Institute Meeting, TUHH, March 3, 2020

Planetary Correlation of Teotihuacán

and the Secret of Sedna

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Outline

(After the talk at the TUHH, the presentation has been slightly updated, extended, and an explanatory text has been added. 2nd Ed., July 2022)

(Figures on front page: Quetzalcoatl, God of Wind and Wisdom, as depicted in the Codex Borbonicus, taken from Wikipedia. For more information concerning licenses, see the Appendix on the last slide.)

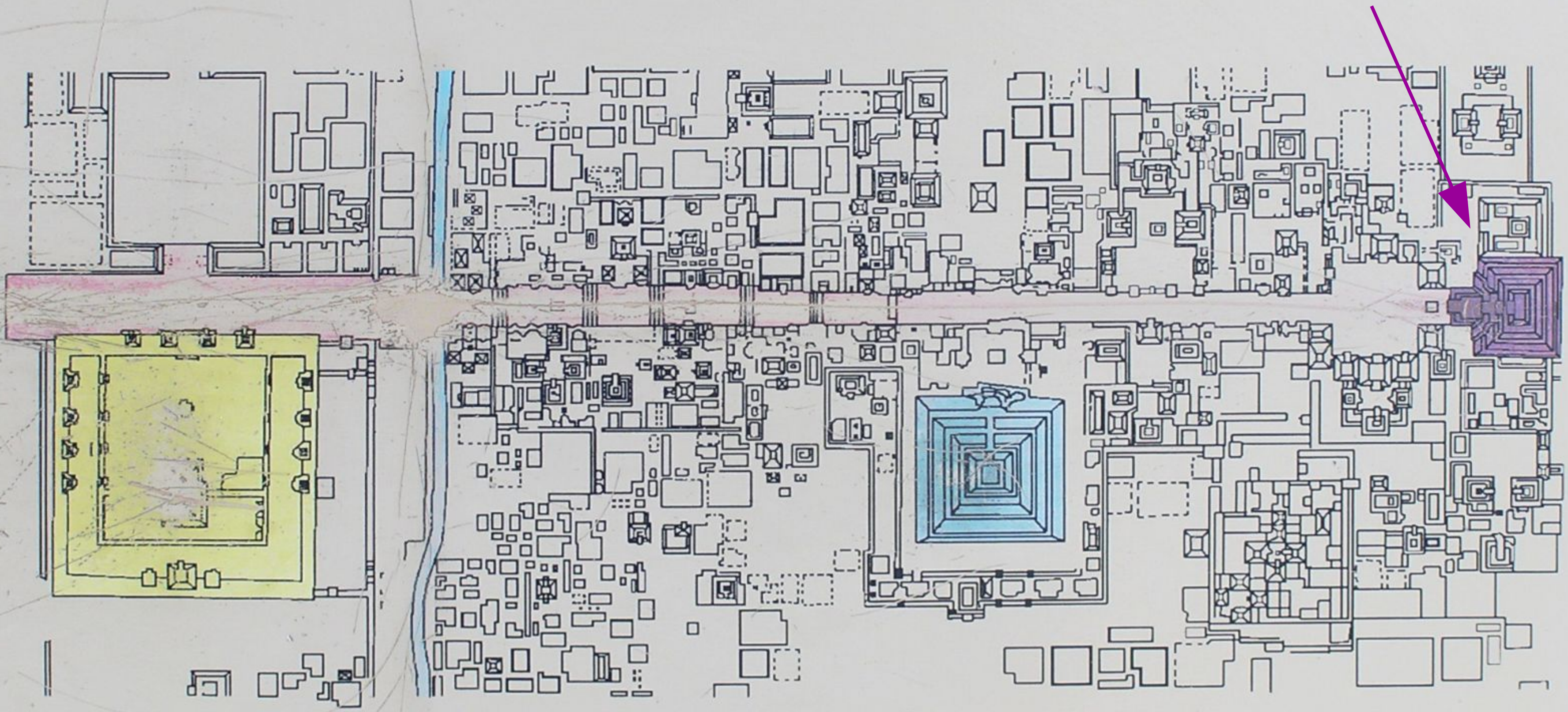
Conference in Cancun in 2005 (IMRC-2005) with subsequent visit of some archaeological sites in Mexico

Display board: INAH, Instituto Nacional de Antropología e Historia, México (see next slide)

Pyramid site of Teotihuacán

Viewpoint (on the Adosada platform) and viewing direction of the photo to the left

The Moon Pyramid is not quadratic but elongated. Why? – This will be answered.



(SECRETARIA DE CULTURA.-INAH.-MEX. Reproduction Authorized by the Instituto Nacional de Antropología e Historia, México)

Pyramid of the Sun


Pyramid of the Moon

Remark: It seems that several structures and pyramid-like platforms are hidden under the grass and trees.


Feathered Serpent Pyramid
Adosada platform
View to the Southwest from the Pyramid of the Sun
Solid barriers on the Avenue of the Dead


A closer look on four
of the solid barriers

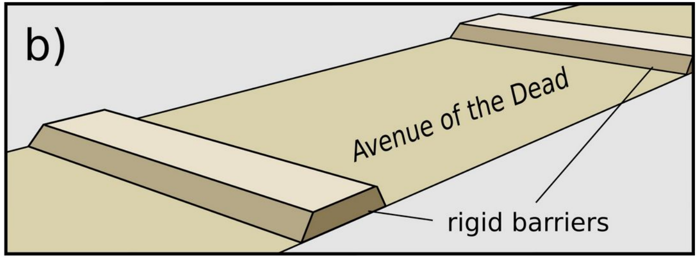
1. Introduction

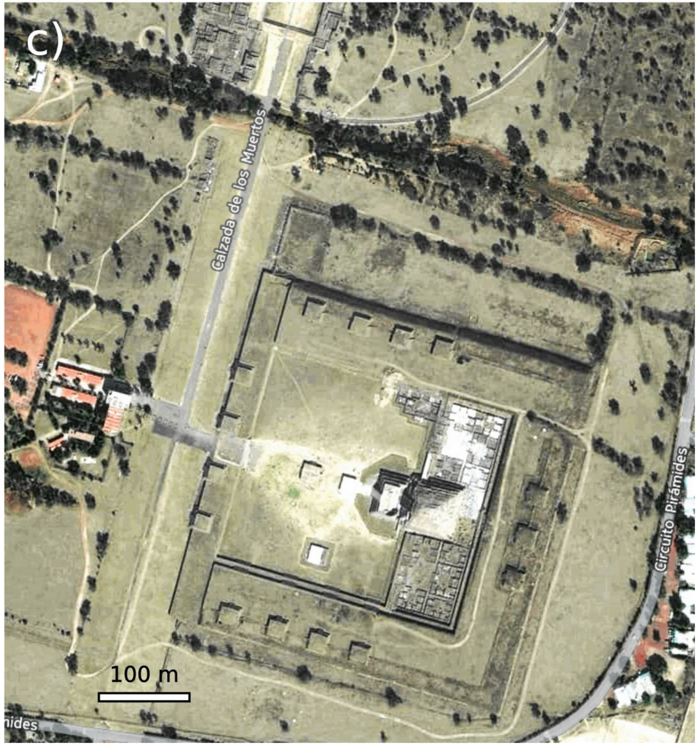
a) The six barriers on the Avenue of the Dead and the Pyramid of the Sun.

b) Simplified drawing of the barriers.

c) The Citadel including the Feathered Serpent Pyramid and the Adosada platform – also called Temple of Quetzalcoatl.

According to modern research, the whole site was built in the first two centuries after Christ.





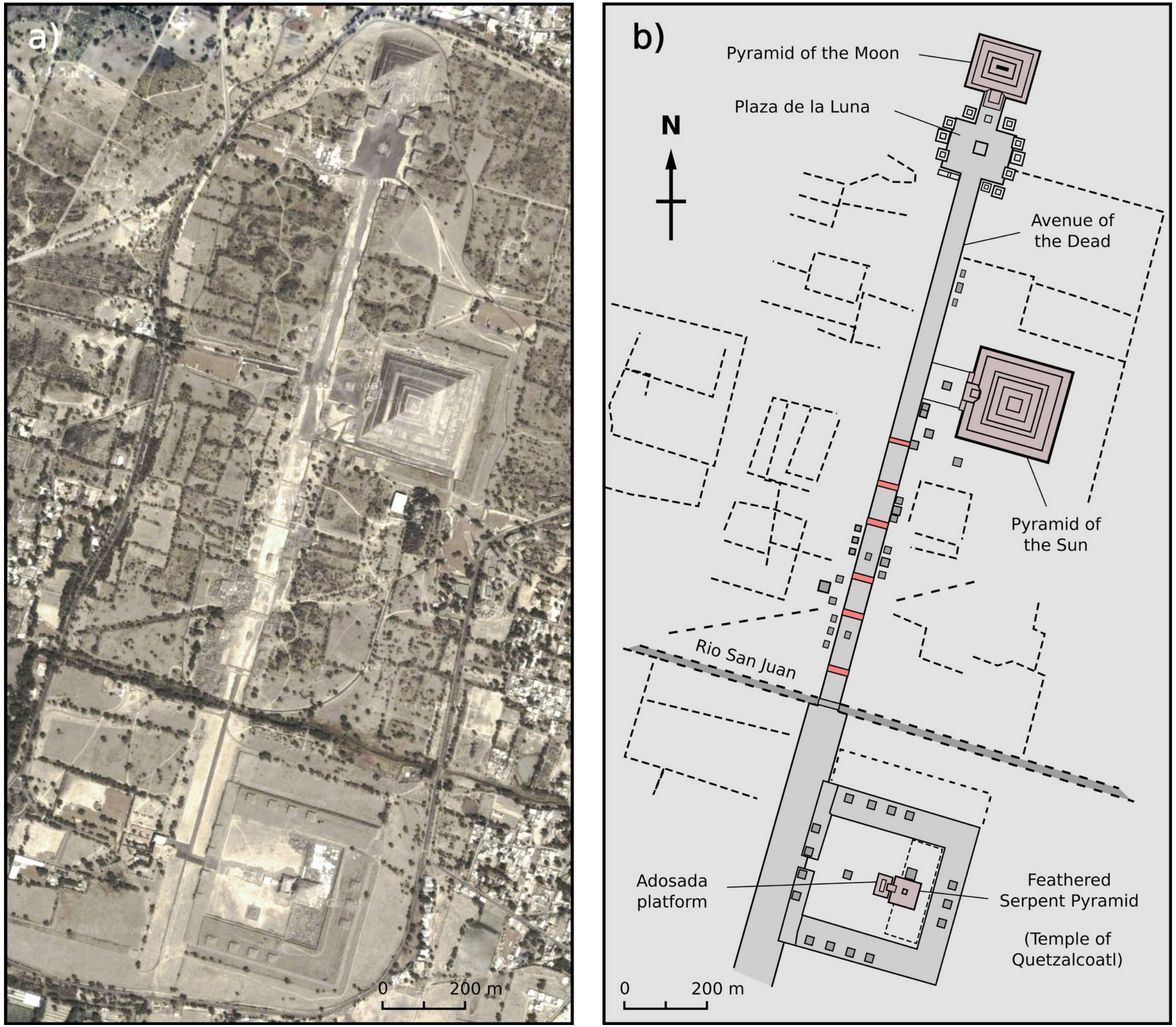
2. Planetary correlation

The six barriers with heights of around one to three meters are a strange phenomenon. They are obstacles that people must climb over when walking along the fantastic avenue. They appear to not make any sense. – But now, a question to the audience:

What does the whole site look like?

To us, it looks like an axis or a scale with the barriers being markers along the scale. The barriers are highlighted in red (Fig. b).

Satellite image from Google Maps: © 2014 Cnes/Spot Image, DigitalGlobe

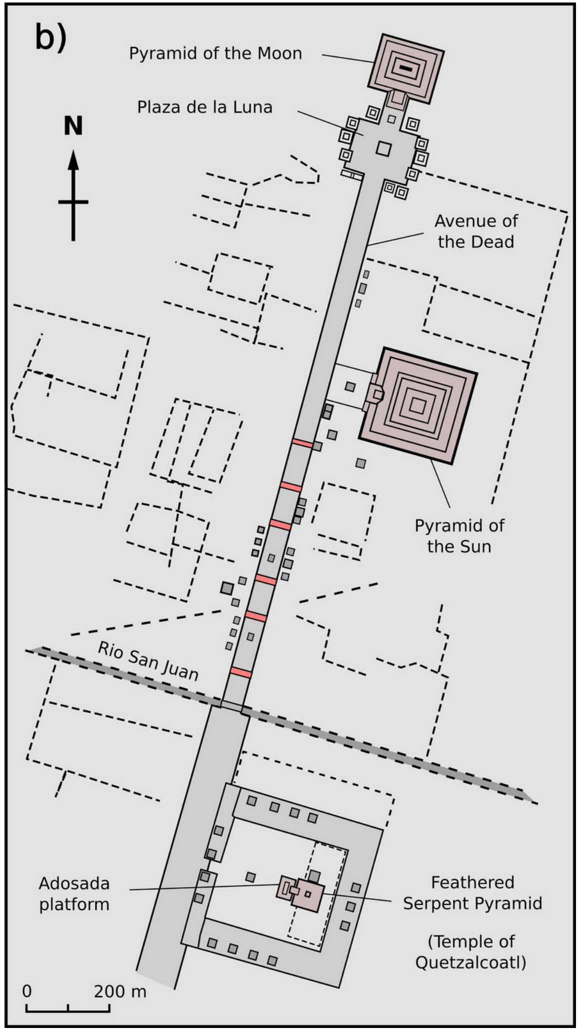


2. Planetary correlation

American civil engineer Hugh Harleston Jr. (1925–2013):

"Teotihuacan represents relations concerning the Earth and our solar system."

When considering the planets, we have a problem in that we have six barriers and eight planets.



Satellite image from Google Maps: © 2014 Cnes/Spot Image, DigitalGlobe

2. Planetary correlation

American civil engineer
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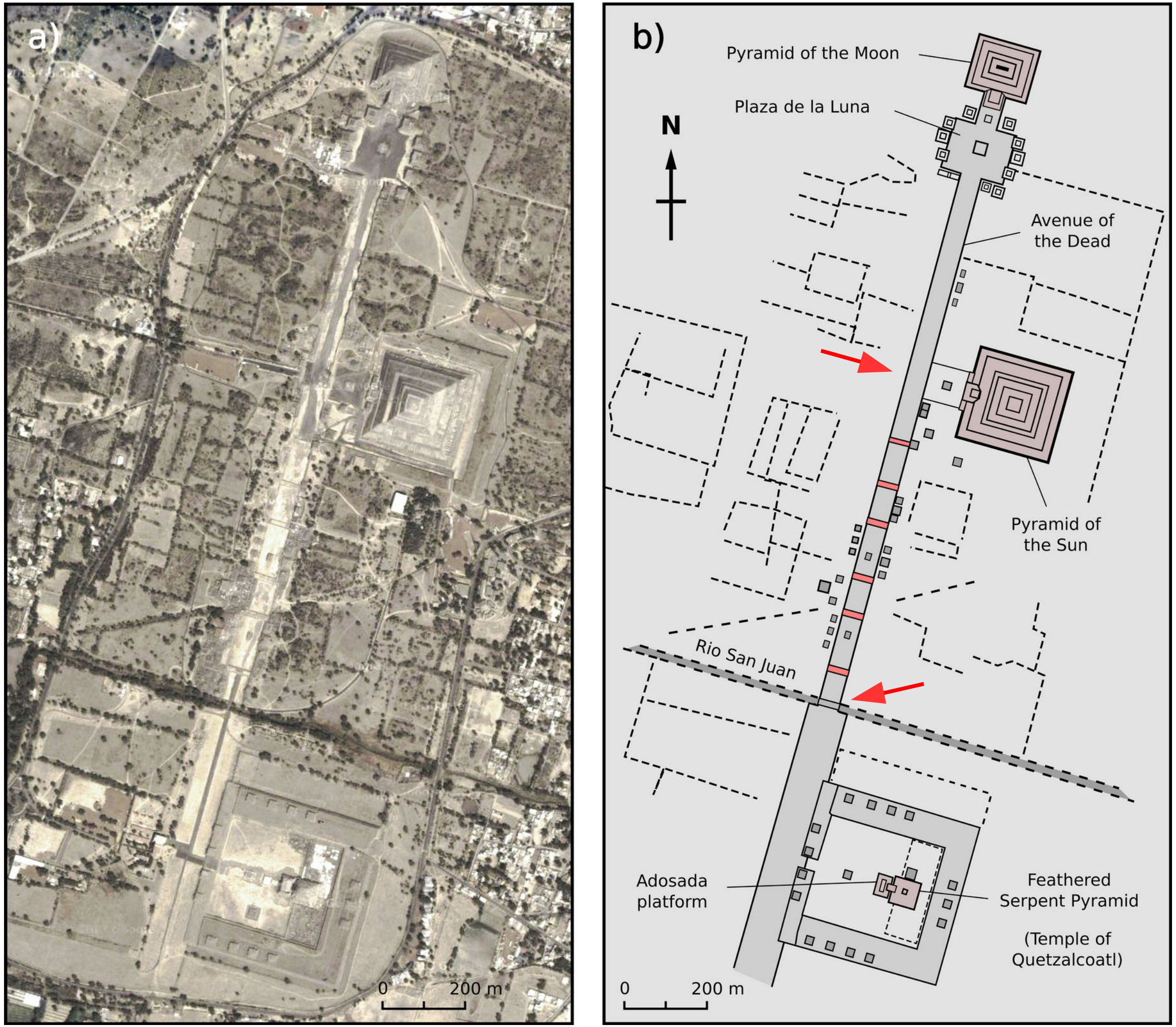
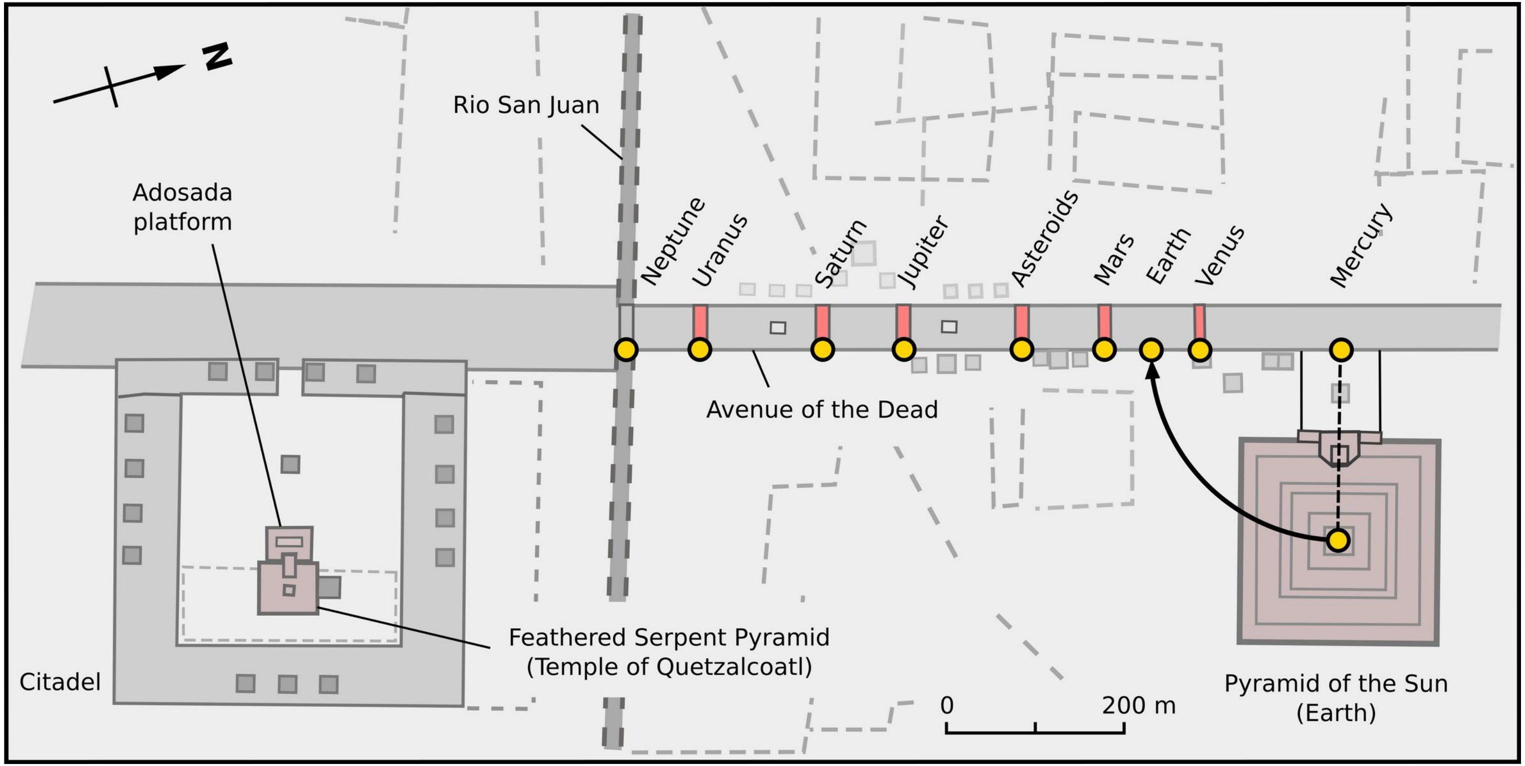
“Teotihuacan represents relations concerning the Earth and our solar system.”

When considering the planets, we have a problem in that we have six barriers and eight planets.

However, the Rio San Juan and the Pyramid of the Sun provide two additional positions on the main axis.

