

## Re: Earth rotation

**Source:** <http://sci.tech-archive.net/Archive/sci.astro/2004-06/1634.html>

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**From:** Robert Grumbine (*bobg\_at\_radix.net*)

**Date:** 06/21/04

Date: Mon, 21 Jun 2004 17:37:36 -0000

In article <273f8e06.0406190346.21c956c6@posting.google.com>, Oriel36 <geraldkelleher@hotmail.com> wrote:  
>bobg@radix.net (Robert Grumbine) wrote in message  
>news:<10d6jlees7e6634@corp.supernews.com>...  
>> In article <273f8e06.0406180842.45ba6f99@posting.google.com>,  
>> Oriel36 <geraldkelleher@hotmail.com> wrote:  
>> >don@tower.net.au (don findlay) wrote in message  
>> >news:<5f164087.0406150729.593b9353@posting.google.com>...

>> [large snip]

[more snipping]

>> >I have no doubt that many suspect that something has gone badly wrong  
>> >but unfortunately not many at present can put their finger on the  
>> >source of the problem.I assure you that it is as simple as the axial  
>> >rotation of the Earth, most people correctly gauge that rotation as 24  
>> >hours exactly (without knowing the principles behind it) while the  
>> >conservation of angular momentum guys have it at 23 hours 56 min 04  
>> >sec.  
>>  
>> Hardly.  
>>  
>> The ancient egyptians defined the 'day' as being 24 hours. It  
>> could equally well have been declared to be 12, or 60, or 10. The  
>> 'hour' was not a fundamental unit of time, it was just a way of  
>> subdividing the (solar) day. For some centuries, the hour was not  
>> of fixed length, either, and was different between day and night.  
>> 'daytime' was divided into 10 parts, with a warmup and cooldown hour  
>> on either side. Around this time of year, those 'hours' were  
>> pretty long. The nighttime 12 were correspondingly short at this  
>> time of year.  
>>  
>> Since you have some mysterious problem with Newton and other  
>> relatively modern folks, I'll stay away from them.  
>>  
>> We're \_given\_ that the solar day was \_declared\_ to be 24 hours.  
>> That was and is true (though we have, now, to deal with the

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>> *equation of time, and mean sun vs. actual, for reasons I'll get  
>> to in a minute.*  
>>  
>  
>*No Sir, you will stop right there as you are using the term 'mean sun'  
>which emerged in 1677 through Flamsteed.If geologists wish to take the  
>effects of the Earth's axial and orbital motions they had better drop  
>these geocentric description of 'mean sun' and 'actual sun' which are  
>a product of inferior thinking.*  
>  
>*Flamsteed tranfered the axial rotational 24 hour/360 degree longitude  
>equivalency to a geocentric 'mean sun',considering that this is a  
>backward step from the heliocentric description of the Earth's axial  
>rotation to a fictitious motion of the Sun*

The 'mean sun' is indeed a fiction. That was known, and the fact duly used, since its inception. But it is a useful thing to declare a day to be 24 hours, as measured by stable chronometers, rather than to rely on solar observations of meridian crossings and then be recomputing the length of the second every day, or changing how many seconds there are in the day, every day.

We also have, in science, the equally fictitious idea of 'standard temperature and pressure'. It's useful to define, but outside of certain contrived situations, never actually occurs. Does that bother you too?

>> *The Maya had determined the length of the year -- time for the  
>> sun to return to the same place in the sky relative to the fixed  
>> stars -- to be 365.242 (and a bit, but I forget that bit and it  
>> doesn't affect the argument) days. Given the declaration that a  
>> day (specifically solar day) is 24 hours, the year is, then,  
>> 8765.808 hours.*  
>>  
>  
>*To determine the annual orbit as 365 days 5 hours 49 minutes you have  
>to determine the equable 24 hour day FIRST.The only means to do that  
>is assume that axial rotation is constant wrt the Sun and apply the  
>Equation of Time to equalise the natural variation from one rotation  
>to the next.*

Actually, no, you don't. First, and probably major for your misunderstandings, is that the Maya (and others) did not determine the year as being 365 days, 5 hours, 49 minutes. To make that determination, one needs a chronometer that measures hours and minutes (and which uses 24 hours in a day, which the Maya did not, and 49 minutes in an hour, which is unlikely -- minutes per hour is legacy of sexigesimal arithmetic, for which Babylon was the only source. The Maya used 10 or 20 for math.)

What they actually determined was the length of year being 365.242+ days. Closer to how they'd have done it, they determined the year to be  $365 + 1/4 - 1/128$  days. One route to the determination is to measure the elevation from the horizon of bright stars at sun rise and sun set. They move approximately 1 degree per day. Repeat for 366 days, and you'll find that on the 365th day, the star was 1/4th degree shy of getting back to where it was when you started, but on day 366, it is 3/4th of a degree past the point. Repeat over 32 years (Mayan records, as do many others, extend for more than a century), and you've got another 1/4th degree discrepancy.

At no time does anybody need a chronometer, nor high precision measuring equipment. 1/4th degree is half the width of a full moon, i.e., very large optically.

To the extent the sun is involved in the measurements, it is the actual, observed, sun. So you're happy, right?

