Response to Comments on Temperature-Gravitation from Dr. Gary D. Gordon
Cavendish Experiment, Analemma, etc.

by: Ali F. AbuTaha March 29, 1994

Your comparison of universal gravitation and temperature gravitation is on the mark. Unlike GM in universal gravitation, AT^4 in my formulas can be checked for different temperatures; including with Cavendish experiment. I have repeated the Cavendish tests with care to generate a quantitative database. ***A first-order effect can be produced by varying the temperature of the masses in the Cavendish experiment.*** Dr. Victor Slabinsky also provided written comments. Results of the Cavendish tests and my response to the objections raised in the comments are given below.

CAVENDISH EXPERIMENT:

The objective of my tests was to establish whether temperature gradients affect the suspended masses in the Cavendish set-up. In my tests, I heated the fixed masses, cooled them, wrapped them in frozen towels, etc. Sample periods of oscillation for different conditions are given below. In the following tests, I used a soldering iron on the fixed mass to maintain constant temperature: **[M ≈ 350gm, m ≈ 140gm, l(fiber) ≈ 150 cm, l(rod) ≈ 84cm]**.

Period of Oscillation (Seconds)

	Room Temp.	Heat On	See Notes	
Average	177.89	186.08	185.86 175.51	Soldering iron ON Turn soldering iron OFF

I modified the Cavendish test by pulling the fixed masses; keeping a constant distance between the masses. In essence, the suspended masses were subjected to the maximum *field* strength continuously. Victor tells me that this method was proposed before to obtain a more accurate value of the constant G. The maximum deflection was different for hot and cold masses; **[M ≈ 4kg, m ≈ 30gm, l(fiber) ≈ 150 cm, l(rod) ≈ 84cm]**

Maximum Deflection of Oscillating Masses

Condition	Deflection
4-kg Weight heated for 1/2 hour	≈ 12 cm
The heated weight in freezer for 5 minutes	≈ 20 cm

I did many experiments to evaluate, and to eliminate, the effects of electrostatic charges, magnetic forces, air currents, thermal radiation, etc. It would be ideal if the suspended masses can be isolated altogether, but I was not able to do this with my crude set-up.

ANALEMMA:

As you wrote, there are many ways to calculate the analemma, and the procedure ***is not simple***. The enclosed figure shows four analemmas, (1) my calculated analemma, (2) your calculated analemma, (3) Sundial measured analemma, and (4) An analemma I derived from the velocity vector in the Ephemeris.

Your calculated analemma and the Sundial analemma are in agreement. On the other hand, my calculated analemma and the Ephemeris' velocity analemma are in agreement (the slight difference is due to my using the eccentric anomaly instead of the true anomaly). The difference between the two sets requires explanation.

I derive the analemma using for the eccentricity of the Earth's orbit, e=0.0167. The velocity vector in the Ephemeris is based (as it should be) on the same eccentricity, e=0.0167; and that is why these two analemmas are in agreement. In your Equation (6.30), as in the Ephemeris C24 and elsewhere, the coefficient "**1.915**" is based on the value "**2e.**" This is the reason for difference between the two analemma sets. Is the use of **2e** justified?

It seems to me that the difference arises from interchanging the satellite analemma with the Earth's analemma. But, the two analemmas are different. The analemma of a geosynchronous satellite is due to the oscillation (or drift) of the satellite in longitude and inclination. If the satellite drifts east-west by λ, then the true anomaly is $(\pi/2 \pm \lambda)$. It is valid to equate λ to the eccentricity **e**, but only when both λ and **e** have small values. Because the drift in longitude of a synchronous satellite is small, the drift can be represented by $\pm\lambda$, or 2λ, or **2e**. Or, for small oscillations about a point in an orbit, the value **2e** (twice the eccentricity) can be used.

But, the Sun on the celestial sphere, or the Earth in its real orbit, do not oscillate about a point in longitude; and it would be incorrect to estimate the Earth's analemma with the **2e** factor, i.e., the **1.915** coefficient in the above mentioned equations.

