Tidal Locking And The Age Of The Solar System

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Abstract

The process of tidal locking reduces the day length of a planet or satellite until its orbital period round its parent equals its rotation period on its axis. Once tidally locked the planet rotates once per orbit. The amount of tidal locking the inner five planets of the Solar System have demonstrates that they are much younger than the assumed 5,000 million year age of the Solar System taught by evolutionists.

Introduction

"Tidal locking (or captured rotation) occurs when the gravitational gradient makes one side of an astronomical body always face another; for example, the same side of the Earth's Moon always faces the Earth. A tidally locked body takes just as long to rotate around its own axis as it does to revolve around its partner."[1]

The objective of this essay is to test current views of the age of the solar system against the observed degree of locking versus the predicted degree of locking. Tidal locking in the inner five planets [Mercury, Venus, Earth, Mars and Jupiter] is strong evidence for a recent creation of the Solar System as opposed to the evolutionist's view that they formed 4.5 to 5 billion years ago.

The tidal locking rate is how fast the planet's day length changes per century. It is the planet's year length [seconds] divided by the total locking time [years]. Scientist Michael Koohafkan says that we can use these formulas to arrive at the maximum age of the planets and satellites:

"Rate of change of rotational speed can be calculated. If it can be represented as a function, then approximate length of time until tidal locking can be calculated. Tidal locking can help measure the age of a planet in relation to a satellite. By measuring the rate at which a planet or satellite is approaching a tidal lock, we can extrapolate back and estimate the age of a satellite or planet." [2]

"Does tidal locking only occur between a mass and a satellite? No. Tidal locking can occur between any two masses that orbit around each other. Planets can become tidally locked with the stars they orbit around, and stars in a binary system can become tidally locked together." [2]

Since many of the satellites in the Solar System are tidally locked and none of the planets are, this gives us a method to check the evolutionist and creationist models. As we shall see, none of the formulas and the ages give can be fitted into the evolutionist's model. They either give young ages for the planets, or unbelievably old ages for moons and planets. Since evolutionists accept that the Big Bang happened 15 billion years ago and the Solar system and planets formed 5 billion years ago, they have a set time scale they can accept.

Table 1. Predicted day lengths [earth Days] versus actual day lengths

Tidal Locking Formula	Predicted Mercury	Predicted Venus	Predicted Earth	Predicted Mars	Predicted Jupiter
Cornell Formula	88	225	365		
Wikipedia Formula	88	225	301	10	5
Ohio Uni Formula	88	225	365	472	
Guilott's Formula	88	104	29	3	
Correia's Formula	88	225	92	20	
Edson's Formula	88	225	13	1	
Castillo-Rogez Formula	88	225	365	90	
Actual	58	243	1	1.025	0.413

Table 2. Maximum ages [Mullion years]

Number	Tidal Locking	Mercury	Venus	Earth	Mars	Jupiter
1	Guilott's Formula	1753		139	1277	
2	Seager's Formula	1753		139	1277	
3	Correia's Formula	42	2577	49	226	
4	Edson's Formula			344		
5	Castillo Formula	662	3619	7	51	
6	Leger's Formula	796	4341	20	136	
7	Robuchon's Formula	662	3619	7	51	
8	Peale's Formula	573	3627	17	114	
9	Barne's Formula	9.5	15	0.13	0.7	
10	Schubert's Formula	662	3619	7	51	
11	Carter's Formula	1948		154	1419	
12	Heath's Formula	2131		170	2115	
13	Melnikov's Formula	102	106	1	38	
14	Grießmeier's Formula	1323		15	103	
15	Cornell Formula	19	315	1.4	35	220
16	Wikipedia Formula	88	960	4	134	190
17	Ohio Uni Formula	1	237	5	10	

Table 3. Percentage of Tidal Locking Process

Planet's Name	Year Length Seconds	Day Length Seconds	Percentage Locked
Mercury	7,600,530	5,080,320	66.84%
Venus	19,414,140	21,081,600	108.59%
Earth	31,558,150	86,400	0.27%
Mars	59,354,294	88,906	0.15%
Jupiter	374,247,821	35,510	0.01%

The Shortest Day Length Possible

What is the fastest speed the planet could have been rotating in the beginning? How long would the original day length have been?

$$T = 2\pi R \div \left(V \sqrt{\frac{f}{F}} \right), \quad (1)$$

Table 4. Shortest Planetary Day Lengths. Formula 5

Planet's Name	Spaghetti Day Length, Seconds
Mercury	5,052
Venus	5,201
Earth	5,070
Mars	5,898
Jupiter	10,669

We use formula 6 to determine how fast the planet would have to spin on its axis for the equatorial centripetal force to exceed the surface gravity. We can use this as an upper limit.

