suspicious. This HAS been shown to completely fog film. Speaking of Heathrow, I do know one person, who is one this list, who gave a very technical explanation of what Xrays do to film to a supervisor, who then did a hand check and allowed him through. Joel M. Moskowitz, M.D.

From: Madden.G <iluvex@netacc.net>

The following has worked for me. It may or may not be applicable to the 2001 destinations or transfer points. It may or may not work for me ever again.

I remove all the 35 mm canisters from their plastic containers (packing the plastic containers in my checked luggage) and place the film in one or two large clear plastic Ziplock bags. As I approach the conveyer, I have the baggies in my hand and offer it to the security person on the other side reaching around the metal detector. They have always taken it and passed it on to the next inspector who sometimes holds the bag and turns it to observe from another angle. By that time, I'm through the metal detector and reaching out for my film which is given to me. When the X-rayed baggage comes out, I simply open it up and replace the now approved baggies.

I think this works for a few reasons (and thus far it has worked on perhaps 100 or so trips). First is the psychology. The clear bag says that I'm not hiding anything. Also, handing it directly to the inspector is a pro-active movement, almost a signal of respect. Then there is the sight of the familiar Kodak yellow canisters universally known for what they are (I only use Kodak film -- I live in THE Kodak town). That color alone tempers suspicions, I am convinced.

Finally, I also try to place myself in a crowded line where there is a lot of bustle and impatience. The security people seem to sense the mood of the passengers and get a little lax. They work faster and handing my baggies to them may be taken as helpful.

Next July I'll let you know how I made out. madden/rochester

From: Glenn Schneider @ Home <gschneider@mac.com>

Well, I will 'fess up. That person was me, and I will relate that and a few other comments/tips/ideas as well. I will say first that as a first line of attack (so to speak) years ago I independently adopted the same approach as G. Madden/Rochester, with a 99% suc-

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cess rate - though I occasionally do use emulsions which were developed (no pun intended) elsewhere than in Rochester. The hand-em-the-transparent-baggie-full-of-uncanistered-35mm-rolls-before-they-have-time-to-ask

works nearly all of the time and nearly everywhere.

Except Heathrow on occasion.

Heathrow is notorious for security underlings spouting the party line about X-ray inspection being mandatory - except it really isn't. I have had a few brushes at Heathrow after the hand-em-the-transparent-baggie-full-of-uncanistered-35mm-rolls-before-they-have-time-to-ask tactic failed, but came out victorious in the end. The key to this is courtesy, politeness, and respect - BUT determination not to needlessly cave in to a flunky (which, of course is a word never uttered in a flunkies presence). Here is what I have done, and always do.

First, in preparation (or anticipation) of a "you have to X-ray it" response, I always throw a couple of rolls of Kodak T-MAX 3200 Professional film into the mix, and carry a copy of what is now Kodak's Technical Publication 32 (downloadable at <http://www.kodak.com/global/en/professional/support/techPubs/f32/f32.pdf>) with me. I also have carried pre-hypered VR-3200 as well. Now, I should say I would never consider using them for an eclipse - but they serve a purpose.

In MANY airports the aforementioned party line is that their X-ray machines are "safe" for film speeds < ISO 1000. That's why I carry ISO 3200 films. In some cases where they do not so delineate, I offer that I am carrying very fast, laboratory hyper-sensitized (the VR 3200 was baked in forming gas and carried in a CLEAR film can filled with dry N2) emulsions to be used for scientific purposes. Indeed, I say further (also true) that I am carrying control-films as calibration witnesses from the same manufacture/lot which have been pre-exposed on a spot-sensitometer so I can maintain knowledge the photometric integrity of the emulsion's response. If they still balk (happened thrice at the "flunky" leve), I note further that my intended use of the T-MAX 3200 is to "push" it to an effective ISO speed of 25,000, and if they would please check with their supervisor they would undoubtedly concur that their X-ray machines have never been tested against such fast films. (This is also why I carry the Kodak Tech Pub, as it CLEARLY says T-MAX 3200 can be pushed to 25,000 and goes into detail on the chemistry of how to do this.)

Well, TWICE - both times at Heathrow - I went this far with an unmoved flunky. At that point I had said "I will wait, at your convenience will you please call the security supervisory, as the sole purpose for my travel is to obtain astronomical images on the specially treated emulsions, which if hand inspected will prove no threat to security". In both cases the supervisor was called, and I calmly explained the situation. I will admit that it probably lent credence to my plea when I explained that I am an astronomer by profession, and the instrument scientist for the Near Infrared Camera on the Hubble Space Telescope (and handed him my business card) and that indeed X-ray machines such as these can and do pose a potential threat to the photometric stability of highly sensitive films, I indicated that I fully understood the need to maintain a high level of security, but I was not asking

for any extraordinary treatment - just a hand inspection of my film canisters.

Well, in both cases the supervisor was very agreeable at that point, and passed me through himself. Indeed, in one case since I had a long lay-over anyway, and he seemed mildly interested in astronomy, I engaged him in a long conversation about some of the most recent results from HST, and promised (and later sent) prints of some NICMOS and WFPC-2 images.

Only ONE time did I have a real hassle. In 1980 on my way to Kenya, I was carrying a 400 foot roll of 35mm VNF 400 (an Ektachrome E-4 analog) which I was going to use on an Airflex camera for the eclipse. Well at JFK in NY the BA security supervisor insisted upon (and I agreed to) a hand-inspection, BUT this was a 400 foot roll of film, sealed in a metal canister (about 7" in diameter). He wanted to open it [unexposed film!] and look at it. I politely said no way, and offered that he could use my changing bag, open it and FEEL that there was nothing in it. But I was leery of using my changing bag in a bright-lit room, just in case, so he agreed to do this with me present in a darkened room. So, off we went to an interior employees-only rest room. I taped the cracks around the door jam from the inside with black tape which I always carry on such trips (not necessary, but at this point for emphasis) and turned out the lights. The film passed his inspection. But, there was a bewildered couple of flight attendants who had been knocking at the door, when we exited as I was pulling black tape off of the periphery of the door jamb.

See you in 5 weeks at Heathrow? Cheers, Glenn Schneider

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From: Olivier "Klipsi" Staiger <olivier.staiger@span.ch>

A tip I was given by a professional photographer: buy a few rolls of INFRARED b/w film, put it on top of your films and insist in having to avoid the x-ray, as you have some infrared film and it gets destroyed by x-ray. If asked why you use infrared film, you say you are an astronomer and you take infrared photos of the night sky and stars (throw in some blabberwocky about taking images of positive pulsars, coronal hyperstructure, matricial magnitude and interplanetary shock-wave inversion, and he'll have BIG eyes...), . And you explain that this kind of film is not obtainable at your destination. You may never actually use that infrared film, keep it for years and years in your film bag, as a "protection" :-). Olivier "Klipsi" Staiger, Geneva Switzerland

From: Dale Ireland <direland@drdale.com>

Hi, I don't think you have to worry too much with the slow films most people use for the eclipse. However there are a few airports like Heathrow and Schiphol that have new machines with two x-ray heads emitting radiation at two different kilovoltages that can fog film, these look mainly at checked luggage. A lead lined pouch will work but they will probably open your luggage. I don't think they run the power up and down to penetrate but rather the gain as someone's else mentioned. The two heads are set very precisely because they are looking for material with a very specific density and absorption properties. I would hand carry your film in a clear plastic bag and pray they don't make you put it through the machine. I suspect you could carry a couple rolls in your pockets through the metal detector without setting it off since the film cases are so thin. Dale

From: Glenn Schneider @ Home <gschneider@mac.com>

Oliver's point is understood, and is a variant of the TP 3200 MAX/ VR 3200 carry-along tactic I wrote on earlier. But, set it straight, commercially available monochrome IR films have no additional susceptibility to X-rays than non-IR responsive films. It's a bit off-topic to get into the details of the photochemistry (so I won't here), but the X-ray interaction cross-section in the emulsions in IR-sensitive films are not different from pan- or monochromatic optical films. That said, an airport security officer is not likely to know this, but if he does this approach may back-fire on you to try this. That said - I wouldn't have ANY films X-rayed, particularly in countries where X-ray dosage and energy spectral dispersions are not as well regulated in U.S. and (some) EU based machines [and even there I wouldn't chance it]. Cheer, Glenn Schneider

From: Joel M. Moskowitz, M.D. <moskowi@attglobal.net>

This is generally what I do too. Something interesting happened to me when I returned from Orlando (Disney). At the Orlando airport, when I went through security with the film, security then took the film and did the gas chromatograph check on it. That's the check where they swab the object and then place the swab into a machine looking for explosive signature chemicals. What was interesting and unexpected here was that the security "officer" individually swabbed and checked the outside and inside of the film bag, and EACH individual roll of film (about 20 rolls). Joel M. Moskowitz, M.D.

From: <stargazer609@att.net>

Hello, The recent discussion involving film emulsion and airport x-rays did not mention video film. I will be video taping the eclipse with mini DV. How sensitive to x-rays is this film compared to still? John Stewart

From: Joel M. Moskowitz, M.D. <moskowi@attglobal.net>

Totally safe. Joel M. Moskowitz, M.D.

From: Vic & Jen Winter, ICSTARS Inc. <icstars@icstars.com>

We found a great way to detract security concern away from your film! - and quite by accident, too.



Our departure from Turkey in '99 was delayed, so when the security guard questioned our 80+ rolls of film in the lead bag, the Eclipse had become an outdated and lame excuse. However, the matter was quickly dropped when the young woman in line in front of us was found to be carrying a loaded semi-automatic hand-gun! Works every time. Clear Skies, Vic & Jen

From: B Yen <byen00@earthlink.net>

Where can I get a lead bag (what brand), to hold 80+ rolls of film? B Yen

From: Vic & Jen Winter, ICSTARS Inc. <icstars@icstars.com>

Most photo shops carry the "sima Super FilmShield" which we use. It is a double-thick lead laminated pouch that's like a large black lunch-sack. The end just folds over when you roll it down and NO X-rays get in. I know from experience it holds 80 rolls

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tightly packed, but really they only print a capacity of 22 in the instructions. _please_. It's possible they assume most travelers aren't carrying more than this... I must confess that we own three. B&H photo has several varieties listed online at www.BHphotovideo.com. When we travel, the film is the last thing packed in the top of the carry-on. This way, when the x-ray shows all the cameras, the attendant isn't surprised when they open the bag up to see the pouch labeled "Film Shield". Honestly, the encounter at the Turkish airport is as much trouble as we have ever experienced in all our travels with lead bags which look like bombs on X-ray. That's because the Military airport is the same as the civilian and we could have been sneaky spies looking at their airbase. I'd worry more about remembering not to wear metal lace-buckles or metal-toed boots when you must be x-rayed frequently. Might as well have a plate in your head. Clear skies, Vic & Jen

From: Joel M. Moskowitz, M.D. <moskowi@attglobal.net>

Not true. They all let X rays in. The amount of lead is not enough to block completely. Their value is in attenuating the strength of the beam to reduce exposure. Next time your lead bag goes through the machine, see if you can get a peak at the screen. All you rolls of film will show up. No x ray security guard would allow a completely x ray opaque thing through. They would then demand you to open the bag to inspect it. If they haven't asked you to open the bag, it is because they saw that it was rolls of film. Joel M. Moskowitz, M.D.