Satellite image from Google Maps: © 2014 Cnes/Spot Image, DigitalGlobe





The positions are localized mainly on the east side of the Avenue of the Dead defining the main axis. Otherwise, the position of the planet Earth on the scale would not be correct.

3. Quantitative analysis

Positions in Teotihuacán

The distances in meters were calculated using GPS coordinates. (The corresponding equations can be found in [1] on pages 58–59. Concerning Teotihuacán, its altitude of about 2300 m above mean sea level must be taken into account.)

The lengths in millimeters in the last column were precisely measured with a ruler on a computer monitor showing a satellite image. These are called “map data.”

Geographical coordinates are taken from Google Maps and HERE WeGo.

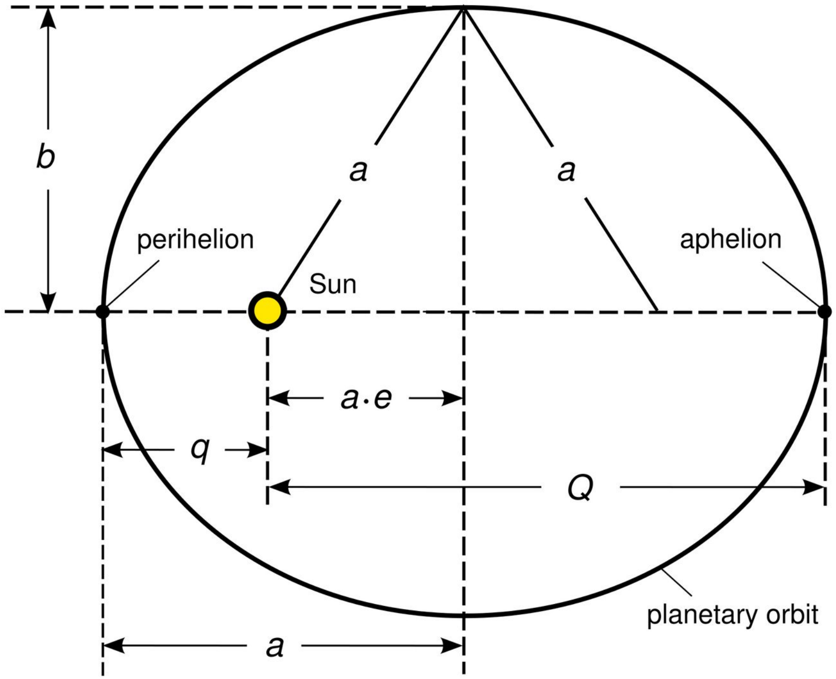
Position	celestial body	geogr. lat.	geogr. long.	distance [m]	*d* (map) [mm]
"Moon Pyramid"	Sun	19.699662	-98.843713	0.00	0.0
"Plaza de la Luna"	"Sun unit"	19.697947	-98.844212	197.00	51.9
"Sun Pyramid"	Mercury	19.692982	-98.845651	767.16	200.0
barrier 1	Venus	19.691620	-98.846028	923.08	240.0
"Sun Pyramid"	Earth	19.692415 *	-98.843693 *	981.92 †	254.5 †
barrier 2	Mars	19.690632	-98.846302	1036.20	270.2
barrier 3	asteroids	19.689801	-98.846546	1131.72	295.4
barrier 4	Jupiter	19.688594	-98.846890	1270.16	331.0
barrier 5	Saturn	19.687797	-98.847053	1359.83	355.5
barrier 6	Uranus	19.686594	-98.847465	1499.71	391.4
Rio San Juan	Neptune	19.685788	-98.847712	1592.64	415.5
Q_{1a}	Sedna (*q*)	19.681881 *	-98.846180 *	1712.25 †	446.7 †
Q_1	“ (*q*)	19.681952 *	-98.846438 *	1740.44 †	453.8 †
Q_{1b} (Adosada pl.)	“ (*q*)	19.682001 *	-98.846622 *	1760.48 †	458.4 †
Q_2	“ (*b*)	19.682515	-98.848481	1963.62	511.5
Q_{3b} (Adosada pl.)	“ (*Q*)	—	—	2166.75 †	564.6 †
Q_3	“ (*Q*)	—	—	2186.80 †	569.2 †
Q_{3a}	“ (*Q*)	—	—	2214.98 †	576.3 †

* Pyramid or temple position (off-axis)
† Sum or difference of two distances

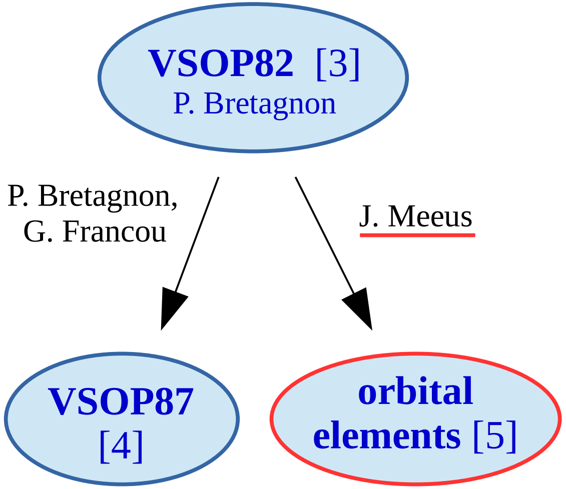
[1] Jelitto, H.: Planetary Correlation of the Giza Pyramids – P4 Program Description. ResearchGate (2015), DOI: 10.13140/RG.2.1.5135.2164

Some orbital elements

- semi-major axis a
- eccentricity e
- semi-minor axis $b = a \cdot \sqrt{1-e^2}$
- perihelion distance $q = a \cdot (1-e)$
- aphelion distance $Q = a \cdot (1+e)$



French planetary theory **VSOP**: **V**ariations **S**éculaires des **O**rbites **P**lanétaires



(last 4 columns of table)

Semi-major axes *a* and eccentricities *e* (three alternatives)

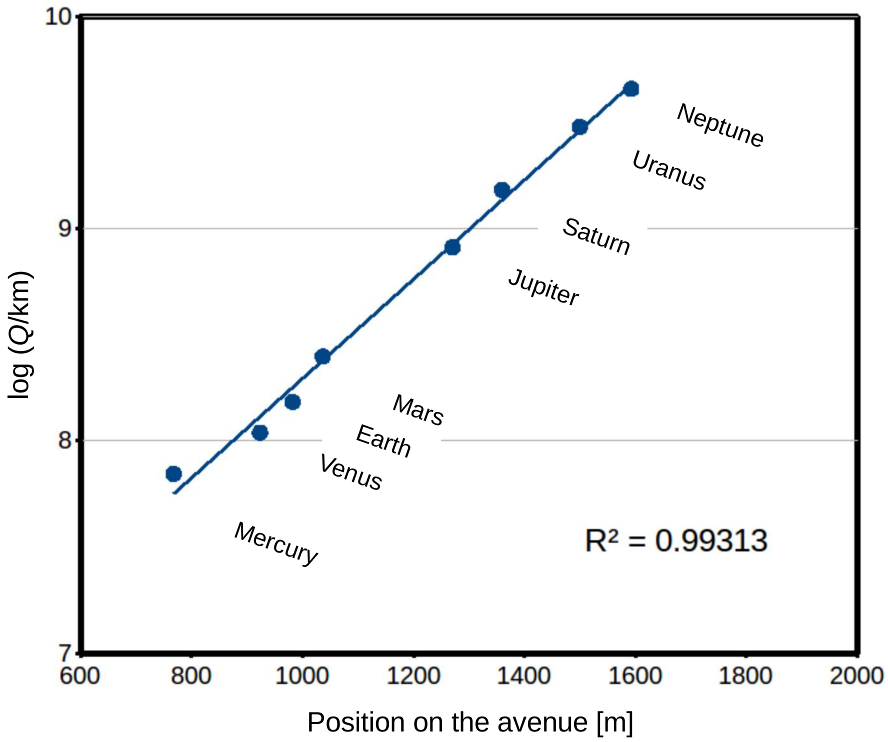
celestial body	*a* [km] [2]	*e* [2]	*a* [km] AD 2000	*e* AD 2000	*a* [km] AD 200	*e* AD 200
Sun (radius)	695508 [6]	—	—	—	—	—
Mercury	57900000	0.2056	57909080	0.2056318	57909080	0.2052562
Venus	108200000	0.0068	108208600	0.0067719	108208600	0.0076607
Earth	149600000	0.0167	149598000	0.0167086	149598000	0.0174250
Mars	227900000	0.0933	227939200	0.0934006	227939200	0.0917479
Jupiter	778300000	0.048	778298400	0.0484949	778297800	0.0454151
Saturn	1427000000	0.056	1429394000	0.0555086	1429400000	0.0615223
Uranus	2869600000	0.046	2875039000	0.0462959	2875039000	0.0468121
Neptune	4496600000	0.010	4504450000	0.0089881	4504450000	0.0088728

[2] Lang, K. R.: Astrophysical Data: Planets and Stars. Springer New York, … (1992)
[3] Bretagnon, P.: Théorie du mouvement … – VSOP82. Astron. Astroph. 114 (1982) 278
[4] Bretagnon, P., Francou, G.: Planetary Theories … – VSOP87, Astron. Astroph. 202 (1988) 309
[5] Meeus, J.: Astronomical Algorithms. 1st Ed., Willmann-Bell Inc., Richmond, Virginia (1991) 197
[6] Brown, T. M., Christensen-Dalsgaard, J.: Accurate D. …, Astrophys. J. 500, L195-L198 (1988)

Aphelion distances *Q*

The distances of the planets from the Sun (AD 200) do not fit because they increase exponentially when moving towards the outer planets.

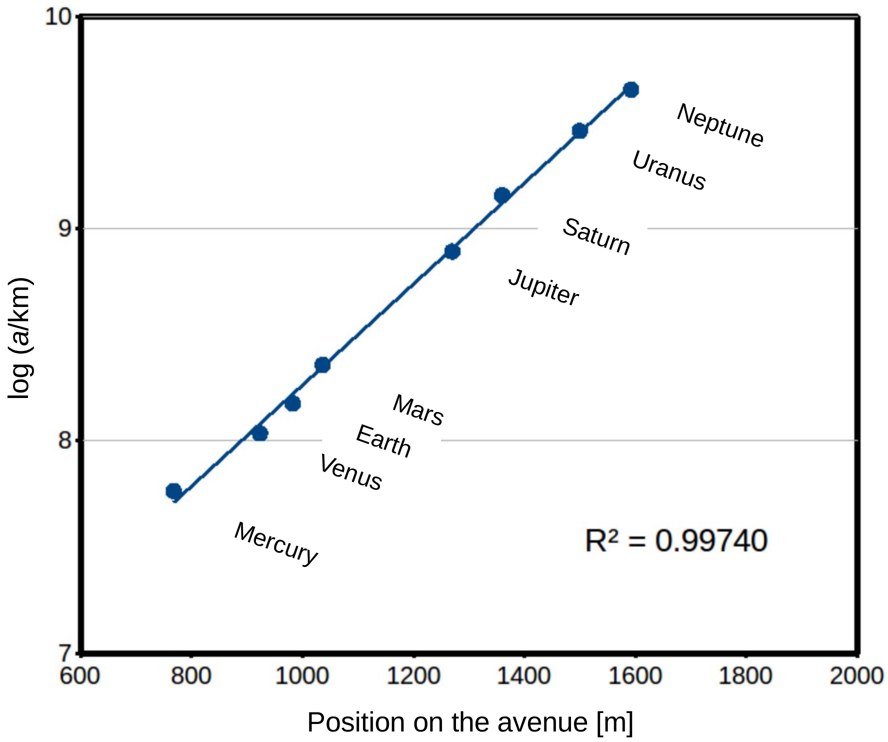
Instead, their logarithms work very well. The blue trend line represents a linear regression fit.



It seems reasonable to place the origin of the horizontal axis at the Pyramid of the Moon.

Semi-major axes *a*

The fit becomes better.

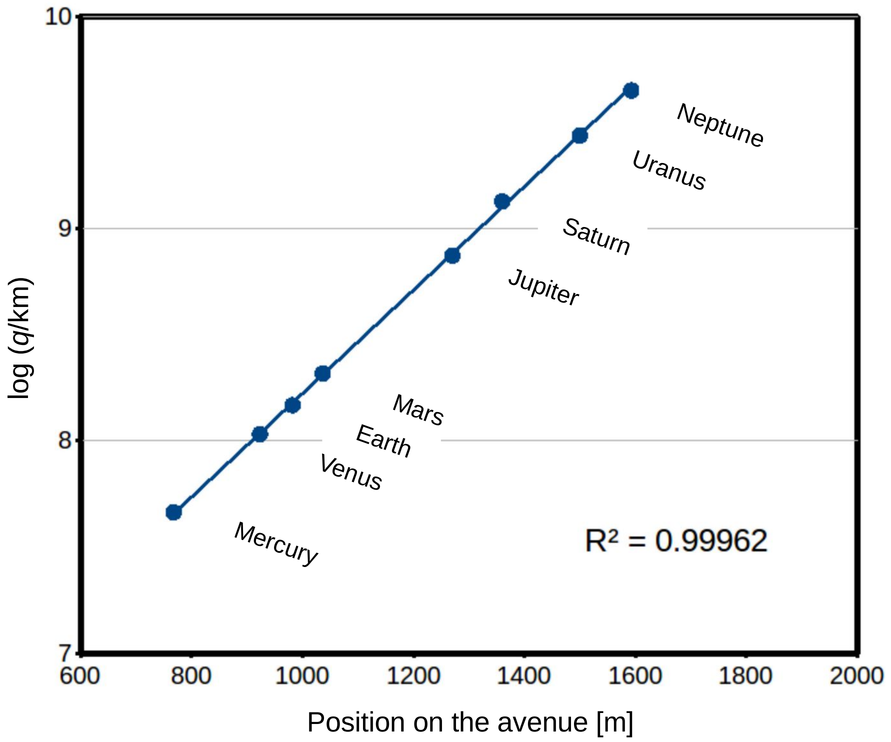


It seems reasonable to place the origin of the horizontal axis at the Pyramid of the Moon.

Perihelion distances *q*

The fit is almost perfect and the coefficient of determination is close to 1 when the perihelion distances are used.

Note that the coefficient of determination is a measure that means the correlation is *not* a co-incidence. So, if R^2 approaches 1, the probability that we have an accidental correlation is close to zero.



It seems reasonable to place the origin of the horizontal axis at the Pyramid of the Moon.

Used equations

Combined representation of the three options

R^2 = coefficient of determination (Bestimmtheitsmaß)

R = correlation coefficient

$$R = \frac{n\sum d_i p_i - \sum d_i \cdot \sum p_i}{\sqrt{n\sum d_i^2 - \left(\sum d_i\right)^2} \cdot \sqrt{n\sum p_i^2 - \left(\sum p_i\right)^2}}$$

d_i = positions (distances) on the avenue

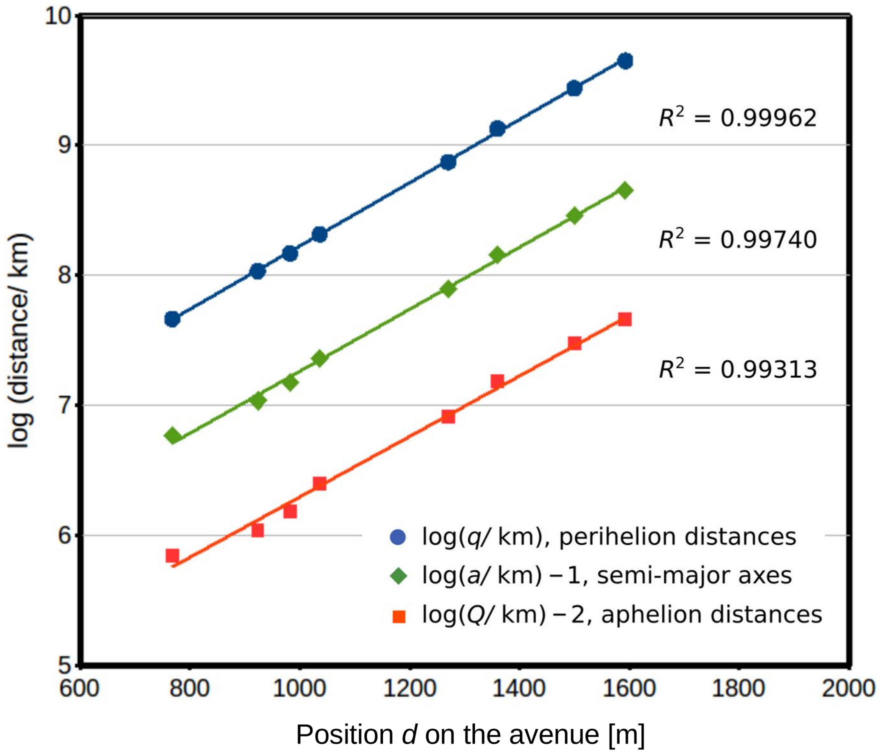
p_i = logarithms of the planetary distances (q, a, Q)

n = number of positions ($i = 1\ldots n$)

$\bar{R}^2$ = *adjusted* coefficient of determination [7]

$$\bar{R}^2 = 1 - \left(1 - R^2\right) \cdot \frac{n-1}{n-s}$$

s = number of free model parameters (Linear regression means $s = 2$.)



[7] Theil, H.: Economic Forecasts and Policy. Amsterdam: North-Holland Publishing Co. XXXI (1958)

$\bar{R}^2$ is almost identical to R^2 (0.99955 instead of 0.99962). So, we use R^2.

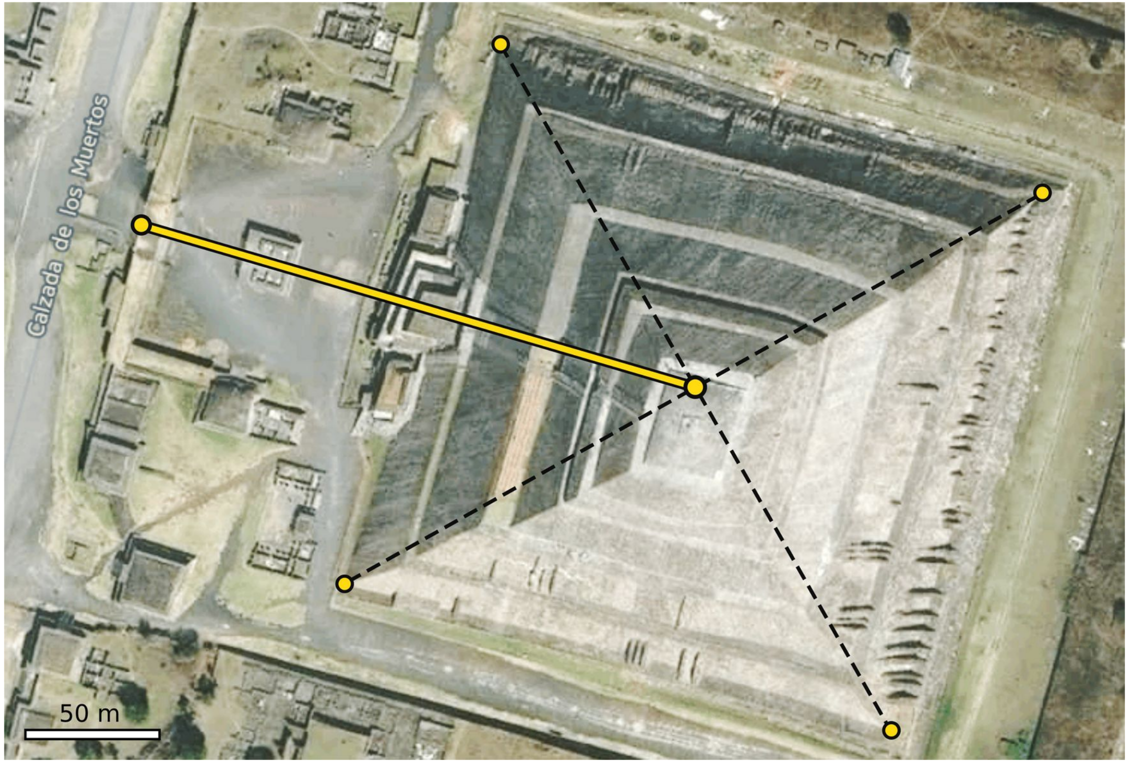
But be careful: Photographic/perspective distortion means that the positions of the pyramids are mostly not their top. The GPS coordinates are valid for the ground level.

The central pyramid position is:

1. the intersection of the diagonals of the pyramid base, or

2. the arithmetic mean of the coordinates at the four corners (for each of latitude and longitude).

Satellite image: © 2017 HERE, 2014 DigitalGlobe, INEGI.



The distance (yellow line) is about 214.8 m according to the GPS data, slide 15.