>> *There's a third return time (first = (mean) sun to return to  
>> the meridian, second = sun to return to the same place relative  
>> to the fixed stars) that can be considered, and it's intrinsic  
>> to the other two. That is, time for a fixed star to return to  
>> the meridian. The frequency for that is the sum of the frequencies  
>> of the other two. In terms of period:  
>>  $1/P3 = 1/P1 + 1/P2$   
>> where  $P1 =$  mean solar day,  $P2 =$  year,  $P3 =$  time for fixed star to  
>> cross meridian.  $P1 = 24$ ,  $P2 = 8765.808$ .  $P3$  is, therefore  
>> 23.9344696 hours, or 23 hours 56 minutes and 4 seconds.  
>  
>*I will make this easy for you and why Flamsteed's premise and method  
>of proof in erroneous at best and fraudulent at worst.I assure you  
>that this effects Newton's gravitational agenda.*  
>  
>*Axial rotation was already assumed to be constant through the 24  
>hour/360 degree longitude equivalency and the Equation of Time  
>adjustment.Flamsteed piggybacks on this already existing assumption  
>and uses the 24 hour clock to calculate the motion of a star back to  
>the same position after a complete rotation and comes up with the  
>figure 23 hours 56 min 04 sec.He then starts from that point and uses  
>the same 24 hour/360 degree equivalency to calculate the next rotation  
>of a star back to the same position.*  
>  
><http://www.burnley.gov.uk/towneley/tryall/eot1.htm>  
>  
>*He has to hide the .986 degree /3 min 56 sec discrepancy between the  
>orginal 24 hour/360 degree equivalency and the sidereal value so he  
>shoves it into orbital motion.**

You really should read the page you link to. It is a nice description of what was done and how. Flamsteed was testing (asking Towneley to test) the constancy of the period of the

earth's rotation (as referenced to the fixed stars). After the year-long trial, the observations demonstrated that the earth's rotation period was indeed constant.

Having *\_tested\_* that the earth's period of rotation is constant — is *\_this\_* the part you object to? That the rotation period is constant? Or are you objecting to the notion that the earth rotates?

So, they *\_tested\_* that the earth's period of rotation is constant.

*\_Given\_* that observation, one then needs to explain why it is that the sun's motion through the sky is *\_not\_* constant, as measured by fixed, reliable chronometers (clock or rotation of the earth referenced to the stars).

Is it instead your complaint that the sun really does move through the sky at 24 hours per day, exactly, and it is the rotation of the earth, motion of stars, periods of pendulums, vibration of cesium atoms, ... that are all varying in agreement with each other, but not with your declaration that the actual sun takes exactly 24 hours to return to the meridian?

Notwithstanding your declarations, there's nothing geocentric about anything I've said. We have observations taken from the earth. One must explain those observations. It doesn't matter whether you center yourself at the sun, the core of the Milky Way galaxy, or M87. You still have to explain why observers standing on the earth see what they see.

>> *This fact seems to be causing you some angst?*  
>>  
>> *The motion of the fixed stars (the 23:56:04), however, is a different matter. That motion shows outstanding constancy.*  
>> *It's an easy observation, but the constancy is so great that you need an excellent time piece. Just look for a star crossing your meridian and time how long it is until it is back in the same position. The time for this varies by no more than a few thousandths of a second.*

[unmarked snip by oriel]

>> *If the variations in the motion of the sun were due to motion of the crust, then the stars should also show that motion. Our observing tools ('til recently) are fixed with respect to the local crust.*  
>  
>> *If it were crustal motions, one might also expect differences*

>> *in the motion of fixed stars as observed by people on different  
>> parts of the crust.*  
>>  
>> *But neither is observed. Everybody sees the same time between  
>> crossings of the fixed stars.*  
>>  
>> *Note, too, that all the preceding is equally true if you prefer  
>> to consider the rest of the universe to be moving around the earth.*  
>  
> *Perhaps geologists and the rest of humanity wish to have their  
> intelligence insulted but that all this is done on the most remarkably  
> simple and erroneous premise that the Earth's rotation can be linked  
> directly to the structure of the remainder of the cosmos and actually  
> taken as valid.*  
>  
> *Allow me show you the structure of your universe derived from stellar  
> circumpolar motion –*  
>  
> <http://ottawa.rasc.ca/pictures/pdelorme/polaris.jpg>  
>  
> *In the 20th century they even jettisoned this structure and decided  
> that 'every point is the valid center' of the universe.*

The picture you reference is a pretty one, and a common one.  
Has nothing to do with the structure of the universe, but does  
illustrate the apparent motion of the stars, and is entirely  
in keeping with the earth rotating.

But what's your objection to 'every point is the valid center' of the  
universe? I'd describe it as '\_a\_ valid center', but that's details.  
You're ticked off somehow about geocentrism, which is fine. But  
if it's not to be geocentric, and it's not to be relativistic, then  
what \_is\_ your preferred center to the universe? And how did you  
decide that?

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Robert Grumbine <http://www.radix.net/~bobq/> Science faqs and amateur activities notes and links.  
Sagredo (Galileo Galilei) "You present these recondite matters with too much  
evidence and ease; this great facility makes them less appreciated than they  
would be had they been presented in a more abstruse manner." Two New Sciences