(2)

$$\Psi = V\sqrt{\frac{f}{F}},$$

$$F = \frac{mV^2}{R},$$

(3)

$$f = \frac{GM}{R^2},$$

(4)

T = Day length, seconds
R = Planet's radius, metres
f = Current Surface gravity force, Newtons
F = Current Equatorial Centripetal force, Newtons
V = Current Equatorial Velocity, Metres/Second
Ψ = Final Equatorial Velocity, Metres/Second

Thus the relative difference [3] between equatorial and polar radii is

$$h = \frac{1}{2} \times \left[\frac{\Omega^2 R^3}{GM}\right],$$

(5)

h = Equatorial Bulge height, metres
Ω = Angular axial rotational velocity, radians/second
R = Planet's radius, metres

G= Gravitational constant
M = Mass of the planet, kilograms

Another formula [4] gives the actual height in metres:

$$h = R^4 \left(\frac{2\pi \div t}{c} \right)^2 \div \frac{2GM}{c^2}, \qquad (6)$$

t = Day length, seconds
c = Velocity of light
G= Gravitational constant
M = Mass of the planet, kilograms
h = Bulge height, meters

Since the Earth could only spin once every 3 hours at the fastest, its maximum change in day length is only 21 hours. We divide 21 hours by 365.25 days and multiply the total locking time by this fraction and get a maximum age of only 4.3 million years.

Since planets like Mercury and Venus have undergone a substantial progress towards locking already, according to Formula 1 they should be very old. Since the locking time for Venus is 290 million years and it is over locked, [rotating backwards] evolutionists should consider it to be extremely young. What about Mercury which is two thirds locked? How can Mercury have gone through two thirds of its locking process when according to formula one, this would take 18 million years!

Since the planets are spinning slower and slower as time goes on, how fast would they have spun millions of years ago? How short would the day length have been? We use the locking formula and work out how many seconds per year the planet's rotation is slowing down. We multiply the value by the maximum age and find out that if they were older than this their original rotation rate must have been impossible.

To determine the maximum age of the planet we multiply its age [Formula 2] by the percentage of locking the planet has achieved. The percentage is the day length divided by the year length. Since Mercury's day is two thirds o its year the planet is 66% locked. Its maximum age is the total locking time multiplied by 0.66.

$$Years = T \frac{d}{y}, \qquad (7)$$

<u>Planets maximum age.</u>
T = Tidal locking time, years.
d = Original day length, seconds
y = Current year length, seconds

Guilott's Formula

Dr. Guillot from Department of Planetary Sciences, University of Arizona [5, 6] gives yet another formula we can use to determine tidal locking times. According to his formula the Earth has been orbiting the Sun less than 150 million years.

$$t = Q\left(\frac{R^3}{Gm}\right)\omega\left(\frac{m}{M}\right)^2\left(\frac{a}{R}\right)^6, \qquad (8)$$

Q is the planet's tidal dissipation factor,
w is the planet's primordial rotation rate,
M is the star's mass,
m is the planet's mass,
R is the planet's radius,
G is the gravitational constant
a is the planet's orbital radius

Table 5. Guilott's Tidal Locking Times

Planets	Maximum Age
Name	Million Years
Mercury	1,753
Venus	9,519
Earth	139
Mars	1,277
Jupiter	164,988,229

Correia's Formula

Dr. Alexandre Correia from Santiago University, Portugal [7] gives yet another formula we can use to determine tidal locking times. According to his formula the Earth has been orbiting the Sun less than 50 million years.

$$t = \frac{9GM^2kgR^3}{ma^6} \qquad \textbf{(9)}$$

M is the star's mass,
m is the planet's mass,
R is the planet's radius,
g is 640
k is the planet's Love number
G is the gravitational constant
a is the planet's orbital radius

