Robert Kellogg (Potomac, MD)

Thursday Registration Reception

The 31st Annual NASS Conference was held at the Hyatt Regency Hotel in Louisville, KY June 25-28, 2026. The conference began with a Thursday evening welcoming reception.

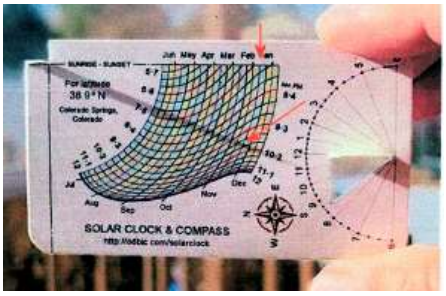
Thursday Social: Mark Montgomery (standing) explains tickets for the grab bag. Left to Right: Mike Moghadam, Bo Manning, Bryan Preas, Jeff Kretsch, Kathy Preas, Kate Aubert, Pam Morris

Of course, there was a "grab bag" for interesting sundial books and dials. This year everyone of the winner kept their first choice of gift:

Tom Kreyche	Chris Daniels: *Sundials;* Margaret Stainer: *Oxford Sundials*, and Jan Walker: *Make a Sundial*
Kathy Preas	R. Newton & Margaret W. Mayall: *Sundials - Their Construction and Use*
Pam Morris	Denis Savoie: *Sundials – Design, Construction and Use*
Steve Johnson	Hester Higton: *Sundials: An Illustrated History of Portable Dials*

Lizzy Longsworth	Fred Sawyer: *Ray of Sunlight (Sciatherics Vol 3)*
Will Grant	Fred Sawyer: *Born of Light (Sciatherics Vol 4)*
Diane Conners	Reproduction of a Colonial American Sundial (Williamsburg Stieff pewter)
Zoon Nguyen	Rene Rohr: *Sundials, History, Theory and Practice*
Mike Moghadam	Frank Cousins: *Sundials – A Simplified Approach by Means of the Equatorial Dial*
Bryan Preas	Barry Perlus: *Celestial Mirror – The Astronomical Observatory of Jai Singh II*
Jeff Kretsch	Sharon L. Gibbs: *Greek and Roman Sun Dials*
Douglass Gennetten	Regiomontanus Sundial created by Vsevolod Buravchenko of Kyiv, Ukraine
Betsy Wilson	Basket of Goodies from Bob and Bo Manning, including David Rooney: *Rooth Belville – The Greenwich Time Lady*

As a welcoming gift to all, Roger Harris created a pocket card sundial. His "solar clock" altitude dial that also served as a compass. The dial was set for Louisville at latitude 38° 54' N.



A word of thanks the authors whose photographs grace this retrospective. A special thanks to Steve Johnson who took photos during the rainy sundial tour and photos during conference breaks and during the conference dinner.

Friday Bus Tour of Sundials

Dire warnings of heavy rain and flooding brought out the umbrellas and raincoats. Perhaps the most interesting sundial was the first dial visited at Cave Hill Cemetery: The Shwab Family Memorial with a reclining sundial made by D.B. Sheahan (who was discussed in two of the conference presentations.

Lizzy Longsworth (left) and Mark Montgomery (Right) inspect the Shwab Reclining Dial (NASS Dial #1135

A quick stop at the second and third dials at Cave Hill Cemetery were the Boomer Family Memorial Horizontal Dial (NASS #1038) and the Schiegel Memorial Family Dial (NASS #1040).

In the photo, Zoon Nguyen (left) and Fred Sawyer (right) discuss the fine points of the Boomer Horizontal dial.

Through a thundershower, the NASS Sundialists persevered to inspect the Louisville Presbyterian Theological Seminary Sundial.