From: Starman <4starman@home.com>

Joel's suggestion of handing clear plastic bags of film canisters to the security officer up front has worked successfully for me in all but one case. I once got into a discussion with a British Airways security officer (who was into astronomy)-he told me that they look for diamonds being smuggled inside the central cylinder. The clear plastic bags make their search a little easier and, let's face it... when someone makes our jobs a little easier, aren't we more inclined to help them along too? Clear Skies! Dennis

From: Vic & Jen Winter, ICSTARS Inc. <icstars@icstars.com>

'They' do regularly ask us to open our bags to inspect them. Thus my note about being sure to keep the lead film bag at the top of one's carry-on. and the ease in having film bags already say "filmshield" while quietly nested next to camera equipment. I have often had the luxury to peer into the screen of some certain Xray screens while our bags were inspected and stopped. I was not aware of the exact technical specifications of each machine I saw through, but I have never seen our film rolls in the screen. - only big, dark blobs similarly shaped to the film bag(s).

We have also never experienced fogging of high speed film while using the film bags. While we've lived through an inconceivable variety of processing and exposure errors, we have never had fogged film due to failure of lead bags, and we've used up to 1600speed film. - Therefore (for us) this has become a non-issue in comparison to other hassles of air travel.

These are only our personal experiences, and not a technical explanation of any xray process. Clear skies, Vic & Jen

From: Gerard M Foley <gfoley@columbus.rr.com>

How in the world do diamonds affect the security of the air travel system? Gerry K8EF

From: Daniel Fischer <dfischer@astro.uni-bonn.de>

Is there anyone on this list who has really seen film damage by airport X-ray machines? I thought they had gotten me last year in Iran, but after much analysis I found out that the alleged X-ray damages were actually sunlight wandering through a tiny hole where a screw had disappeared.

The only other 'case' I've seen firsthand was an ISO 1000 (!) slide film that apparently received some blueish artifacts from X-rays in Mexico 10 years ago, but otherwise neither I nor any of my friends have experienced problems despite travelling through the most remote airports. Or the most intimidating ones: In Tel Aviv my films were X-rayed all the time by truly gigantic machines, and nothing happened.

So - is there a risk *at*all* for films of ISO 400 and below, regardless of the machines used? Dan

From: Starman <4starman@home.com>

How in the world do diamonds affect the security of the air travel system? Gerry K8EF

No one said they did... I'm simply passing on useful information from a British Airways security officer. --Dennis

From: Bill Ronald <ronaldb@home.com>

HI Dan, There is an example of a Kodak Gold 200 film, supposedly damaged by the new CTX-5000 security scanner found in US airports, at this URL: http://www.f-stop.org/sample_photograph.htm

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This is from the FSTOP site <http://www.f-stop.org/Default.htm> They also have a recommendation page.

Kodak also shows damage to a Kodak Vision 200 T Film here: <http://www.kodak.com/US/en/motion/support/technical/xray4.shtml>

As you can see, according to Kodak, the CTX 5500 is normally used only for checked baggage but some spot checking of carry-on may be done in some airports. They also say that it can damage films of ISO 100 or higher. They recommend that you keep an eye out for the InVision Technologies, Inc. tag on any airport machine: <http://www.invision-tech.com/Images/smlogo.gif> Bill

From: <JohnLX200@aol.com>

The latest word in the photo magazines is that the newer machines used for scanning checked baggage can do serious damage in one pass, but the carry-on scanners are essentially harmless even with 1600 or 3200 speed film and multiple passes. So....

CARRY YOUR FILM ONTO THE PLANE.

Follow that one rule, and there is almost nothing to worry about. If you're paranoid (or just very thorough, perhaps) then take a few pictures on a roll of your fastest film, mark it specially so that you pass it through every machine that any of your film goes through, and get them developed at your destination before using the rest of your film for any important photos. Then you can be sure it's OK at least until you take your pictures.

I fly a great deal in the USA and a moderate amount in Europe. I feel confident in letting any given roll of film ISO 800 or lower film go through carry-on x-ray machines up to at least 10 times or so, and if I forget to pass the 1600 or 3200 around security a few times, I don't worry. I've never had any problems with fogging or anything else with these rolls, which I've used to take thousands of night photos of lights on the ground from altitude...a type of photo much like astrophotography which would show fogging quite easily. When taking a large amount of film on a trip, not all of which is likely to be shot, I do put the bare rolls of 35mm film in large Ziploc bags like most people, complete with a several rolls of Ektapress 1600 around the edges and a couple of Tmax P3200 near the opening to help my case when there's a sign saying that up to ISO 1000 is safe. I don't do this because I think they are zapping my film very hard, but because I wouldn't want the 5% of my film which might go on 5-10 trips before being used, to go through 50 machines. It would probably be OK, but keeping the number of passes reasonable is the second line of defense, after remembering not to leave any film in checked bags.

In the case of a security person looking for trouble, I would sooner pass the film through the machine than get them mad and maybe run it through many times or do something else to get even with me.

Another good strategy is to ask about passing the film around BEFORE the rest of your bags go into the machine. Once my bags are in the machine, I want to get through security myself before anything gets stolen. If you pass your cameras through the machine and then start arguing about film, it is a perfect opportunity for them to stall you while your cameras are stolen. With no bags in the machine, there's always the option to walk away and try later or at a different line. If traveling in a group, get one person cleared through before putting expensive stuff in the machine. They can watch what's going on with your bags on the secure side.

I personally don't think a lead film bag buys you any advantage at all, and might in fact subject you to additional scrutiny. 90% of the time you'll get to pass all your film around the machine anyway, 90% of the remaining cases you'll get to pass your very fast film at least, and 99% of the remaining time it won't matter anyway, as the machines are OK. I'd bet that well over half the time, the lead bag gets pulled out and you're back at square one. I'd say they'd be more likely to run it through the machine again without the bag, than if you'd handed them a Ziploc and asked for a hand inspection. Plus, they'll probably take the whole bag outside security, not just your film, when they start over. "Who knows what was hidden above or below the film bag?" Then you're then looking at having bags on both sides of security, which I find more frightening than any machine.

By the way, I will actually be using my P3200, possibly pushed even faster, to attempt photographing shadow bands. Perhaps a little pre-exposure will help get something on film faster ;-) John

From: <johnleppert@peoplepc.com>

Friends, I've not followed this whole thread. So, perhaps what I'm going to discuss has already been dealt with. Several months ago I purchased a heavy lead-lined film pouch that is intended to protect film from x-rays. It appears that it will hold several dozen canisters. Does anyone know whether this is likely to protect film from airport x-rays devices? Any experience with one? John Leppert

From: Jean-Loup <j_loup@yahoo.com> To: <SOLARECLIPSES@AULA.COM> Sent: Wednesday, May 09, 2001 2:22 AM Subject: [SE]

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View of the eclipse from the ISS

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Hi all: I am quoting here my current issue (June 2001) of YIL (Yahoo! Internet Life) [<http://www.yil.com>], page 25, not in line yet:

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A Total Eclipse on the Web. Thursday, June 21, 8:30 A.M. Eastern Daylight Time. As most Americans go about their rituals of caffeine and morning-TV claptrap, a team of scientists from San Francisco Exploratorium is finishing up its final preparations in Zambia. Its mission: Bring the world images of the 21st century's first solar eclipse. Since this phenomenon will be visible only from southern and central Africa, NASA and the Exploratorium will transmit views of the actual eclipse to Solar Eclipse [<http://www.exploratorium.edu/eclipse>], as well as to 40-plus participating museum sites at 9:12 A.M. EDT. As if it isn't already offering the best seat in the house, the Exploratorium will also webcast eclipse views from the International Space Station, courtesy of its astronauts-in-residence, who will act as commentators as the moon's shadow passes over Earth. For this, you can live without Katie and Matt for just a day. j-l.

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From: <Rayabrooks2@cs.com>

The international space station ISS will enjoy a 28 percent magnitude eclipse as it passes northwest of the eclipse path at 11:47 UTC. The STS 104 crew should be there also. This includes standard drag effects but no orbiter boosts. The re-boosts will slightly reduce the magnitude.

2

From: Olivier "Klipsi" Staiger <olivier.staiger@span.ch>

cool ! is it possible to calculate where on Earth you must be to see the ISS and STS pass precisely in front of the eclipsed sun ? And fine-tune the calculations after reboost for last minute accuracy ? If we can find out, we can try to inform members of the local astronomy societies and ask them to film / photograph the event. Olivier "Klipsi" Staiger , Geneva Switzerland

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From: Eric Pauer <pauer@bit-net.com>

I saw an article related to this topic in the April 2001 issue of Sky and Telescope (p 124). Here's a link to the table of contents for that issue (no photos or story unfortunately):

1

<http://www.skypub.com/skytel/tofc/0104toc.html> "Observer's Notebook - An excellent eclipse adventure", By Gary Seronik

With some careful calculations and timing (and weather luck!), he observed/videotaped the ISS transiting the partially eclipsed sun on 25 Dec 2000 from Ontario, Canada. There is a nice composite image showing a series of "shadows" of the ISS taken every 1/30 second (video frame rate) against the partially eclipsed sun. Cool! It took just 1.5 seconds for the ISS to cross the sun's disk. Eric

From: Glenn Schneider <gschneider@mac.com>

Can the flight dynamics folks really predict the in-track position of ISS six weeks out with such precision? To say a "28%" eclipse, which implies a precision of ~ 1% in coverage also implies a pretty small error circle in the in-track location. You do say this does not include upper atmospheric drag, but that can actually be quite large for a LEO object with as large a cross-section as ISS. For HST, which is in a higher orbit, the in-track error in predicted position is about +/-15 seconds of time a week out, and gets worse in a non-linear way. Actually, near sunspot maximum, when the upper atmosphere (i.e., extending to hundreds of kms) "swells" the in-track uncertainties can be off by 2 minutes, six weeks ahead of time. 2 minutes for an object in LEO is a distance of something like 500 miles along the orbit track. I wouldn't want to bet the farm on a 28% prediction with that kind of uncertainty. (Of course, it is more a question of when then where, but the where is moving... Cheers, Glenn Schneider

From: <Rayabrooks2@cs.com>

Sorry, Glenn, did not mean to imply that the crew would see a 0.28 mag eclipse versus 0.27, I was just passing on an observation. Should have simply said a small magnitude but for some they may have envisioned a tiny, tiny nick.

