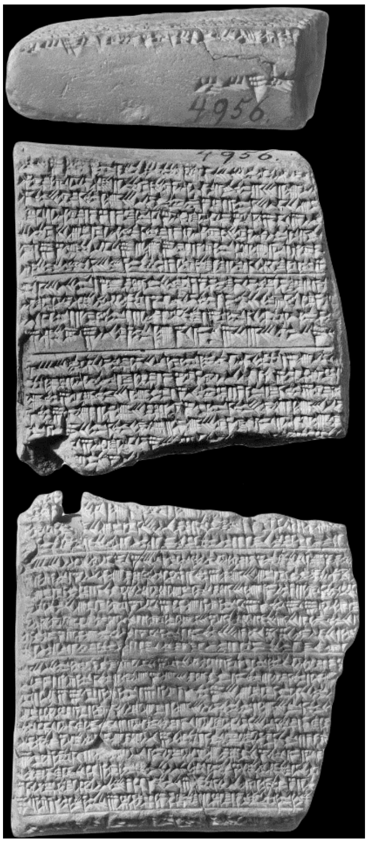
Fact-checking ‘VAT4956.com’

Do all 13 sets of lunar positions on VAT 4956 fit the year 588/7 BCE?

Introduction

The website is another attempt at redating the astronomical diary VAT 4956 from Nebuchadnezzar II’s 37th regnal year. Its anonymous author[1] rehashes some of Dr. Rolf Furuli’s work[2] but presents a few new arguments and material of his own. The conventional dating of the tablet to 568/7 BCE is secure but because Furuli was, until recently, a Jehovah’s Witness (hereafter, ‘JW’), he had an interest in redating this and other astronomical texts to conform to JW dogma about Jerusalem’s destruction at the hands of King Nebuchadnezzar in 607 BCE (rather than the generally accepted year 587 BCE). Furuli claimed that all the lunar positions were ‘real’ and ‘original’ observations, and that all 13 lunar positions ‘perfectly fit the year 588/87’.[3] He also thought the tablet’s planetary data consisted of unidentifiable signs, vague or wrong positions and, when correct, backwards calculations belonging to 568/7 BCE.[4]



VAT 4956 *(Picture credit: cdli.ucla.edu)*

Furuli was excommunicated from the JW community in May 2020. From then on, JWs would likely distance themselves from using his books on chronology in support of their doctrine. I suspect this event – at least in part – was the motivation for the website’s launch two months later in July and it does not mention Furuli or his books on any of its webpages.

The author explains his reasons for the website’s launch on his page titled, “Why re-examine VAT 4956?”[5] There he states that cuneiform translation “must be very difficult” and “each symbol can represent many syllables each

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[1] For simplicity, I shall refer to the author as a male. Apologies if ‘he’ is a ‘she.’

[2] Furuli, R. J. (2013) *Assyrian, Babylonian, and Egyptian Chronology, Vol. II*, Larvik, Awatu Publishers.

[3] Furuli, *ibid.*

> “As for the lunar positions, they perfectly fit the year 588/87, and this indicates that they were copied from one tablet containing real observations from that year.” - p. 133.
>
> “Thus, the lunar positions seem to be original observations from 588/87.” - p. 416.

[4] Furuli*, ibid*., pp. 412, 416.

[5] http://www.vat4956.com/articles.php?1.-why#start. Accessed August 6, 2020.

with multiple meanings."[6] Therefore, he suggests that the tablet is open to interpretation except in at least three details: month lengths, the Metonic cycle,[7] and the predicted lunar eclipse. The three details he thinks undermine the conventional year can be resolved quickly:

Regarding the month lengths, the author believes "[t]he partial pattern recorded on Vat 4956 does not match the pattern of month lengths for the year 568 BC."[8] For instance, on the page discussing Obverse Line 8 and the beginning of Month II[9], he cites Parker & Dubberstein's tables to show Month I only had 29 days instead of the 30 days as given on the tablet. Unfortunately, he was using an early edition of the tables and the discrepancy vanishes in the updated 1956 version.[10]

The author contends that the mentioned intercalary month on the tablet does not fit the natural 19-year Metonic cycle when applied to 568/7 BCE[11] but his arguments are obscure. He provides a series of sky images that he thinks demonstrates this issue, but he has been careless with some of his new month dates. Comparing lunar positions on the correct dates should help clear up the problem.

The objection that the lunar eclipse of July 568 BCE could not be predicted according to an 18-year scheme is discussed later in this article.

Echoing Furuli's stance on the 13 lunar positions, the author writes:

> "This website uses reference works and data that you can verify for yourself that VAT 4956 is better dated to the year 588 BC."