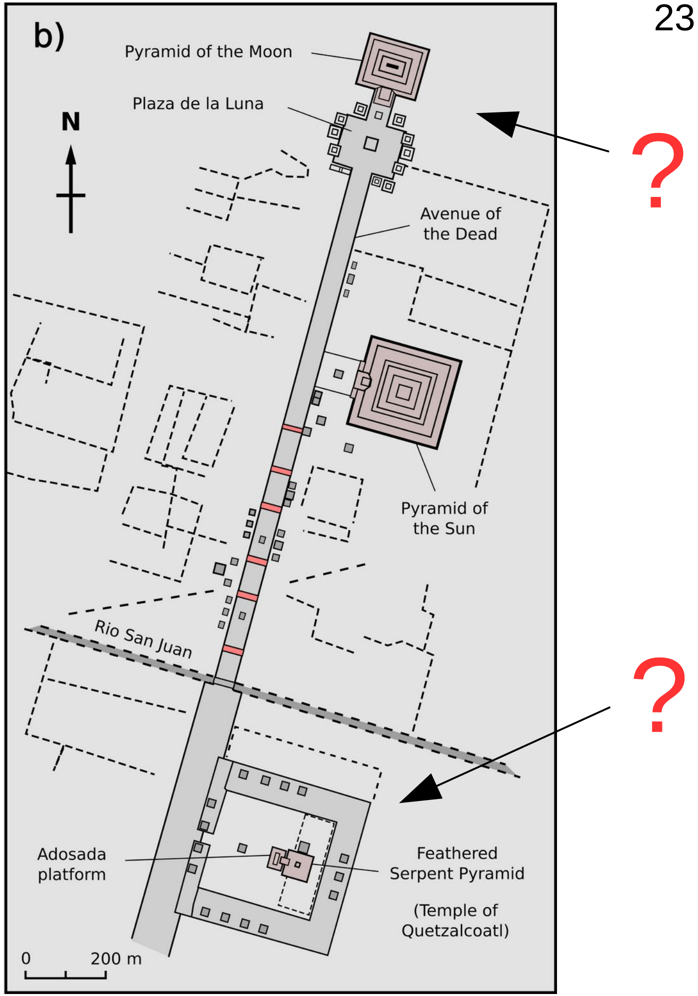
4. Including the Sun

First, we concentrate on the upper question mark (right figure).

By moving further northward on the avenue, there is no other celestial body except the Sun. Is the Pyramid of the Moon another marking on the main axis, associated with the Sun?

If we look for a distance, measured from the solar center and being characteristic for the Sun, the solar radius seems obvious.

By including the logarithm of this radius, the curve appears as it is in the diagram on the next slide.



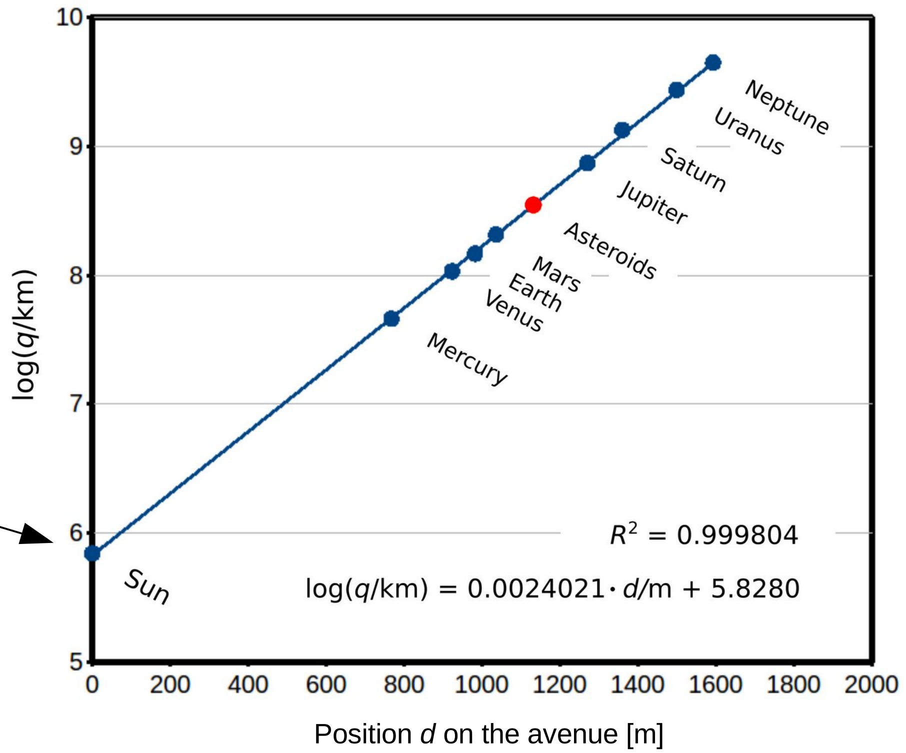
4. Including the Sun

Equation of the trend line:

$$\log\left(\frac{q}{\text{km}}\right) = 0.0024021 \cdot \frac{d}{\text{m}} + 5.8280 \qquad (1)$$

The logarithm of the solar radius (695508 km) is exactly in line with the data points of the planets (perihelion distances).

The red point is calculated by inserting the position of the "barrier of the asteroids" into Eq. (1).



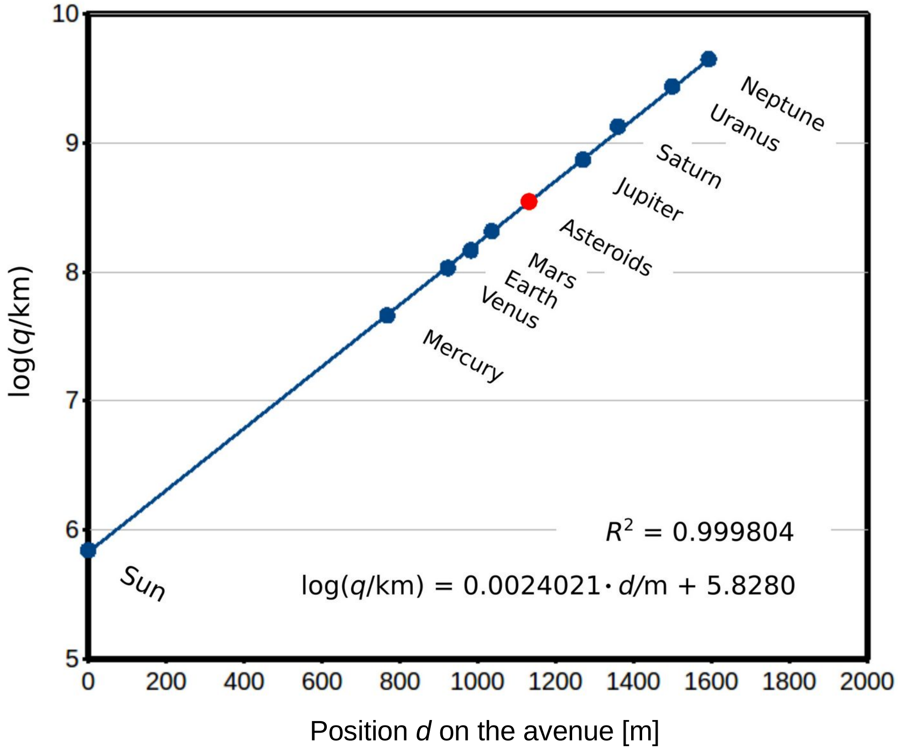
Remark: If we assume a hypothetical former planet at the position of the asteroids, the corresponding barrier yields a perihelion distance of 2.353 AU (GPS) and 2.372 AU (map data), respectively, calculated for the year AD 200.

Equation of the trend line:

$$\log\left(\frac{q}{\text{km}}\right) = 0.0024021 \cdot \frac{d}{\text{m}} + 5.8280 \qquad (1)$$

?

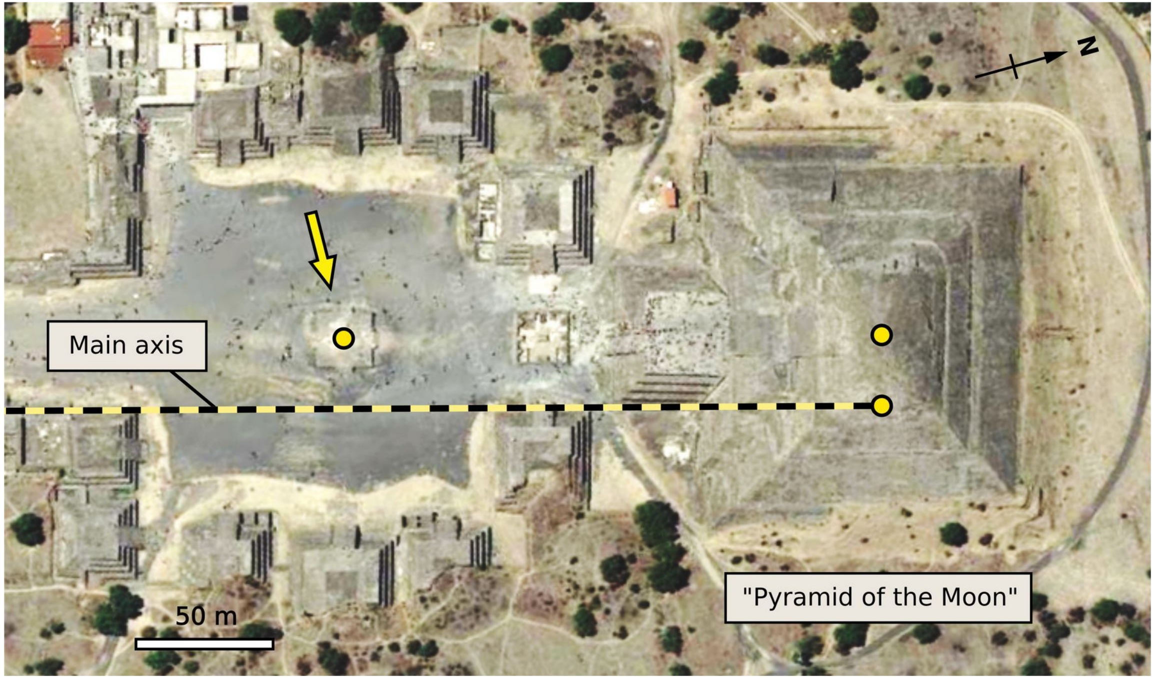
What about these numbers? In order to simplify the equation, we replace the human-made units of length with “natural” units. Thus, “km” is replaced by the already-used solar radius and “m” by the “Sun unit” (next two slides).



Remark: If we assume a hypothetical former planet at the position of the asteroids, the corresponding barrier yields a perihelion distance of 2.353 AU (GPS) and 2.372 AU (map data), respectively, calculated for the year AD 200.

Definition of the “Sun unit”

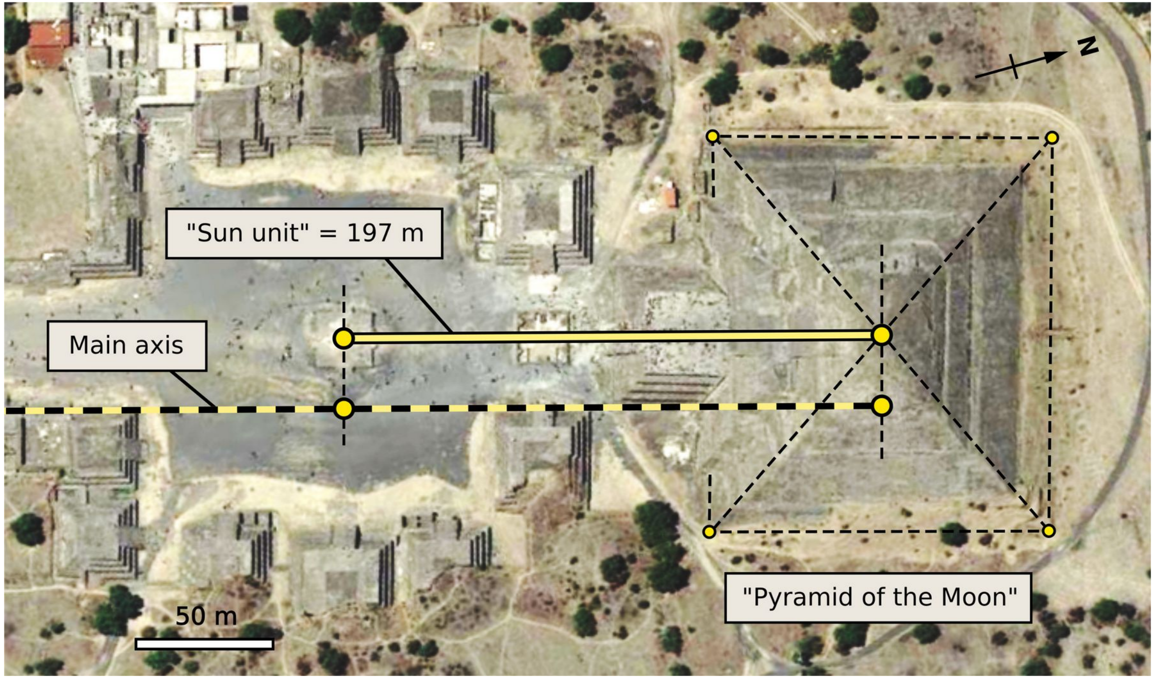
An eye-catching position is provided by the central platform of the Plaza de la Luna (Plaza of the Moon). So, we define the “Sun unit” by the horizontal distance from this platform to the center of the Pyramid of the Moon (Sun).



Satellite image: © 2020 Maxar Technologies

Three base lines of the pyramid are covered with rubble. So, one must be careful when determining the position using the corners of the base. However, it seems that, accidentally, this satellite photograph was taken from almost vertically above the pyramid.

(Remark: The GPS coordinates for the pyramid and the central platform in the table of slide 15 belong to the lower points on the main axis.)

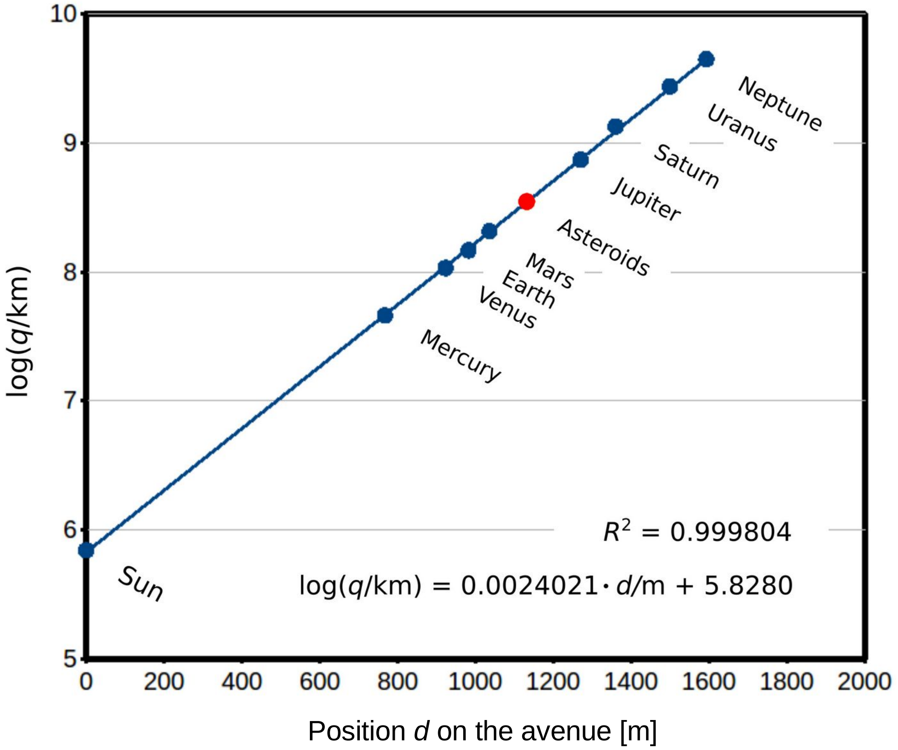


4. Including the Sun

$$\log\left(\frac{q}{\text{km}}\right) = 0.0024021 \cdot \frac{d}{\text{m}} + 5.8280 \qquad (1)$$

Units: R_{Sun} = 695508 km [6], u_{Sun} = 197 m

$$\Rightarrow \quad \log\left(\frac{q}{R_{Sun}}\right) = 0.47322 \cdot \frac{d}{u_{Sun}} - 0.01431 \qquad (2)$$



[6] Brown, T. M., Christensen-Dalsgaard, J.: Accurate Determination of the Solar Photospheric Radius, Astrophys. J. 500, L195-L198 (1998)

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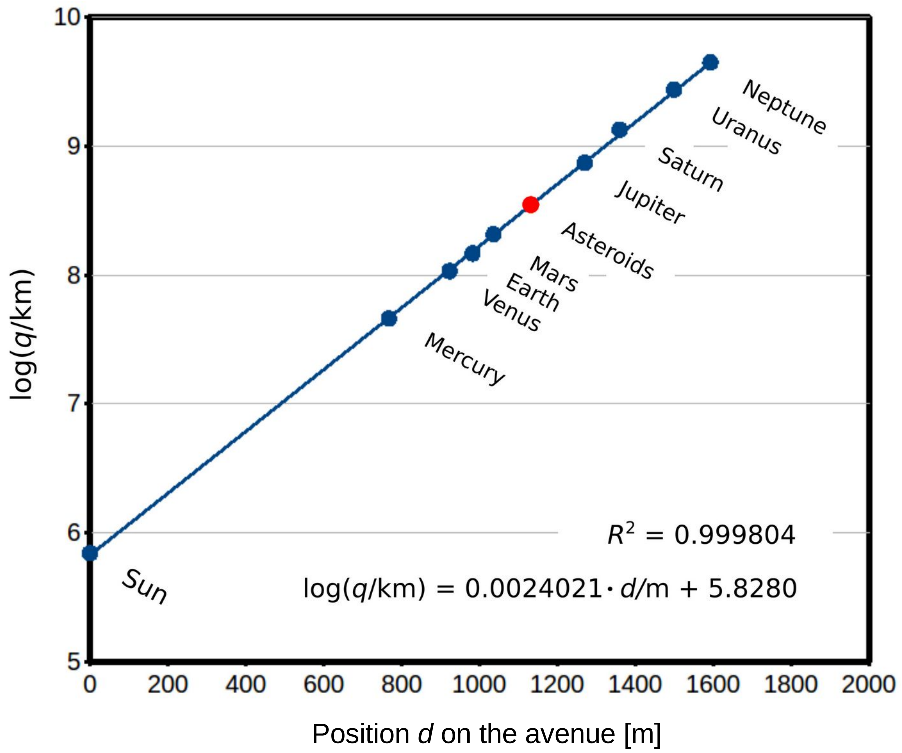
(almost zero)

?

This factor would vanish if it would be 1.
What else can we do?



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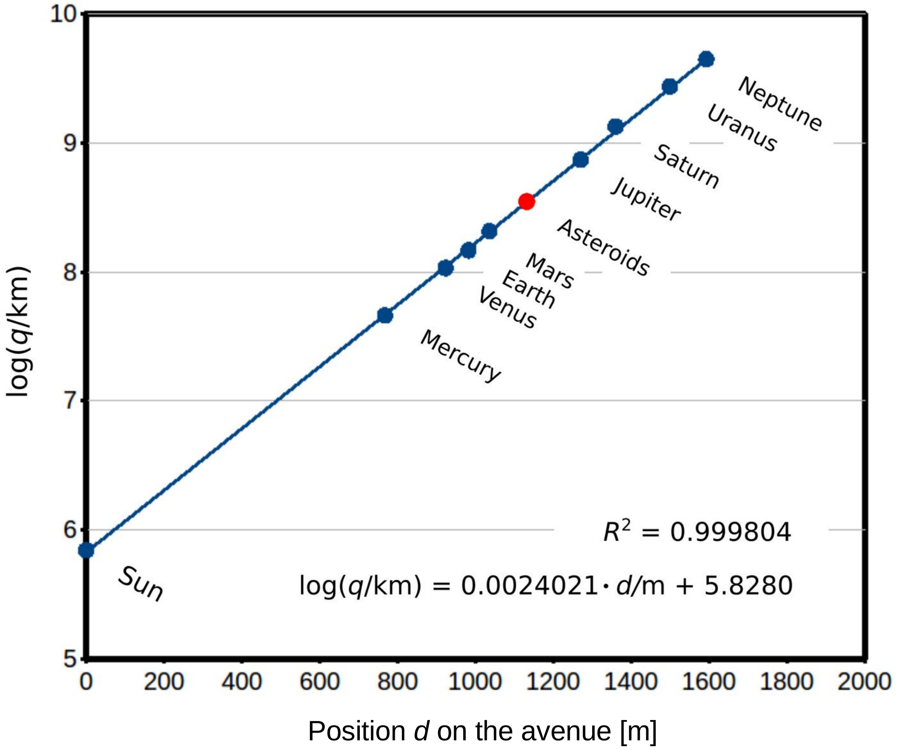
$$\Rightarrow \quad \log\left(\frac{q}{R_{Sun}}\right) = 0.47322 \cdot \frac{d}{u_{Sun}} - 0.01431 \qquad (2)$$

Base-3 logarithm:

$$\Rightarrow \quad \log_3\left(\frac{q}{R_{Sun}}\right) = 0.99181 \cdot \frac{d}{u_{Sun}} - 0.02998 \qquad \textbf{(GPS)}$$

$$\text{or:} \quad \log_3\left(\frac{q}{R_{Sun}}\right) = 1.00063 \cdot \frac{d}{u_{Sun}} - 0.02022 \qquad \textbf{(map)}$$



(Remember: $\log_3 x = \log x / \log 3$)

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$$\log\left(\frac{q}{\text{km}}\right) = 0.0024021 \cdot \frac{d}{\text{m}} + 5.8280 \qquad (1)$$