Since the biggest variable is the re-boost magnitude and frequency and since the flight schedule presently shows a launch of June 14 meaning there will likely be re-boosts prior to eclipse day June 21 precise prediction is a waste of time.

I use three programs for satellite predictions, primarily Heavens-Above on the internet, WinOrbit version 3.6 by C.D. Gregory (a

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NASA guy) and the NASA site JAVA 2.0. I have found Chris Peats' Heavens-Above to be the best for plots a month or so in the future for vacations to South America etc. WinOrbit allows you to adjust the decay rate (B star) but I don't screw that because it only decays about a minute delay later in one months time versus H-Above. The NASA site decays ISS very fast, about 6 minutes earlier arrival time per month versus H-Above but I have found that to be overly conservative although I understand the NASA concern about "losing height".

Each program has an advantage, H-Above has concise plot listings for 10 day slots, Winorbit allows an instantaneous plot X months or weeks or years into the past or future, and the NASA Java 2.0 site has nice sky plots even during the day passes for passes in front of the sun or daytime moon.

So let's say the actual pass by the ISS on June 21 is 2 minutes sooner (unlikely, but possible - see <http://www.heavens-above.com/issheight.asp>) then the observed magnitude would be greater by about 0.02. So roughly the mid- to upper-20's for magnitude. Just having fun. Having seen over 1000 passes of HST, MIR, ISS I am confident the pass will likely be within a minute of 11:47 but I have no farm any longer to bet - 120 acres in the Berkshires of Mass which I dearly miss.

I was in Siberia in 1997 testing my Russian and saw MIR, Progress and Soyuz all about 30 miles apart simultaneously. Very cool.

Actually I did *not* say I ignored drag, I said I included the standard drag coefficient.

B star (.00057903) may or may not be pretty good for the next 6 weeks of solar activity. Delay times are variable but the left-right tracking errors for passes are quite small. Precession is not affected much. Curious note of mine I found: MIR has same inclination as ISS, 51.6 degrees, ABOUT 93 TIMES FASTER PRECESSION THAN THE MOON's orbit AND ABOUT 95 TIMES CLOSER TO EARTH'S CENTER. USING JTrack 3D which is a good TOOL, SHUTTLE STS 92 orbit PRECESSES (360 degrees SIDEREAL) IN 2.2747 MONTHS 9 WEEKS 6 DAYS and not much affected by sun distance (expected) and it precesses about the Earth equator not the ecliptic.

Back to Earth: I am really getting scared about weather now - the path in Africa was a mess Jan thru March and now it has been perfect!!! I hope we are not blowing our handful of chips - it seems every one of my (only six) eclipses has been touch and go. T minus about 1.3 lunations!!

From: Dale Ireland <direland@drdale.com>

Hi, I have been tracking, photographing, and receiving transmissions from satellites for years. <http://www.drdaledale.com/satellites> I am afraid there is just no way you can predict the ISS position this far ahead with anything near the accuracy needed to see a transit of the Sun, which is a path about 3 mi wide on the ground. Any small boost, and they always happen near and during shuttle missions, will change the times by 5 minutes overnight and move the transit groundtrack 20 miles. Even without a boost there is no way to make that good a prediction six weeks out. You need orbital elements that are only a couple days old. They are updated online every 2-3 days. You might have a chance if the shuttle mission is delayed and/or you can get daily elements, during the shuttle mission the change and are updated 2 or 3 times per DAY! Dale

From: <Jay.M.Pasachoff@williams.edu>

I know we have many non-English-speakers on this list, so permit me to correct the spelling in the title to "Millennium": 2 n's. There are a few other things in English that I could mention that people may want to know about: "its" means "something belongs to it" while "it's," with an apostrophe, means "it is." If you see "it's," try substituting "it is"; if the sentence doesn't make sense with "it is," then delete the apostrophe. Baily's beads (often miswritten as "Bailey's beads), is a common mistake in eclipse discussions. Jay Pasachoff

From: <Rayabrooks2@cs.com>

drdale.com I am afraid there is just no way you can predict the ISS position this far ahead with anything near the accuracy needed to see a transit of the Sun, which is a path about 3 mi wide on the ground. >>

Response: My comment about the ISS crew being able to see a partial phase has gotten quite misconstrued. Firstly, I am *not* talking about a transit of the sun by the spacecraft as viewed by an observer on the ground. I completely agree that for such an event one would need the very latest orbital elements. I have only had one opportunity within driving distance of my home for such a pass and the TLE was about 18 hours old (too old) and I was unsuccessful.

For the ISS altitude of 370 km the "band width" on the ground is only plus/minus 1 mile for an overhead pass (zenith) but much much wider for low altitude moons or suns. (The last thing I do before leaving for the airport is print the latest pass info - I have

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too much to carry already without a laptop.)

Back to the real issue - will ISS be able to see a partial phase?

Inspection of the ISS height over the last year shows most boost phases are approx 10 km. although one was 46 and a few were about 20 km. (I am calling a boost phase the obvious spike which is really half a dozen or so vernier boosts over a few days time). If they really do get the shuttle launched June 14 a reboost will not likely occur before June 17 since docking is scheduled for 15:00 UT June 16. If we look at a 5 km boost and the effect 4 days later, arrival time is almost exactly 7 minutes later and shifted 1.6 degrees to the west (over 100 miles - such a change would reduce the partial eclipse from 0.28 to 0.15 which is why I stated earlier that boosts render a precise calculation meaningless. It is clear a boost 10 km or more will eliminate the chance.

So I felt (and still feel based on experience) without boosts the crew is very very likely to see a partial phase greater than 0.20 magnitude and I'll bet an ant farm on it. (do they still make those?) There is one thing however which I admit I did not realize until a few minutes ago, the ISS is getting boosts from a source other than the shuttle.

MIR got all the boosts from Progress modules about every 6 weeks. Up until Jan 2001 I was religious about following the ISS activities (it got cloudy here in Illinois at that time) and I know that they have no permanent module at this time for boosts. I did not read anything about boosts by the Progress attached but apparently it did because there was a boost early April when no shuttle was docked.

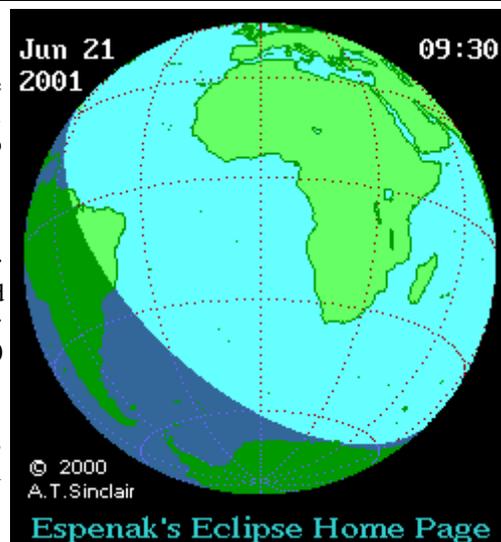
I do not know the ultimate or average planned height of the ISS but there is another flight in July so they might not make the boost in June a very big one. So anyone out there need an ant farm? Again, over mag 0.20 if there are no boosts between now and then.

From: Dale Ireland <direland@drdale.com>

Hi, Yes it looks pretty certain that they will have one brief, "unspectacular" glimpse of a partial. They will not get a view of the umbra on the ground. Dale

From: Daniel Fischer <dfischer@astro.uni-bonn.de>

In Germany one of the most advanced telescope mounts on the market, selling for about \$US 5000, has "MilleniumMount" written on it - despite all the hype about the wrong millennium two years ago, it's probably the most misspelled English word. Dan (sorry, couldn't resist :-)



From: Kidinvs@aol.com To: SOLARECLIPSES@aula.com Sent: Monday, May 21, 2001 4:28 PM Subject: [SE]

June 21st Landless Corners, Zambia.

Hi, all. As many of you all ready know, I have put together a tour for this eclipse. I will have a total of 65 people at the tented village that has been constructed by Geoffrey Carew. This tented village will be in Landless Corners. I dont know how to get there, but if you travel north of Lusaka, it is supposedly pretty easy to find... just ask. On EclipseDay, Geoffrey as said that outsiders will be permitted to enter the area to view the eclipse, and to hear the lectures that will begin at about 9am that morning. All that is asked is that you pick up after yourselves. There will be NO FOOD available, so bring your own if you like, but there will be drinks available at a nominal cost. There will not be any cost to enter the area... so if you are looking for a place to see the eclipse where there will be good security, about 250-300 people and lots of experts, feel free to find your way up, and look for me when you arrive.I'm packed!!!!!!! Eric Brown www.eclipsesafaris.com

From: Harvey Wasserman <onsite@gate.net>

For those interested, if you look at Fred's map of the eclipse path north of Lusaka, http://umbra.nascom.nasa.gov/eclipse/010621/maps/map_5.gif or Map 6, page 84 of the eclipse bullitin, Landless Corner appears to me to be just about where the "n" in

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"Sendwe" crosses the road, and is just north of centerline. I believe the airfield is on the southwest corner of the intersection (where I will be!). Don't know where Eric's group will be, but I am sure close by.
Ron Landless describes the location of his airfield this way:

"Postion : junction of tarred Great North Road, and the district gravel road to Mumbwa.
GPS = S 14 52 57 , E 028 03 28 "

Hope this helps, Harvey

From: Kidinvs@aol.com

I am told that the airfield that Harvey speaks of is a stone's throw from the tented village that you are all invited to. I am of course assuming that this is the only air strip in the immediate area. PS, Harvey. I also fly small planes... wanna take a spin? Eric Brown

From: Mike Simmons <msimm@ucla.edu> To: <solareclipses@Aula.com> Sent: Friday, May 18, 2001 6:26 PM Subject: [SE]

Needed: space for two

Needed: space for two people from an Iranian TV station with cameras and telescope for the June eclipse. 7 to 10 days with some sightseeing in addition to a good location for the eclipse (of course!), preferably with a view of the incoming shadow. Looking for an inexpensive tour. Current plans are not working out (no contact with the previous expedition leader). Any last-minute help would be greatly appreciated. You can respond directly to me: eclipse99@mwoa.org. Thanks! Mike Simmons

From: B Yen <byen00@earthlink.net> To: <SOLARECLIPSES@AULA.COM> Sent: Thursday, May 31, 2001 10:24 PM Subject: [SE]

NGC program, Zambia & Botswana

There was a program on NGC (National Geographic Channel) about 2 scientists doing conservation work in Botswana & Zambia. 2pm PDT, DirectTV, May 31 (it will probably be repeated this weekend).