Although similar comparisons between these two years have been made online in the past[12] and the 588/7 BCE lunar positions consistently fared poorly overall, the website's method is a little different. Furuli used the horizon system; other independent researchers (including myself) used equatorial coordinates. The website, quite rightly, applies the ecliptic system.[13] The findings of a recent analysis of thousands of astronomical positions contained in the Diaries "strongly supports the hypothesis that the Babylonian astronomers either directly observed or calculated passages in the ecliptical coordinate system."[14] So let us again test the claim, this time using the website's *own* conditions.

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[6] The website's alternative translations are briefly discussed later on p. 19f.

[7] This is where the Moon returns to approximately the same position in the sky, at the same phase, on the same day every 235 lunations or 19 years.

[8] See the Appendix, '(3) Which year's month lengths harmonize with the ones given on the tablet?' on p. 23 to check this claim.

[9] http://www.vat4956.com/thetablet.php?frontline8. Accessed August 6, 2020.

[10] Parker, R.A. & Dubberstein, W.H. (1956) *Babylonian Chronology: 626 B.C. - A.D. 75*. Providence, R.I., Brown University Press, p. 28.

[11] http://www.vat4956.com/articles.php?metonic-cycle#start. Accessed August 6, 2020.

[12] Mason, D. (2011) https://jwstudies.com/Critique_Part_B__References__of_Jerusalem_Destroyed_part_2.pdf, p. 36-41; Hunger, H. (2010) http://kristenfrihet.se/kf4/reviewHunger.htm. Jonsson, C.O. (2007) http://kristenfrihet.se/kf2/review.htm. All web articles accessed August 27, 2020.

[13] http://www.vat4956.com/articles.php?13-moon-positions#start. Accessed August 6, 2020.

> "How should the measurements be made? 'it appears more reasonable to suppose that the Babylonian astronomers used an ecliptical system' … Each position will be measured using the system described above."

[14] Graßhoff, G. & Wenger, E. (2017) 'The Coordinate System of Astronomical Observations in the Babylonian Diaries' in Steele, J. & Ossendrijver, M. (eds.), *Studies on the Ancient Exact Sciences in Honour of Lis Brack-Bernsen*, Berlin: Edition Topoi, p. 83f.

Conditions and premises for comparing years

I am using,

- Cartes du Ciel 4.2.1.[15]
- Ecliptic coordinates: longitude corresponds to 'behind' and 'in front of' (east or west of the object respectively); latitude corresponds to 'above' and 'below' (north or south of the object respectively).
- Degree conversions: 1° = 4 minutes; 2.2° = 1 cubit.[16]
- Babylon, Iraq as the geographical location.

Also note:

- Like Furuli's analysis, the website has an unprecedented late Babylonian new year, starting it on May 2, 588 BCE.[17]
- Even though the website excludes the Lunar Three intervals, they are added to this examination because they are lunar positions relative to the Sun.
- For brevity, I do not quote from the translation exactly but summarize the relevant tablet details.

I use similar, strict 'traffic light' criteria to the website to distinguish between how well or otherwise the positions match the tablet's details.

> ***Key:***
>
> Green - The position matches that on the tablet; the measured distance is up to 1° of that indicated.
>
> Amber - The position is borderline; the measured difference is between 1° and 1°30' of that indicated.
>
> **Red** - The position does not match the tablet; the measured difference is 1°30' or more than indicated.

Marking a position wrong if it deviates beyond 1°30' is particularly harsh given the primitive methods the ancients had at their disposal and, as acknowledged by the website, the limitations of computer software.[18] Furuli was slightly more forgiving in only declaring a 'bad fit' beyond a deviation of 2°.[19]

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[15] The website uses Cartes Du Ciel software to simulate the historical night sky. Free download at https://www.ap-i.net/skychart/en/start. Accessed August 6, 2020.

[16] The website uses the value of 2.2° per cubit following Fatoohi, L.J., Stephenson, F.R., & Al-Dargazelli, S.S. (1999) 'The Babylonian First Visibility of the Lunar Crescent: Data and Criterion,' *Journal for the History of Astronomy*, 30(1), p. 55. Available at http://articles.adsabs.harvard.edu//full/1999JHA....30...51F/0000055.000.html. Accessed August 17, 2020.

[17] See Appendix: '(1) The Babylonian year never started in May' on p. 22.

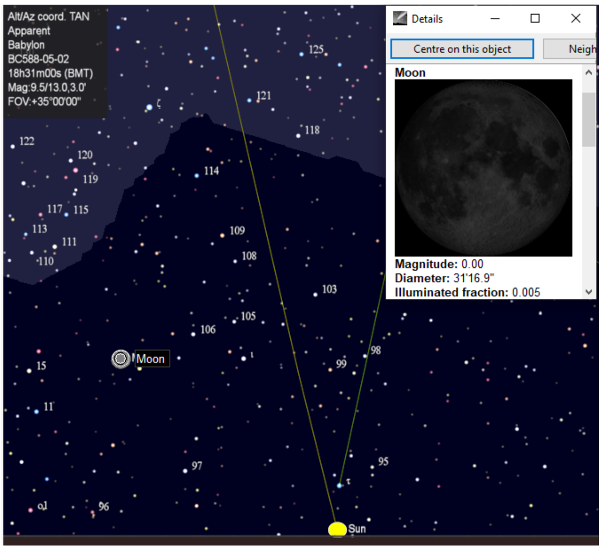
[18] http://www.vat4956.com/articles.php?limitations#start. Accessed August 24, 2020.