Table 6. Correia's Tidal Locking Times

Planets	Maximum Age
Name	Million Years
Mercury	42
Venus	2,577
Earth	49
Mars	226
Jupiter	7,595

Edson's Formula

Dr. Adam Edson from Department of Meteorology, The Pennsylvania State University [8] gives yet another formula we can use to determine tidal locking times. According to his formula the Earth has been orbiting the Sun less than 350 million years.

$$a = 0.024 \times \sqrt[3]{M} \times \sqrt[6]{\left(\frac{Pt}{Q}\right)} \qquad \textbf{(10)}$$

We change this formula to get t rather than a:

Firstly isolate the sixth root:

$$\frac{a}{0.024 \times \sqrt[3]{M}} = \sqrt[6]{\left(\frac{Pt}{Q}\right)} \qquad \textbf{(11)}$$

Raise both sides to the power six:

$$\left(\frac{a}{0.024 \times \sqrt[3]{M}}\right)^6 = \frac{Pt}{Q} \qquad \textbf{(12)}$$

Isolate T from P and Q:

$$t = \frac{Q}{p}\left(\frac{a}{0.024 \times \sqrt[3]{M}}\right)^6 \qquad \textbf{(13)}$$

P is the original rotation period of the planet in hours
t is the time period from formation
M is the mass of the star
a is the planet's orbital radius

Table 7. Edson's Tidal Locking Times

Planets	Maximum Age
Name	Million Years
Mercury	4,320
Venus	24,860
Earth	344
Mars	4,288

The Castillo-Rogez Formula

Dr Castillo-Rogez, Jet Propulsion Laboratory, California Institute of Technology [9] gives yet another formula we can use to determine tidal locking times. According to his formula the Earth has been orbiting the Sun less than 8 million years.

$$dt = -d\omega \div \left(\frac{3kGM^2 r^5}{Ca^6 Q} \right) \qquad \textbf{(14)}$$

$$\frac{d\omega}{dt} = -\frac{3kGM^2 a^5}{CD^6 Q} \qquad \textbf{(15)}$$

Table 8. Castillo-Rogez Tidal Locking Times

Planets	Maximum Age
Name	Million Years
Mercury	662
Venus	3,619
Earth	7
Mars	51

Based on current tidal locking formulae and the derived maximum tidal locking times and the degree to which the planets are tidally locked, one concludes that either:

1. The planets had impossibly fast initial spin rates, or
2. The solar system is much less than 4.5 billion years old

Tidal locking is consistent with a young age for the solar system. Robuchon and Schubert [10, 11] give the identical formula in their publications.

Barnes' Formula

Using formula 22-24 by Barnes [12] we get young ages for the solar system. According to his formula the Earth has been orbiting the Sun less than 200 thousand years.

Table 9. Barnes Tidal Locking Times

Planets	Maximum Age
Name	Million Years
Mercury	6.76
Venus	14.64
Earth	0.13
Mars	0.65

$$\Omega = \frac{2\pi}{T}\left(1 + \frac{19}{2}e^2\right),$$

(16)

$$\omega = \frac{2\pi}{t}, \tag{17}$$

$$T_L = \frac{8mQa^6}{45GM^2kR^3}(\omega - \Omega), \tag{18}$$

Where
w, is the initial spin rate (radians per second)
a, is the semi-major axis of the motion of the planet around the sun
W, satellites orbital spin
e, satellites eccentricity
Q, is the dissipation function of the planet.
G, is the gravitational constant
M, is the mass of the parent, kilograms
m, is the mass of the planet, kilograms
k, is the tidal Love number of the planet
R, is the radius of the planet, metres.
t = Initial day length, seconds
T = Orbital period, seconds
T_L, tidal locking time seconds

Leger's Formula

Using formula 25 by Leger [13] we get young ages for the solar system. According to his formula the Earth has been orbiting the Sun less than 30 million years.

$$t = \frac{|n - \Omega| \times (IQ \div k)}{(3M \div 2m)(R \div a)^3 (GM \div a^3)} \tag{19}$$

T= Seconds
M= Mass of the star, kilograms
m=mass of the planet, kilograms
n is the mean orbital motion
Ω is the primordial rotation rate of the planet
a, is the semi-major axis
G, is the gravitational constant
R, is the radius of the planet, metres.
Q the planetary dissipation constant,
k the Love number of second order
I = 0.4

Table 10. Leger's Tidal Locking Times

Planets	Maximum Age
Name	Million Years
Mercury	796
Venus	4,341
Earth	20
Mars	136

Peale's Formula

Peale [14] gives a formula we can use to determine tidal locking times. According to his formula the Earth has been orbiting the Sun less than 20 million years.