As I said in our meeting, the differences require, (a) an acceleration of the Earth from the vernal equinox to the summer solstice and, (b) an acceleration component in the winter solstice region. Kepler called the irregularity "***the colure* (lure or attraction) *of the solstices.***" He also wrote that it took two eccentricities to explain the irregularity. Kepler also noted that, (1) the irregularity was caused by the planets (not by the Sun, Moon, etc.), and specifically, (2) by the poles, and (3) by the "**posture**," or orientation, of the poles. I discussed the relationship of these factors to the location of the northern and southern icecaps on Earth.

THE MOON:

Many Arab astronomers tried to make precise predictions of the Moon's motion, if only because the annual Islamic events are based on lunar calendar. Many years ago, I made similar attempts, and I also failed. The Moon's motion is simply incomprehensible. Over the years, my concept of temperature-gravitation benefited from my work in the space and the earth segments, and your satellite orbits courses of the early 70's were particularly useful.

The presentation in my hurriedly prepared report, **The Cause of Gravity**, and my use of the round figure of 10,000°K for the Earth did not help in checking out my formulas. Victor included in his objections the occurrence of Full Moon at perigee. The Full Moon was taken to produce maximum temperature difference and, according to my theory, the Moon should be rather farther from the Earth. In the Earth-Moon system, the Earth is the central body, and the Earth's temperature has greater effect than that of the Moon. I had recommended in my report that a reasonable screened-temperature for the Earth should be used, and I suggested 1,810°K.

My analysis of the Moon's orbit is also extensive. I considered many parameters, including, the phases, eclipses, distances, declinations, liberations, apogees, perigees, etc. From the maze of numbers and possibilities, I was able to develop meaningful correlations from temperature-gravitation; e.g., PERIGEE OCCURS AFTER MINIMUM DECLINATION (see enclosed figure).

The above correlation can be related to temperature distribution on Earth, particularly, to the structure and position of the Arctic and Antarctic icecaps. The southern icecap sits squarely on the south pole, 90^o, while the northern icecap [and permafrost] are centered around 75^o. This is a significant difference. I might add that this is reflected in the carefully measured zonal harmonic terms, especially, the J_3 term, the Earth's pear-shape harmonic. With the declination of the Earth, Kepler's ***posture*** of the poles can be seen to affect the Moon's orbit by a greater gravitational pull from the southern hemisphere on Earth.

The above correlation is not an isolated case. One can take the temperature distribution in different months, or seasons, and predict from these the motion of the Moon. In our meeting, we looked at some Figures (see enclosed figures entitled Moon Ellipse). These show the Moon of different months (or seasons) starting off the gate at the same time. From the temperature profile on Earth, one can predict (at least I can) which Moon will move fast or slow.

The diversity and unpredictability of the weather on Earth can produce the diversity and unpredictability of the Moon's motion. I mentioned the formidable mass-based equation of 250 pages that describes the Moon's orbit. I offer an equation of one line; i.e., the radius vector to the Moon as function of temperatures and distance; to predict the motion of the Moon.

<u>ECCENTRIC ORBITS:</u>

Kepler related the eccentricities of the moons to their parent planets (particularly to the orientation of the poles). The list of known moons today, including those discovered in the 1980's, is long. Here is an excellent correlation derived from my concept.

IF A MOON (OR RING) IS TOO CLOSE TO THE PARENT PLANET SO THAT IT DOES NOT VIEW THE POLES, THEN THE ECCENTRICITY OF THE MOON'S ORBIT IS VERY SMALL OR ZERO. WHEREAS IF A MOON IS FAR ENOUGH FROM THE PARENT PLANET SO AS TO VIEW THE POLES, THEN THE MOON'S ORBIT IS RATHER ECCENTRIC. This is true of most the moons we know today! The greater temperature gradient in the poles is the potential answer. Can we generalize this observation to include satellites? You and Victor are better equipped to answer this question.