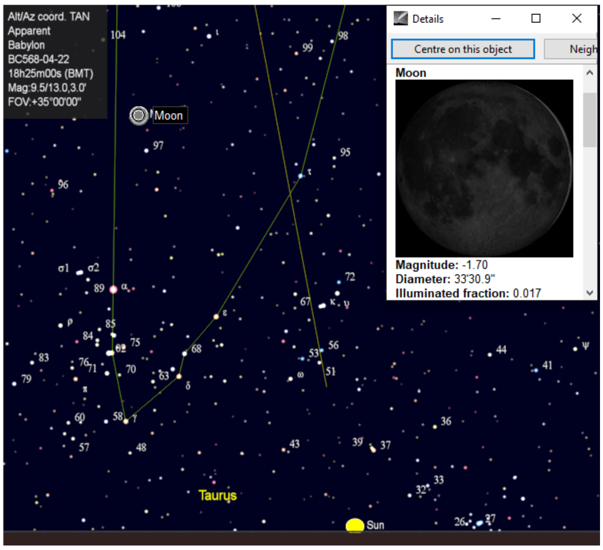
[19] Furuli, *op.cit*., p. 386.

Obverse side

Line 1: Nisanu 1 = May 2, 588 BCE/ April 22, 568 BCE

Moon visible behind Bull of Heaven (Taurus)





No match

Match

Although the Moon was behind the 'Bull of Heaven' for both years, it could not be seen on May 2, 588 BCE. The first crescent would have been sighted on the next evening, May 3.[20] An invisible Moon renders this and the rest of the 588 BCE comparisons invalid as they follow on from this date, and having a visible Moon throws off subsequent comparisons by a day. Even so, let us continue regardless.

Line 3: Nisanu 9 = May 10, 588 BCE / April 30, 568 BCE

Beginning of the night, Moon 1 cubit in front of β Virginis

On May 10, 588 BCE, Cartes du Ciel has the Moon half a cubit *behind* (east of) β Vir. This is 1.5 cubits (3.3°) off from the tablet's stated position. Using the website's criteria for categorizing the measurements (see Key above), we have no match.

	May 10, 588 BCE 20:00	**April 30, 568 BCE 20:00**
	Long.	**Long.**
Moon	+141°40'	+151°57'
β Vir.	+140°40'	+140°57'
Difference	**1° = 0.45 cubit**	**11° = 5.00 cubits**
	No match	No match

The conventional date does not match the tablet's observation either. The Moon was far behind β Vir. and was nearer and in front of γ Vir. on Nisanu

[20] Anderlič, U. *First Lunar Crescents for Babylon -599 to -550* [Online]. Available at https://www.univie.ac.at/EPH/Geschichte/First_Lunar_Crescents/Babylon-0599-0550.htm. Accessed August 17, 2020; Lange, R., Swerdlow, N.M., & Moshier, S. (2006) *Planetary, Stellar and Lunar Visibility 3.1* [Computer program]. Alcyone Software. Free download available at http://www.alcyone-ephemeris.info/planetary_lunar_and_stellar_visibility.html. Accessed August 17, 2020; Parker & Dubberstein, *op. cit*., p. 28, cf. row '588 BCE.' Note that the Babylonian day starts the evening before the listed date (p.26). Also see the Appendix, '(2) Controversial Moon Sightings' on p. 22-3.

9 – a clear mismatch. A similar error occurs later on Line 14 and in an older 7th century BCE astronomical text dated to the reign of Kandalanu. It is possible that, rather than a day error, the scribe confused the names for β and γ Virginis.[21]

Line 4: Nisanu 14 = May 16, 588 BCE / May 6, 568 BCE

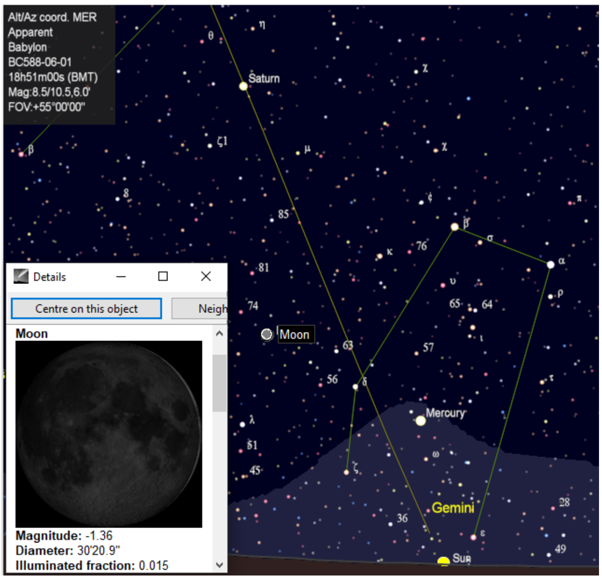
Sunrise to moonset 4°

No sunrise-to-moonset measurement is possible for the date in 588 BCE. The Moon set before sunrise.