After some disastrous drought in Botswana, they went to Kafue Park in Zambia. It is mentioned that Zambia is committed to conservation, & their program is to have the villagers benefit from this conservation effort. They talk to villagers & show them their book about Botswana. They find a tourist camp burned out by poachers, & racks for drying meat. So, they're all bummed out & fly to North Luangwa park. Oh wow!! It's all pristine, untouched. So, they are involved in the conservation program there until '97. (The program was dated '98).

[there's probably some story-type manipulation in the above. That's the media for you]

The program is good, in that it gives me a chance to see the country & the people. I did talk to Eddie at www.tusker.com, who told me he was involved in anti-poaching patrols in Kafue. So, I guess poaching exists & one should be alert. (I did read somewhere, that if you run into poachers, they probably would avoid contact with you). If there are villages within Kafue, then it should be *possible* to get the elders permission to camp nearby. (I am hearing that Kafue is "booked up", but that only means tourist camps. You would only allowed a day pass into Kafue, if you couldn't demonstrate a booking)

The villagers spoke English, & I am told that English is spoken around Zambia.

I have a video called Zambia Safari, which profiles the many parks: Luangwa, Kafue, Victoria Falls, etc. If you want to buy, contact me off the list.



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From: Jean-Paul Godard <jean-paul.godard@noos.fr> To: <SOLARECLIPSES@AULA.COM> Sent: Monday, May 07, 2001 9:02 PM Subject: [SE]

Nyamapanda Zimbabwe ?

Hi everyone,

1 - Does anybody has the coordinates of *Nyamapanda* in Zimbabwe, located north of Harare, near Mozambican border and called "Cochemane"? on Fred Espenak maps ?

2 - What kind of electrical plugs are used in Zimbabwe? english one's?

Thanks for your help. Cordialement / Regards Jean-paul.godard@noos.fr

From: Jean-Loup <j_loup@yahoo.com>

1/ From the Global Gazetteer: "No liability whatsoever is assumed." <http://www.calle.com/world/zimbabwe/Ny.html> j-l.

From: Govert Schilling <mail@govertschilling.nl>

Jean-Paul: On my Zimbabwe road map, there is a small town called Nyamapanda on the A2 (the main road leading from Harare to the northeast). It is almost exactly on the Mozambique border, at 32.84 degrees east and 16.96 degrees south (coordinates read off the map). I don't find the name 'Cochemane'. --Govert Schilling

From: Gerard M Foley <gfoley@columbus.rr.com>

Hi everyone, One source gives S16d57m16.7sE32d51m16.6s

Bonne Chance and Clear Skies. Gerry K8EF, <http://home.columbus.rr.com/gfoley/>

From: Henrik Glintborg <Henrik@tycho.dk>

Hi Jean-Paul, As mentioned before I have just returned from Zimbabwe and the 5 different hotels I stayed on - in Harare, Hwange National Park and Vic Falls - all used the english type of plugs. Henrik Glintborg

From: F.Podmore <podmore@science.uz.ac.zw>

> 1 - Does anybody has the coordinates of *Nyamapanda* in Zimbabwe, located north of Harare, near Mozambican border and called "Cochemane"? on Fred Espenak maps ?

The best coordinates I have (read from the 1:50 000 topographic map) are

16 deg 58 min South, 32 deg 51 min East elev about 650 m

From there 1st contact is 15:52:47, mid eclipse 15:17:32 4th contact 16:29:47 duration of totality 3m 15s

These start and end times differ by about 5 seconds from those from a different eclipse prediction programme, namely 15:53:00 15:17:37 16:29:50 with a totality of 3m 14s. So who is RIGHT??

I can supply more precise coordinates, but you need to say WHERE in Nyamapanda you will be(e.g. UTM grid coordinates), not that it's a very big place.

Incidentally I have contact timings for about 65 locations in Zimbabwe.

2 - What kind of electrical plugs are used in Zimbabwe? english one's?

Yes, We use 'English' plugs for mains power (220VAC 50Hz), i.e. 3 rectangular brass pins. They are called '13 amp' plugs here. My pleasure, Francis Podmore

From: Patrick Poitevin <patrick_poitevin@hotmail.com>

African roadmaps... In present postings I see people derive African coordinates from roadmaps. It is dangerous to thrust on coordinates from roadmaps of automobile organizations. Example: From my video-timings of 2d and 3d Contact during the TSE of 11th July 1991 on the University Campus of the Universidad Autonoma de Baja California Sur (La Paz, Baja), I made retrospectively inverse computations of my geographical position. The resulting position was in accordance with a map of the US Naval Observatory, but not with an automobile-roadmap of Southern Baja, on which my observing site should have been in the water of La Paz harbour (a difference of 4,2 kilometers) !! Also my results differed some hundreds of meters from the coordinates that the local official eclipse committee gave for the Campus, probably caused by a different geodetical approximation of the local terrestrial surface. I used the geodetical S- and C-factors for the Earth ellipsoide as a whole, that were published in the Explanatory Supplement to the Astronomical Ephemeris (Her Majesty's Stationary Office, 1961). Wil Carton.

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From: Gerard M Foley <gfoley@columbus.rr.com>

This a problem no matter what the map source. In early April I carried a Garmin e-map GPS receiver in Cairo, Egypt. Not many roads are shown on Garmin's WorldMap in Cairo, but of those that were the GPS disagreed by a significant fraction of a mile from the map. Thus, though I have been willing to supply quoted positions of named places, the positions may or may not agree with those from either GPS or astronomical observations. Gerry K8EF

From: Assoc Prof J R Huddle <huddle@usna.edu>

Gerry K8EF wrote, "This a problem no matter what the map source." I concur; A chart I got from the U.S. Navy for the 1998 eclipse in the Caribbean had me a half a km out to sea instead of on Sonesta Island. You really DO have to be careful. Jim Huddle

From: Harvey Wasserman <onsite@gate.net>

All maps are drawn with reference to some particular underlying datum I don't have the details in front of me, and others may have a clearer explanation than I have, but fairly large errors can be introduced when using 2 different datums as references. This can be esp. true when locating Islands, as different starting points have been used for the survey work.

Each base datum has a name. When looking at nautical charts or aeronautical charts, you should be able to find the name of the datum somewhere in the legend or perhaps along an edge. Perhaps not true of road maps, but then again, perhaps it is. For instance, the World Aeronautical Chart (WAC) showing the Lake Karibe area is labeled "Topographic Base 1982", whereas the WAC for Jacksonville, Florida, lists the "North American Datum of 1983". I believe that there used to be a number of datum for North America, depending on if the surveys were based on a point in the East or in the West, but these were normalized under the above mentioned standard.

GPS uses some approximation of the surface of the earth, which is different from the datum used for the map or chart. Some GPSs, perhaps all, can be adjusted for this fact - at least according to a Coast Guard class I recently took. There should be a setting within the unit for this purpose.

Apparantly, as various places on the Earth have been surveyed over the years, various starting points were used, and as you get further away from these starting points, errors in location become cumulative. The UPS must be using the same datum as the map, or you will be off.

Of course, then there are the potential errors in the map itself, as well. Sincerely, Harvey Wasserman

From: Jean-Paul Godard <jean-paul.godard@noos.fr>

Typically, I have an initialisation step with my GPS, where I give a 2 digit code designing the reference system for the local official coordinates. Does that means that in a given country the official coordinate system, may differ from some "worldwide accepted" ? I think so!.

Many over differences might appear: For example, in France, yellow road maps (from a former Michelin subsidiary) use "grades" (1/100 of a degree) and longitude is based on the Paris meridian crossing Paris in front of Notre-Dame Cathedral...

I hope nobody was confuse by this during last TSE. Keep a GPS with you and use it in "route error mode" (giving the distance to the route between two resgisted point selected as beeing part of path of centrality)

From: Harvey Wasserman <onsite@gate.net>

Well, yes, more or less. That 2 letter code tells the GPS to use the same reference datum as the maps and charts you are using for a given locality. Its not that a given country is using a different coordinate system - everyone, as far as I know, uses lat/lon, but the underlying surveyor's records of the local maps is what needs to be normalized to the GPS sense of the world.

Take an example. One surveyor starts in San Francisco to survey the US, and another in New York, some 3,000 miles away. By the time they arrive in Kansas, cumulative errors produce different readings. Which datum will you use to locate Kansas City? Either will work - it just depends on what starting point you want to use.

Now, if this discussion goes much farther, I will have to ask others that may be more knowledgeable to step in, or else I shall have to drag out the books and do more research myself. Harvey

From: Gerard M Foley <gfoley@columbus.rr.com>

All maps are drawn with reference to some particular underlying datum. I

This datum is abbreviated NAD83.

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<snip> Apparently, as various places on the Earth have been surveyed over the years, various starting points were used, and as you get further away from these starting points, errors in location become cumulative. The UPS must be using the same datum as the map, or you will be off.

Many GPS Receivers have a number of datums built in, to be chosen by the user. The Garmin GPSII+, for instance, lists over a hundred optional datums (one is Dos 1968 for Gizo Island, one of the New Georgia Islands!), and the Garmin e-Map has a lot too. The list of datums for the Garmin GPSII+ includes two for the areas of most interest for TSE2001:

ARC 1950 - Botswana, Lesotho, Malawi, Swaziland, Zaire, Zambia, Zimbabwe

ARC 1960 - Kenya, Tanzania

The Garmin MapSource WorldMap says the user may "select from over 100 different map datums allowing MapSource to easily match up with just about any paper chart or map." (Garmin split the infinitive, not I). I have assumed that its default datum is the same as that for most Garmin receivers, which is WGS84. Thus I could hope that it is correct to compare a position determined by the Garmin GPS with the ones plotted from WorldMap when both are set to WGS84. This comparison gave rise to the near 1 mile disparities I found in Cairo. Good luck and clear skies, Gerry K8EF

From: Peter Tiedt <rigel@stars.co.za>

On the Zambia and Zimbabwe topo maps in my possession, the datum is the Clarke 1880 Spheroid, which I understand is the reference spheroid for virtually all of sub-Saharan Africa. (Including South Africa). It is also the reference spheroid for my SA maps.