Table 11. Peale's Tidal Locking Times

Planets	Maximum Age
Name	Million Years
Mercury	573
Venus	3,627
Earth	17
Mars	114

$$t = \frac{wr^6 CQ}{3Gm^2 kR^5} \qquad (20)$$

w, is the initial spin rate (radians per second)
G, is the gravitational constant
m, is the mass of the planet, kilograms
k, is the tidal Love number of the planet
R, is the radius of the planet, metres

Carter's Formula

Joshua Carter gives a formula [15] we can use to determine tidal locking times. According to his formula the Earth has been orbiting the Sun less than 160 million years.

$$t = \frac{4QC}{9}\left(\frac{R^3}{Gm}\right)\Omega\left(\frac{m}{M}\right)^2\left(\frac{a}{r}\right)^6 \qquad (21)$$

Table 12. Carter's Tidal Locking Times

Planets	Maximum Age
Name	Million Years
Mercury	1,948
Earth	154
Mars	1,419

Heath's Formula

Martin Heath gives a formula [16] we can use to determine tidal locking times. According to his formula the Earth has been orbiting the Sun less than 160 million years.

$$t = \frac{Q}{PM^2}\left(\frac{r}{0.027}\right)^6 \qquad (22)$$

Where Q is a friction parameter
P is the initial rotation period of the planet,
M is the mass of the parent star,
And r is the planet's orbital semi major axis (all in cgs units).

Table 13. Heath's Tidal Locking Times

Planets	Maximum Age
Name	Million Years
Mercury	2,131
Venus	12,263
Earth	170
Mars	2,115

Melnikov's Formula

A.V. Melnikov gives a formula [17] we can use to determine tidal locking times. According to his formula the Earth has been orbiting the Sun less than 160 million years.

Table 14. Melnikov's Formula Tidal Locking Times

Planets	Maximum Age
Name	Million Years
Mercury	1,948
Earth	154
Mars	1,419

$$E = (1-e)^2 \times \left(1 + 3e^2 + \frac{3}{8}e^4\right) \qquad (23)$$

$$T = \frac{W_i - W_f}{W} \qquad (24)$$

$$W = \frac{45pr^2n^4}{38\mu Q} \qquad (25)$$

$$W = E\frac{45pr^2n^4}{38\mu Q} \qquad (26)$$

Wi = Initial rotation rate

Wf = Final rotation rate
p = Density, kilograms per cubic metre
R= planets radius, metres
N = Mean orbital motion
e= Eccentricity
μ = Planets rigidity, Newtons per square metre
E = Ratio for large eccentricity orbits

Griessmeier's Formula

J.-M. Griessmeier gives a formula [18, 19] we can use to determine tidal locking times. According to his formula the Earth has been orbiting the Sun less than 16 million years.

Table 15. Griessmeier's Formula Tidal Locking Times

Planets	Maximum Age
Name	Million Years
Mercury	1,323
Venus	7,237
Earth	15
Mars	103

$$T = \frac{4}{9}\alpha Q_p\left(\frac{R^3}{GM}\right)(W_i - W_f)\left(\frac{M_p}{M_s}\right)^2\left(\frac{d}{R_p}\right)^6 \quad \textbf{(27)}$$

$$Q_p = \frac{3Q}{2k} \quad \textbf{(28)}$$

Saturn's Moon Iapetus

Astronomers know that this moon [20] is tidally locked to Saturn. Using formula 1 the time needed would be 4,624 million years. In order to get around this problem astronomers claim that there are deposits of short live radioactive isotopes [21] underneath the moon's surface. These heated up the planet and changed its elasticity. Such a claim is of course totally unprovable.