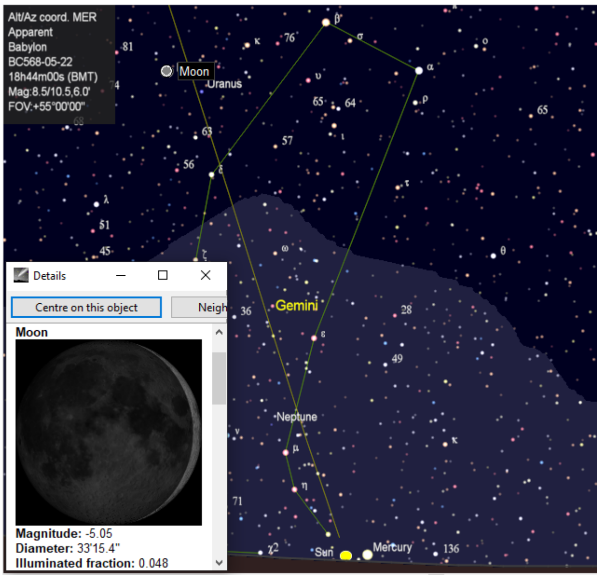
	May 16, 588 BCE	May 6, 568 BCE
Sunrise	05:02	05:12
Moonset	04:29	05:27
Difference	**- 33 min = - 8.25°**	**15 min = 3.75°**
	No match	Match

Line 8: Ayyaru 1 = June 1, 588 BCE / May 22, 568 BCE

Moon crescent 'thick,' visible 'while the sun stood there' …



Thin first crescent



Thick first crescent

The first crescent is described as 'thick' and visible 'while the sun stood there.' This could not have been the case on the 588 BCE date as the Moon was only 1.5% illuminated. With so small an angular distance from the Sun, the slender crescent would not have been bright enough to have been visible "while (part of) the sun [was] still above the horizon"[22]. Contrast this with the

	June 1, 588 BCE 19:30	May 22, 568 BCE 19:30
	Lat.	**Lat.**
Moon	-03°22'	-01°01'
β Gem.	+06°29'	+06°29'
Difference	**9°51' = 4.48 cubits**	**7°30' = 3.41 cubits**
	Borderline	Borderline

[21] Walker, C.B.F. (1999) 'Babylonian Observations of Saturn During the Reign of Kandalanu' in Swerdlow, N.M. (ed.) *Ancient Astronomy and Celestial Divination*, p. 72-3.

[22] Sachs, A. & Hunger, H. (1988) *Astronomical diaries and related texts from Babylonia, Vol. I* (*ADRT I*). Wien: Verlag der Österreichischen Akademie der Wissenschaften, p. 22.

Moon's greater angular distance from the Sun and its 'thick' 4.8% illuminated crescent on May 22, 568 BCE. The website does not discuss this important detail.

… ***4 cubits below β Geminorum***

There is >1° difference from the tablet's figure for both years. According to the website's strict criteria, this would render both positions borderline.

Line 11: Ayyaru 26 = June 27, 588 BCE / June 17, 568 BCE

Moonrise to sunrise, 23°, not observed

At month-end, it was common to record a moonrise-to-sunrise interval (logogram: KUR) on the last morning of lunar visibility before the Moon's conjunction with the Sun. Although the KUR sign is missing on the tablet, it is likely this is what the measurement of 23° refers to. The line comments that the interval was not observed, thus it must have been calculated.

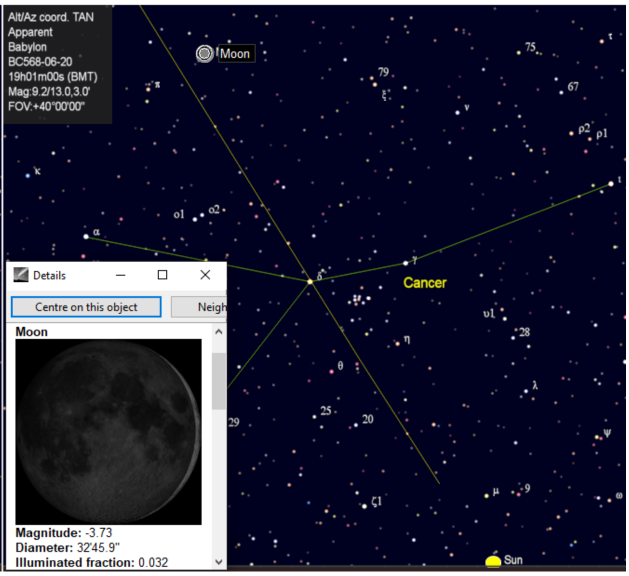
	June 27, 588 BCE	**June 17, 568 BCE**
Moonrise	02:55	03:13
Sunrise	04:46	04:46
Difference	**111 min = 27.75°**	**93 min = 23.25°**
	No match	Match