<u>MARS:</u>

You mentioned in your comments how "*some individuals are satisfied by different answers.*" In my extensive gravitation work, I have simply asked questions that have not been asked before. For example, astronomy textbooks give, in text and figures, observational facts. Aphelion of Mars' orbit occurs long ***before*** the planet's summer solstice, and perihelion occurs long ***before*** the winter solstice. The aphelion and perihelion of Earth occur slightly ***after*** the solstices. The difference is distinct (enclosed sketch). Why?

I mentioned earlier the effect of the Arctic and Antarctic icecaps. The structure and behavior of the icecaps seem to affect the planet's own motion. Kepler likened this to the action of ***oars*** in a river boat. If the temperature gradient, particularly in the poles, affect gravitation as I propose, then can Mars' orbit be explained by the structure and behavior of its icecaps?

Before the solstices on Mars, the planet's icecaps literally wane and disappear. This is well documented with sequenced photos taken by NASA missions and with telescopes. With the icecap melted, the land heats up, the temperature gradient between Mars' interior and surface grows smaller, the g-pull grows weaker, and the planet drifts farther from the Sun sooner than the solstice! By contrast, the icecaps on Earth grow and shrink annually, but the icecaps do not disappear altogether, as on Mars.

Further analysis shows that the relative number of days of spring, summer, fall and winter on Earth and on Mars are distinctly different, and these can be related to the temperature distribution on each planet and, in particular, to the general behavior of the polar icecaps.

Venus, with the lowest eccentricity, also provides a compelling case for my concept. The cloud cover, or greenhouse effect, precludes sharp temperature differences on the planet's surface. Also, if Kepler's constant is meaningful, and it is, then why is the constant for Venus more than 15% from what it should be, while the constant for all the other planets vary by less than 2%? I do not know of any ***mass*** effect that can produce such variation. I know, and I can show, that temperature distribution can.

GENERAL REMARKS:

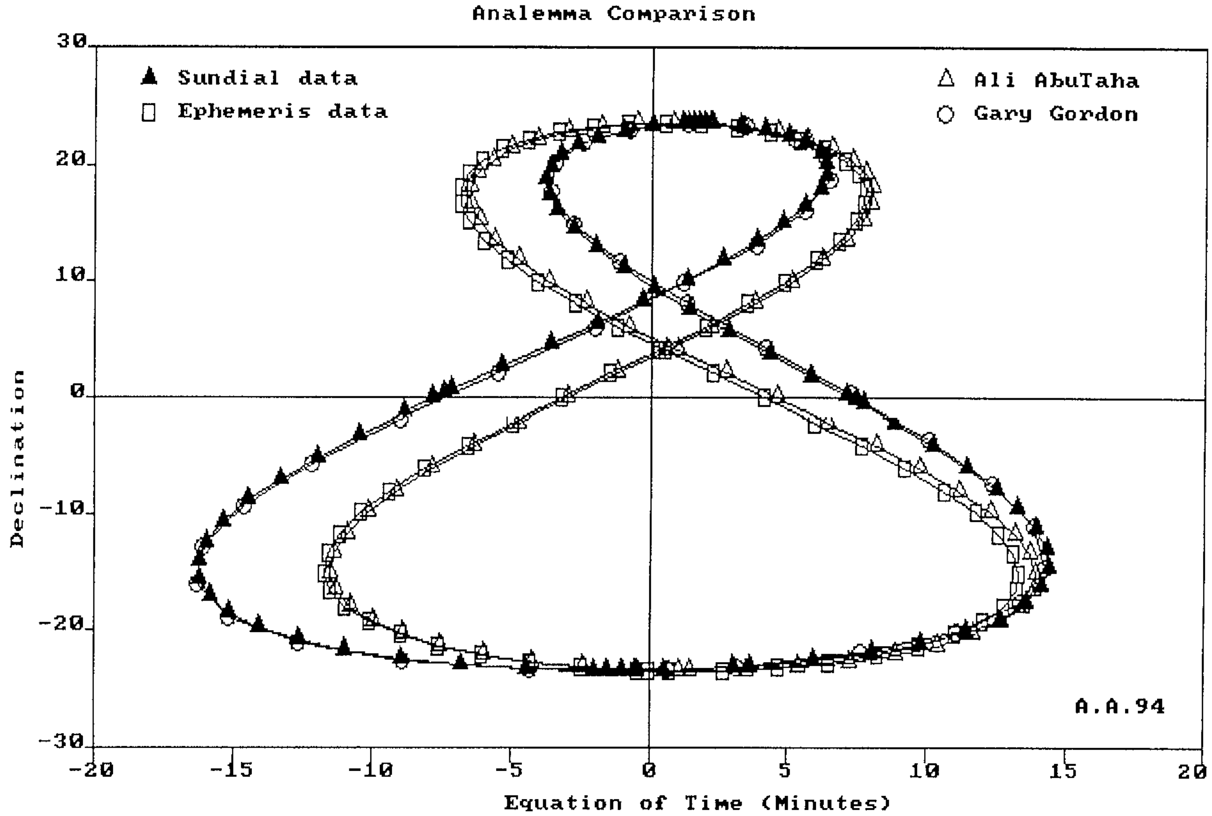
It would take several reports, as the one you reviewed, to make a complete presentation of my study. I have exhausted my resources doing the research, and without support or sponsorship, I could not make a complete presentation. So far, I have limited my write-ups to the point mass model, such as in GM/r^2.