No shadow today…only rain on the elegant horizontal dial (NASS #1043) at the Louisville Presbyterian Theological Seminary

The highlight of the sundial tour was a stop at the Kentucky National guard in Frankfort, KY. As the NASS Sundialists waited for lunch, General (Ret) Mike Davidson gave a presentation on the history and construction of the Kentucky Vietnam Memorial. The memorial was designed by Helm Roberts, using a sundial to cast its shadow on the year and date of fallen Kentucky Vietnam service members. Adding relevance, Zoon Nguyen spoke of his memories as a young child in Saigon, befriended by a member of the US Army and given chewing gum. He and his parents fortunately fled South Vietnam before its fall, immigrating to the United States.

NASS Conference Attendees at the Kentucky Vietnam Memorial: (Back Row L to R) Paul Ulbrich, Douglas Gennetten, Fred Sawyer, Jeff Brewer, George Wilson, Jack Aubert, Tom Kreyche, Kate Aubert, Lizzy Longsworth, Will Grant, Bryan Preas, Mike Moghadam, George Perkins, Marvin Taylor, Bo Manning, Phil Sawyer, Dean Conners, Mark Montgomery, Zoon Nguyen, Susan Haynes, Evan Boxer-Cook, Marc Boone, Bob Manning, Steve Johnson, (Front Row L to R) Betsy Wilson, Jeff Kretsch, Frank King, Kathy Preas, Bob Kellogg, Pam Morris, Phylis Montgomery. (Photo by Beth Avey)

The last sundial of the day was at Ashland Gateway Park along the edge of the Ohio River. Mark Montgomery helped this Bicentennial Dial by designing a new gnomon. The rain had stopped and for a brief moment the sun came out allowing the gnomon's shadow to tell the time at 3:55pm.

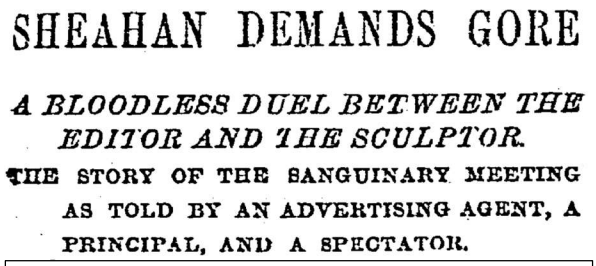
Sundial Presentations

Fred Sawyer welcomed everyone at passed out presentation bingo cards to ensure everyone watched the presentations closely.

Mark Montgomery began the presentations reviewing the use of an analog watch as a compass. While using your watch in the wilderness to find North at temperate latitudes, Mark showed that at low latitudes the computed azimuth direction of the compass watch was severely distorted. Northern Woods, OK but beware in the swamps of Florida.

Bob Kellogg presented his decadal talk on digital sundials. What's new is not the idea of digital sundials, but the advancements in 3D printing and laser cutting to produce them.

Fred Sawyer and Bob Manning presented the first of two presentations on D.B. Sheahan, who although a renowned sculpture, acquired the distinction of being a forger. He became even more famous for a duel: In 1883 Sheahan was working on a relief plaque for John Armoy Knox, editor of a Texas humor magazine. The men met regularly for a friendly dinner, but one meeting devolved into a political argument and Knox challenged Sheahan to a duel with pistols. Their first shots missed, but "They fired again, and Knox reportedly found a hole in


SHEAHAN DEMANDS GORE

A BLOODLESS DUEL BETWEEN THE EDITOR AND THE SCULPTOR.

THE STORY OF THE SANGUINARY MEETING AS TOLD BY AN ADVERTISING AGENT, A PRINCIPAL, AND A SPECTATOR.

New York Times, July 1883

his shirt and some small amount of blood. All were satisfied and they returned home before the arrival of the constabulary."

Sheahan may have been a fine sculptor, but his true knowledge of sundials was lacking, as for example attributing correction of the Equation of Time to the Analemmatic Sundial.