Many GPS Receivers have a number of datums built in, to be chosen by the user. The >Garmin GPSII+, for instance, lists over a hundred optional datums (one is Dos 1968 for >Gizo Island, one of the New Georgia Islands!), and the Garmin e-Map has a lot too. The list >of datums for the Garmin GPSII+ includes two for the areas of most interest for TSE2001:

>ARC 1950 - Botswana, Lesotho, Malawi, Swaziland, Zaire, Zambia, Zimbabwe

>ARC 1960 - Kenya, Tanzania

There is also the Cape datum built into Garmin GPS Units. This I understand corresponds to the Clarke 1880 spheroid. In other words, if you set your GPS to this datum, it and your map should be in sync. I am using a Garmin GPS12.

I have taken an arbitrary point (near to the intercept of the centreline and the Zambezi river)

In WGS 84, this point is 15 deg 37.083' S; 29 deg 46.200' E

Changing the GPS Datum to Cape, this waypoint translates to: 15 deg 37.004' S; 29 deg 46.215' E

Changing to ARC 1950, we have 15 deg 37.004' S; 29 deg 46.204' E

The displacements between these points are: (Using 1' Lat = 1852m and 1' Long = 1783m)

WGS84 to Cape - 146 metres north and 27 meters East.

WGS84 to ARC1950 - 146 m north and 7 m East

ARC1950 to Cape - Nil north and 20 m East

To all intents and purposes, these differences are minimal and probably for purists only ;-)

The accuracy of predictions to 0.1 sec at a shadow speed of 1300 m/s at maximum eclipse at that point means that in 0.1 sec the shadow will move about 130 m, about the maximum displacement listed above.

Then there are other inaccuracies, such as the lunar limb profile, centre of mass of moon etc etc. Perhaps Fred or Glenn can comment.

So, I will just leave my GPS on WGS 84. I will be timing to 1 sec.

The eclipse track (centreline, northern and southern limits) at 1/4 degree increments in various formats, including Waypoint+, Garmin, text and Excel Spreadsheet (all in one small zipped file) is available for download from the Africlipse website on the 2001 page - see www.eclipse.za.net/html/2001html

These waypoints can be uploaded directly into any Garmin GPS.



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Input for this is from Fred's site - and Fred uses the IAU spheroid, which is different again. I have assumed that the IAU spheroid = WGS84 and the errors will be minimal and more or less in the same order of magnitude as above. Hope this has helped. Peter Tiedt

From: Peter Tiedt <rigel@stars.co.za>

I am sorry - The link provided for the waypoints for 2001 was incorrect.

Please go to www.eclipse.za.net/html/2001.html

The link for the download is about 2/3 of the way down the page.

Cut and paste the URL below (entire line) and you should go direct to the file. www.eclipse.za.net/html/pix/TSE2000June21Waypoints.zip Peter Tiedt

From: Assoc Prof J R Huddle <huddle@usna.edu>

Sometime last fall (northern hemisphere fall, that is) I heard a lecture given by a fellow, a PhD geodysist if memory serves, who had done some of the original R&D on the GPS satellite system. In response to my question at the end of his talk, he showed a transparency that indicated that the difference between WGS-84 and other map datums is rarely more than a couple hundred meters. (It is not Latin, so "datums" is correct.) Unfortunately for members of the SE list, the modified Clarke 1880 spheroid used in southern Africa is one of the datums that differs most strongly from WGS-84, as has been demonstrated by Peter Tiedt.

Please note that on a 1:250,000 scale map such as the one I have of the Mana Pools area in Zimbabwe, a plotting error of 0.2 or 0.3 mm (approximate thickness of a sharp pencil line) corresponds to an error of 50 to 75 meters on the ground, so that while map datum errors are typically the same order of magnitude as plotting errors in eclipse work, datum errors in Africa can be a factor of two or three larger than plotting. As they say, "Life is tough in Africa."

Complicating the matter further is the fact that north in one datum is not necessarily the same as north in another datum. My 1:250k Mana Pools topo map has both Clarke 1880 and geographic coordinates on it. Someone has run off with my protractor, but from a quick measurement with a ruler, it looks like the difference is about 3/4 of a degree. At least, in the Mana Pools area; it may be a little different in southwest Zim, and is almost certainly different in Cape Town. So converting from local mapping coordinates to WGS-84 is nontrivial, because it is not a "linear transformation", to use the mathematical term. (In fact, it is not strictly a transformation at all, because the zero vectors don't transform into each other, but it also is nonlinear.) However, as Peter Tiedt has done, you can use your GPS to do the conversion for you. (I e-mailed Garmin last summer and asked if this is valid, and they assured me that it is. But you have to be careful; it is easy to make errors doing this - I've even done it backwards.)

Note that we have errors arising from map datums, and from the finite width of your pencil lines, and plotting errors, and a few more. Each of these is independent of the others, so they should be combined in quadrature - that is, you square them, add the squares, and take the square root of the sum. This is why it is difficult to pinpoint an observing location "a priori" to better than about 0.5 to 1.0 km.

But let me close by noting that, as has been pointed out before in this forum, if you are headed for the centerline and miss your target destination by even a kilometer or two, it will not necessarily spell disaster. But contact timers and others headed for the path edge need to take all these points into consideration, or they risk missing the eclipse altogether. Clear Skies! Jim Huddle

From: Cliff Turk <cliffturk@yebo.co.za>

Hi Everyone, You will no doubt be pleased to know that things are being put right. The official South African datum is no longer "Clark 1880" but is "Hartbeesthoek 94." The SA Trigonometrical Survey Office which is responsible for mapping in SA was (and hopefully still is) able to rapidly convert Clark 1880 co-ordinates to the new SA datum and gave mine to me over the telephone. But as has been said, the variation is not consistent throughout the country.

In my case, Clark 1880 was: Lon 18 deg 30' 54.7" Lat 33 deg 56' 26.9"

Hartebeesthoek 94 was: 18 deg 30' 52.2" Lat 33 deg 56' 27.6"

A GPS unit gave 0.1" more than H'hoek 94 in both Lon and Lat.

It will take many years to change all the maps but at least there is a move in the right direction - even if it doesn't help much for this eclipse. Cliff Turk

From: Hal Couzens To: SOLARECLIPSES@AULA.COM Sent: Tuesday, May 22, 2001 10:35 AM Subject: [SE]

Sunpath

Dear All, Does anyone have a good URL or diagram indicating the sun's path for 21st June from: the Kamilonga/Chisamba region just north of Lusaka. Further to your communication Eric, is Landless Corners near Kamilonga/Chisamba? Thank you, Hal

From: Peter Tiedt

The co-ordinates (at 0.25 deg Longitude steps) of the centreline, and N & S limits are available from Fred's site and also

as a text file

as an Excel spreadsheet

as a Waypoint+ file

and various other formats

in a small (19KB) download from www.eclipse.za.net/html/2001.html

Using the co-ordinates you can plot them on a map, or upload into a GPS. Should help.... Peter

From: Hal Couzens

Thank you for the response but I was looking for a diagram showing the path of the sun through the sky showing its zenith and so on. Just preparing for the day when armed with compass and inclinometer I will set-up my battery of digital and film recording devices from where I will ambush these heavenly bodies... Ok I am excited about it. Hal

From: Peter Tiedt

OK - I have a reply/solution for this as well

There is a shareware version of GeoClock available on the net - this may help - unsure of the URL

Or - there is a demoware version of StarryNight also available on the net. - try www.siennasoft.com

Both can give minute by minute altazimuth info on the sun and moon.

Regards, Peter, Give a man a fish and you feed him for a day Teach a man to fish and you feed him for a lifetime

From: Michael L. Gorodetsky <gorm@hbar.phys.msu.su>

There is a freeware very compact and fast program StarCalc: <http://www.relex.ru/~zalex/main.htm> Don't forget to download plugins for solar and lunar eclipse demonstrations.

From: Peter Tiedt

Hal, OK ANOTHER SOLUTION

EMapWin can do something - if you plug in to latitude and longitude of a observation point, in the <Display> <Local> <Set> section

It produces a little chart soing Altitude and Azimuth at 1st Contact, Mid eclipse and 4th contact.

I am forwarding an example direct to you - If you let me have the location you are interested in, I will do another. reply to rigel@stars.co.za Peter

From: Olivier "Klipsi" Staiger

Hi Hal, Fred Espenak has this map on one of his sites: http://umbra.nascom.nasa.gov/eclipse/010621/maps/map_5.gif

HAL, open the door ! (sorry, couldn't resist . 2001 is really going to be YOUR space odyssey :-) Olivier "Klipsi" Staiger , Geneva Switzerland

From: Evan Zucker

www.geoclock.com. Duh! GeoClock is a great program, although I haven't used it in connection with eclipses. It goes back many years, having originated as a DOS program. When I was stuck in an office practicing law in the late '80s, I'd watch the terminator line move its way across the U.S., then across California, and finally across San Diego and then Los Angeles. Evan H. Zucker

From: Joel M. Moskowitz, M.D.

Glenn Schneider has an animation showing the sky during the eclipse. Joel M. Moskowitz, M.D.

From: Glenn Schneider @ Home

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Hal, The animations (actually two) which Joel mentioned may be downloaded from:

http://nicmosis.as.arizona.edu:8000/ECLIPSE_WEB/ECLIPSE_01/ECLIPSE_2001_MVUU_ALTAZ.MOV

and

http://nicmosis.as.arizona.edu:8000/ECLIPSE_WEB/ECLIPSE_01/WHOLE_ECLIPSE_2001.MOV

The first shows the path of the sun through the sky from first contact through fourth contact against a fixed local horizon-view (altitude/azimuth) grid. During totality the sky darkens and you can see the placement of bright stars and planets.

The second is a "close-up" fixed on the sun with the direction toward the zenith up which shows how the moon will cross the face of the Sun as you are looking at it. There is a moving alt/azimuth grid in the background.

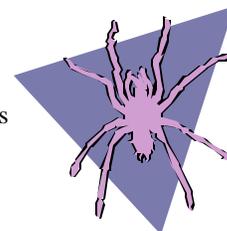
Specifically I generated these for Latitude: $-15^{\circ} 45' 55''$, Longitude: $+29^{\circ} 13' 11''$, which is at the Mvuu Lodge (south of centerline on the Zambizi River in Zambia), so the aspect will be a bit different in detail from other locations - but you will certainly get the general idea.