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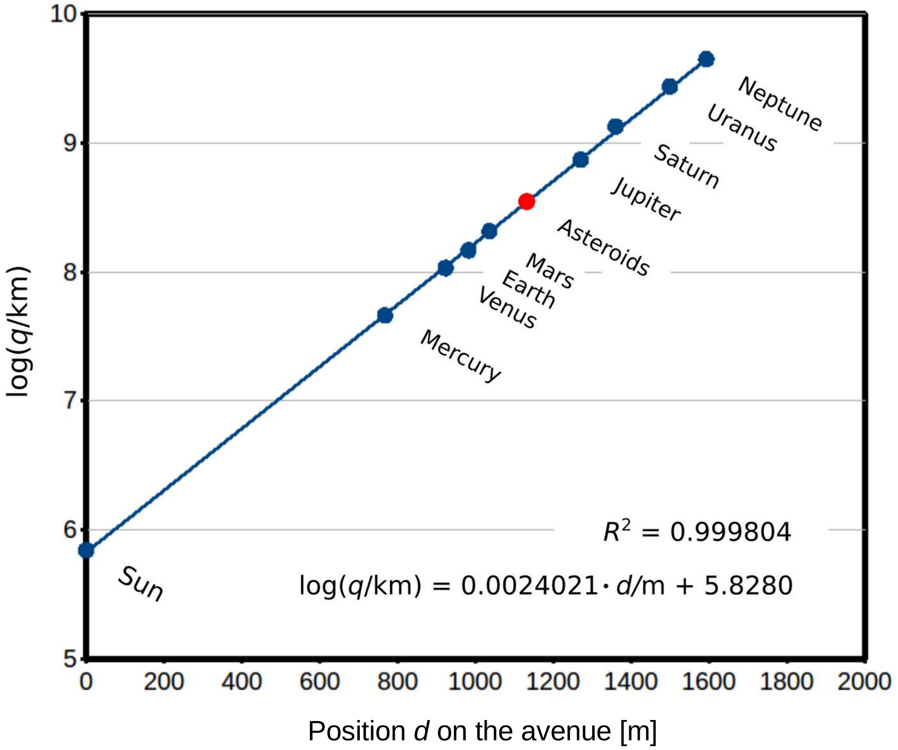


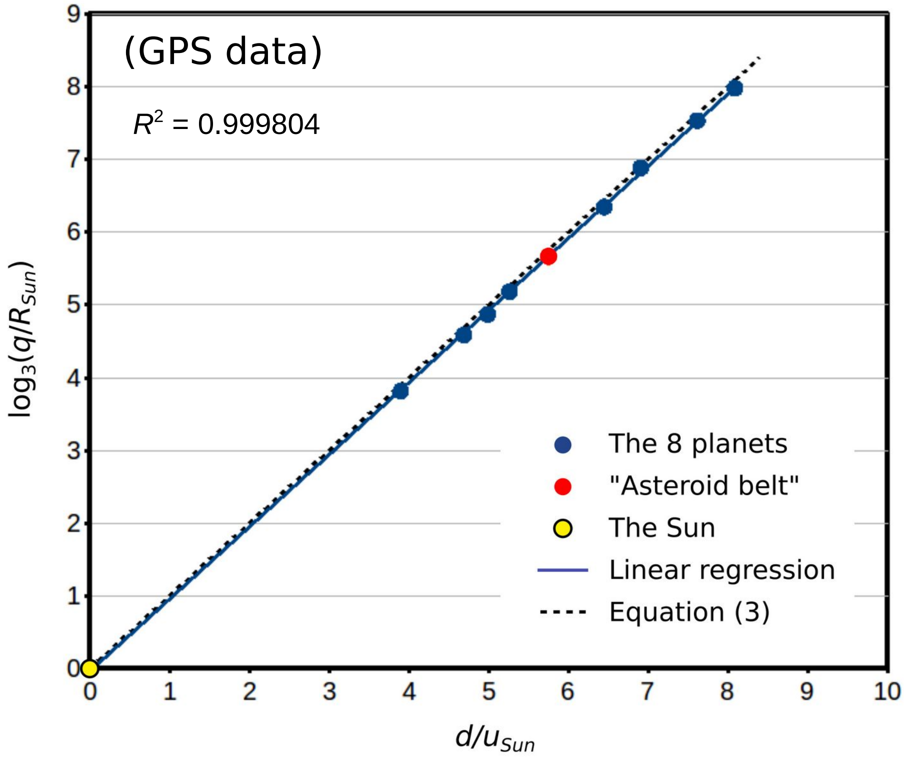
(Remember: $\log_3 x = \log x / \log 3$)

This leads to the basic equation (3):

$$\log_3\left(\frac{q_i}{R_{Sun}}\right) = \frac{d_i}{u_{Sun}}, \qquad i = 0, \ldots, 9 \tag{3}$$

(q_i = perihelion distance, except $q_0 = R_{Sun}$)

i	celestial body
0	Sun
1	Mercury
2	Venus
3	Earth
4	Mars
5	(Asteroids)
6	Jupiter
7	Saturn
8	Uranus
9	Neptune



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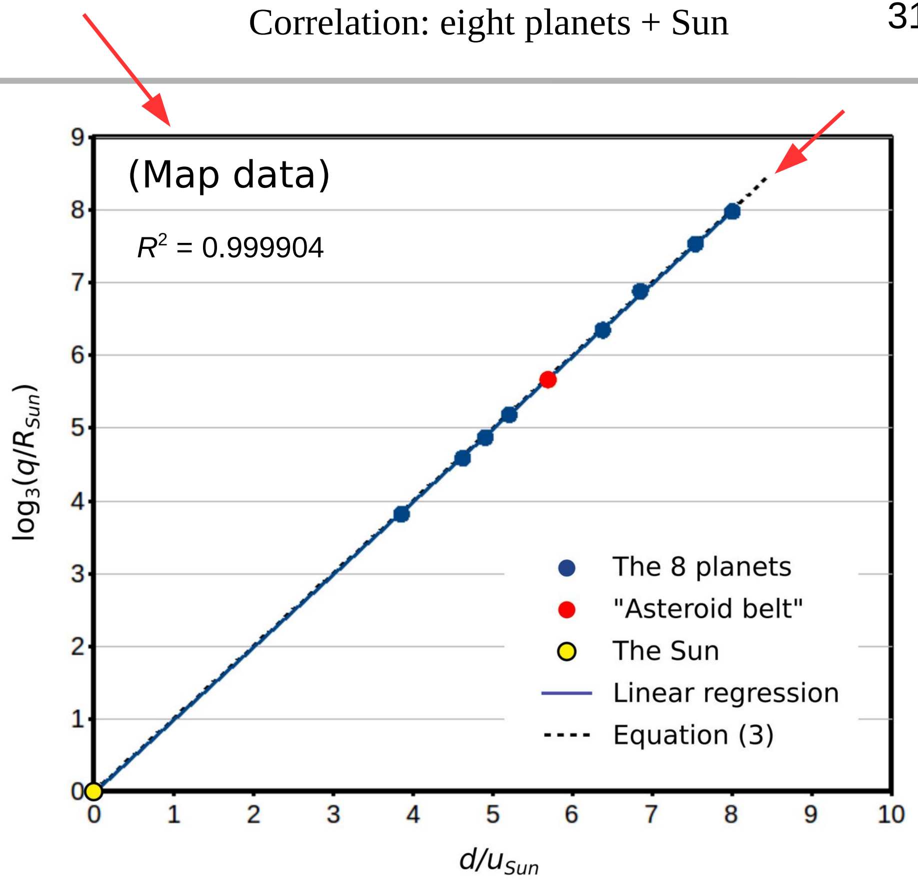

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7	Saturn
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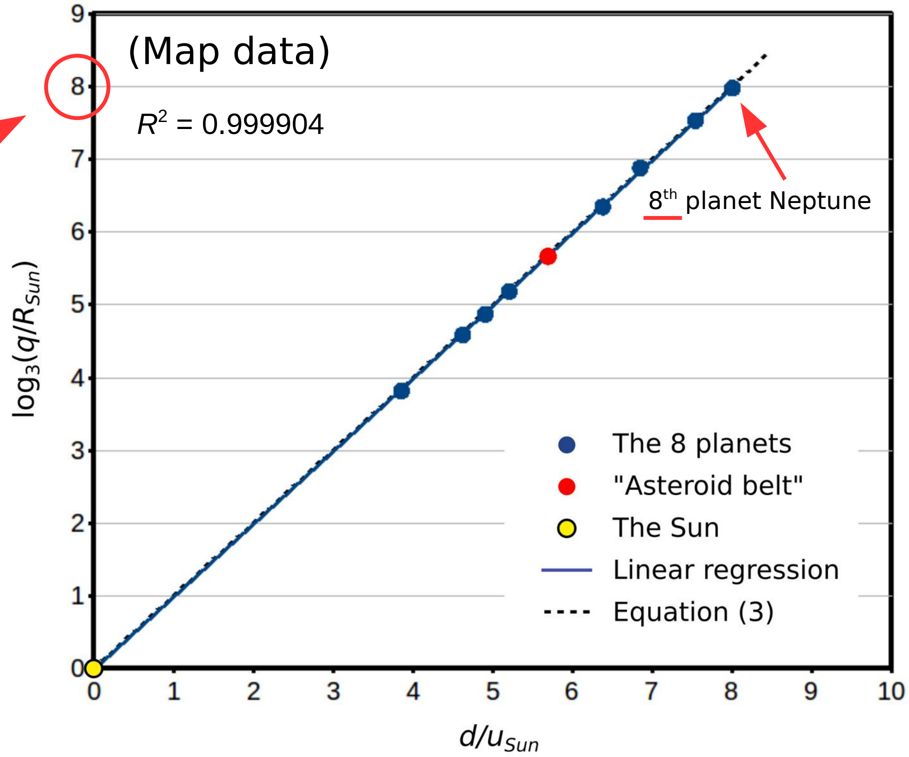
9	Neptune

$$3^8 \cdot R_{Sun} = 4.56 \cdot 10^9 \text{ km}$$
$$q_{Neptune} = 4.46 \cdot 10^9 \text{ km}$$



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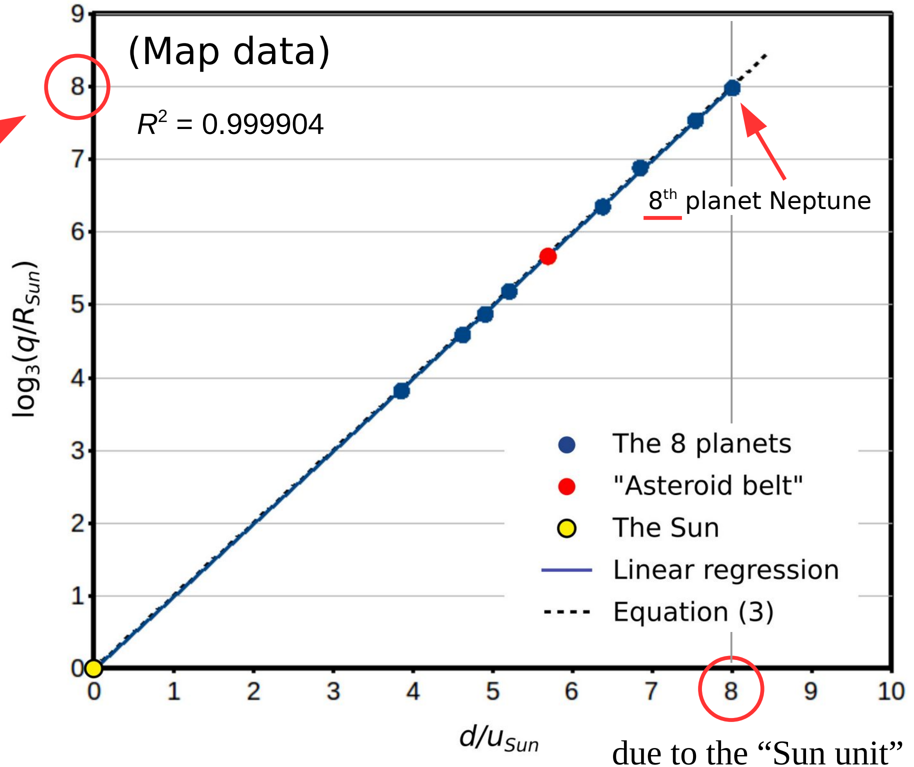

due to the "Sun unit"

(The Sun unit, u_{Sun}, was probably intended.)

4. Including the Sun

Correlation: eight planets + Sun

$$\log_3\left(\frac{q_i}{R_{Sun}}\right) = \frac{d_i}{u_{Sun}}\,, \qquad i = 0, \ldots, 9 \tag{3}$$

(q_i = perihelion distance, except $q_0 = R_{Sun}$)

i	celestial body
0	Sun
1	Mercury
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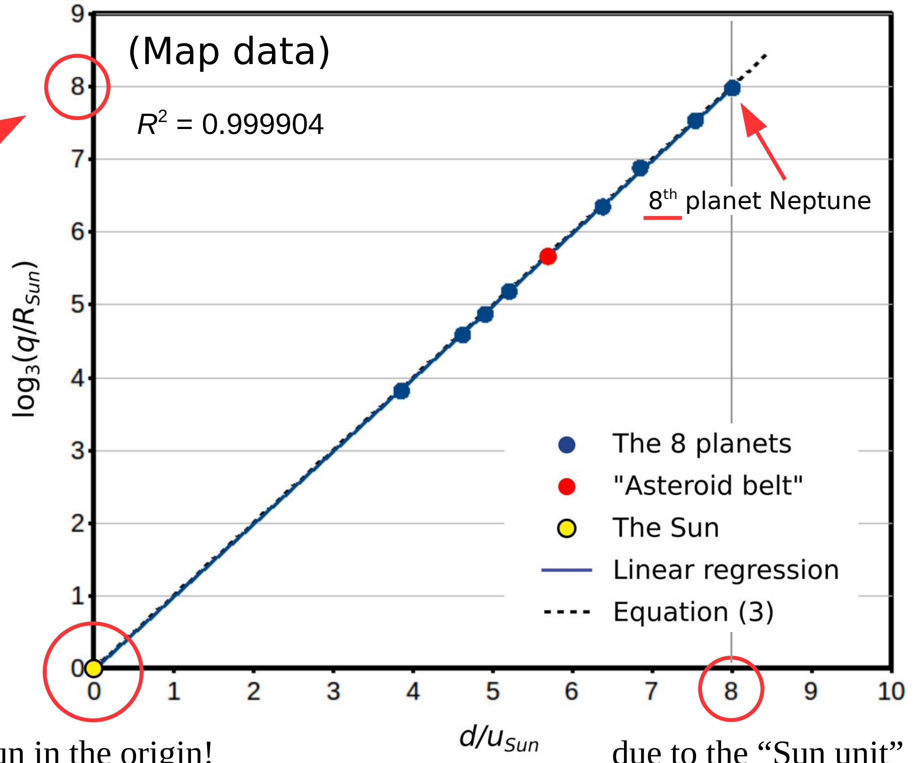
$$3^8 \cdot R_{Sun} = 4.56 \cdot 10^9 \text{ km}$$
$$q_{Neptune} = 4.46 \cdot 10^9 \text{ km}$$



Sun in the origin!

due to the “Sun unit”

(The Sun unit, u_{Sun}, was probably intended.)

4. Including the Sun

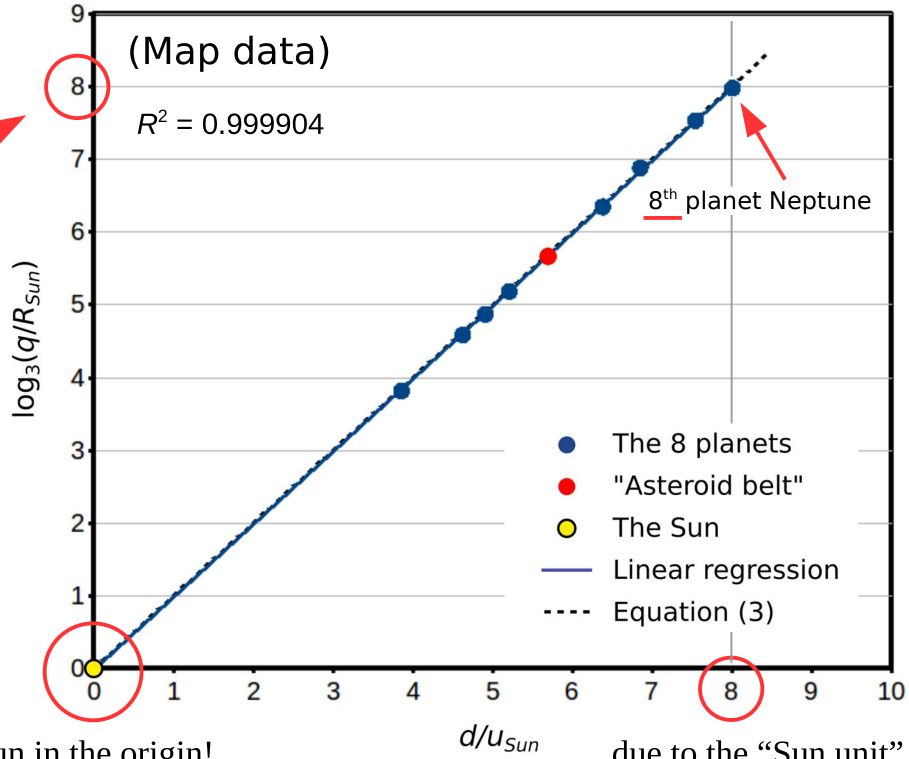
$$\log_3\left(\frac{q_i}{R_{Sun}}\right) = \frac{d_i}{u_{Sun}}, \qquad i = 0, \ldots, 9 \qquad (3)$$

(q_i = perihelion distance, except $q_0 = R_{Sun}$)

i	celestial body
0	Sun
1	Mercury
2	Venus
3	Earth
4	Mars
5	(Asteroids)
6	Jupiter
7	Saturn
8	Uranus
9	Neptune

$$3^8 \cdot R_{Sun} = 4.56 \cdot 10^9 \text{ km}$$
$$q_{Neptune} = 4.46 \cdot 10^9 \text{ km}$$

How would R^2 change if we consider the remote past or future?



Sun in the origin!

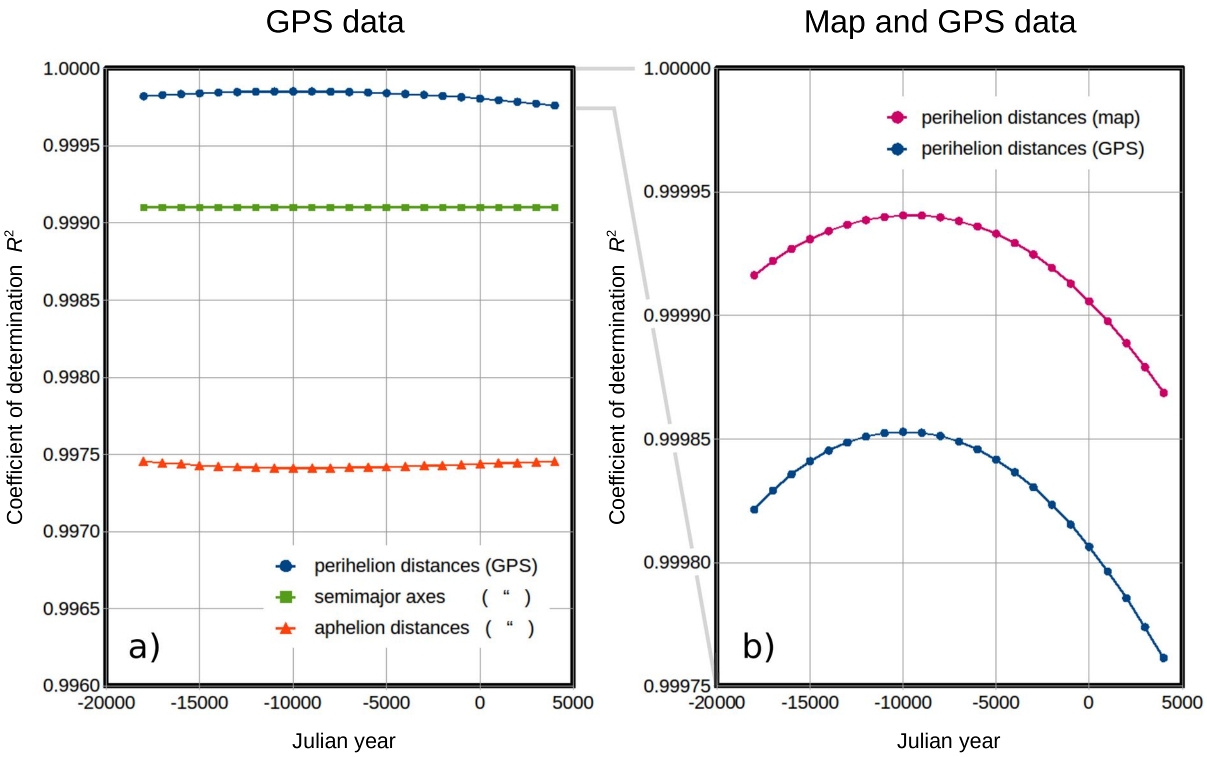
due to the “Sun unit”

(The Sun unit, u_{Sun}, was probably intended.)

The semi-major axis a and eccentricity e as functions of time are derived from **VSOP82** by Jean Meeus [5].