Evan Boxer-Cook presented his experiments into creating classic sundials made at the Visualization Lab at Bates College. His prototypes included nocturnals, the navicula sundial, the Roman altitude dial, astrolabe, and ring dials styled with both bead on wire and pinhole on the Zodiac. These dials and astrolabe were laser cut and marked in wood. For several workshops he created multiple wood astrolabes and a box full of plastic ring dials for his students.

Evan's design and laser cut astrolabe

Frank King as the entrepreneur who sells the French Revolution Calendar, is now an anticipated event. Beside hawking the benefits of a 10-month year, Frank discussed diversions of "Eine Blocksonnenuhr" that he presented at the last NASS conference. Hunting for the monogrammist of this sundial "1534 IB" led him to consider the Seven Planets and that led to the association of the planets with the Zodiac. This in turn led to a discussion of the confusion between Cronos, the Titan who ate his children for fear that one would eventually kill him (Zeus does) and Chronos, the Greek primordial god of time turning the wheel of the Zodiac.

Cronos, associated with Saturn, preparing to eat one of his young. Note the scythe at his foot, while the other is missing hinting at Father Time

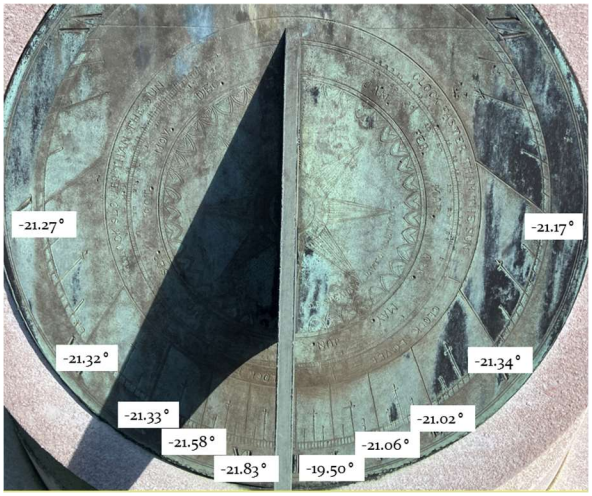
With a break in presentations, attendees had a chance to view sundial displays that surrounded the conference room.

Sundial Displays (Clockwise from top) ZoonNguyen explains his dial that can be longitude displaced, Evan Boxer-Cook discusses his antique laser cut-out dials, Mark Montgomery Horizontal Azimuth Dials (left) telling Local Solar Time and (right) telling Civil Time, Bob Kellogg shows the inside of a 3D printed Foster-Lambert Sundial

Fred Sawyer and Bob Manning returned, presenting "Modeling the Errors in the Sheahan Sundial." Starting in September 2025 Bob Manning made extensive measurements of the Sheahan Sundial. The gnomon angle to north is 36.2°, not the 38.2° of its latitude. Bob found that the dial and entire sculpture was rotated clockwise through an angle 10.5° from true north, and not attributable to using magnetic north. The dial was also rotated on its inclined plane approximate minus 1°. If the dial were corrected for all these errors, the dial still

would tell time 6 minutes off. At least for the 8:28am hour line, correcting for a miss-drawn hour line finally corrects for the last 6 minutes error.

Looking at the other hour lines, none agree with the gnomon's elevation of either -20.8° (for correct latitude) or -22.8° (as built), with most hour lines implying the gnomon's elevation of about 21°. Again, Sheahan may have been an excellent sculptor, but he was a sloppy dialist.



Reclining Sundial by Sheahan – Calculated gnomon elevation angle based on engraved hour lines.