Both of these are QuickTime files. If you don't have a MAC, you can download a free QuickTime viewer for Windows (95/98/NT/ME/2000) machines at:

<http://www.apple.com/quicktime/download/> Cheers, Glenn Schneider

From: Brian Garrett

Reiner C. Ott's program Astronom (available for download at <http://www.dutch.nl/rcott/astronom.htm>) does something similar--no sky charts, but the altazimuth grid, which is highly customizable, is handy. The graphics aren't spectacular, but for a freebie it's certainly not bad. Brian



From: FRED ESPENAK <u32fe@lepvax.gsfc.nasa.gov> To: <SOLARECLIPSES@AULA.COM> Sent: Tuesday, May 15, 2001 9:02 PM Subject: [SE]

UTC in Africa

Accurate time signals are always essential on eclipse expeditions. In the USA, WWV broadcasts accurate time signals at several short wave frequencies. Does anyone on the list know if any African countries offer a similar service? If so, what are the bands and frequencies?

I will have a Garmin III GPS with me in Africa. Although it displays the time (UTC?), I have heard that it is not accurate to better than one or two seconds. Supposedly, the accuracy of the displayed GPS time depends on:

- 1) the make and model of your GPS and how much priority the electronics devote to displaying the exact time. (most of the emphasis in these devices is understandably placed on your positional accuracy)
- 2) the GPS satellite constellation at any given time.

Can anyone on the SEML confirm any of this or can you expand on the accuracy of time via GPS receivers? Thanks, Fred Espenak

From: Peter Tiedt <rigel@stars.co.za>

I believe there is a South African Time Signal will try and find more out Perhaps Cliff Turk knows more - you listening Cliff? I have heard that the GPS time is about 0.5 sec out Peter Tiedt

From: <JohnLX200@aol.com>

GPS time is dead-on, although the display on a GPS might or might not be, depending upon the receiver.

What I'd suggest for Fred is to tune in WWV or call the USNO special land telephone line several times, to see if his own receiver is repeatedly accurate, off by some constant amount, or has some random variation.

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Despite many people telling me that their GPS receivers are off by up to 1-2 seconds, every time I've tried it with my old Garmin 45, it has been within perhaps 0.1 or 0.2 seconds, turning over the displayed second right at the tick mark on the special land telephone line.

The best thing about GPS, is that once you have confidence in your own receiver, it's good anywhere in the world.

Differences in GPS time (no leap seconds, etc.) vs. UT vs. UTC vs. TDT and so forth are all fairly well known and documented. Not all GPS devices display the same version of time, but I'd bet that all reasonably modern Garmins do.

Occultation observers in IOTA seem to have time measurement down to a science better than most. I think they have their members start their camcorders, videotape CNN (a television channel), videotape the occultation, and videotape CNN again. They have highly skilled people recording the CNN signal vs. some accurate time signals, and can thereby reconstruct the true time at each camcorder. I don't think this will help you in Zambia, but who knows...

Maybe Fred can contact David W. Dunham to find out the next few times this is being done, and videotape his GPS along with CNN, and have their gurus get him a few data points on his receiver within 1/30 second or whatever their capability is.

Even radio receivers have some mechanical lag in the speaker itself, the speed of sound, the mechanical lag of your eardrum, and your physiological response time to perceive the eardrum movement. By flicking two fingernails against each other in front of the computer monitor, you might even perceive quicker response by the eye than the ear by estimating where the finger is when you hear the sound. For me, it's slightly after seeing the fingernails hit. John Hopper

From: Glenn Schneider <gschneider@mac.com>

In general, whatever kind of unit you are using, a GPS receiver will generally be accurate to ~ 1 second *IF* it has been collecting data long enough to down-link and apply a "leap second correction count" as part of the navigational message. GPS time intrinsically is not corrected for leap seconds from a timebase established in 1980. Your GPS receiver must acquire and apply the leap-second correction as part of the navigational down-link message. Once this is done (which COULD take several minutes) the UTC displayed SHOULD be accurate to "about" a second, but could lag by as much as two. For accurate times you should use a broadcast atomic clock signal (like WWV, WWVB, CHU, etc.).

There is a Web-based summary from the U.S. Navy (NPS) Dept. of Oceanography C. Lynch on the historical accuracy of GPS time vs. UTC. I know nothing of the origination of this report, and suggest the author be queried for any follow-up details.

<http://www.oc.nps.navy.mil/~jclynch/timsys.html>

You probably should also see a note from Joe Mehaffey regarding several Garmin receivers:

<http://joe.mehaffey.com/gpstime.htm>

A more detailed report, with background about GPS timekeeping in general comes from David Allen at Hewlett Packard.

http://www.allanstime.com/Publications/DWA/Science_Timekeeping/TheScienceOfTimekeeping.pdf

There is also a great report from NIST not to be missed:

<http://www.bldrdoc.gov/timefreq/service/pdf/gpsmeasurements.pdf>

From: Gerard M Foley <gfoley@columbus.rr.com>

The few times I tuned my Sony ICF-SW100 with its built in whip antenna to WWV frequencies in Rome and Cairo early in April I had no reception.

> I will have a Garmin III GPS with me in Africa. Although it displays the time (UTC?), I have heard that it is not accurate to better than one or two seconds.

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I don't know a really good way to check the accuracy of a GPS. My GPSII+ seems to turn the seconds right in synchrony with a clock that is supposed to be in radio contact with WWVL, judging by eye. When I listen to the 15MHz signal from WWV with the speaker about 10 feet away I seem to hear the tick a tiny bit before the GPS display changes. When I feed the GPS serial output to a computer terminal program, the \$GPRMC sentence seems to pop up on the computer screen at the same time I hear the ticks. This sentence contains Universal time, latitude, longitude and date. It is transmitted by the GPSII+ every other second (on the even second right now).

Both the GPS and the clock displays are LCD's, which are not famous for being fast. Whether this accounts for my impression that I hear the tick before I see the display change on the GPS or not, I don't know. The impression is that the clock and the tick are a little closer together than the GPS display and the tick.

I don't know exactly what the eclipse chaser is going to be comparing the GPS or any other time source with. If it is something recorded in a computer, if you can get the GPS output into the same computer I would think you would be within a tenth of a second or so of timing whatever it is that you are timing.

Good Luck and clear skies to everyone. Gerry K8EF

From: Cliff Turk <cliffturk@yebo.co.za>

Hi All, Yes, there WAS a time signal in South Africa - on 5 MHz - but it was fairly low power from the Johannesburg area and even in Cape Town we often could not hear more than the lengthened minute markers. It was broadcast on an old Post Office transmitter which had certainly seen better days. Eventually it was scrapped about 10 or twelve years ago. WWV is not easy unless you have a communications receiver, but WWVH is sometimes very good. (especially when using the top wire of a fence as an aerial)

At night I have often been lucky with ATA (New Delhi, India) on 10 MHz, but have never received during the day. However I have checked GPS time against the time service at the SA Astronomical Observatory on two or three occasions and have never found a difference between them of more than 0.15 secs.

Taking into account all the problems of heavy receiving equipment etc, I really think it best to rely on the GPS time. Cliff Turk

From: Manfred Rudolf <mrudolf@epo.org>

Hi, I have noticed substantial deviations of the time displayed on GPS versus terrestrially broadcasted time signals (DCF77 from Frankfurt). I had the opportunity to closer examine the Magellan 300 GPS which is a single channel multiplexer (i.e. it receives one sat at a given time only and switches then to other sats). With this GPS, the seconds displayed were delayed, sometimes the "second's jump" included two seconds, and all that with no recognisable periodicity. The two DCF77 radio clocks for comparison had absolutely synchronous second's jumps.

Obviously the processor is kept busy with position calculations, and time display has much lower priority.

There is a GPS data archive which shows the time difference GPS-UTC for a given date. It is within the range of nanoseconds.

www.bldrdoc.gov/timefreq/service/gpstrace.htm, Manfred Rudolf

From: Marc Weihrauch <marc.weihrauch@student.uni-halle.de>

Hello, so far, this discussion about how exact GPS is for measuring time can be summarized like this:

The error in the "internal" time of the receiver is well below 1s, but there's an additional delay in displaying the time. Did I get this right?

If so, perhaps one might use the "Simulator mode" the Garmin GPS12, for instance, offers. In this mode the device doesn't watch any satellites - no processor load by position calculation - but doesn't receive any more timesignals. However, if you change to this mode just a few minutes before first contact, the internal clock should be exact enough to run without much error over the few hours of the eclipse.

Do the experts think this might work? I'll play around with my GPS12 tomorrow, anyway. Best regards, Marc

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From: Gerard M Foley <gfoley@columbus.rr.com>

The error in the "internal" time of the receiver is well below 1s, but

Roughly so. I don't know how to evaluate the delay which may occur between the internal clock and some useful presentation of the time, whether on a visual display or as a record in a computer.

> If so, perhaps one might use the "Simulator mode" the Garmin GPS12, for

I don't see how this would affect the problem. The unevaluated delay would be the same whether in simulator mode or an active reception. Gerry K8EF

From: <JohnLX200@aol.com>

Gerry, The display delay has a number of components, and the actual LCD response time is not the most significant of those, certainly not of the order 1 or 2 seconds. The higher higher-priority CPU-hogging tasks are the main problem. Eliminate the high-priority tasks from running, and you eliminate those large sources of delay.

The GPS unit has the time correct internally to way better than a microsecond in order to get a good position to the level possible even in cheap units.

Even if you make a worst-case assumption of some constant, equal time error from all satellites simultaneously, consider that they are moving very fast (not sure how high their orbits are, but probably still where velocity is still a few miles per second) there is at least sub-millisecond absolute accuracy in your device to avoid problems calculating a correct 3-D position to the accuracy we get.

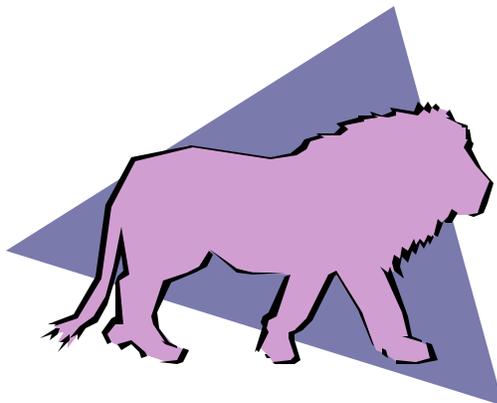
Whether the internal time is sub-microsecond (which I think is the case) accurate or sub-millisecond accurate doesn't matter for our purposes.