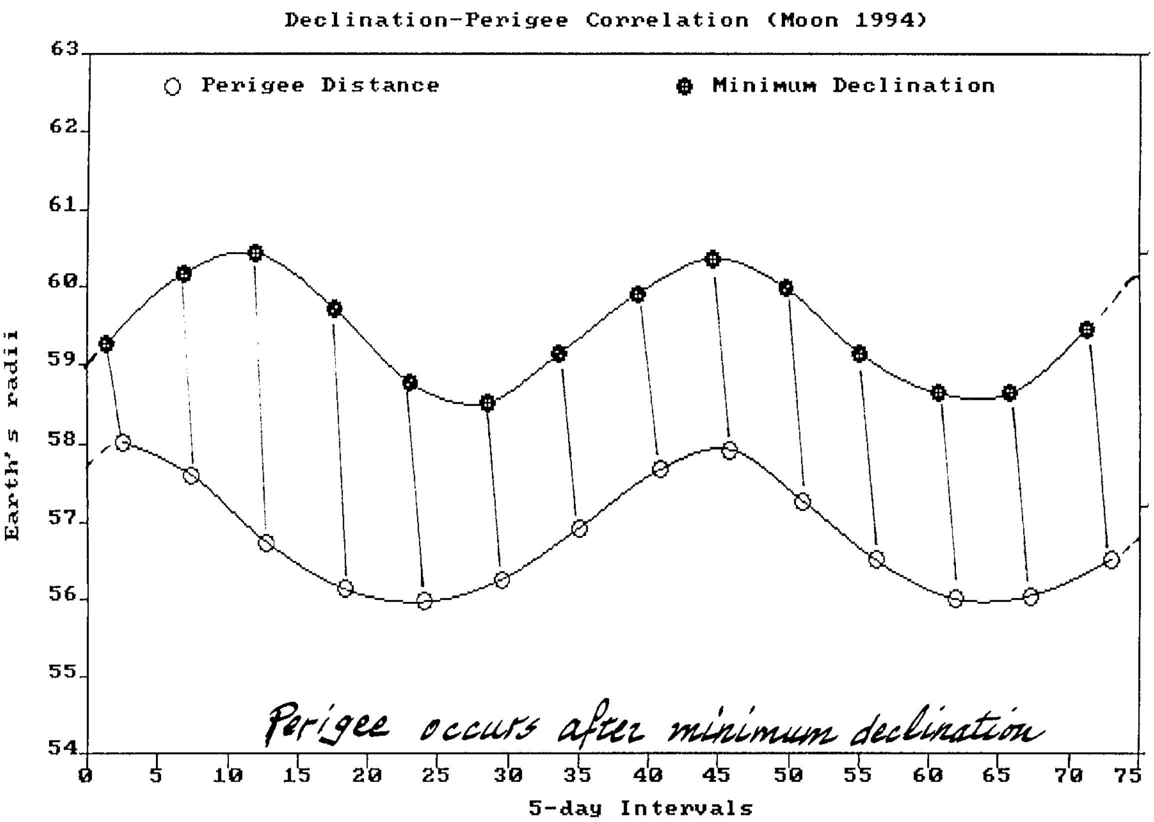
Gravitational anomalies are abundant. With mass gravitation, the solution is found in mascons (mass concentrations) which are always invisible. We cannot get a mascon sample because these are way under the mountains, oceans, or volcanoes. Sometimes, the measurements require mascons with densities that are opposite to what should be the case for a given location. The gravitation footprints in oceanic trenches, measured by Meinesz in the 1920's, and in volcanic areas can be correlated to specific temperature distributions in the fire trenches and volcanic areas. In my view, mass gravitation runs into its most difficult test with periodic and non-periodic changes in the intensity and direction of gravity in a given location. To explain some of these requires that the invisible mascons move underground like cars on California highways. The temperature changes, on the other hand, are perceptible, measurable, and can explain the ***time*** variation of gravity.