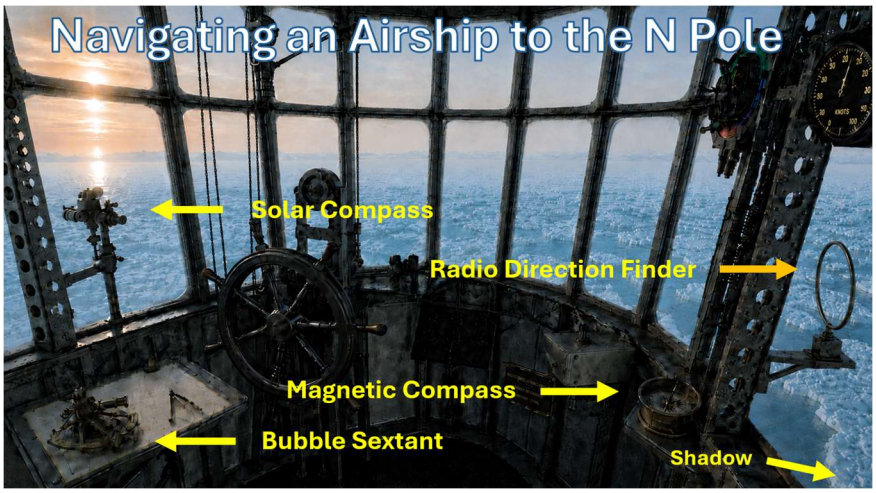
Zoon Nguyen, who is passionate about vector descriptions of sundial parameters and interpretation of spherical trigonometry, demonstrated the vector coordinates of a horizontal dial translated to that of a complementary vertical dial. The demonstration used 3 sticks (coordinate axes), two hands, and a beach ball for the earth.

Tom Kreyche continued his research from last year's Ottawa's conference, finding that the mysterious object presented at the

Canadian Museum of History was a solar compass for polar exploration.

Object at Ottawa Conference Now Identified as a Solar Compass used by the British Terra Nova South Pole Expedition 1910-1913. Used at Camp Evans 78° South in attempt to reach the South Pole

On Sunday Tom continued discussing polar exploration and solar navigation. To reach the poles by air, explorers met many hazards of wind and weather, some stranded on ice and some losing their lives. In all these explorations the solar compass played a critical role in polar navigation using time and the hour angle of the sun to determine azimuth.

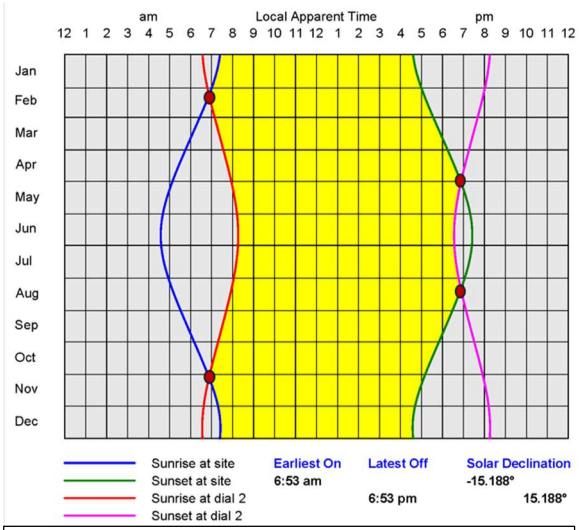


Graf Zeppelin Successful in reaching the North Pole - 1931 using Solar Compass, Magnetic Compass, Bubble Sextant, Radio Direction Finder, and altitude/drift using the Zeppelin' s own shadow

Fred Sawyer returned to the podium to discus Hauxley's Challenge: At what latitude is an erect south declining dial have its declination, distance of the substyle from the meridian, and the substyle's height all be equal? (1737 First Edition Mechanick Dialling.) The solution published was a quartic equation x^4 – 3x^2 = -1, when solved gave x = +/- sqrt((3+/-sqrt(5))/2). Fred started with the spherical triangle, to find sin(lat) = (-1+sqrt(5))/2. It turns out that the value on the right side is phi, the ratio of the side of the golden rectangle, 0.6180339…