"While most of the satellites despin rapidly, Iapetus, mainly because of its large distance from Saturn, requires longer than the age of the solar system to despin to synchronous rotation." [21]

Mercury's orbital eccentricity = 0.205630
Iapetus orbital eccentricity = 0.0286125

This means that Mercury's eccentricity is over seven times that of Iapetus. Dr Conor Nixon claims that the reason Mercury is not tidally locked is that it eccentricity stops this happening. [22] If this is so, then objects that do not have this obstacle should lock. Since the tidal locking time for the Earth is 1.8 billion years and the age of the Earth is supposed 4.5 billion years, it should be 100% locked. This means that the Earth's current day length should be 8,766 hours. Evolutionists admit that the moon Iapetus' eccentricity has never varied:

"The time needed for the eccentricity to evolve is much larger than the age of the Solar System, unless the initial eccentricity is very close to its present value. Similar reasoning based on Peale (1999) indicates that the semi-major axis evolution has been negligible over Iapetus' lifetime. Thus, little dynamical evolution has taken place post-despinning and Iapetus' present semi-major axis and eccentricity are indicative of its initial state." [23]

Iapetus has locked even though the time needed is greater than the evolutionist's chronology allows.

Planetary Migration
To explain how planets like Jupiter, Saturn, Uranus and Neptune formed in the first place evolutionists have invented the theory of planetary migration [24]**.** This would not affect tidal locking times of Saturn, Uranus and Neptune because they are so great. According to this theory these planets formed much closer to the Sun than what they are now, and then later migrated out to their current positions.

"In both cases, the initial semi-major axes of Jupiter, Saturn, Uranus, and Neptune are 5.4, 8.7, 13.8, and 18.1 AU, respectively". [25]

Even if Saturn, Uranus and Neptune were this much closer to the Sun it would not affect their tidal locking. We know that planetary day lengths come in pairs:

Earth-Mars	24	-	24.6	Hours
Jupiter-Saturn	10	-	10.5	Hours
Uranus-Neptune	16	-	17	Hours

Since Uranus and Neptune are outside the tidal locking zone their day lengths are unchanged. Since Saturn's orbit is outside the tidal locking influence of the Sun its day length is unchanged. If their day lengths were within one hour of each other from the beginning like Uranus and Neptune, Jupiter's day length has only changed by one hour because Saturn has been unaffected by tidal locking. This would reduce its age down to less than 60 million years. If the Earth and Mars original day lengths only differed by one hour this would reduce the Earth's maximum age to 500,000 years. Since the day length of Uranus and Neptune is unchanged we can assume that day lengths were not radically different in the past. If the Earth had the same day length as either of these planets in the beginning how long would it take to slow to its present value of 24 hour [86,400 seconds] day?

The Age Of The Earth

Earth's original day length = 23 hours
Maximum age = 193,938 years

Earth's original day length = Uranus current day length [62,063 seconds]
Earth's Maximum age = 1,388,083 years

Earth's original day length = Neptune's current day length [58,000 seconds]
Maximum age = 1,619,849 years

The Age Of Mars

Mars' original day length = 23.hours
Maximum age = 7,225,156 years

Mars' original day length = Uranus current day length [62,063 seconds]
Mars' Maximum age = 34,032,953 years

Mars' original day length = Neptune's current day length [58,000 seconds]
Mars' Maximum age = 39,235,910 years

The Age Of Jupiter

Jupiter's shortest possible day length = 17,010 seconds
Maximum age = 220,089,458 years

Jupiter's original day length = 30,052 seconds
Maximum age = 66,755,766 years

Evolutionists Admit Major Problems

Evolutionists admit major problems in their theories on the origin of planetary rotation. The theory of a magnetic field solving the problem would require the Sun's field to be more powerful than a neutron star.