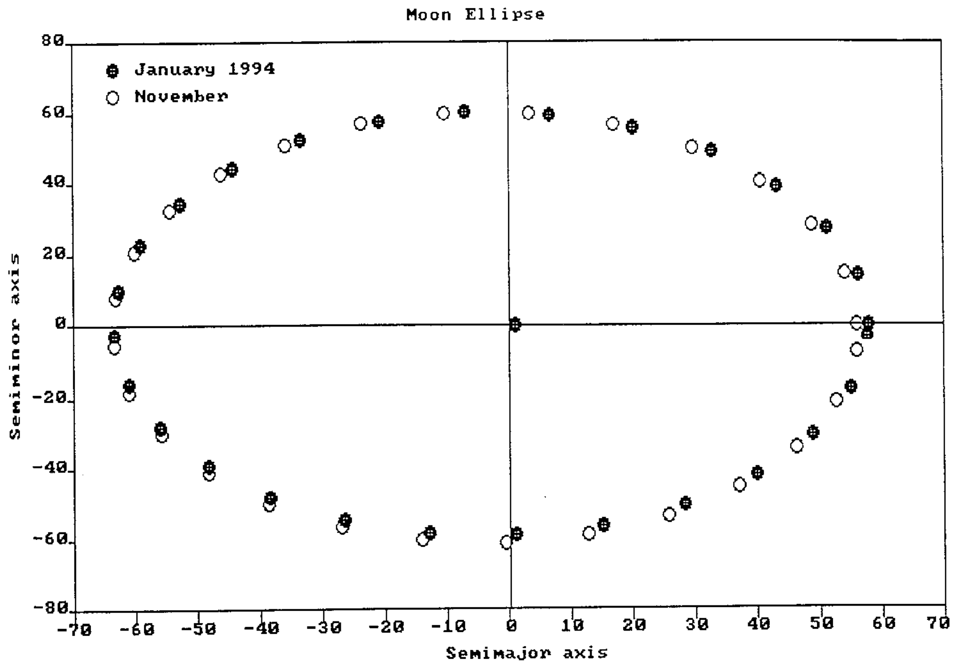
I sincerely thank you and Victor for your comments. I do not know where all of this will lead. Others have said that it really doesn't matter. Orbital parameters are already accurately predicted, and there is no need for a new theory. I would point out that Ptolemy's model gave better predictions than Copernicus'.