Maximum of R^2 (perih. distances):

99.985 % in 9930 BC (GPS data)
99.994 % in 9570 BC (map data)



[5] Meeus, J.: Astronomical Algorithms. Willmann-Bell Inc., Richmond, Virginia (1991) 197–204

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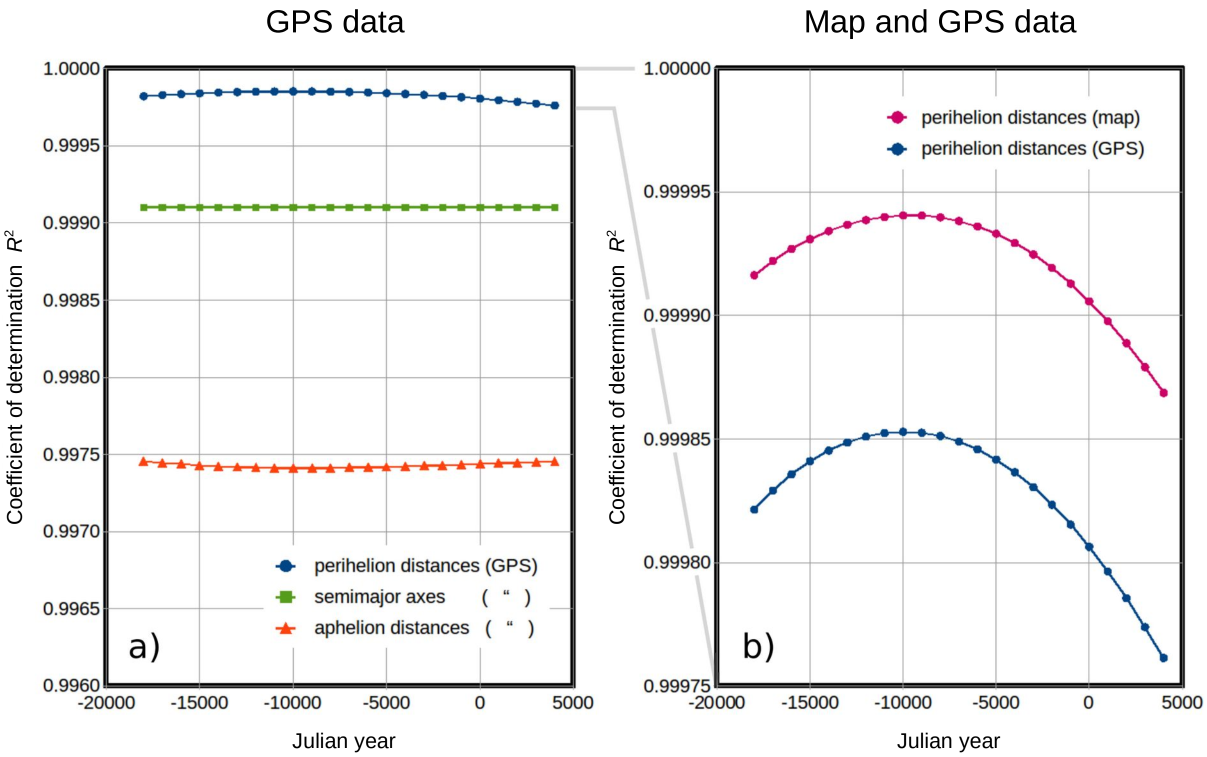
Maximum of R^2 (perih. distances):

99.985 % in 9930 BC (GPS data)
99.994 % in 9570 BC (map data)

The pyramid site is probably not so old, but another theoretical possibility exists.

In principle, this could be a hint from the master builders pointing to an important event in the distant past around 9900 to 9600 BC.



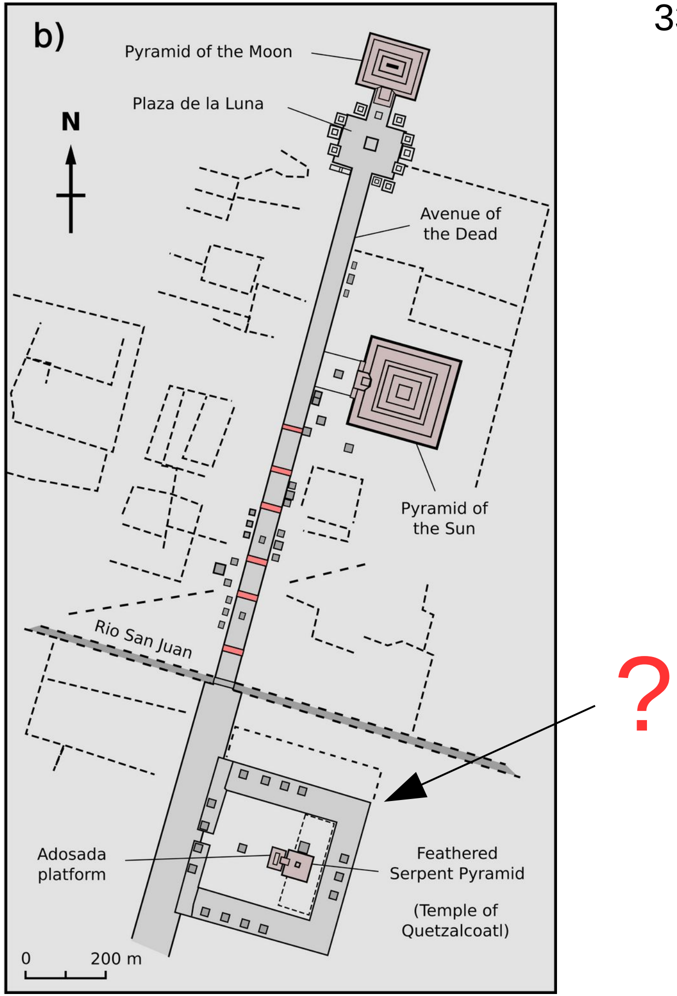
[5] Meeus, J.: Astronomical Algorithms. Willmann-Bell Inc., Richmond, Virginia (1991) 197–204

5. Temple of Quetzalcoatl

Crossing the Rio San Juan and following the Avenue of the Dead southwards, we reach the Temple of Quetzalcoatl. The given planetary correlation defines a precise astronomical scale that can be easily extended to larger distances. Passing the Rio San Juan means entering the trans-Neptunian area.

This outer region comprises the Kuiper belt, Pluto, and several other trans-Neptunian objects (TNOs). So, is there any celestial body that can be attributed to the Temple of Quetzalcoatl?

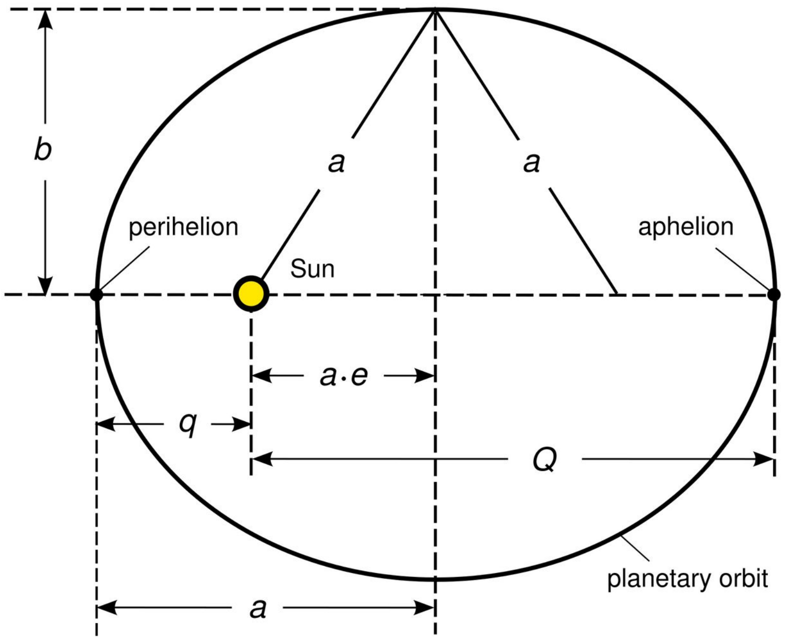
Satellite image: © 2014 Cnes/Spot Image, DigitalGlobe



Connection between Kepler's planetary orbits and the logarithmic scale

perihelion distance $q = a \cdot (1 - e)$ (4)

aphelion distance $Q = a \cdot (1 + e)$ (5)



Connection between Kepler's planetary orbits and the logarithmic scale

perihelion distance $q = a \cdot (1 - e)$ (4)

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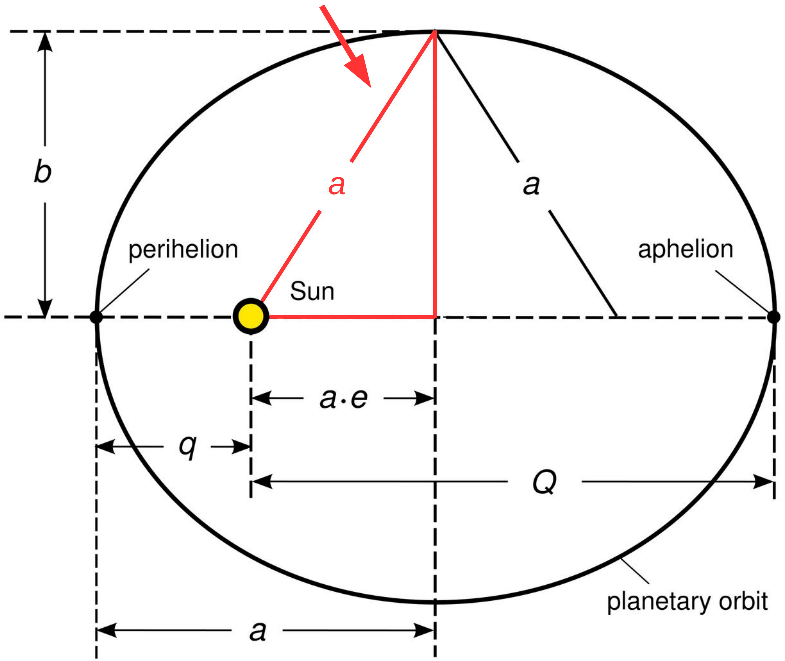
$$a^2 = b^2 + (a \cdot e)^2 \quad \Leftrightarrow \quad a = \frac{b}{\sqrt{1-e^2}} \qquad (6)$$



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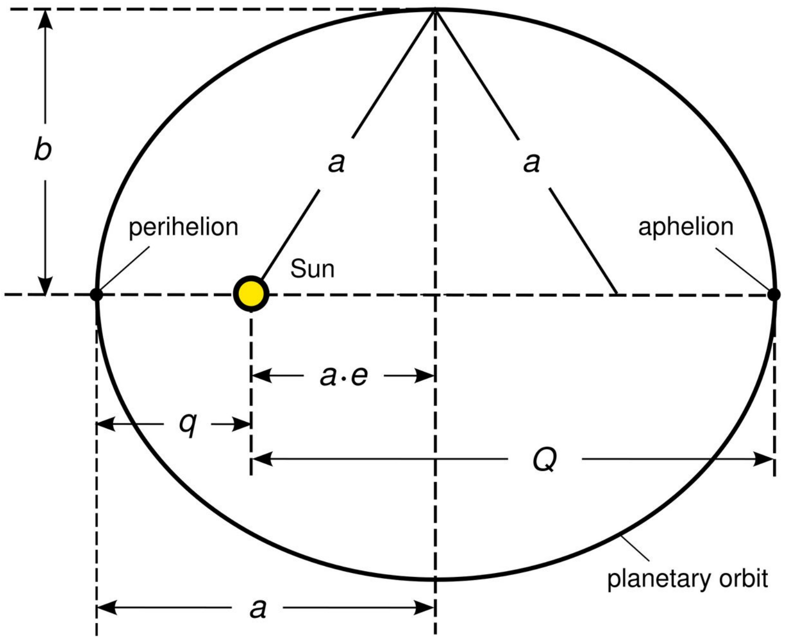

Replacing a in Eqs. (4) and (5) by means of Eq. (6) and multiplying q and Q yield

$$q \cdot Q = \frac{(1-e)(1+e)}{1-e^2} \cdot b^2 = b^2$$

$$\Leftrightarrow \qquad \log\left(b^2\right) = \log\left(q \cdot Q\right)$$

$$\Leftrightarrow \qquad \log(b) = \frac{\log(q) + \log(Q)}{2}$$

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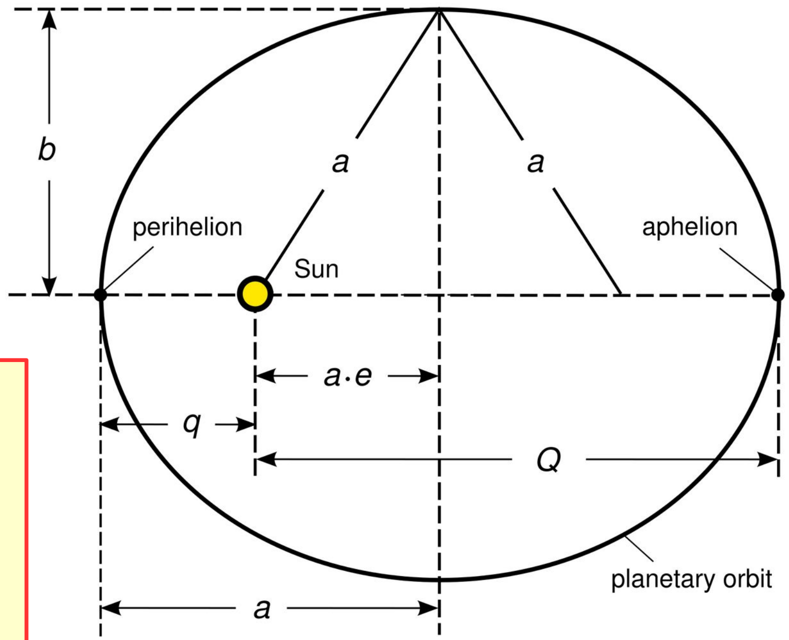


Replacing *a* in Eqs. (4) and (5) by means of Eq. (6) and multiplying *q* and *Q* yield

$$q \cdot Q = \frac{(1-e)(1+e)}{1-e^2} \cdot b^2 = b^2$$

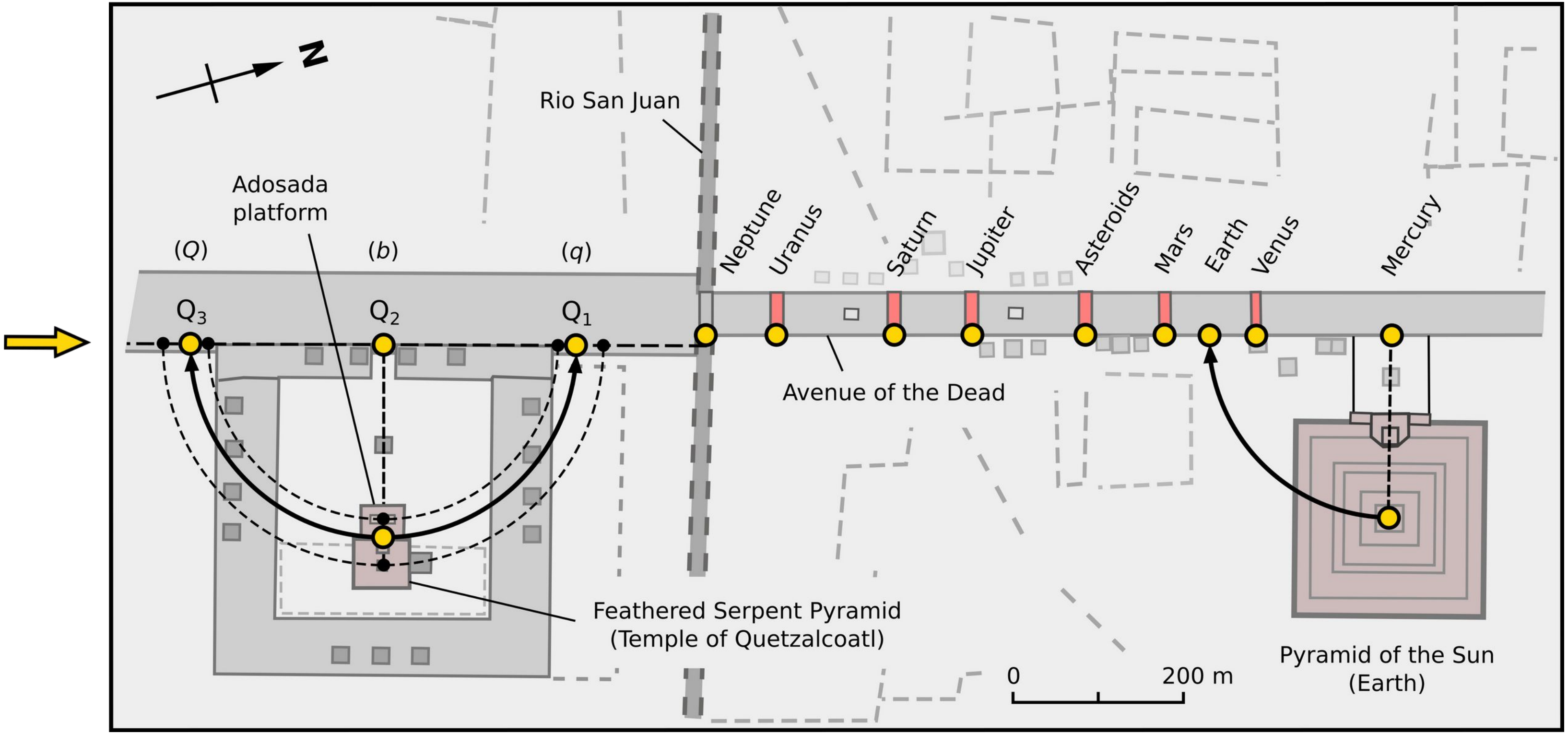
$$\Leftrightarrow \qquad \log(b^2) = \log(q \cdot Q)$$

$$\Leftrightarrow \qquad \log(b) = \frac{\log(q) + \log(Q)}{2}$$

So, log(*b*) is the arithmetic mean of log(*q*) and log(*Q*). Therefore, log(*q*), log(*b*), and log(*Q*) follow each other at equal distances on the logarithmic scale. See Q_1, Q_2, and Q_3 on the next slide.

5. Temple of Quetzalcoatl

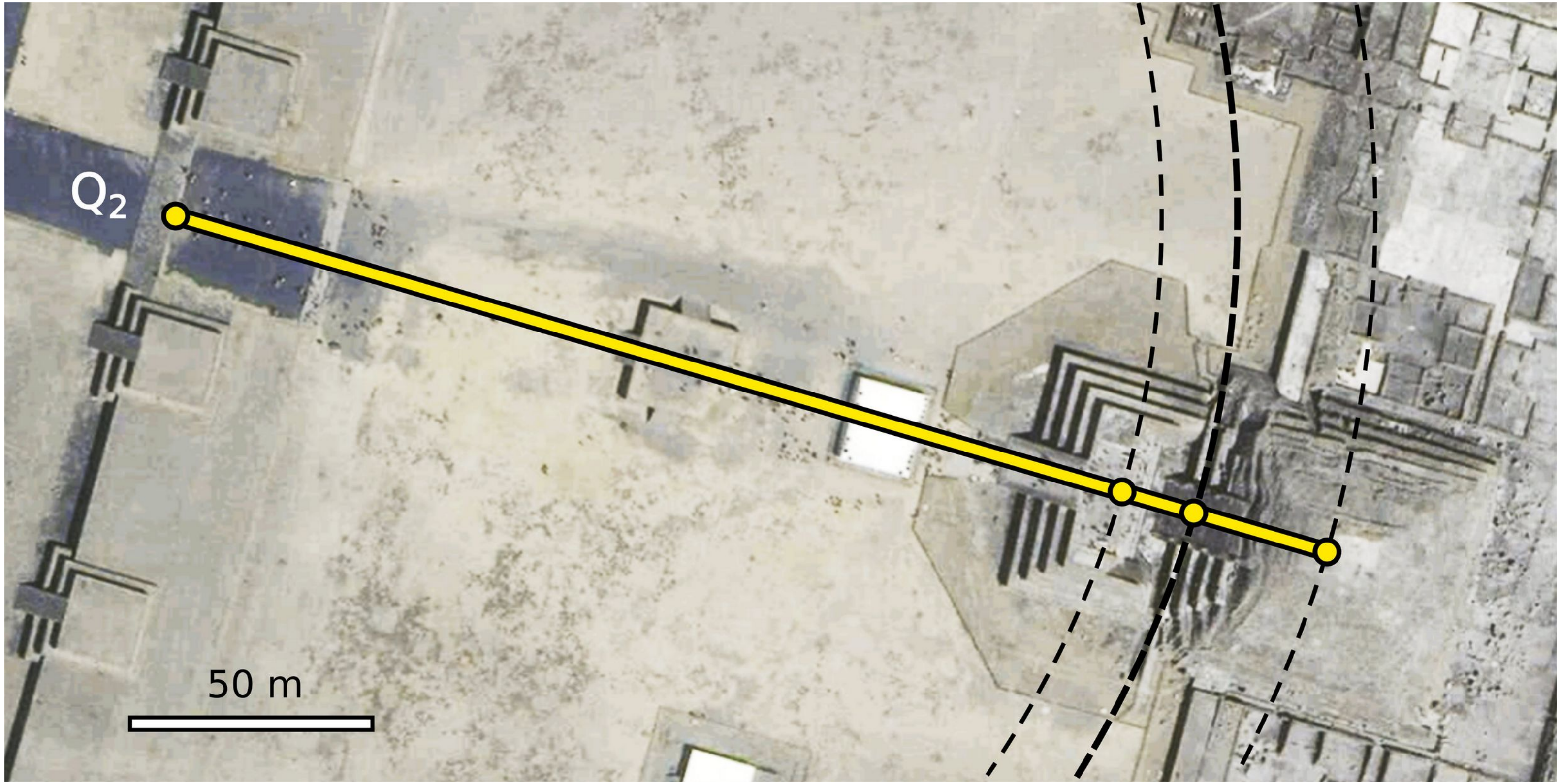
Is there any trans-Neptunian object consistent with Q_1, Q_2, and Q_3?



According to the geographical data in slide 15, the radius of the main semicircle is $\overline{Q_1Q_2} = \overline{Q_2Q_3} = 223.2$ m.