"The mechanism also provides explanations for the formation of planetary spin, why axes of spin can be tilted, and the lack of angular momentum in the sun. But the magnetic fields that are required are extraordinarily large, being generally greater than those of neutron stars." [26]

John Lowke cites NASA scientist Jack Lissauer's article saying:

"It is difficult for the nebular hypothesis to explain the origin of planetary spin" [27]

Thayer Watkins from San Hoses University says that the planets obtained the rotational energy from orbiting debris in the Solar System:

"As the proto-planets acquire mass they also acquire angular momenta. The mechanism for the acquisition of angular momentum in the planetary sweep of the ring resulted in rotation periods for the planets that are largely independent of their masses. Jupiter is nearly three thousand times more massive than Mars but its rotation speed is only about sixty percent faster." [28]

"The small level of statistical dependence of rotation period on mass is apparently not due to the correlation of mass with other factors affecting the rotation period. There is an effect of mass on rotation period that arises from the gravitational coalescence and contraction of the material of the planets which could account for the second order level of dependence of rotation period on mass." [28]

"The second order differences in the periods of rotation can be accounted for by the gravitational contractions of the planets. A larger gaseous planet contracts more than a smaller rocky planet and thus its rotation speed increases more." [29]

If the planets formed by evolution why do they have different day lengths? If a planet derived its rotational energy from the orbital velocity of the surrounding material we would expect that the closer to the Sun the shorter the day length. The material that Mercury accreted from had ten times the orbital velocity/kinetic energy that the material Pluto came from. Pluto's day length however, is ten times shorter than Mercury. If we compare the day length [seconds] to the orbital velocity [metres/second] there is no relationship. If tidal resonance forces caused the day lengths we would expect the year/day ratio to be less than or equal to one. The year day ratio is the year length [seconds] divided by the day length [seconds].

Table 16. Planet's orbital velocity versus day length.

Planets	Year/Day	Velocity/Day
Name	Ratio	Ratio
Mercury	1.4966	48.36
Venus	0.9209	145.68
Earth	365	707.49
Mars	668	3.64
Jupiter	10,540	6.81
Saturn	25,140	3.7
Uranus	41,043	5.43
Neptune	75,062	11.88
Pluto	339,326	14.6

M. G. Parisi & A Brunini

"The origin of planetary rotation and obliquity (inclination of the spin axis with respect to the orbital plane) is an open question." [30]

If matter were hitting a planet it is most probable that it would be random and depending on which side it hits it would increase or decrease the planet's rotation. Much of the matter would hit at the wrong angle and provide no rotational energy at all. The craters on the Moon and other satellites do not show any special pattern in this area.

Sergei Nayakshin [31, 32] has put forward a new theory that the planets formed from rotating gas clouds up to 50 AU from the Sun. Instead of the standard accretion model, he proposes that the planets condensed from individual rotating gas clouds. Because the nebula would be so big with their original density as one kilogram per cubic kilometre, he has to place them at vast distances from the Sun so that they do not overlap each other. After formation they migrate to their current distance from the Sun. Unfortunately the nebulae that the moons of the planets would form from overlap the planets and each other. Exo solar planets have not migrated in this fashion as many orbit very close to their parent star.

Table 17. Moon's orbital radius versus accretion nebulae radius.

Jupiter's	Orbital Radius	Cloud Radius
Moon	Kilometres	Million Kilometres
Io	421,700	1,286
Europa	671,034	1,047
Ganymede	1,070,412	1,531
Callisto	1,882,709	1,381

v = volume, cubic metres
M = objects current mass, kilograms
P = original nebulae density, one gram per cubic kilometre, [10^{-12} kilograms per cubic metre]
The radius R of the original cloud is thus:

$$R = \sqrt[3]{\frac{M \div p}{4\pi \div 3}}, \quad (29)$$

"The origin of these large and coherent planetary spins is difficult to understand (e.g., Dones & Tremaine 1993) in the context of the "classical" Earth assembly model (e.g., Wetherill 1990)." [33]

According to Schubert [34] the original rotation rate for satellites in the Solar System was 5 to 10 hours. According to Schlichting [34, 35] the Earth's original day length was 4 hours.

Dr. Lissauer:

"The origin of the Solar System is one of the most fundamental problems of science. Together with the origin of the Universe, galaxy formation, and the origin and evolution of life, it forms a crucial piece in understanding where we, as a species, come from." [36]

"However, the growth of solid bodies from mm size to km size still presents particular problems. The physics of inter particle collisions in this regime is poorly understood. Furthermore, the high rate of orbital decay due to gas drag form size particles implies that growth through this size range must occur very rapidly." [37]

"The origin of planetary rotation is one of the most fundamental questions of cosmogony. It has also proven to be one of the most difficult to answer (Safronov 1969, Lissauer & Kary 1991)." [38]