Line 12: Simanu 1 = June 30, 588 BCE / June 20, 568 BCE

Moon visible behind Cancer, 'thick' crescent …

The Moon could not have been observed on the 588 BCE date. The nearly non-existent crescent was only 0.4% illuminated and too close to the Sun for viewing. The Moon became visible the next evening. Like the website's chosen date for the start of Month I, this also invalidates the rest of the month's comparisons due to the day error. The only agreement with the tablet is the program showing the Moon behind Cancer but both would have set before it was dark enough for any stars to appear. In contrast, the program shows that the 568 BCE date fits the tablet's description.

Moon not visible



Moon visible; 'thick' crescent

… Sunset to moonset 20°

Both computations fall foul of the website's key for indicating a mismatch with the tablet. Even so, one year is wildly out while the other is near the tablet's measurement.

	June 30, 588 BCE	June 20, 568 BCE
Sunset	19:06	19:03
Moonset	19:29	20:35
Difference	**23 min = 5.75°**	**92 min = 23.00°**
	No match	No match

Line 14: Simanu 5 = July 4, 588 BCE / June 24, 568 BCE

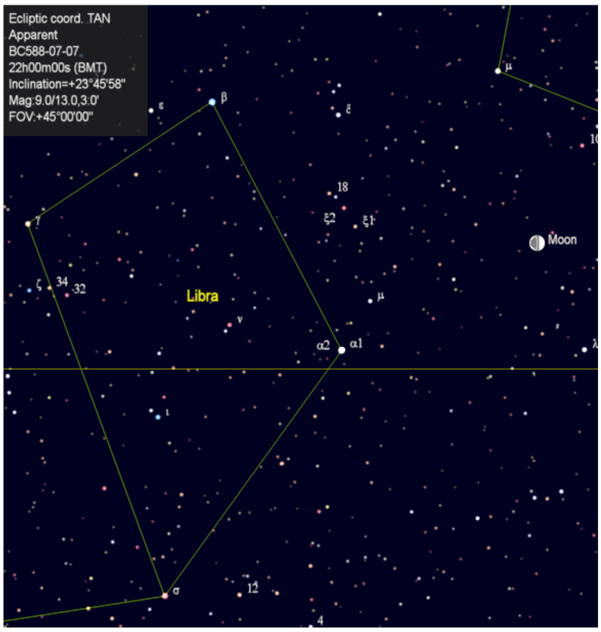
Beginning of the night, Moon passed east 1 cubit <above/below> β Virginis

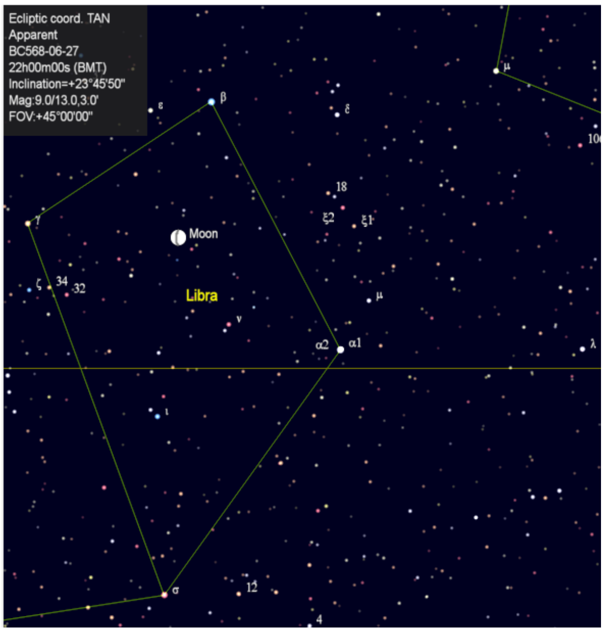
On the 588 BCE date, the Moon's position is consistent with the tablet (disregarding the day error in starting the month). The problem with the 567 BCE date is similar to the mistake on Line 3.