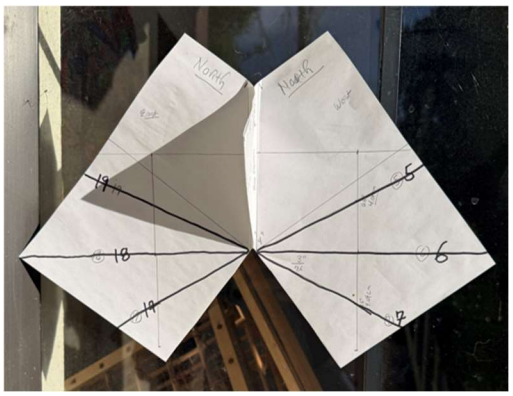
Fred concluded this mathematical exercise showing that the latitude is 38° 10' is also the latitude of the Louisville Muhammad Ali International Airport.

All of this led Fred to his Sunday talk, "A Time to Come On and a Time to Go Off" where he considered "when does sunlight illuminate" an inclining and declining dial. Back in 1995 Fred published "Extreme Hours of Sunlight" in the Compendium, but "Horror of horrors… I had committed Hauxley's sin. I had announced a solution to a problem but left … no breadcrumbs to indicate how I had arrived at it…[30 years later] this time, I will provide a full accounting."

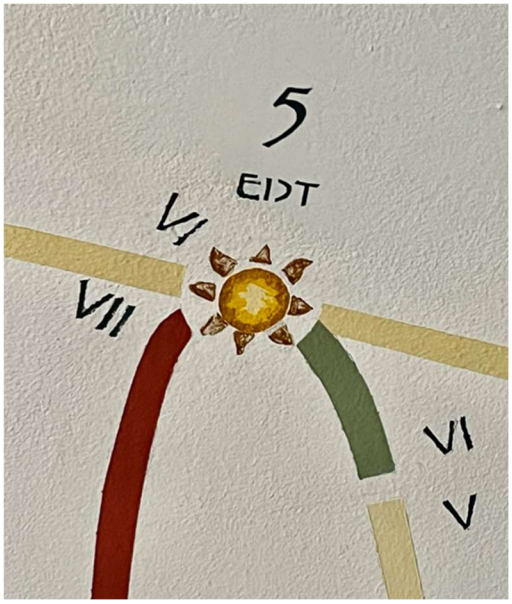


Analysis of a dial at lat = 40°, declining 40° W, and inclining 70°. Notice that there are two extremes of the "Come On" and two of the "Go Off" times when sunlight illuminates this dial

Paul Ulbrich presented the origami and kirigami of folding paper sundials, testing them on his window. Kirigami is the art of folding paper, and cutting it. Origami is the are of folding paper and nothing else (such as creating a simple polar sundial).



Dean Conners talked about his "Pair of Reflecting Sundials" at his home in Michigan. The key to successfully plotting the sun on his bedroom ceiling was a phone alarm, charcoal marking, and post-it-notes. The project started in 2015 and continued until 2019.



Using the sun to plot the analemma shape depended upon the weather (mostly clouding during the winter) and dodging the shadows of a back yard full of mature maple trees.

Doing the second reflecting dial on his porch ceiling was much more difficult as the ceiling had planking with grooves that were very hard to paint the analemma line.

Congratulations to Evan Boxer-Cook

At the Saturday evening conference dinner, Fred Sawyer presented an Artisan Industrials *Spectra Sundial* to Evan Boxer-Cook. Evan graduated from Bates College with A BA in Classical and Medieval Studies. His Senior Thesis was on the use of equal hours in ancient Rome – and at graduation, it won the award for best research thesis of the year.