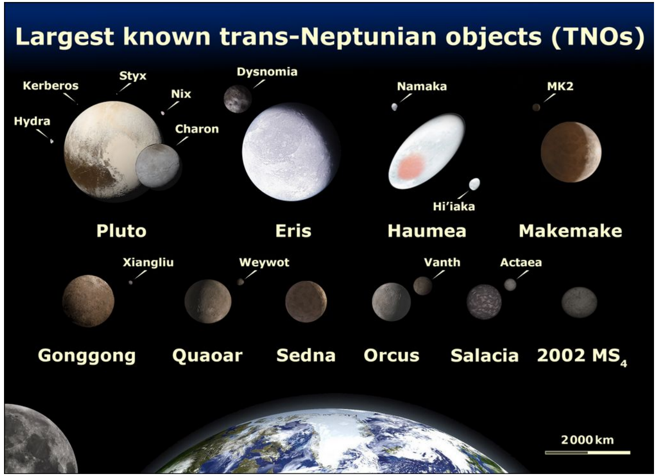
Visualization of the “Quetzalcoatl positions” as given in the table of slide 15

Satellite image: © 2020 HERE, DigitalGlobe, INEGI



The yellow points allow the GPS data to be checked, e.g., by using HERE WeGo.

TNOs with diameters $D \geq 800$ km



Wikimedia Commons (detailed description in "TNO")

TNO	*a* [AU]	*e*	*U* [years]	*D* [km]	
Sedna	499.47 ± 0.17	0.84715 ± 0.00005	11162.8 ± 5.8	995 ± 80	[10]
Eris	68.004 ± 0.001	0.43347 ± 0.00001	560.80 ± 0.02	2326 ± 12	[11]
Gonggong	67.474 ± 0.003	0.49853 ± 0.00003	554.25 ± 0.04	1230 ± 50	[12]
Makemake	45.3176 ± 0.0002	0.164275 ± 0.000003	305.076 ± 0.002	1430 (mean)	[13]
Quaoar	43.6168 ± 0.0008	0.041572 ± 0.000004	288.064 ± 0.008	1111 (mean)	[14]
Haumea	43.0542 ± 0.0002	0.197757 ± 0.000004	282.509 ± 0.002	1559 (mean)	[15,16]
Salacia	42.2978 ± 0.0008	0.103813 ± 0.000008	275.097 ± 0.008	846 ± 21	[17]
2002 MS_4	42.010 ± 0.003	0.14120 ± 0.00007	272.29 ± 0.03	800 ± 24	[18]
Pluto	39.481687	0.248808	247.945	2376.6 ± 3.2	[19]
Orcus	39.1105 ± 0.0004	0.228963 ± 0.000008	244.595 ± 0.004	917 ± 25	[20,21]

Quantities *a*, *e*, and *U* (orbital period): [8], exception Pluto: [9], (uncertainty: 1-sigma, astronomical unit: 1 AU = 149,597,870.700 km ≈ a_{Earth})

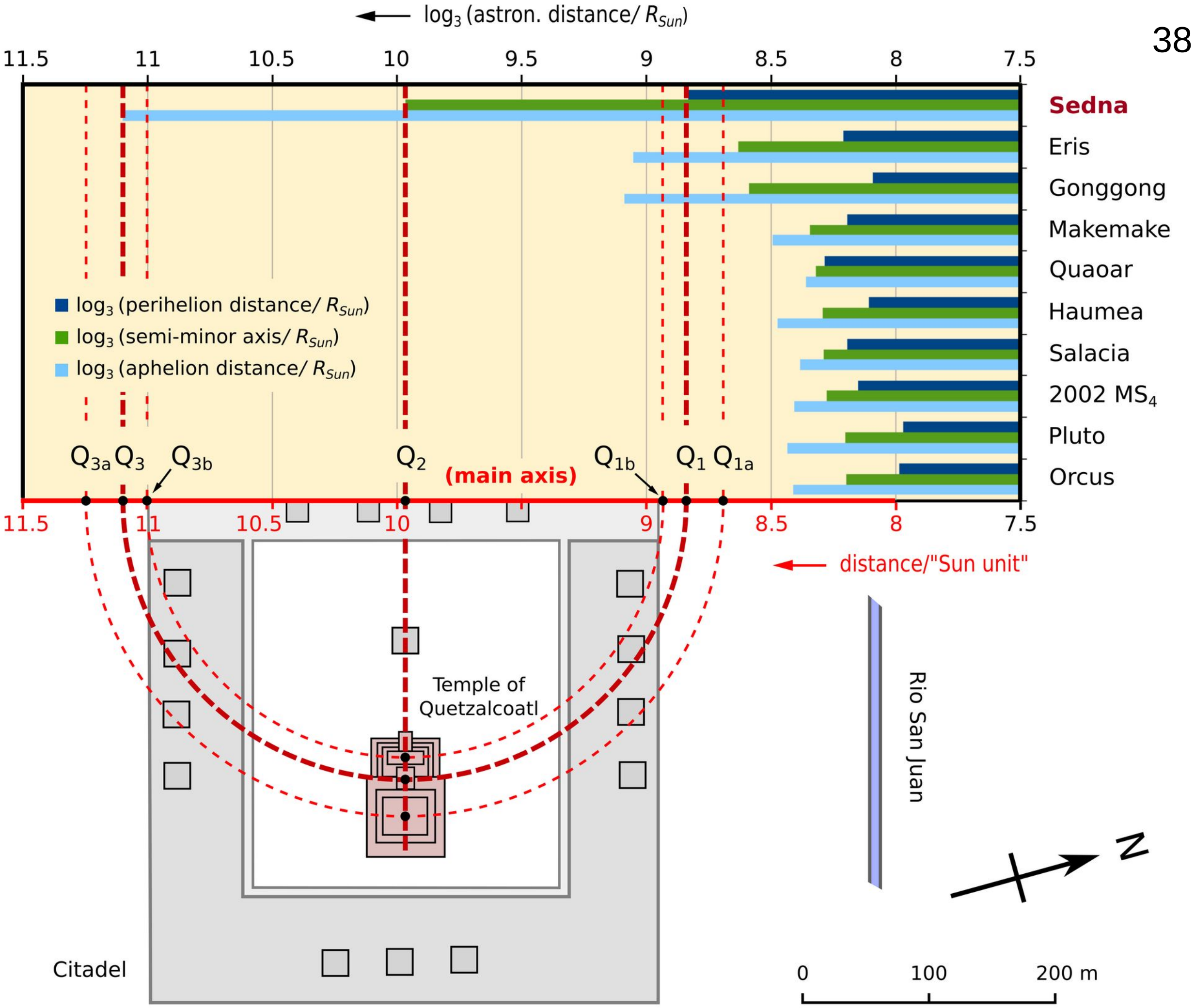
(References for *D* [10–21] are listed in the Appendix.)

[8] JPL, Small-Body Database Lookup. NASA, Jet Propulsion Laboratory, Caltech (retrieved Oct. 2021)
[9] Pluto fact sheet. (Williams, D. R.), NASA, Goddard Space Flight Center, Greenbelt, MD 20771 (2019)

5. Temple of Quetzalcoatl

Orbital elements of large TNOs and comparison with the Teotihuacán site

Whereas nine of these objects are completely out of range, Sedna fits surprisingly well (GPS data).



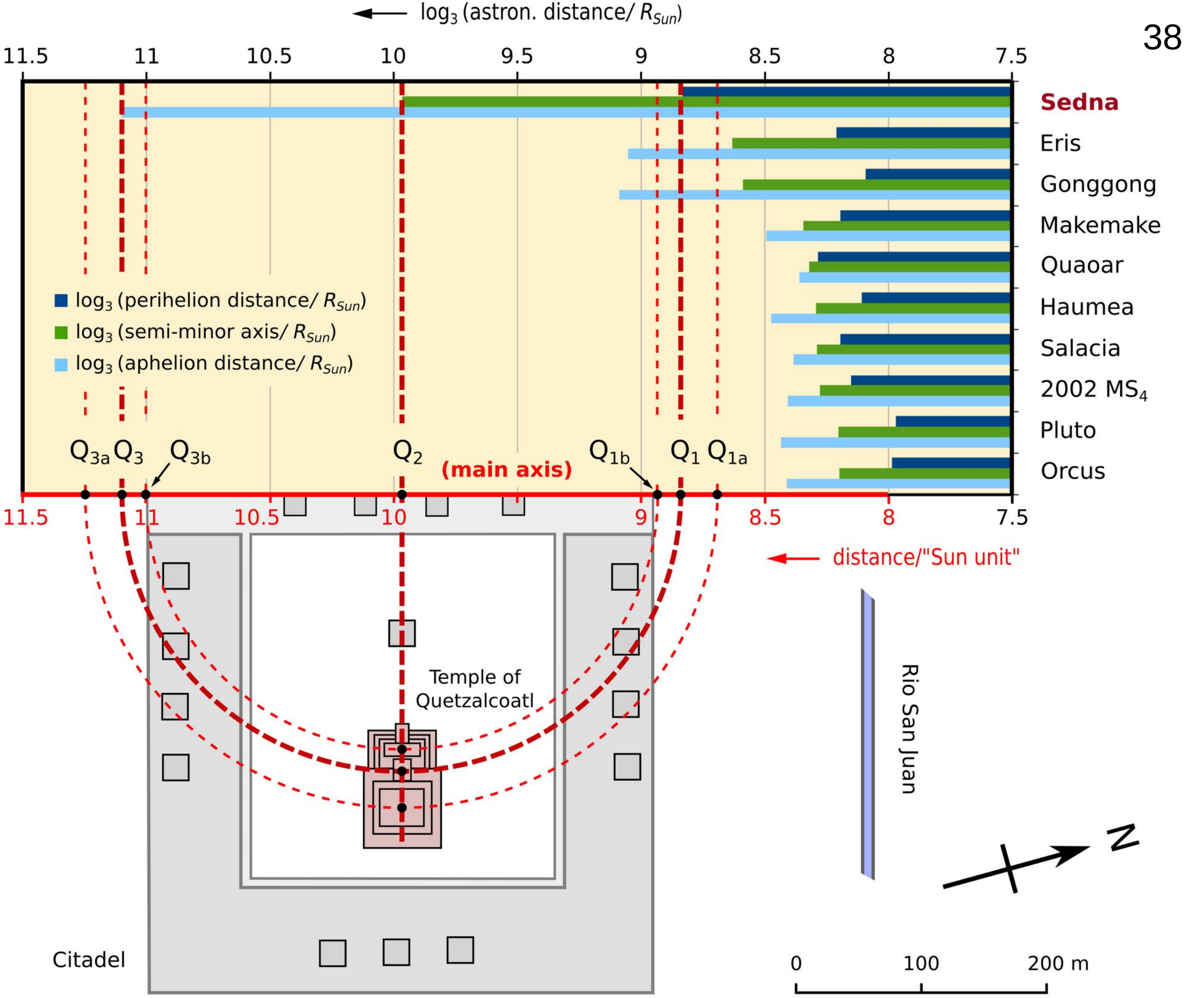
5. Temple of Quetzalcoatl

Orbital elements of large TNOs and comparison with the Teotihuacán site

Whereas nine of these objects are completely out of range, Sedna fits surprisingly well (GPS data).

The bold semicircle gives the best agreement with the astronomical data.

Of the several hundred smaller TNOs, accurately determined in astronomy, around 99 % belong to the Kuiper Belt and are located approximately between 8 and 9 on the given logarithmic axis. From the four or five TNOs with an orbital size similar to that of Sedna, none fit as well as Sedna and all of them are orders of magnitude smaller than Sedna.



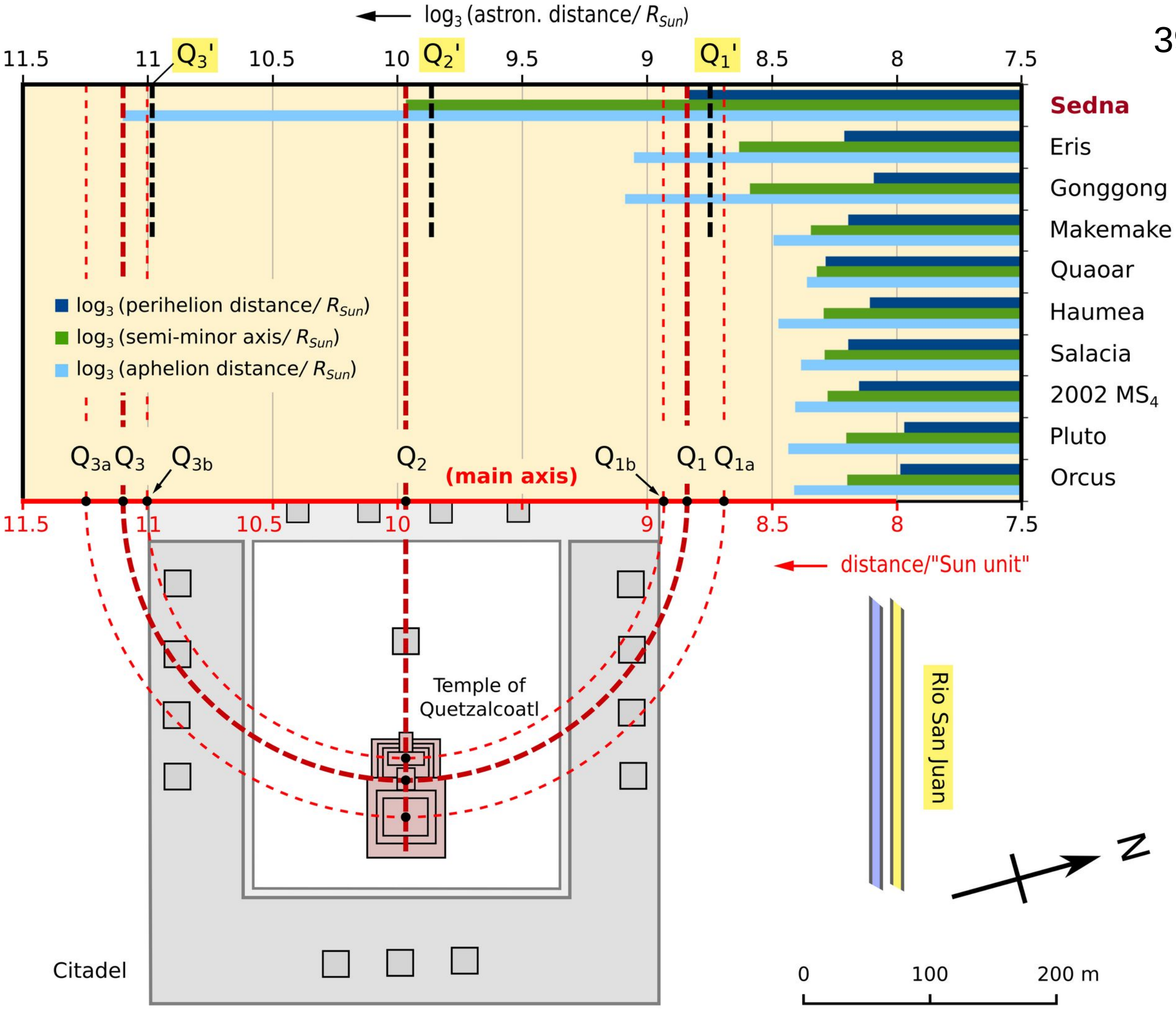
5. Temple of Quetzalcoatl

Adaption of the "Sun unit"

On the logarithmic scale (GPS data), the Rio San Juan is positioned not at 8, but at 8.0845, which relates to the "Sun unit" of 197 m. By modifying this unit to 199.08 m, the river moves exactly to 8, and we have an almost perfect fit of the data as given in the diagram on p. 31 according to Eq. (3).

Nevertheless, the agreement in the histogram on the right changes. If using 199.08 m, the points Q_1, Q_2, and Q_3 shift to Q_1', Q_2', and Q_3', represented by the black dashed lines. Even if this reduces the concordance, the agreement with the TNO Sedna is still remarkable.

However, this discrepancy needs further clarification. A possible explanation is given on the next slides.



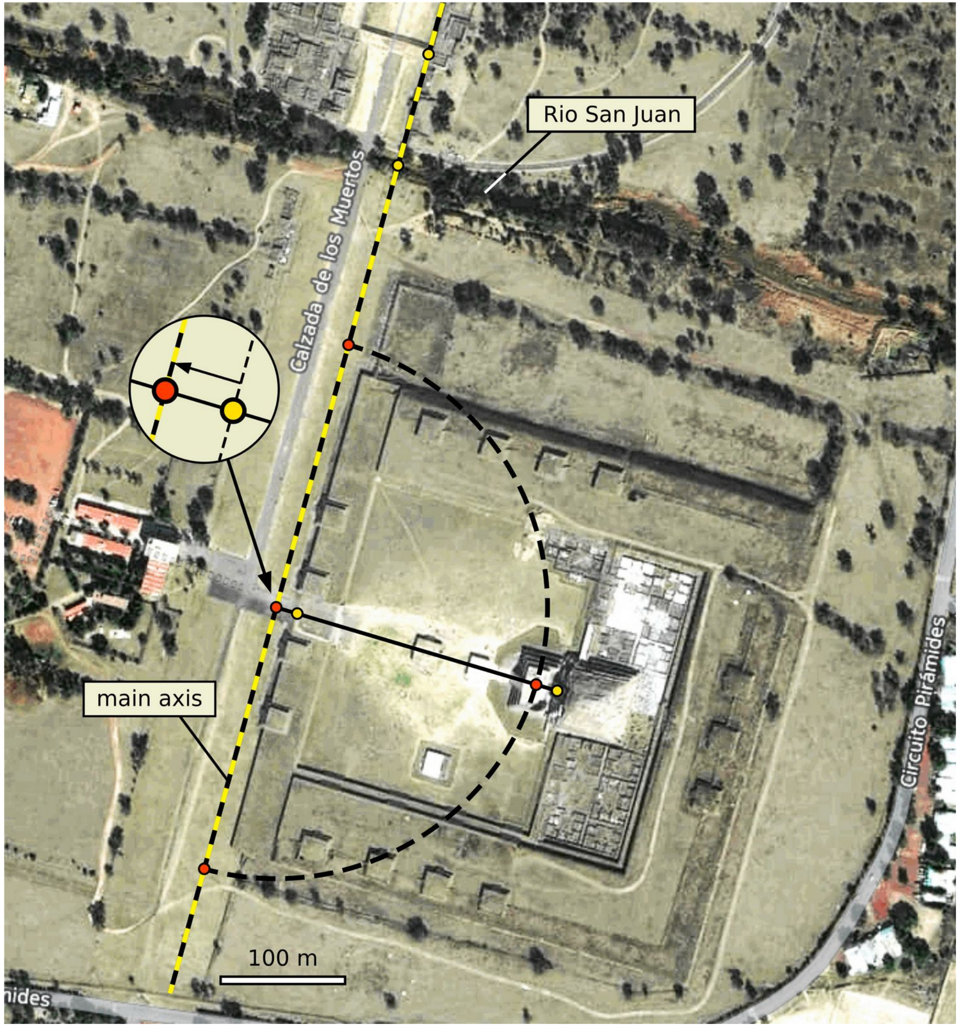
5. Temple of Quetzalcoatl

Alternative mapping of positions

At the Rio San Juan the avenue becomes broader and the east side of the avenue (main axis) has a parallel shift of about 16 to 18 meters – see slide 35. In order to avoid this shift, an alternative mapping of the main points at the Citadel is possible.

If we move the lower two yellow points by this shift westwards to the positions of the red points, the latter points are positioned almost exactly on the Adosada platform and on the extension of the (now continuous) main axis. Since the radius of the semicircle is the same, the result in the previous slides remains unchanged.

Interestingly, the mismatch between point Q_2' and the correlated astronomical value (slide 39) is about 18 m and is the same size as the shift of the main axis. Please, note the perspective distortion visible at the Adosada platform.



Satellite image: © 2017 HERE, 2014 DigitalGlobe, INEGI

5. Temple of Quetzalcoatl

A possible solution of the “shift-problem”

The shift of the extended main axis (along the east side of the avenue) is a parallel shift to the west border of the Citadel. So, the red points R_1 to R_3 shift to the points Q_1’ to Q_3’. We denote the related distance $\overline{R_2 Q_2'}$ with *s*, the radius of the semicircle with *r*, and the distance from the Pyramid of the Moon to point R_2 with R_2.

By including the shift, the astronomical distances are now assigned in the following way.