Going into simulator mode temporarily would eliminate the CPU load of the great majority of the heavy-duty tasks, namely dealing with the data streams from the satellites, doing all the number-crunching trying to come up with a revised position, and making a microscopic adjustment to the internal time.

The premise (correct, I believe) was that the clock-display update task is performed at lower priority than handling satellite input and doing position calculations.

I hadn't thought about it, but when I called the UNSO clock and got my dead-on result, I don't think I was in simulator mode, but I was indoors and therefore very probably not receiving any satellite data. So I probably only had a task running looking for satellites, but not handling the data streams or doing number crunching. Maybe that's why my display clock was always dead-on. I'll have to try it outdoors on the cellphone with a bunch of satellites locked on, then maybe I can reproduce the 1-2 second delays some people have seen.

So going into simulator mode, or covering the antenna with aluminum foil, might be all that is needed in order to get the clock display updated much closer to the internal tick mark which we know to be accurate. John Hopper



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From: Henrik Glintborg <Henrik@tycho.dk> To: <solareclipses@aula.com> Sent: Monday, May 07, 2001 9:54 AM Subject: [SE]

Pre-eclipse visit to Zimbabwe 2

Hi! Just returned from Zimbabwe with so many impressions... I visited among many other things Harare, Vic Falls, Hvange National Park (saw hundreds of elephants, giraffes, ostrichesimpalas, kudus etc., etc....) - fantastic!

The situation in Zimbabwe is very quiet at the moment. When I arrived in Harare there had just been a threat against the foreign embassys from the war veterans and the Zimbabwean government should had pronounced that it could not guarantee the safety of the embassys and their staff. I had a meeting with the danish ambassador and consul last tuesday and they told me that the embassys had called in the minister of foreign affairs for a talk the day before and that everything had been solved out. The zimbabwean minister regretted what had been said and assured that the Zimbabwean government was very aware about the opportunity of the eclipse to "put Zimbabwe back on the tourist map again". He guaranteed that everything would be just perfect so that the many "eclipse"-tourists could enjoy their stay in Zimbabwe.

The fuel situation is a bit complicated for the ordinary zimbabwean, but the many touroperators have their own supplies of fuel so they guaranteed that there would be now problems in June.

I had a wonderful time in Zimbabwe - the nature is just fantastic and the people are very friendly. So I have absolutely no hesitations bringing my group of 80 people to Zimbabwe. Henrik Glintborg

From: F.Podmore <podmore@science.uz.ac.zw> To: <solareclipses@aula.com> Sent: Saturday, April 14, 2001 2:10 AM Subject: [SE]

SPACE AVAILABLE for ECLIPSE 2001 in Kanyemba

I have just received the information in the email below - SPACE IS AVAILABLE!!! Francis

Date: Mon, 14 May 2001 12:34:03 +0200 From: Swainsons Safaris <swainsaf@mweb.co.zw> To: podmore@compcentre.uz.ac.zw Subject: Eclipse - 21 June

Dear Mr Podmore, We have a 16 bed camp at Kanyemba and due to cancellations our camp is available for foreign clients needing accommodation. Please advise if you have anyone interested. Best regards Daryl Meredith

From: Chris O'Byrne <obyrne@iol.ie> To: <SOLARECLIPSES@AULA.COM> Sent: Wednesday, May 23, 2001 3:56 PM Subject: [SE]

Tides in Morombe

Folks, Does anyone know what the tides will be doing on the beach in Morombe, Madagascar on, say, erm, 21st June? At what times are high tide and low tide predicted to be? Are we all going to find ourselves being bunched up by the advancing tide as the day wears on??? Chris. (Less than one lunation to go now!!!!!!!)

From: Archer Sully <archer@meer.net>

I don't know about the tide, but the name "Morombe" means "Big Beach" in Malgasy, so I suspect that there will be plenty of room for all ;-).

But thinking about the tide for a moment, it will probably be high and ebbing during the eclipse. Archer Sully

From: Marc Bernstein <marc.bernstein@worldnet.att.net> To: <SOLARECLIPSES@AULA.COM> Sent: Tuesday, May 15, 2001 10:42 PM Subject: [SE] **time signals**

This link has a current listing of worldwide broadcast time signals, it doesn't show anything in Africa. pollux.nss.nima.mil/NAV_PUBS/RNA/117chapter2.pdf

From: Gerard M Foley <gfoley@columbus.rr.com>

I couldn't find a date on this document, although I didn't look at every page. It seems to omit the Fort Collins CO USA transmission from NIST on a low frequency. I believe the callsign is WWVL and the frequency 60 kHz (there was once a transmission from this location on 20 kHz, WWVB?, but there is only one LF transmission now). The BBC World Service frequencies will vary from time to time and season to season, and the signals, like many of those listed, are intermittent. The Australian transmissions, VNG, were discontinued at one time, and their financing was very uncertain, so I am not sure that they still are on the air. These services have little political clout in any country, so are often interrupted or abandoned. Gerry K8EF

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From: Peter Tiedt <rigel@stars.co.za> To: Solar Eclipse Mailing List <SOLARECLIPSES@AULA.COM> Sent: Friday, May 25, 2001 8:23 PM Subject: [SE]

Use UV Filters - Yes or No?

Hi all ... I have (as a standard practice) placed UV filters on all my lenses. Do I leave them on or take them off for photography during totality? Peter Tiedt

From: FRED ESPENAK <u32fe@lepvox.gsfc.nasa.gov>

If you plan to shoot the diamond ring effect (and who doesn't?), I'd remove all filters first. Any filter (even a multi coated one) could be a potential source of unwanted reflections when you point your lens directly into the Sun. - Fred Espenak

From: Olivier "Klipsi" Staiger <olivier.staiger@span.ch>

I would recommend to take it off, there may be a slight mirroring of bright parts in the image vs. the dark background (e.g. diamond ring). I think it is best to have the lens as pure as possible. Klipsi

From: Dale Ireland <direland@drdale.com>

Take off every piece of glass you can. It is also a good idea to test your exact lens configuration on some bright object at infinity against a darker background, like a streetlight, to see if you get ghost images from internal lens reflections. The more doublers and so on, the more reflections. I had one setup that produced a ghost of the inner corona that overlapped the actual image. This is especially bad with shorter focal length lenses like 200-400 where the bright ring is small and near the center of the field. Also I tip my solar filter slightly during partial phase photos to eliminate reflections Dale

From: Marc Weihrauch <marc.weihrauch@student.uni-halle.de>

Hi there, Beside that, UV-filters probably aren't any useful around totality. Strong UV makes your photos look like a hazy day, even though the weather was clear and sunny, right? But I suppose that around totality the UV isn't strong enough for that effect, anyway. Best regards, Marc

From: Olivier "Klipsi" Staiger <olivier.staiger@span.ch>

Well said, Dale and Fred. I also had ghost images and internal reflections with diamond rings. And Peter, here is a tip: test your lens on a bright dot against dark background, as Dale suggested. If a ghost image appears and overlaps over the main image, that will be bad for the eclipse. In such case, it is wise to do the following: most of times you would put the diamond ring in the center of the field-of-view, and then the ghost image overlaps on the main image. But what you can do is to move slightly aside, that is to put the subject you are photographing in the left half of the field of view, and then the ghost reflection will shift to the right side. Thus your original image will have no superimposed light. Same thing applies

to a video cam, and you can test it with immediate check. Klipsi

From: <JohnLX200@aol.com>

If you center the moon in the field of view, then the diamond ring is by definition off-center. Unfortunately, I forgot to do that in 1998 at Contact 2, and had the diamond centered, so when totality started, my coronal pictures were off-center and chopped off.

If there is blowing sand and salt-air mist in high winds as I had in Aruba, I'd leave the UV filter on for physical protection, otherwise I'd remove it as with any other critical photograph you take. It's a compromise between eventually degrading your lens physically vs. continually taking the chance of degrading your images with an otherwise perfect lens. John

From: Dale Ireland <direland@drdale.com>

Hi, If there is blowing dust or sand I would still take the filter off to get a picture with fewer reflections. I doubt a brief exposure to dust would do that much harm and you can always get another lens, you can't get another 2001 African eclipse shot. Of course reflections are mostly internal. I don't agree with the method of trying to perfectly center the bright area (ring), even if you can do it the reflection ring is inverted and will still degrade your image. Best to have it off to one side so you can crop it out later. Lens focal length has a lot to do with it, with a longer lens the internal reflections move out of the field with just a little bit of "off centering". This is also an example of "you get what you pay for" in lenses. High quality multicoatings really reduce this problem. Dale

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From: B Yen <byen00@earthlink.net> To: <SOLARECLIPSES@AULA.COM> Sent: Tuesday, May 08, 2001 11:48 AM Subject: [SE]

4x4 groups going to northern Kafue Park?

Are there any small self-organized groups, going to northern-Kafue Park by 4x4 (from Lusaka)? (& staying in tents) I'm looking for such a group, to go with. Please contact me privately.

Arrive in Lusaka, I want to get to the observation-site 1 week before E-day, & setup. I want to do a lot of nighttime astrophotography. This requires a safe/secure site (since lions/leopards/hyenas prey at night). I would like to do some daytime photo-safari. I don't like these tours which do a lot of sightseeing/travel before (& after) E-day, which increases expenses. Just some wildlife viewing around Kafue Park is sufficient the week after E-day. byen

From: B Yen <byen00@earthlink.net> To: <SOLARECLIPSES@AULA.COM> Sent: Thursday, May 31, 2001 11:59 AM Subject: [SE]

weather in Zambia

<http://www.sat.dundee.ac.uk/pdus/AV/>

I see patterns of clear, then cloudy skies in the Zambia/Zimbabwe area. This concerns me. It would be a mistake to plant oneself in an area, & hope the skies are clear for E-day. I figure I should go west in Zambia to settle in at my site. Near E-day, I should call Jay Pasachoff or Olivier Staiger, to get a last minute weather report (preferably using a satellite image). Then, based on that, possibly move to a site which will probably be clear on E-day.

I'm feeling that maybe I ought to be going as far west as I can, like Zambezi (kinda close to Angolan border, slightly risky).

I like what Daniel Fischer's group is doing. They are going there 2 weeks in advance, to "feel out" the situation. The more data/info, the better chance of success. I may be seeing them at ZASTI on June 14-15, & share information. I may or may not join with their caravan. Bob Yen

From: Jean-Paul Godard <jean-paul.godard@noos.fr> To: <SOLARECLIPSES@AULA.COM> Sent: Sunday, May 13, 2001 9:12 AM Subject: [SE]

Travelling with "AFA"

Sorry for this "near limit" question? Anyone here travelling with "Association Française d'Astronomie" to Zimbabwe? Cordialement / Regards Jean-paul.godard@noos.fr

From: Peter Tiedt <rigel@stars.co.za> To: Solar Eclipse Mailing List <SOLARECLIPSES@AULA.COM> Sent: Tuesday, May 08, 2001 7:12 PM Subject: [SE]

Update to the Africlipse Website

The Africlipse website <http://www.eclipse.za.net> has been updated with some minor revisions.