	July 4, 588 BCE 20:00		June 24, 568 BCE 20:00	
	Lat.	**Long.**	**Lat.**	**Long.**
Moon	+02°25'	+145°40'	+04°28'	+156°36'
β Vir.	+00°38'	+140°40'	+00°38'	+140°57'
Difference	**1°47' = 0.81 cubit**	**5°00' = 2.27 cubits**	**3°50' = 1.74 cubits**	**15°39' = 7.11 cubits**
	Match		No match	

Line 15: Simanu 8 = July 7, 588 BCE / June 27, 568 BCE

First part of night, Moon 2½ cubits below β Librae





It is evident from the images above that the Moon was not below β Lib. on the 588 BCE date but was a considerable distance ahead (west) of the Libra constellation. The Moon shifts its position about 12-13° per day and is nearly 11° in front of β Lib. This means its position is *almost a day too early* for the chosen 588 BCE date. The Moon was 'below' β Lib. on July 8.

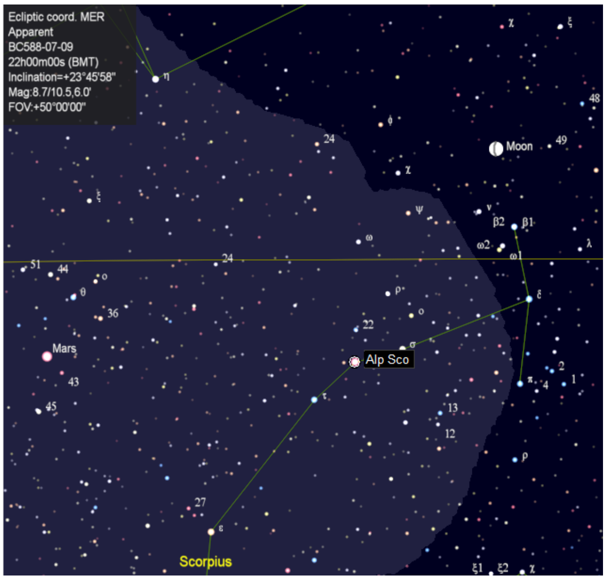
At this point, the author of the website comments, "It is not known whether 'below' is measured with reference to the Eclipic [*sic*] or not."[23] Yet, he already established the method he was applying to his analysis on the '13 Moon Positions' page[24] which included the bullet point, "Below - X is below Y perpendicular to the ecliptic line."

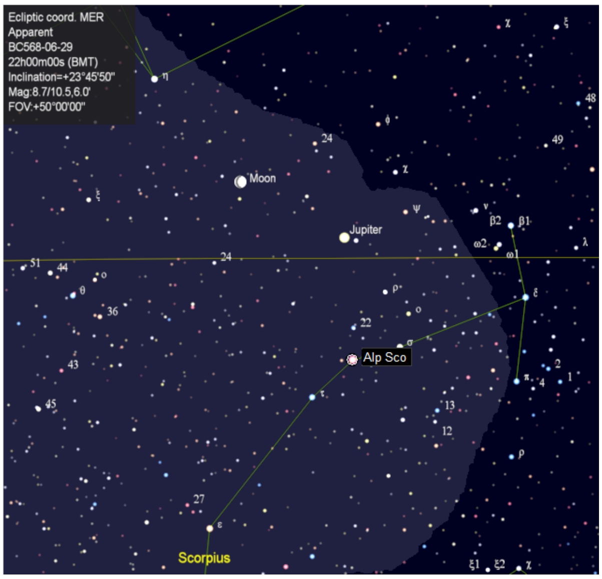
	July 7, 588 BCE 22:00		**June 27, 568 BCE 22:00**	
	Lat.	**Long.**	**Lat.**	**Long.**
Moon	+04°18'	+182°40'	+04°19'	+194°46'
β Lib.	+08°47'	+193°28'	+08°47'	+193°45'
Difference	**4°29' = 2.04 cubits**	**10°48' = 4.91 cubits**	**4°28' = 2.03 cubits**	**1°01' = 0.46 cubit**
	No match		Borderline	

Despite the Moon's position on June 27, 568 BCE being consistent with that on the tablet, the website would categorize its barely >1° deviation in latitude as borderline.

Line 16: Simanu 10 = July 9, 588 BCE / June 29, 568 BCE

First part of the night, Moon balanced 3½ cubits above α Scorpii





[23] http://www.vat4956.com/thetablet.php?frontline15. Accessed September 10, 2020.

[24] Cf. note 13.

'Balanced' (LÁL) was an expression found in older diaries up until the 4th century BCE and it was nearly always used when the two celestial objects shared the same or nearly the same longitude.[25] In 588 BCE the Moon was 'balanced' with a different 'Normal Star,'[26] namely, the 'upper star of the Head of the Scorpion' or β Sco.[27] The 568 BCE Moon's nearest 'Normal Star' was α Sco.