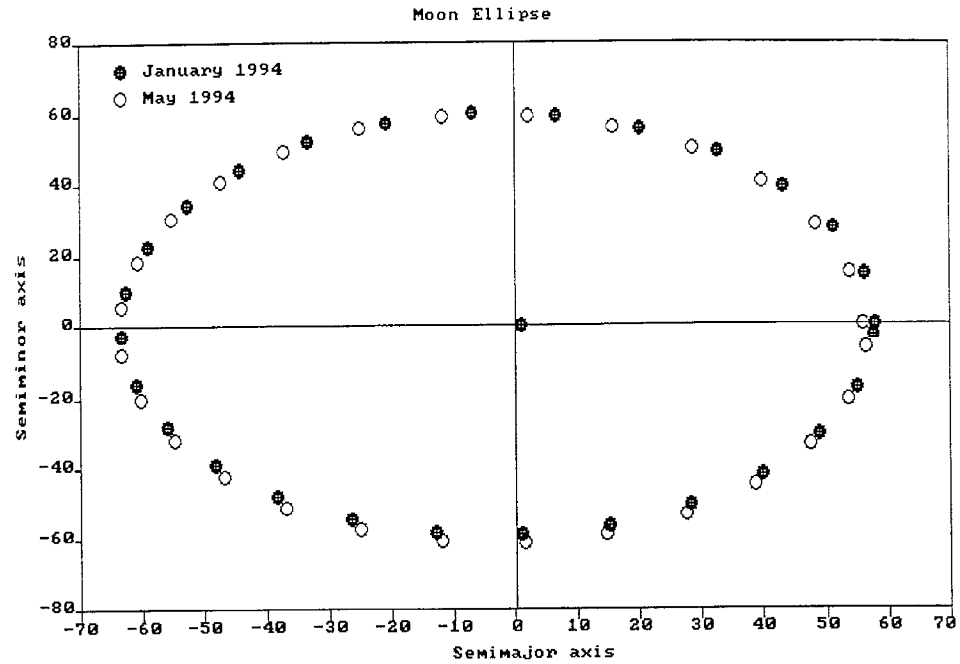
Ali F. AbuTaha

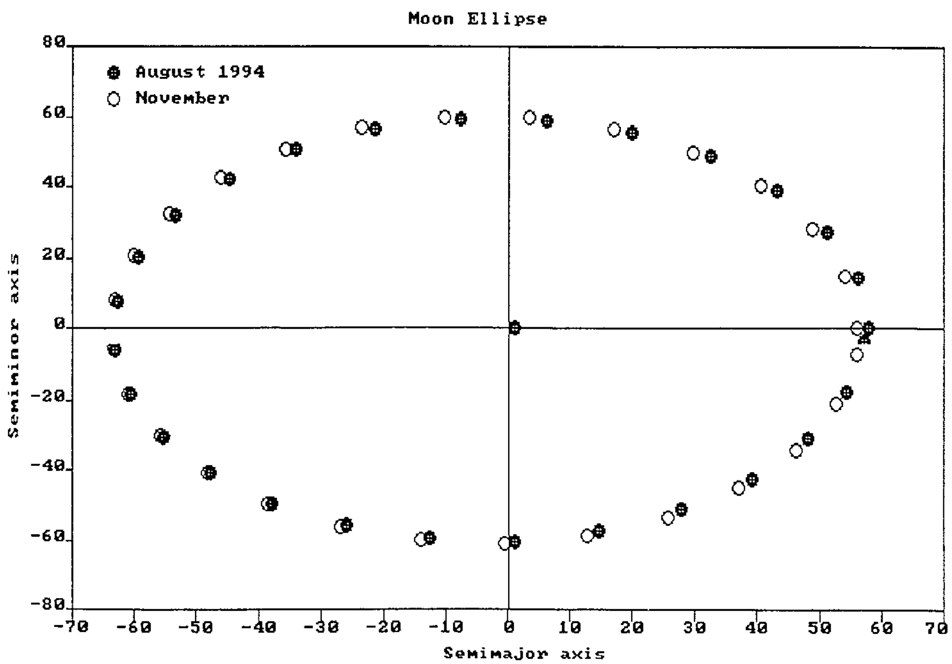
Enclosures

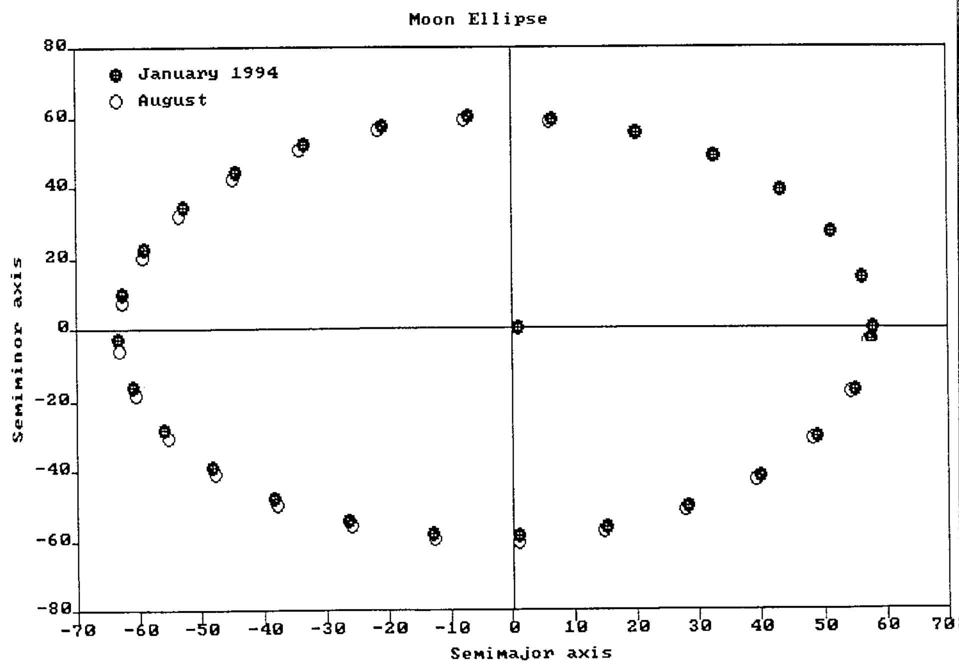

Analemma Comparison
Sundial data
Ephemeris data
Ali AbuTaha
Gary Gordon
Declination
Equation of Time (Minutes)
A.A.94
30
20
10
0
-10
-20
-30
-20
-15
-10
-5
0
5
10
15
20