For those who have not yet firmed up on their plans there is a 5 day bus trip to northern Zimbabwe, departing Johannesburg at an incredible price of less than US\$150.

I have also put up (on the 2001 page) a very nice 3-D map of Zambia which may prove interesting to the list.

See <http://www.eclipse.za.net/html/2001.html>

I have also put up a 2002 Tours page - If you know of any 2002 tours, I will list them here. See http://www.eclipse.za.net/html/2002_Tours.html Peter Tiedt

From: Glenn Schneider <gschneider@mac.com> To: <gschneider@mac.com>; <moskowi@attglobal.net>; <dan@mcglaun.com>; <charles@atmos.albany.edu>; <KOLODNY@Kolodny-Anteau.com>; <kay@astro.columbia.edu>; <small.exoticexp@erols.com>; <eclipsechaser@yahoo.com>; <johan@mvuulodge.com> Sent: Wednesday, May 09, 2001 9:36 PM Subject: [SE]

Zimbabwean Visas

FYI - For those in the U.S. Application forms for Zimbabwean visas may be obtained (with instructions) via the internet at: <http://www.zimembassy-usa.org/pdf/visa.pdf> Glenn Schneider

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From: B Yen <byen00@earthlink.net> To: <SOLARECLIPSES@AULA.COM> Sent: Monday, May 21, 2001 8:08 AM Subject: [SE]

Zambia, close to Angolan borde? (Zambezi)

Has anyone considered going to Zambezi in far western Zambia? It is close to Angolan border.

Pros: higher chances of clear skies & longer eclipse duration (almost 4 min)

Cons: less security? (because of proximity to Angola & possible rebel activity)

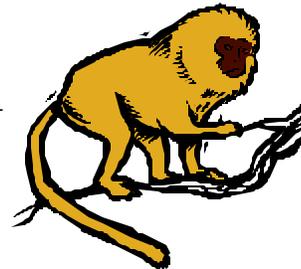
I've been told that Kafue Park requires an overnight booking (lodges or \$10/night campsite), which are unavailable (booked up). I don't know if Kafue Park is an option for me. I probably try villages outside the park boundaries. B Yen

From: <JohnLX200@aol.com>

Bob, The longer totality is tempting, but if you look over Fred's map of likely smoke density due to biomass burning, going west of the park might be a losing move. So even the technical gains are debatable, and you will be giving up a huge amount of mobility if you are on the west side of the river. Simply put, you're pinned down there, between Angola and the river. It's not a good roll of the dice, even ignoring the inconvenience and danger.

I considered a package offered by a Canadian group (Vancouver amateur group or planetarium?) which is going up into that corner for the eclipse, on the western side of the river. A few things turned me away from it. The general security concerns were high on the list: it sounds cool to be next to a dangerous border, but it's not worth it. Equally high on the list was the fact that travel is said to be quite difficult, and the nearest passable river crossing is a very long distance away. There were all kinds of cautions about making sure you have multiple 4WD vehicles to extricate each other from sand and mud on the way to get there. A lot of warnings about needing to carry extra fuel due to the poor driving conditions, also. I think the group is taking a BUS, so I was quite concerned about getting stuck. Hopefully they know what they're doing, but the timing of when the driving conditions will improve wasn't certain enough for me.

The road southwest from Kasempa offers some interesting possibilities by Kabompo, but I don't know of anyone else trying it, so you have to ask if you want it badly enough to be driving alone on a semi-major road where anyone looking to give you trouble knows where the centerline crosses the road as well as you do.



Availability of space on any tour with a camping permit in Kafue Park, much less beds, has been tight for a long time. I believe that tour operators took all the available permits, but I'm not 100% sure.

There are some tough, tough logistical problems and risks getting into Kafue, and even bigger ones on the Zambezi. I was in a state of denial about them when Roy Mayhugh canceled my original itinerary based at Musungwa Lodge to have eclipse day in Kafue. It turns out that getting from Musungwa at Lake Itzhi-tezhi (spelling?) to the park would take longer than Lusaka to the park. He wasn't sure we'd even make it in time, so he gave up his Kafue permits to a group from Germany, Switzerland, or Austria I believe.

Without a park permit, you can head from Lusaka toward Moshi. If you make it, fine, and if you don't, there are one or two closer places where you can head north and hope the small ferry crossings are open. If not, you're not too far from the centerline anyway.

All in all, I'd recommend planning to view north of Lusaka like everyone else, and if you manage to hook up with enough others with vehicles and guides before the eclipse, maybe venture west in a strong group. The Lusaka-Kafue-Mongu road around eclipse day is going to BE an adventure, I'd suspect. John

From: Daniel Fischer <dfischer@astro.uni-bonn.de>

If you're looking for a relatively current FIRST-HAND report about travelling Zambia's 'Wild West' on your own and can read German, go to http://www.hupeverlag.de/Features/Feat._Reiseberichte/body_feat._reiseberichte.html - this covers the area of

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interest. In a nutshell: Yes, it's an adventure, but there is no reason for paranoia. And don't forget to ask your embassy about the various borders and related problems: They can tell you exactly where not to go even more precisely than various travel advisory websites (see below). Daniel

Other useful sites for updates on the situation in Zambia:

<http://www.lonelyplanet.com/scoop/afr/zam.htm>

http://www.hupeverlag.de/Sambia_Malawi/News_Sambia/body_news_sambia.html

<http://www.dispatch.co.zm>

<http://www.astro.uni-bonn.de/~dfischer/2001>

<http://travel.state.gov/zambia.html>

http://www.auswaertiges-amt.de/www/de/laenderinfos/laender/laender_ausgabe.html?land_id=142&type_id=14

<http://www.fco.gov.uk/travel/countryadvice.asp>

From: <Jay.M.Pasachoff@williams.edu> To: <solareclipses@aula.com> Sent: Monday, May 14, 2001 11:30 PM Subject: [SE]

Zimbabwe travels

Those contemplating going to Zimbabwe for the eclipse should read the editorial in today's New York Times. There is free registration if you go to www.nytimes.com and choose editorials.

You can potentially go to: <http://www.nytimes.com/2001/05/14/opinion/14ROTB.html> though you will have to sign on at some point.

In the comments, it includes such dismal comments about the situation in Zimbabwe that I think people planning to go there for an eclipse should arrange to go elsewhere. Availability of fuel is one problem. Those of you who think you are going to drive to the northeast corner may find no fuel to allow you to do so.

But the biggest problem is that if some legal problem arises, there is no authority to protect you and no respect for your own government if they should try to extricate you from a legal situation in or out of jail. Jay Pasachoff



From: Govert Schilling <mail@govertschilling.nl> To: <SOLARECLIPSES@AULA.COM> Sent: Wednesday, May 23, 2001 4:49 PM Subject: [SE]

Zimbabwe plans

My plans are finally definitive. I will travel to Zimbabwe with a group of 16 Dutch people who will be on a combined eclipse/walking tour for just over three weeks. I will only join them for the first few days, as an added tour leader (just for the eclipse). We arrive in Harare on June 18 around noon and will spend the afternoon and the whole next day (June 19) in Harare. On June 20, we travel to the northeast, to Murehwa. Eclipse instructions in the afternoon; sky gazing in the evening. On the morning of Eclipse Day, we travel to the neighborhood of Kotwa (on the A2, pretty close to the Mozambique border), where we will watch the eclipse. I will return to Harare that same evening or (more likely) the next morning, and then fly back home on the evening of the 22nd. This is NOT an amateur astronomy group or a group of semi-professional eclipse chasers; just interested tourists. I'd certainly like to meet other list members, so if you think your schedule crosses mine in time and space, and like to have a chat, let me know. --Govert

From: Mike Zorn <rigoleto@table.jps.net> To: <SOLARECLIPSES@AULA.COM> Sent: Thursday, May 24, 2001 7:31 PM Subject: Re: [SE] Zimbabwe travels

I realize that most people's plans have most likely already been made, and that some are veterans of the Iran eclipse, but as

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Jay Pasachoff points out, things are still dicey in Zimbabwe.

I asked someone on another List, who replied (excerpts):

"British Airways still flies into Zimbabwe but after it has unloaded passengers the plane flies to a neighbouring country where it is a little safer for the crew to stay overnight!

"The information in question was received from people who have close family living in Zimbabwe and at least one of whom has to visit his relatives whether he likes it or not.

"He says the least dangerous way is not to go to Harare but only to Bulawayo, which is mainly inhabited by the Matabele tribe, not the majority tribe of President Mugabe's thugs.

"Despite what the main airlines and travel agents say, there is a feeder air service from Johannesburg in South Africa directly to Bulawayo and back.

"Things are now so bad that South African trains stop in the middle of nowhere, on the Zimbabwe border; from there passengers have to walk unless they can find other means of transport!" Mike Zorn

From: B Yen <byen00@earthlink.net> To: <SOLARECLIPSES@AULA.COM> Sent: Monday, May 21, 2001 5:59 PM
Subject: [SE]

weather on 5/21: Zambia & Zimbabwe

http://www.sat.dundee.ac.uk/pdus/AV/200105211200AV1_g.jpg

1 month to eclipse, visual image at 12:00 UT (2pm local Zambian time). Looks like there is clouds in Zambia. Zimbabwe has more clear area.

From: Assoc Prof J R Huddle <huddle@usna.edu> To: <SOLARECLIPSES@AULA.COM> Sent: Saturday, May 05, 2001 7:40 PM
Subject: [SE]

Where will you be?

Point your browser to http://antwrp.gsfc.nasa.gov/apod/image/0011/earthlights_dmisp_big.jpg Can you find where you will be on 21 June 2001?

From: Peter Tiedt To: 'SEML' Sent: Monday, May 14, 2001 1:08 PM Subject: [SE]

Yellow Fever Vaccinations

News has just come to light (via a business associate returning from Zambia) that South Africa now requires travellers entering SA from Zambia to have a valid Yellow Fever Vaccination.

This will affect all South Africans, as well as those returning to their destination via Johannesburg or Cape Town. Peter Tiedt

I'm off to have mine tomorrow.



Joanne & Patrick

Solar Eclipse Mailing List



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