Fred Sawyer presents Evan Boxer-Cook with a Spectra Sundial at congratulations on best Senior Thesis

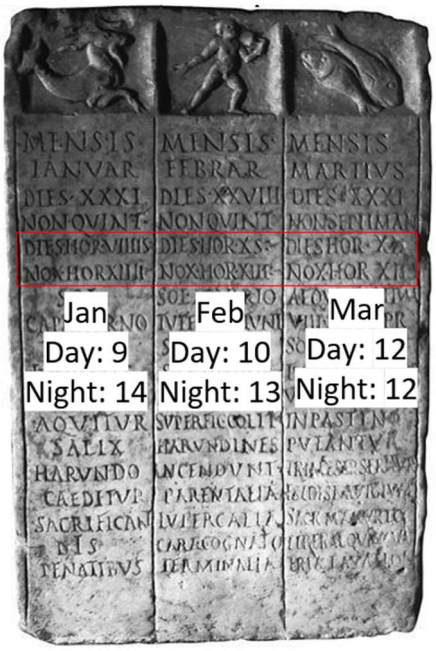
Evan gave his Baccalaureate Address on "The Equinoctial Hour in Antiquity", giving examples of hour lines on Greek and Roman sundials: "Seasonal hours appear in the Greek material record by the mid third century BCE…[while] equinoctial hours were relegated to very specific niches cases requiring the articulation of daylight duration…[which] sets the scene for a later Roman resurgence of the equinoctial hour."

Evan explained in the writings of Pliny the Elder (first century CE): "The longest day covers 12 8/9 equinoctial hours at Meroe, but 14 hours at Alexandria, 15 in Italy and 17 in Britain." The equinoctial

hour spread to common use in funerary epigraphy such as “Ragonia Septimilla lived for 20 years, one day, and 11 hours.”

In the Menologia Rustica equinoctial hours were used in agricultural to tell the length of the day for planting.

The conclusion is that with equinoctial hours used in agricultural texts and funerary epigraphy, knowledge and use of equinoctial hours, as well as for specific comparisons of time, were used by the Roman public at large.



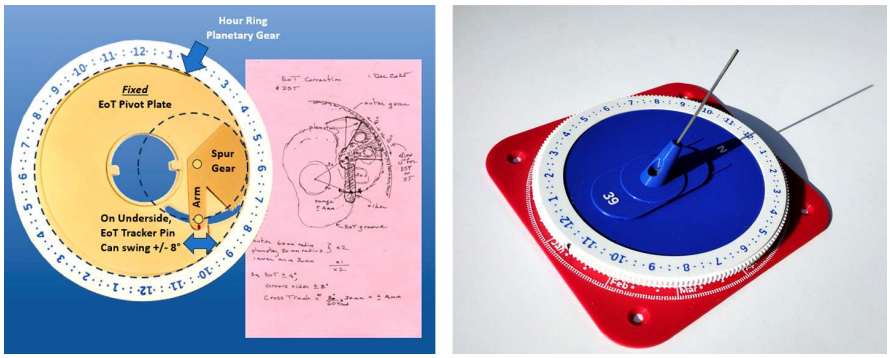
Menologia Rustica – Translation Highlighted

<u>Dinner Gifts</u>

Bob Kellogg presented a sophisticated Foster-Lambert Sundial with EOT correction to full registered attendees of the conference and Douglas Gennetten provided a pop-up paper sundial with an elegant Louisville theme to all, and spouses received special Louisville candies.

Back cover of the horizontal sundial created for Louisville by Precision Sundials (Douglas Gennetten)

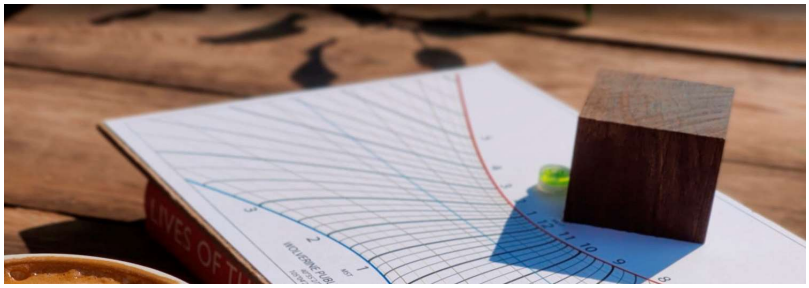
Bob Kellogg's presentation on the Foster-Lambert dial noted that it was invented in 1654 by Samuel Foster and reinvented in 1777 by J.H. Lambert. Since the gnomon does not point to the North Celestial Pole, this type dial requires a declination (Zodiac) movement of the gnomon. The mathematics of the gnomon seasonal movement allows for a circular time ring of 15° per hour rather than the ellipse of the analemmatic sundial. Bob used a cam to move the gnomon and then included a second cam to move the time ring for the equation of time as well.