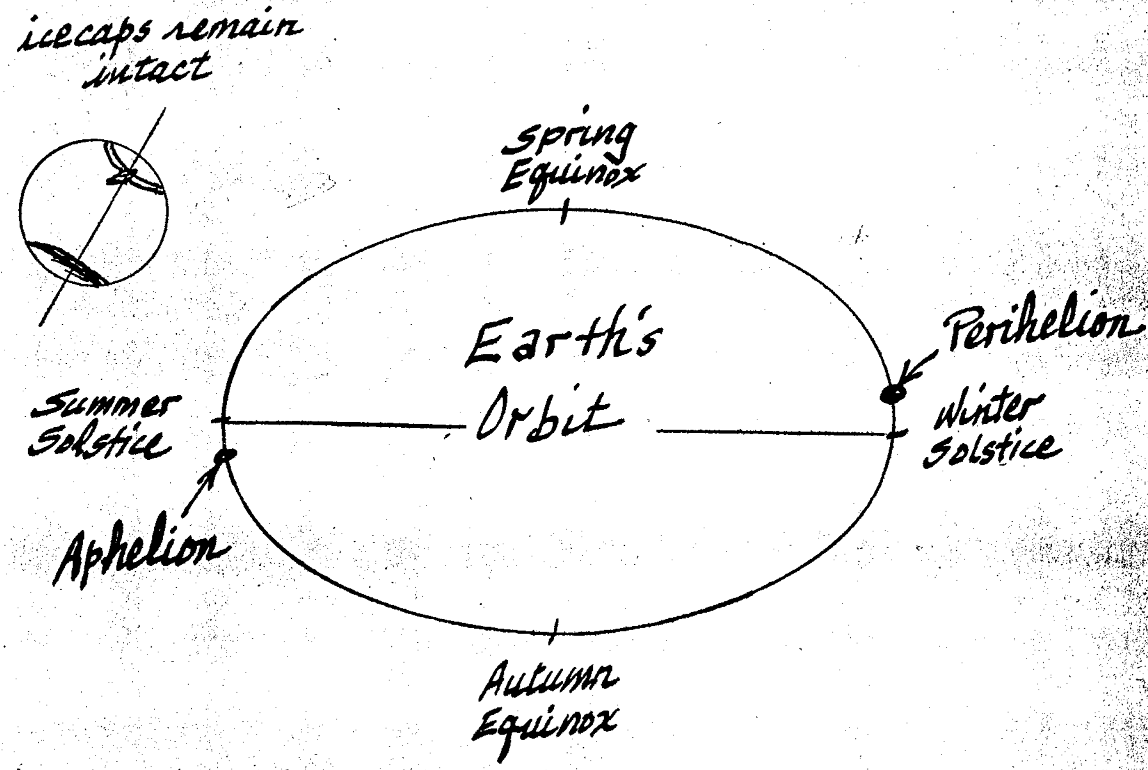

Declination-Perigee Correlation (Moon 1994)
Perigee Distance
Minimum Declination
Earth's radii
5-day Intervals
Perigee occurs after minimum declination
63
62
61
60
59
58
57
56
55
54
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75

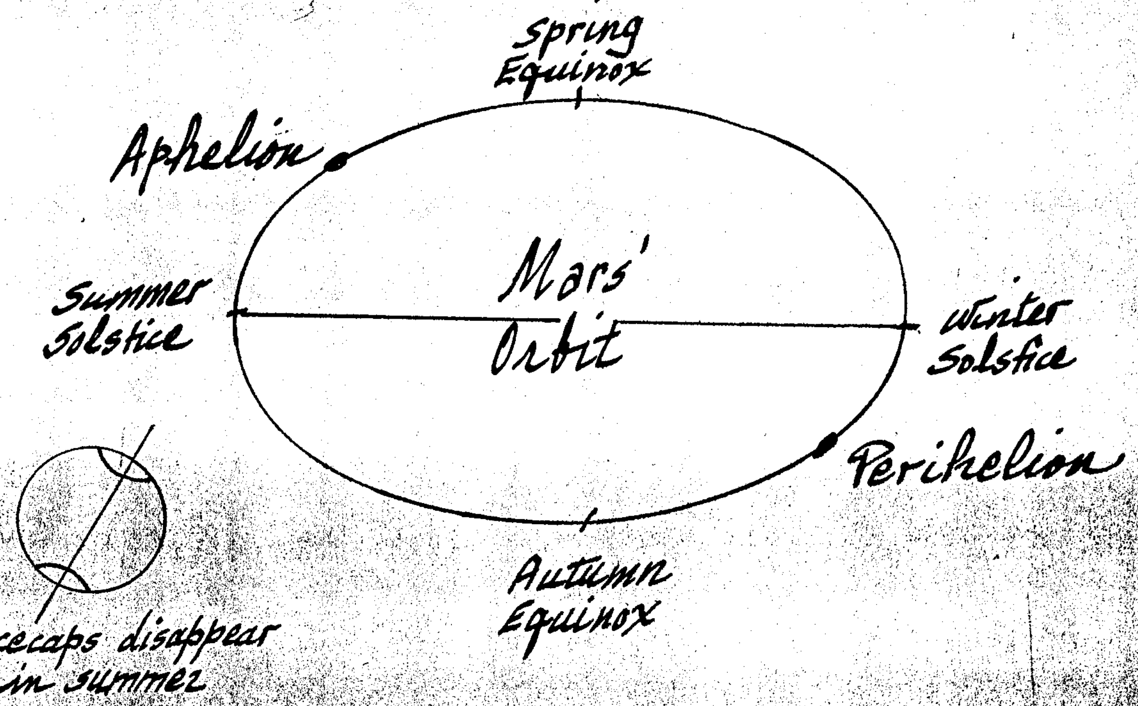

Moon Ellipse
January 1994
November
Seminor axis
Semimajor axis


Moon Ellipse
January 1994
May 1994
Semiminor axis
Semimajor axis


Moon Ellipse
August 1994
November
Semiminor axis
Semimajor axis


Moon Ellipse
January 1994
August
Semiminor axis
Semimajor axis





Temperature-gravitation explains why Perihelions and Aphelions occur as shown.