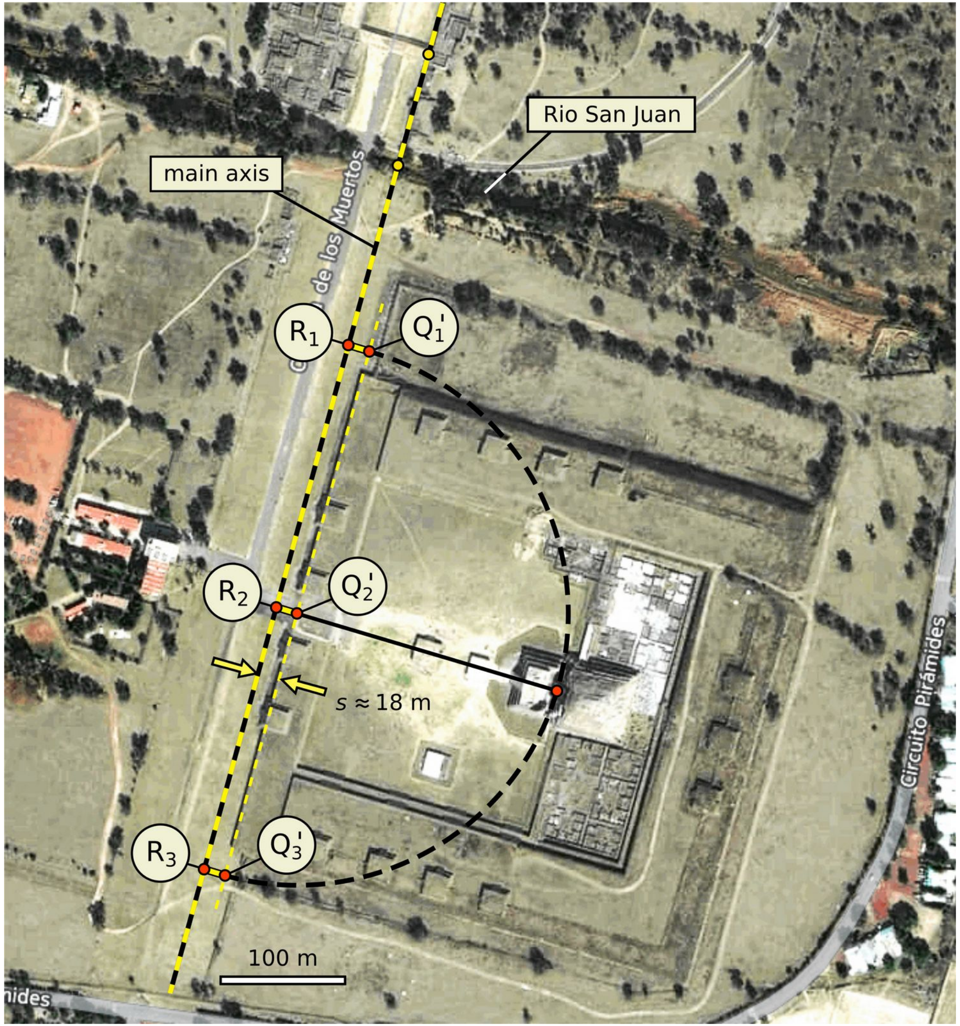
perihelion distance: $\log(q) \;\rightarrow\; R_2 + s - r$

semi-minor axis: $\log(b) \;\rightarrow\; R_2 + s$

aphelion distance: $\log(Q) \;\rightarrow\; R_2 + s + r$

In this way, the shift of the main axis is not ignored but precisely taken into account. Note: In this drawing *r* is ca. 220.6 m due to former orbital data of Sedna. The current value *r* = 223.18 m does not yield much change. The following slide shows the main diagram including Sedna.

Satellite image: © 2017 HERE, 2014 DigitalGlobe, INEGI



5. Temple of Quetzalcoatl

A possible solution of the “shift-problem”

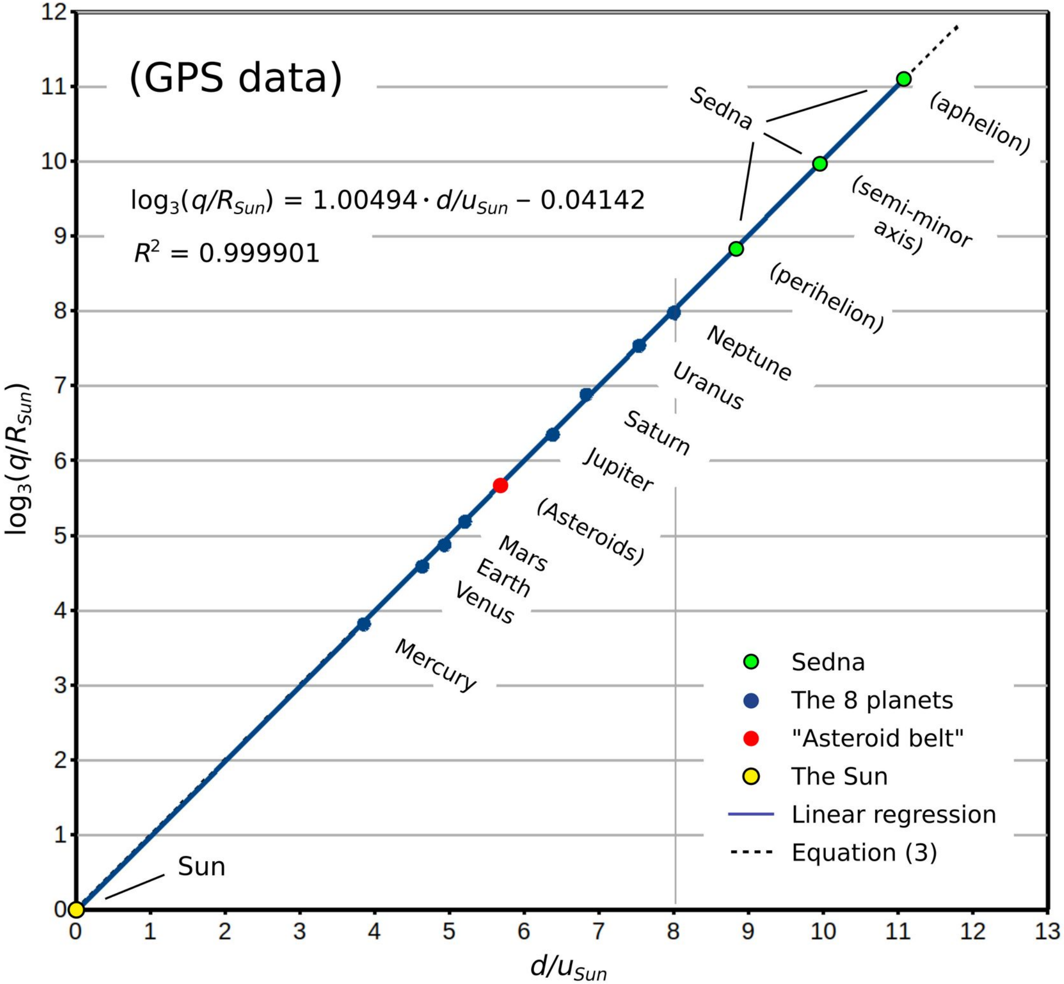
The green points in the diagram on the right are obtained using the following values:

shift $s = 18$ m, radius $r = 223.18$ m (slide 15), “Sun unit” $u_{Sun} = 199.08$ m (slide 39).

On the basis of the GPS data and due to the assignments on the preceding slide, the points relating to Sedna are precisely in line with the planetary data. The trend line fits almost perfectly to the main Eq. (3). The coefficient of determination is 0.999901, and the Rio San Juan (Neptune) is positioned at exactly 8.

All of the points, except the red one, are used in the linear regression. If we omit the parallel shift ($\Rightarrow$ $s = 0$ m), we obtain $R^2 = 0.999765$, and, thus, the picture is nearly the same.

One reason for the fact that the avenue becomes broader after passing the Rio San Juan is to symbolize the wide space beyond Neptune. Two other reasons are given on the next slide.

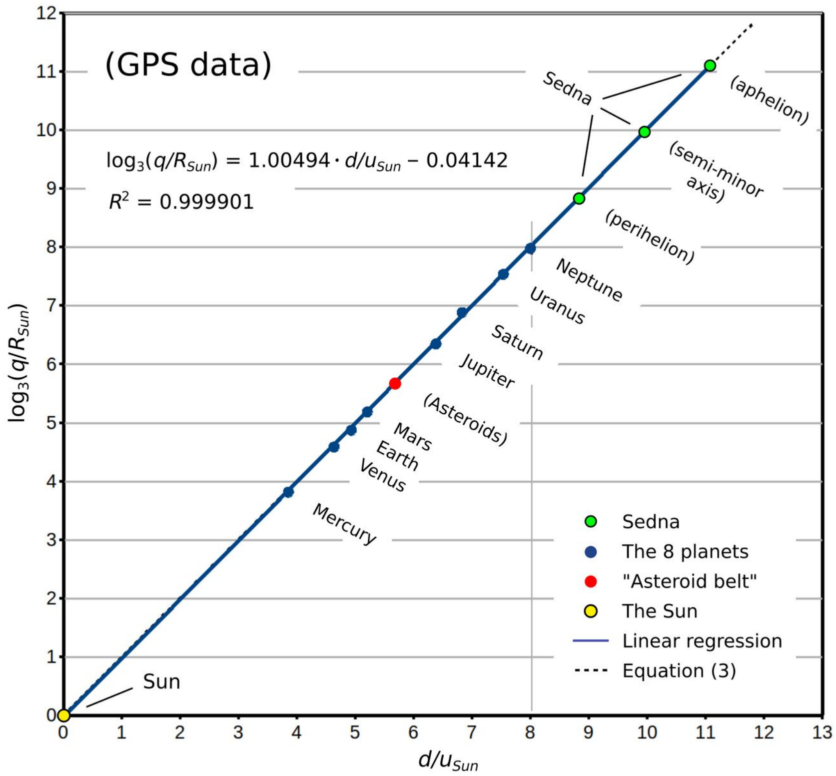


A possible solution of the “shift-problem”

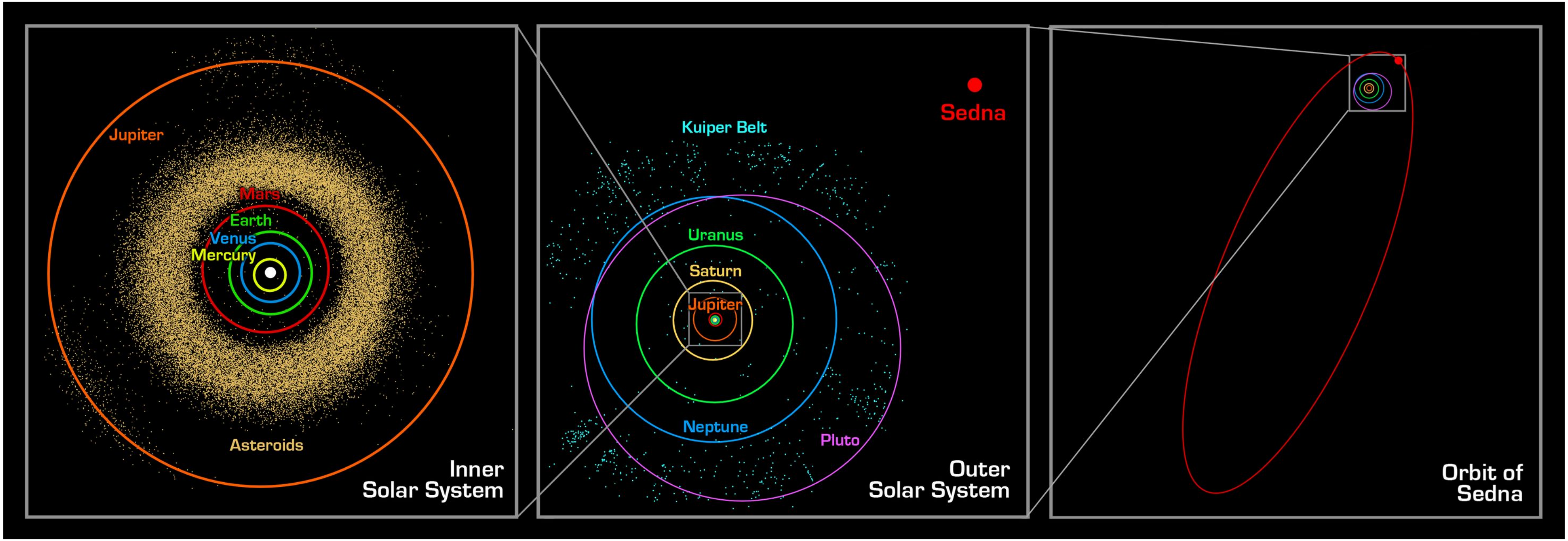
The second reason for the widening of the avenue could be that most of the space within the Neptune orbit is occupied and “forbidden” by the other planets due to their gravitational influence. This is not the case beyond Neptune. The third reason is the modus operandi. The “narrow” avenue is mainly associated with the perihelion distances; the widened avenue includes the perihelion distance, the aphelion distance, and the semi-minor axis.

Please note that the previous slides 40–42, concerning the shift of the main axis at the Rio San Juan, are a preliminary attempt to explain this phenomenon. This should be seen as a possibility and is not strictly intended as the final solution.

Nevertheless, the overall picture is not much affected by the way the calculation is done. Thus, we are dealing with a very robust relation. Irrespective of the well-defined planetary correlation, the probability that the connection with Sedna was planned by the master builders appears to be very high.



Sedna, detected in 2003, will reach its perihelion in 2076.



Oort_cloud_Sedna_orbit.jpg: Image courtesy of NASA / JPL-Caltech / Robert L. Hurt (arrangement of pictures modified and fourth picture, the Oort cloud, omitted)

Estimated number of *undetected* Sedna-like objects (Sednoids): 40–120 [22]. Since the orbits are rather different in size and shape, the number of alternatives to Sedna is small, if not zero.

[22] Brown, M. E.: The largest Kuiper belt objects. in “The Solar System Beyond Neptune”, Univ. of Arizona Press (2008) 335 pdf

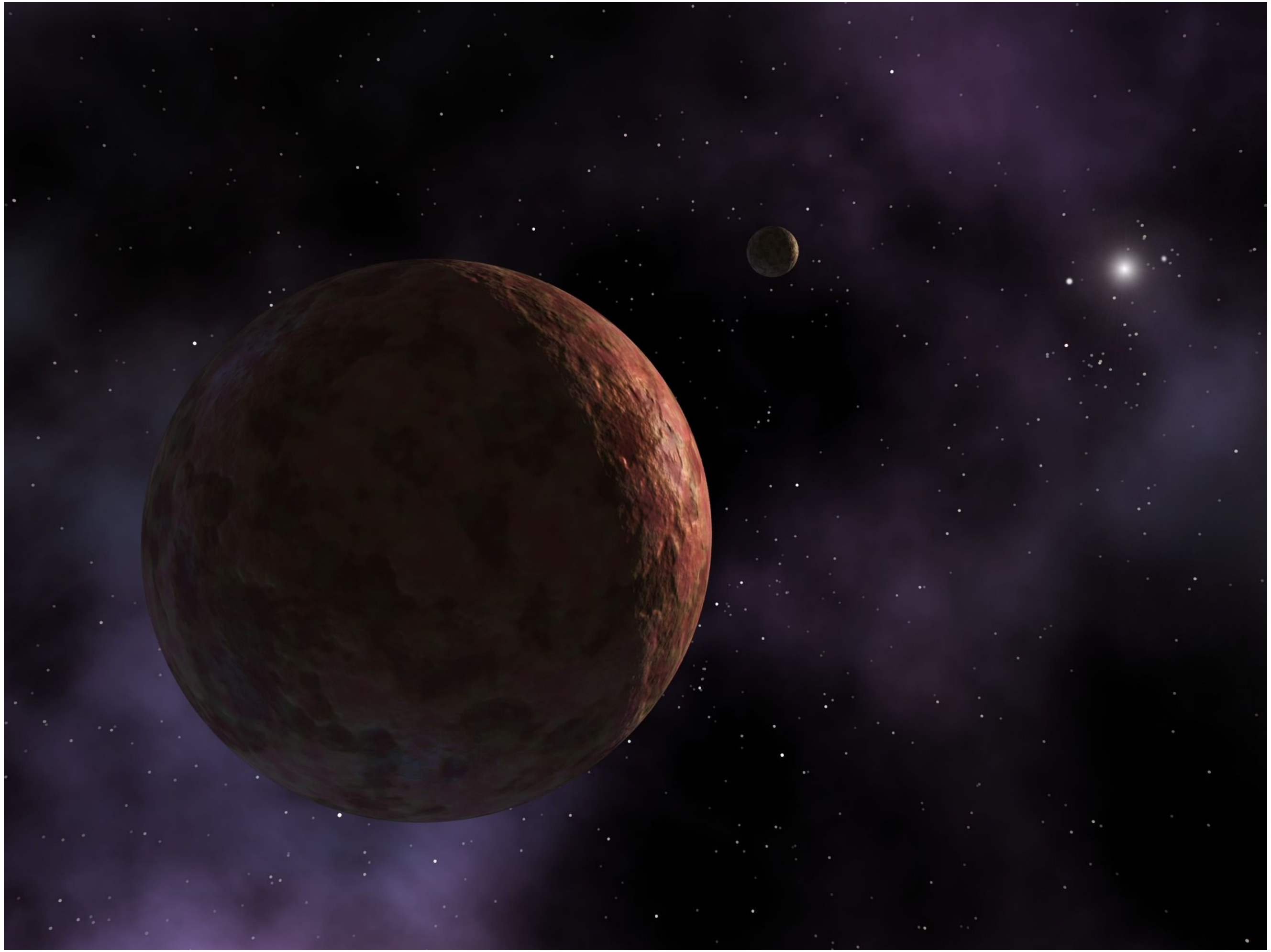
5. Temple of Quetzalcoatl

Sedna and the distant Sun

If the connection of the pyramid site to Sedna was really intended by the master builders, the following questions arise:

What is so special about Sedna, so far outside the solar system?

Does a connection between Quetzalcoatl and Sedna exist?

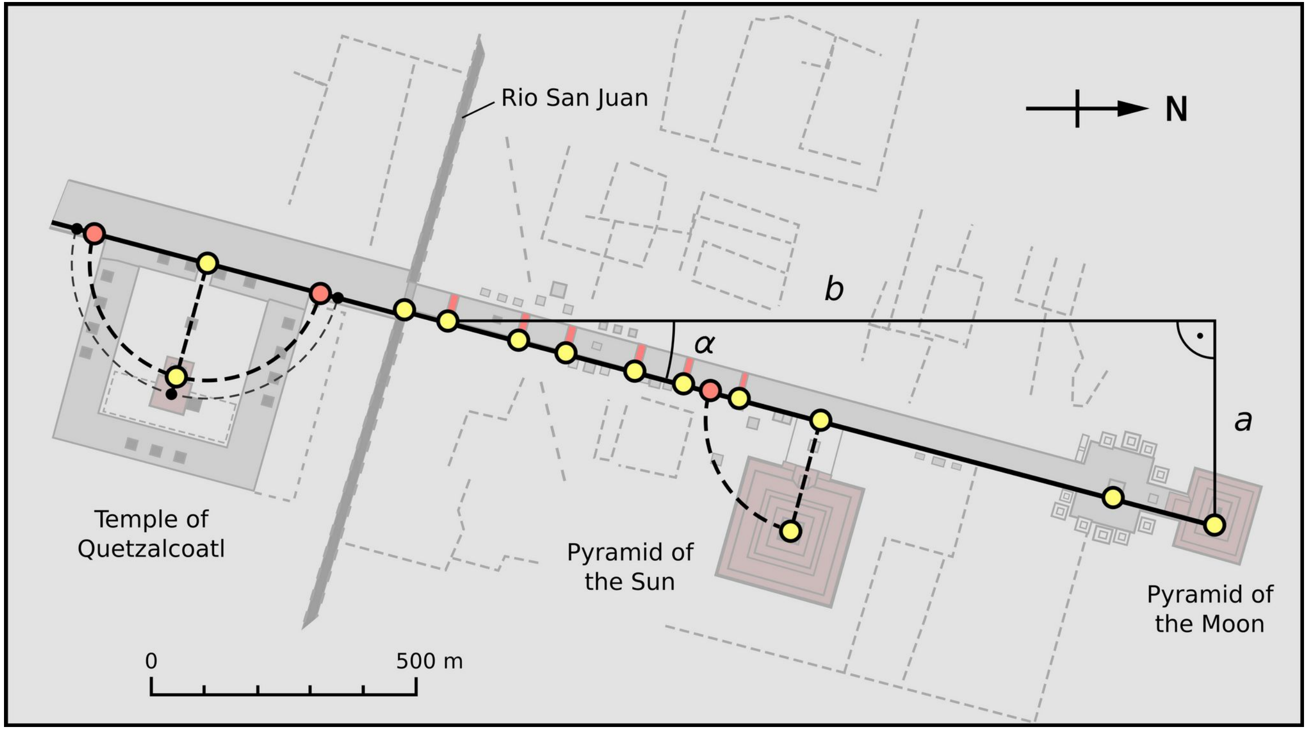


Artist's visualization of Sedna, author: NASA/JPL-Caltech/ R. Hurt (SSC-Caltech)

The distances *a* and *b* can be calculated from the GPS data By using the main axis (yellow points) and $\alpha = \arctan(a/b)$, we get approx. 15.28° ± 0.11°.

If the angle is determined using platforms on the center line of the avenue, we obtain probably more exactly $\alpha = 15.45° \pm 0.03°$.

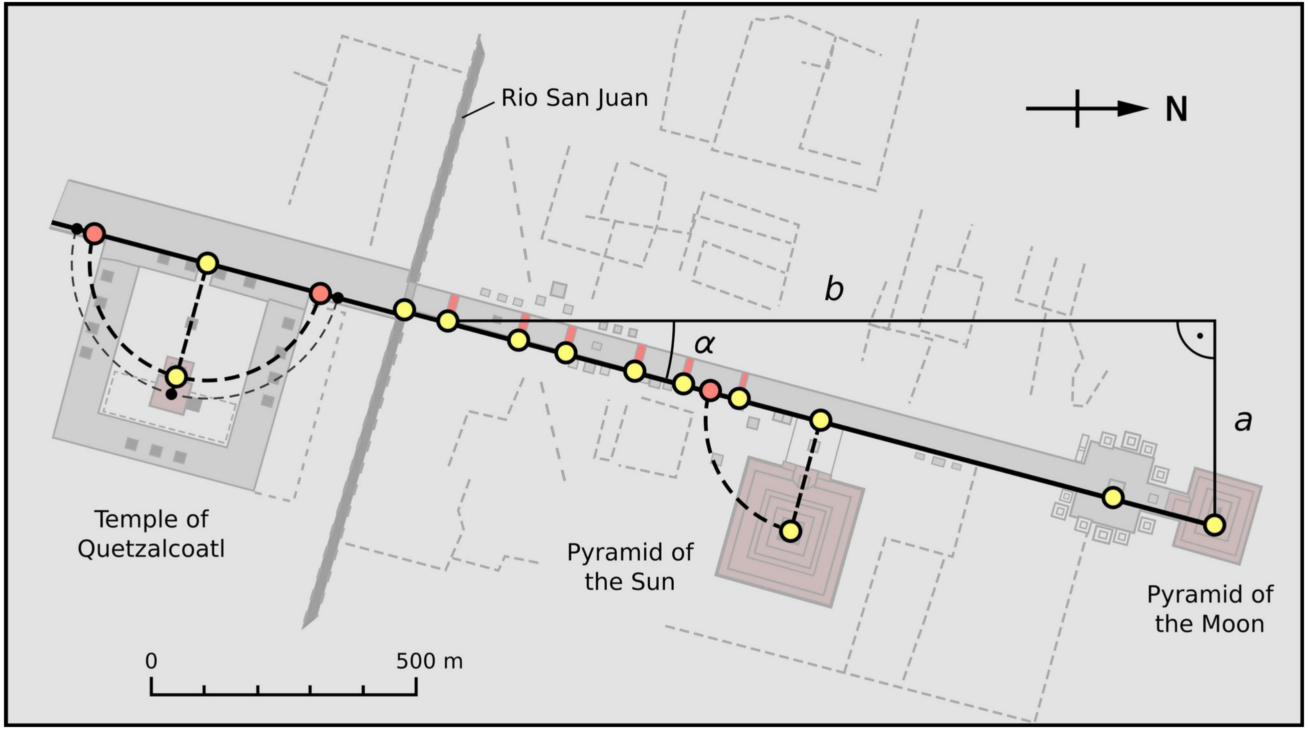
Does this angle have a meaning?