(Left) EOT Cam with Spur Gear to Rotate Time Ring; (Right) Fully Assembled Foster-Lambert Sundial

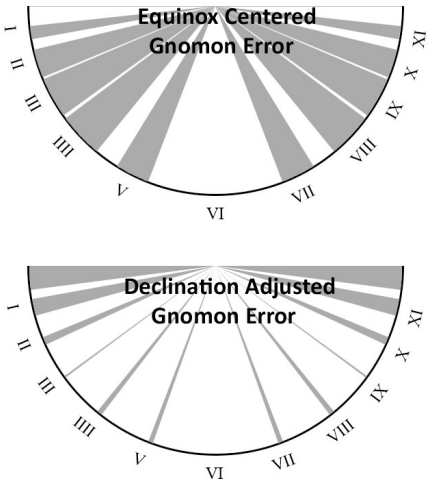
Douglas Gennetten discussed the shape of the gnomon tip as nodus, showing the work of John Carmichael (Compendium, 2006) and then expanding on the idea of a corner cube giving two umbral shadows. "In private communication, John Carmichael suggested, correctly, an even better nodus would be my 90 degree corner, tilted to latitude, ensuring even better odds of a 90 degree shadow intersection."

In addition, Douglas described the eye response to the shadow as it goes from penumbra to umbra. And it's not where you think. The response is very near the umbra edge rather than the 50% illumination point.



Douglas Gennetten demonstrates the advantage of a cubic or corner gnomon to cast a more robust umbral shadow.

Frank King continued the discussion of non-polar gnomons starting with Sue Manston's analemmatic dial for unequal hours, then collapsing the Zodiac walkway to a standing spot and moving the unequal hours through the seasons. This was to convince us that for a dial such as the one Frank designed for the Margaret Stanier Dial the gnomon must compromise time through the seasons when drawing the unequal hours. Then Frank showed the way of finding the best (least squares) position of the gnomon to give minimum time error.



Frank Kings' s graphic showing distribution of unequal hour error between the equinox centered gnomon and a re-centered gnomon to minimize error

Annual General Meeting

At 07:58 EDT Fred Sawyer called the Annual General Meeting (AGM) to order. Secretary Steve Lelievre was not able to attend and wished everyone well. The minutes (reprinted for all) from the last AGM were accepted as recorded.

As editor, Steve repeated the call for additional sub-missions to the NASS Compendium.

Fred presented a display of authors, showing that 57% of the papers in the Compendium were produced by the NASS Board. More authors are required to maintain an average of 8 quality articles per issue.

Mark Montgomery as Treasurer presented the statement of financial position, and then from the last several years, comparison charts of income and expenses of NASS.

Bob Kellogg announced that the Sundial Registry had 1153 entries, with developments in finding a new Farenholt sundial in Norco, CA and an expected 8-foot (2.4m) Schmoyer-type sundial for York University later in 2026.

Just before the NASS conference, the sundials.org website was hacked. Fortunately, the upgrade of website and server (thanks to Jack Aubert) was in testing. Transition to the new and more robust https:sundials.org went smoothly with no data lost.

Fred Sawyer reported that in June 2025 NASS had 234 members. 29 members lapsed, but gained 28 new members, resulting in June 2026 a total of NASS 233 members.

During 2026/2027 the NASS board intends to change the way it operates to provide opportunities for more people to become involved.

The AGM was adjourned at 8:32 am EDT.