	July 9, 588 BCE 22:00		June 29, 568 BCE 22:00	
	Lat.	**Long.**	**Lat.**	**Long.**
Moon	+04°31'	+208°00'	+03°11'	+218°45'
α Sco.	-04°14'	+213°51'	-04°14'	+214°08'
Difference	**8°45' = 3.98 cubits**	**5°51' = 2.66 cubits**	**7°25' = 3.37 cubits**	**4°37' = 2.10 cubits**
	Borderline		Match	

Line 17: Simanu 15 = July 15, 588 BCE / July 5, 568 BCE

Sunrise to moonset: 7°30', 'omitted' lunar eclipse

No sunrise to moonset measurement was possible on the 588 BCE date. Sunrise was 5 minutes (1.25°) *after* moonset. An unviewable lunar eclipse did take place that morning a few hours after the Moon had set. The 568 BCE date has the calculated interval close to the figure on the tablet.

	July 15, 588 BCE	July 5, 568 BCE
Sunrise	04:53	04:48
Moonset	04:48	05:22
Difference	**-5 min = -1.25°**	**34 min = 8.50°**
	No match	Match

Regarding the 568 BCE lunar eclipse, the author suggests this entry is indicative of a misdated tablet. He seems to believe the Babylonians were unable to predict lunar eclipses apart from the 18-year Saros series and only an eclipse which had been visible 18 years beforehand could be used for predicting the next one:

> "This is one of the key reasons why VAT4956 may be dated incorrectly. …
>
> "… **What is the problem?** in the year 568 BC this lunar eclipse could not have been predicted using the usual 18 year period. This is because saros 59 (which this lunar eclipse in 568 BC belongs to) had not been visible prior to this date. In fact the first time a lunar eclipse belonging to saros 59 was visible from Babylon was 15th July 550 BC.
>
> "The year 588 BC does not have this issue, the lunar eclipse happened below the horizon as the tablet suggests but it could have easily been predicted by the one that occurred 18 years prior."[28]

[25] Graßhoff & Wenger, *op. cit*., p. 85, Tab. 1; Sachs & Hunger, *op. cit*., p. 52, Comments: 11; Neugebauer, P.V. & Weidner, E.F. (1915) *Ein astronomischer Beobachtungstext aus dem 37. Jahre Nebukadnezars II (-567/66).* Berichte über die Verhandlungen der Königl. Sächsischen Gesellschaft der Wissenschaften zu Leipzig: Philologisch-historische Klasse, Band 67, Heft 2, p. 78.

[26] These are reference stars dotted around the celestial sphere approximately in line with the ecliptic.

[27] Sachs & Hunger, *op. cit*., p. 18.

[28] http://www.vat4956.com/thetablet.php?frontline17. Accessed September 14, 2020.

Yet an eclipse *was* somehow predicted and *did* occur in Month III of 568 BCE! On another page devoted to eclipse predictions,[29] the author selectively quotes Prof. John Steele to cast doubt on the Babylonians' ability to predict the 568 BCE eclipse and to imply that scholars merely speculate about another scheme being used. But the author has not included quotes from the same paper where Steele describes an early, simple prediction method.

> "This rule that eclipses can be predicted by simply moving on by 6 or occasionally 5 lunar months from the preceding eclipse possibility is the most basic scheme for calculating eclipses that can be identified. Its use is complicated by the uncertainty as to when the 5 month interval is needed. However, once the months of eclipse possibilities have been identified it is even possible to make a rough estimate of the time of the expected eclipses by measuring the time interval during which the moon and sun had been seen together on the days running up to syzygy. It is easy to see how such a basic method would work."[30]

This method is evidenced by Assyrian astrological reports and Babylonian astronomical texts dating from the 8th century BCE. Steele goes on to discuss these. Perhaps the website's author did not take in the distinction between a 'Saros cycle' and a 'Saros series' that Steele explained:

> By 'Saros cycle,' I mean the period of 223 synodic months containing 38 eclipse possibilities. By 'Saros series,' I am referring to a collection of eclipse possibilities each separated by one Saros of 223 synodic months from the preceding eclipse possibility.[31]

A scheme based on counting 6 (or 5) months from previous eclipses or eclipse possibilities will, of course, contain observations and predictions from *various* Saros families. While it is true that the July 568 BCE eclipse did not have an observable predecessor some 18 years earlier in its Saros family (Series 59), it did have an observable predecessor 6 months earlier from Saros Series 54[32] which would have alerted them to an eclipse possibility in Month III.

This completes the lunar positions on the Obverse side.

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[29] http://www.vat4956.com/articles.php?3.-eclipse-predictions#start. Accessed September 16, 2020.

[30] Steele, J.M. (2000) 'Eclipse Prediction in Mesopotamia,' *Arch. Hist. Exact Sci. 54*, p. 423.