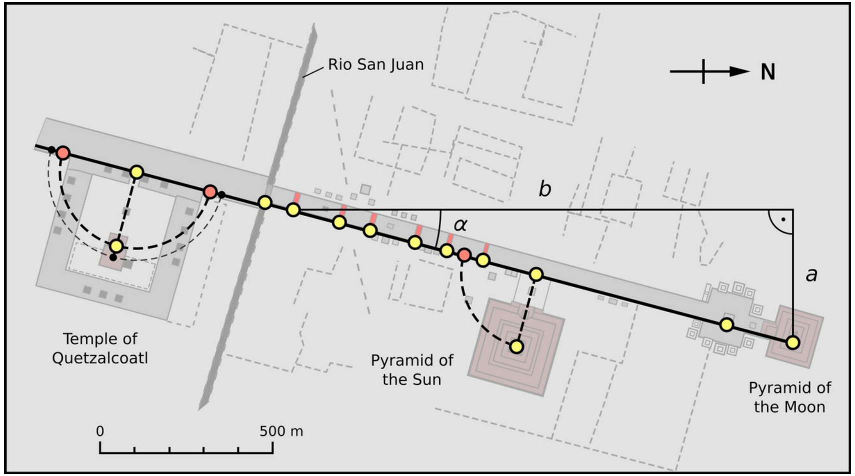
The distances *a* and *b* can be calculated from the GPS data By using the main axis (yellow points) and $\alpha = \arctan(a/b)$, we get approx. 15.28° ± 0.11°.

If the angle is determined using platforms on the center line of the avenue, we obtain probably more exactly $\alpha = 15.45° \pm 0.03°$.

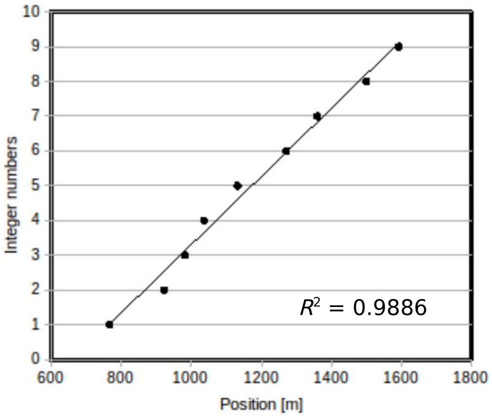
If exactly 15° was intended, the angle would describe the apparent motion of the Sun in the sky over <u>one hour</u>. This would include the dimension of "time." Perhaps, the angle was exactly 15°, e.g., in the year 9800 BC (polar motion).

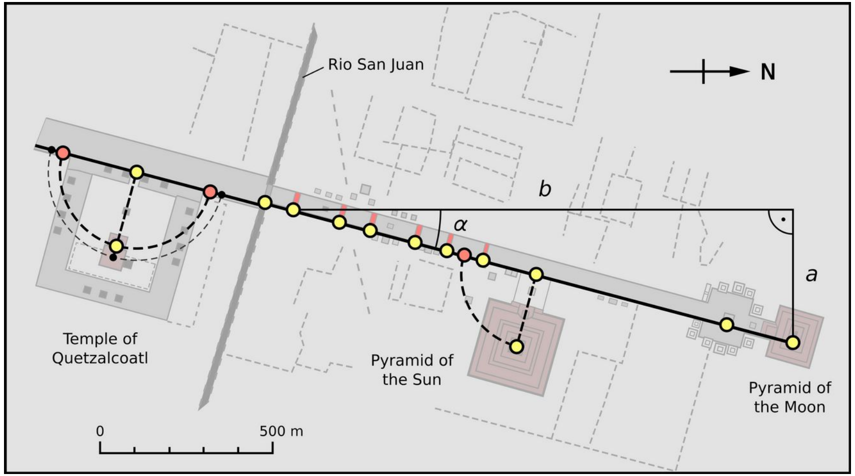


Something always fits?



A constructed example: Correlation of the 9 essential positions on the avenue (incl. the “asteroid barrier”) with the numbers 1–9





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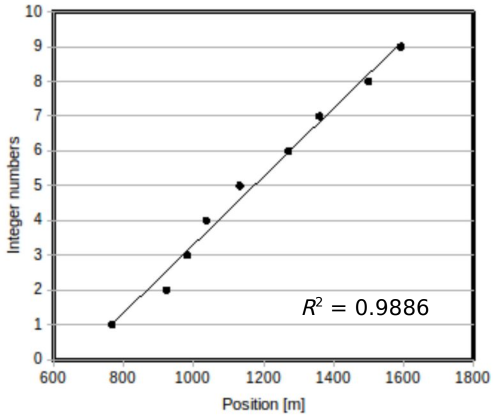
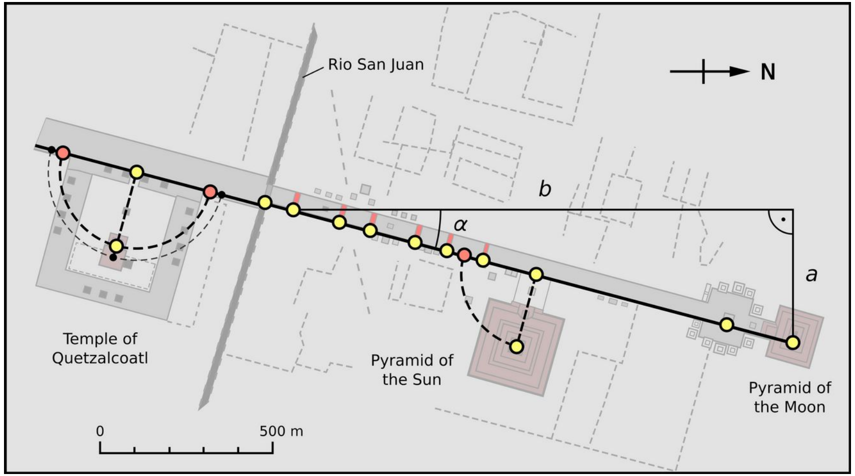


Titius-Bode law: $\boxed{a\ [\mathrm{AU}] = 0.4 + 0.3 \cdot 2^n}$ with $n = -\infty, 0, 1, 2, \ldots$

Mercury, Venus, Earth, ...

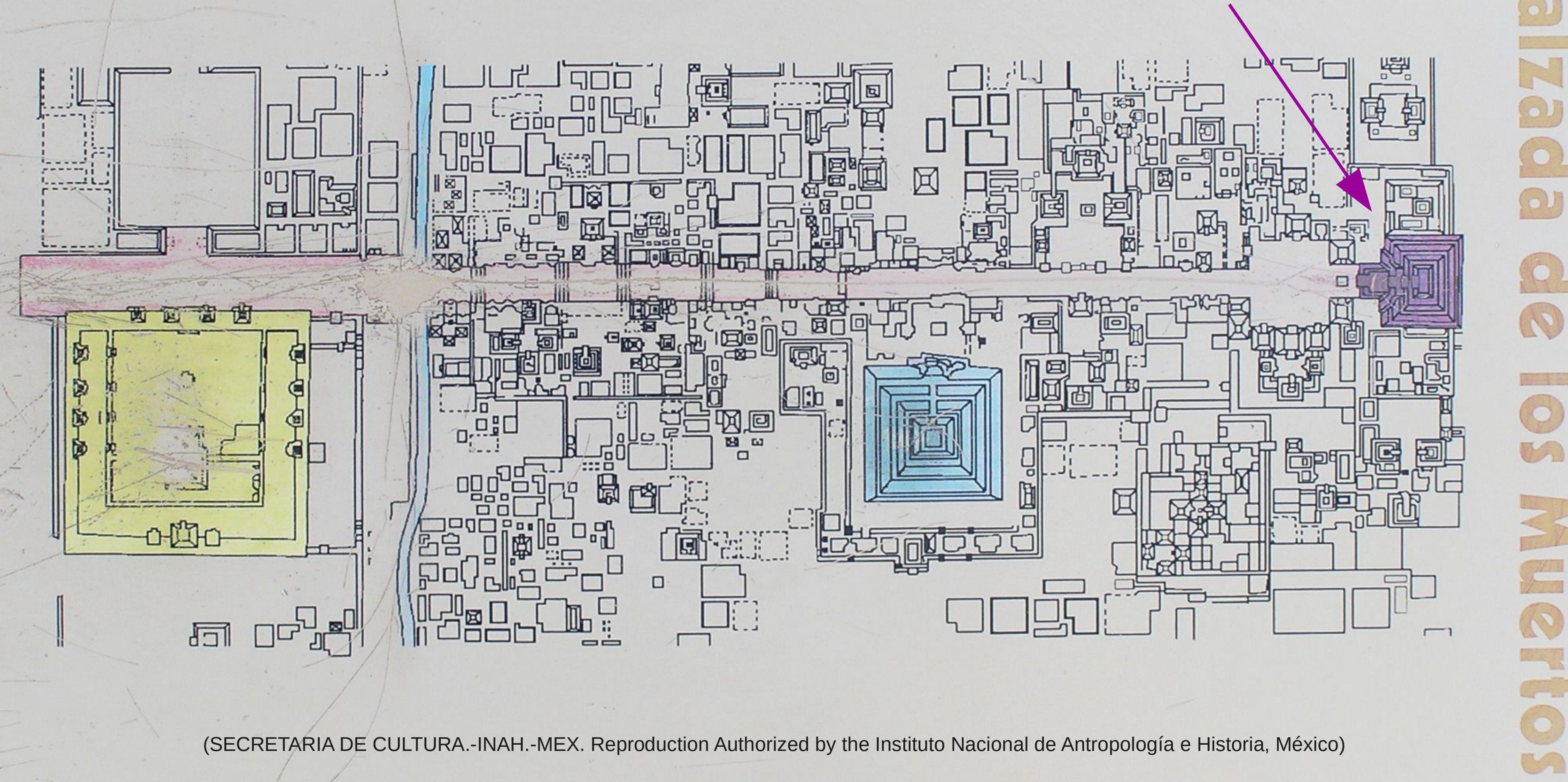
This means that the above R^2 simply reflects the regularity of the exponential Titius-Bode law. It is still consistent with the significance of the planetary correlation.

(By using the astronomical quantities log(q/km) and the numbers 1–9 without 5, we obtain R^2 = 0.9931.)



- The real R^2 is 58 to 118 times closer to 1 than the "constructed" R^2.
- There are neither too many nor too few markings on the avenue.
- The full length of the avenue is used. It is neither too long nor too short.
- The solid barriers do not make sense, except as markers.
- The "Pyr. of the Sun" represents Earth. (makes sense, our planet)
- It simultaneously defines the position of Mercury (the first planet).
- The Pyramid of the Moon is a bold marker for the Sun (radius).
- Thus, the size relation "Moon Pyramid"–barriers is adequate.
- With Eq. (3), the eighth planet Neptune has the number 8 on both axes in the diagram (slide 31). The "Sun point" is at the origin of the diagram, as the Sun represents the center of the solar system.
- The Rio San Juan differs from the other markers. It reflects the transition from the planetary area to the wide trans-Neptunian space. Accordingly, the avenue becomes broader when passing the river.
- Eq. (3) represents ten equations. The planetary correlation (R^2) is independent of the choice of the units of length, of the logarithmic base, and of the zero position of the logarithmic scale (Pyramid of the Moon). With Sedna we even have thirteen equations.

The platform at the top of the pyramid, with its elongated shape and orientation, looks similar to the barriers.
This confirms that the pyramid is just a bold marker at the origin of the scale, representing the Sun.



8. Summary

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$$\log_3\left(\frac{q_i}{R_{Sun}}\right) = \frac{d_i}{u_{Sun}}$$

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- One barrier belongs to the asteroid belt. This leads to the question: Did a former planet exist between Mars and Jupiter? ($q \approx 2.36$ AU)

$$\log_3\left(\frac{q_i}{R_{Sun}}\right) = \frac{d_i}{u_{Sun}}$$

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- The 8 planets and the Sun are represented by the logarithms of the perihelion distances and the solar radius, respectively ($R^2 = 99.98$ %).

$$\log_3\left(\frac{q_i}{R_{Sun}}\right) = \frac{d_i}{u_{Sun}}$$

- One barrier belongs to the asteroid belt. This leads to the question: Did a former planet exist between Mars and Jupiter? ($q \approx 2.36$ AU)
- Some renaming seems appropriate:

"Pyramid of the Moon"	$\rightarrow$	Pyramid of the Sun
"Pyramid of the Sun"	$\rightarrow$	Pyramid of the Earth
"Avenue of the Dead"	$\rightarrow$	Avenue of the Planets (Calzada de los Planetas)

- A planetary correlation has been discovered in Teotihuacán.
- The central avenue provides an astronomical scale.
- Pyramids, river, barriers, and the temple define markers on the scale.
- The 8 planets and the Sun are represented by the logarithms of the perihelion distances and the solar radius, respectively ($R^2 = 99.98$ %).

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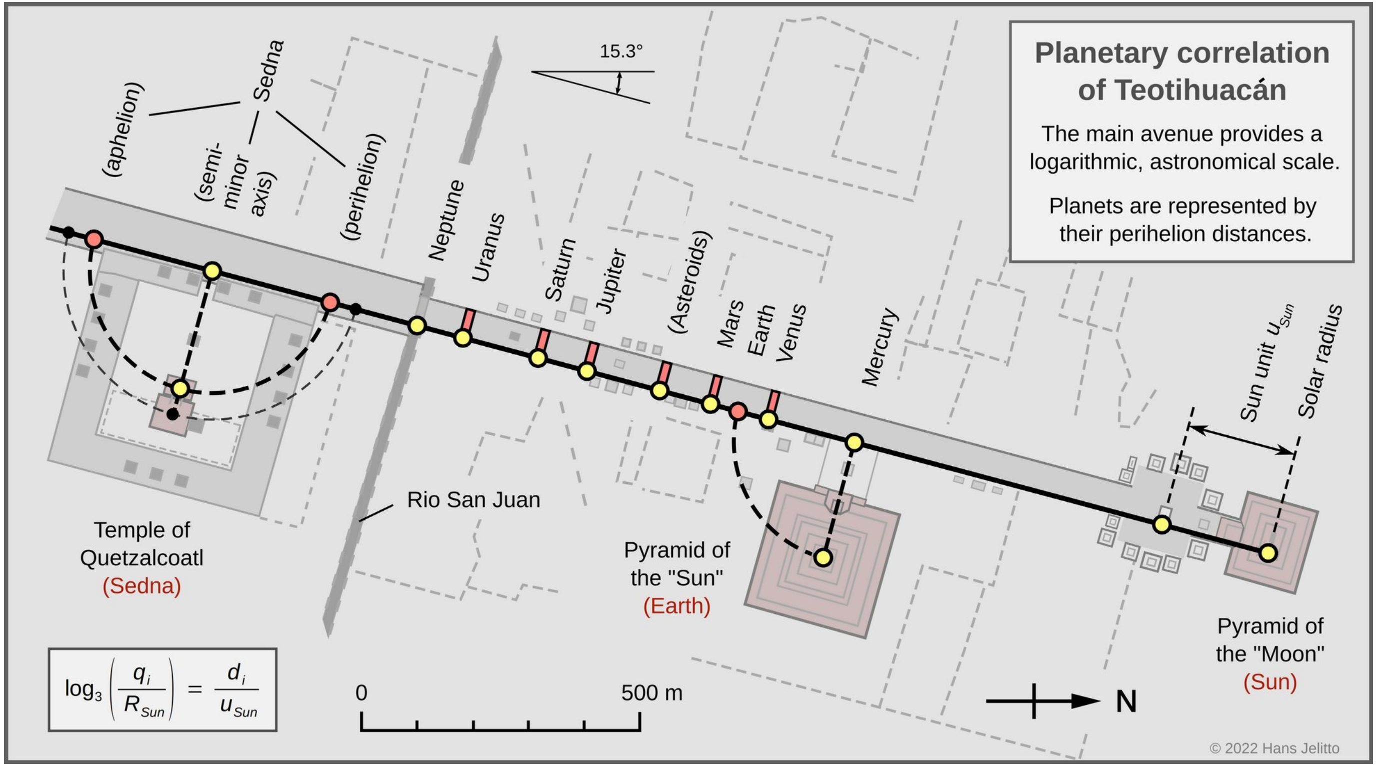
- Temple of Quetzalcoatl $\rightarrow$ TNO Sedna. Does Sedna have a companion? (Adosada platform)
- The main question does not refer to correctness – within their small uncertainties, the data are correct. The question is: "Are these findings altogether a great coincidence or not?" According to the numbers (99.98 %), this is most probably not the case.



The positions of the points at the Citadel correspond to the continuous main axis as shown on slide 40.
(More information is provided in the separate article “Planetary correlation of Teotihuacán.”)

Acknowledgments

I am indebted to Dr. José Martínez Trinidad for driving me to Teotihuacán in 2005. He accompanied me for the entire day at the pyramid site, and thus helped to make this work possible.

My gratitude is expressed to Ms. Nicola Wilton for accurately proofreading the English text.

Furthermore, I would like to thank the Instituto Nacional de Antropología e Historia (INAH) for the permission to use the site plan of the pyramid area of Teotihuacán (slides 4, 5, and 49).

Souvenirs for tourists:
Here, we have the planets!


Thank you for your attention!

[10] Pál, A., Kiss, C., Müller, T. G., et al.: "TNOs are Cool": A survey of the trans-Neptunian region, VII. Size and surface characteristics of (90377) Sedna and 2010 EK_{139}. Astron. Astrophys. 541 (2012) L6, DOI: 10.1051/0004-6361/201218874

[11] Sicardy, B., Ortiz, J. L., Assafin, M., et al.: Size, density, albedo and atmosphere limit of dwarf planet Eris from a stellar occultation. EPSC Abstracts, Vol. 6, EPSC-DPS2011-137-8, EPS-DPS Joint Meeting (2011), Bibcode: 2011epsc.conf..137S

[12] Kiss, C., Marton, G., Parker, A. H., et al.: The mass and density of the dwarf planet (225088) 2007 OR_{10}. (2019), arXiv: 1903.05439, DOI: 10.1016/j.icarus.2019.03.013

[13] Brown, M. E.: On the size, shape, and density of dwarf planet Makemake. Astrophys. J. Lett. 767/1, (2013) L7, arXiv: 1304.1041, DOI: 10.1088/2041-8205/767/1/L7

[14] Braga-Ribas, F., Vieira-Martins, R., Assafin, M, et al.: Stellar Occultations by Transneptunian and Centaurs Objects: results from more than 10 observed events. RevMexAA (Serie de Conferencias), 44, 3–3 (2014), Bibcode: 2014RMxAC..44....3B

[15] Dunham, E. T., Desch, S. J., Probst, L.: Haumea’s Shape, Composition, and Internal Structure. The Astrophysical Journal 877/1 (2019) 41–51, DOI: 10.3847/1538-4357/ab13b3

[16] Ortiz, l., Santos-Sanz, P., Sicardy, B., et al.: The size, shape, density and ring of the dwarf planet Haumea from a stellar occultation. Nature 550 (2017) 219–223, DOI: 10.1038/nature24051

[17] Grundy, W. M., Noll, K. S., Roe, H. G., et al.: Mutual orbit orientations of transneptunian binaries. Icarus 334 (2019) 62–78, DOI: 10.1016/j.icarus.2019.03.035

[18] Rommel, F. L., Braga-Ribas, F., Vara-Lubiano, M., et al.: Evidence of topographic features on (307261) 2002 MS_4 surface. Europlanet Science Congress 2021. Europlanet Society. DOI: 10.5194/epsc2021-440, EPSC2021-440. Retrieved 13 September 2021.

[19] Nimmo, F., Umurhan, O., Lisse, C. M., et al.: Mean radius and shape of Pluto and Charon from *New Horizons* images. Icarus 287 (2017) 12–29, arXiv: 1603.00821, DOI: 10.1016/j.icarus.2016.06.027

[20] Fornasier, S., Lellouch, E., Müller, T., et al.: "TNOs are Cool": A survey of the trans-Neptunian region, VIII. Combined Herschel PACS and SPIRE observations of nine bright targets at 70–500 µm. Astron. Astrophys. 555 (2013) A15, DOI: 10.1051/0004-6361/201321329

[21] Brown, M. E., Butler, B. J.: Medium-sized satellites of large Kuiper belt objects. Astron. J. 156/4 (2018) 164–169, DOI: 10.3847/1538-3881/aad9f2