"Our various tabulated results are not mutually consistent, because we have considered several possible scenarios of planetesimal mass distribution and giant planet growth. The accuracy of these assumptions is open to some question, but clearly our analysis is more applicable to some planets than to others. For instance, solar tidal forces invalidate all of our results for Mercury and Venus, and it is unreasonable to think that no systematic component exists for the rotation of Jupiter and Saturn." [39]

Alan W. Harris and William R. Ward:

"We discuss briefly the possibility of alteration of obliquity through resonance in Section 3; however, the obliquities of the outer planets must be regarded as an unsolved problem." [40]

Luke Dones And Scott Tremaine:

The origin of planetary spins is poorly understood, for several reasons:

(i) The spins of several of the planets (at least Mercury, Venus, and Pluto) have been modified by tidal friction, so their primordial spins are unknown.

(ii) The planets probably acquired their rotations by accreting spin angular momentum along with mass as they grew from the protoplanetary disk.

(iii) The physical parameters of the solar nebula, such as the velocity dispersion of planetesimal amounts of gas and solid bodies, have not been well constrained.

(iv) Any model in which the planets form by accreting gas and small bodies predicts that the planets should have near-zero obliquity, and whatever process created the substantial observed obliquities may also have modified the magnitudes of the spins (Harris and Ward 1982, Tremaine 1991, Ward and Rudy 1991).

(v) At present, planetary perturbations cause the obliquity of Mars to vary chaotically over a wide range, and the obliquities of the other terrestrial planets may have been chaotic in the past (Laskar and Robutel 1993; Laskar *et al.* 1993; Touma and Wisdom 1993). [41]

K. Tanikawa And S. Manabe:

"In order to calculate the angular momentum acquired by a proto planet, we need models of flux and mass distributions of planetesimals and eccentricity and semi major axis distributions of planetesimal orbits. However, we do not have information on these quantities. Therefore it is very difficult to treat the entire problem of calculating the angular momentum of planets. Here we make a simple assumption and try to obtain a qualitative result on the final angular momentum of planets." [42]

Thierry Montmerle:

"There are however four main problems in the above scenario, which have not yet been solved." [43]

"Thus, at present, astronomers are only able to draft general trends without being able yet to further constrain the main steps that allow to go from sub-micron size grain to km-sized bodies, and this is a major problem in particular for theories of the formation of the solar system." [44]

"In principle, the 200 known exoplanetary systems should also give us clues about planetary formation in general, and the formation of the solar system in particular. However, at least as far as the formation of the solar system is concerned (which is our main concern here in the context of the origin of life as we know it), there are still many open problems." [45]

The Tidal Locking Formula, Cornell University

Astronomers at Cornell University have devised a formula [46] we can use to arrive at this value. By doing these calculations we can determine the maximum time that these planets have been orbiting the Sun.

$$T = \frac{3}{2} k \frac{GmR^5}{a^6} \sin(2\varepsilon),$$

(30)

$$\tan(2\varepsilon) = \frac{1}{Q}, \quad (31)$$

$$t = \frac{\alpha M R^2 \Omega}{T}, \quad (32)$$

$$\alpha = \frac{3}{2}\left(\frac{n}{\mu}\right)^2 \left[\frac{C-(A+B)\div 2}{C}\right], \quad (33)$$

[The value of α is from Gladman et al [47]]

Where
t= Tidal locking time in seconds
ε = The lag angle
T = Tidal torque
n = Mean orbital motion
A = Satellite's moment of inertia about long axis
α = Solid body angular acceleration in dimensionless units
B = Satellite's moment of inertia about intermediate axis
C = Satellite's moment of inertia about the spin axis
Ω, is the initial spin rate (radians per second)
a, is the semi-major axis of the motion of the planet around the sun
Q, is the dissipation function of the planet.
G, is the gravitational constant
M, is the mass of the Sun
m, is the mass of the planet
k_2, is the tidal Love number of the planet
R, is the radius of the Sun.
μ = Precession of perihelion, degrees per day

Table 18. Tidal locking times for various planets. [46]

Planets	Tidal Locking Time
Name	**Million Years**
Mercury	**28**
Venus	**290**
Earth	**1,800**
Mars	**76,000**
Jupiter	**400,000**

To determine what percentage the planet or moon is through the locking process, we divide its day length [seconds] by its year length [seconds]. Since the Earth spins on its axis 365.25 times per obit, its locking percentage is 1 divided by 365.25. Since the Earth is only 0.273% locked, evolutionists cannot accept formula 2 and 3 because the Earth would only be young. Formula one gives the locking time for the Earth as 1,800 million years. 0.273% of this time would give the maximum age of the Earth as only 4.3 million years. If we compare the day length [seconds] to the year length [seconds] of the planets, we can find out what percentage they are through the locking process.

Table 19. Planet's Ages, Cornell Formula

Planets	Locking Time	Maximum Age	Original Day	Current Year	Current Day
Name	Million Years	Years	Seconds	Seconds	Seconds
Mercury	28	18,686,117	8,020	7,600,530	5,080,320
Venus	290	314,782,325	8,400	19,414,140	21,081,600
Earth	1,800	1,388,083	62,064	31,558,150	86,400
Earth	1,800	4,312,040	10,800	31,558,150	86,400
Earth	1,800	1,619,849	58,000	31,558,150	86,400
Earth	1,800	193,928	83,000	31,558,150	86,400
Mars	76,000	34,032,953	62,064	59,354,294	88,643
Mars	76,000	39,235,910	58,000	59,354,294	88,643
Mars	76,000	7,225,156	83,000	59,354,294	88,643
Jupiter	4,400,000	220,089,458	17,010	374,247,821	35,730
Jupiter	4,400,000	66,755,766	30,052	374,247,821	35,730

Wikipedia Formula, Tidal Locking Times

$$t = \frac{6a^6 R\mu}{mM^2} \times 10^{10} \qquad \textbf{(34)}$$

t = Years
a = Planet's Orbital radius, metres
R = Planet's radius, Metres
$\mu = 3 \times 10^{10}$
m = Mass of the planet, kilograms
M= Mass of the Sun, kilograms

The Wikipedia website [48-53] gives another formula we can use to determine tidal locking times. Several universities uphold this on their physics websites.

University of Oklahoma, Physics Department
Swarthmore College, Physics Department
Santa Barbera University, Physics Department
Buffalo State University, Physics Department

Professor Stan Peale [**peale@physics.ucsb.edu**] is a world expert who has authored many [54-69] articles on the subject. He is in charge at the Physics Department, Santa Barbera University. The fact that this website promotes this formula adds very strong weight to its accuracy.

Table 20. Wikipedia Tidal Locking Times

Planets	Tidal Locking Time	Maximum Age	Original Day Length
Name	Million Years	Million Years	Seconds
Mercury	132	88	8,020
Venus	884	960	8,400
Earth	5,443	4	62,064
Earth	5,443	5	58,000
Earth	5,443	1	83,000
Mars	298,713	134	62,064
Mars	298,713	154	58,000
Mars	298,713	28	83,000
Jupiter	3,793,047	190	17,010
Jupiter	3,793,047	58	30,052

Tidal Locking Formula, Ohio University.

The Ohio University website [70] gives yet another formula we can use to determine tidal locking times.

$$t = 10^{12} \times \left(\frac{a}{AU}\right)^{6} \times \sqrt{(m/M)} \qquad \textbf{(35)}$$

t = Years
a = Planet's Orbital radius, metres
AU = Astronomical Unit, Metres
m = Mass of the planet, kilograms
M= Mass of the Sun, kilograms

Table 21. Ohio Formula Tidal Locking Times

Planets	Tidal Locking	Maximum Age
Name	Time Years	Million Years
Mercury	1,433,709	1
Venus	217,953,706	237
Earth	1,733,312,966	5
Mars	6,548,184,125	10

Conclusion

The tidal locking time for the five inner planets give ages much less than the evolutionist model predicts

The tidal locking times for the five inner planets give ages much less than the evolutionist model predicts. However, these tidal locking times are consistent with a young age for the solar system.

The tidal locking times for many of the moons in the solar system are much longer than the evolutionary age of the solar system, yet the moons are already locked. Other moons are not yet locked to their planets but should be if the evolutionary ages are correct.

The solar system exhibits features consistent with having been created just thousands of years ago. This is consistent with the Genesis account of creation and Biblical timescales.

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