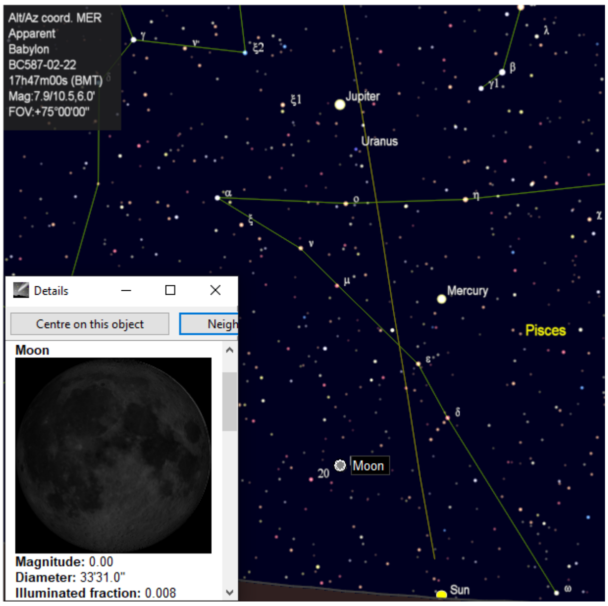
[31] Steele, *ibid*., p. 424.

[32] January 7, 568 BCE, corresponding to Month X of the previous regnal year. See NASA's online 'Five Millennium Catalog of Lunar Eclipses' at https://eclipse.gsfc.nasa.gov/LEcat5/LE-0599--0500.html. Accessed September 14, 2020.

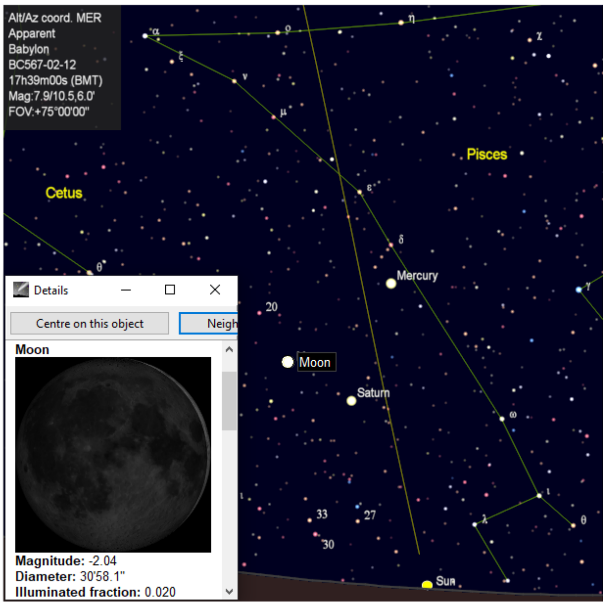
Reverse side

Line 5': Šabatu 1 = February 22, 587 BCE / February 12, 567 BCE

Moon visible in the Swallow (southern Pisces) …



Moon visibility unlikely



Moon visible

The Moon was 'in the Swallow' both years. However, if sunset Feb. 22, 587 BCE was supposed to begin Šabatu 1, lunar visibility would be unlikely because of its low angular distance from the Sun and having less than 1% illuminated fraction. The likelihood of visibility would have been the *next* evening on Feb. 23.[33]

… Sunset to moonset: 14°30'

These differences are over the website's 1°30' threshold for a bad fit, but the 567 BCE interval is closer to the tablet's value.

	February 22, 587 BCE	February 12, 567 BCE
Sunset	17:50	17:42
Moonset	18:29	18:51
Difference	**39 min = 9.75°**	**69 min = 17.25°**
	No match	No match

[33] Cf. note 15. Anderlič's table lists Feb. 22, 587 BCE as the date of first visible lunar crescent but, in the column for the Moon's altitude at the end of civil twilight, he marks it with a 'n' for 'next day.' See also https://www.univie.ac.at/EPH/Geschichte/First_Lunar_Crescents/Main.htm. Accessed August 17, 2020.

Line 6': Šabatu 6 = Feb. 27

First part of the night, Moon surrounded by halo; Pleiades, the Bull of Heaven, and the Chariot [stood in it ....]

Halos come in specific sizes due to uniformly shaped ice crystals in the atmosphere and the angles at which they refract the light. The most commonly seen halo is 22° in radius. Rarely, there are larger 46° ones.[34]

On February 27, 587 BCE, during the first part of the night, the Moon was more than 28° away from the Pleiades. Assuming the scribe wanted to say the constellations 'stood in' the halo (the line is broken, but the phrase is found in many other texts discussing halos so the reconstruction is likely), the question is: Which halo was seen that night? Can we know?

Yes, we can. The ancients had two words for halo: the smaller 22° one was called *tarbaşu* (TÙR), and the larger one of 46° was called *supūru* (AMAŠ). The Introduction to *ADRT I* says,

> "TÙR 'halo'
>
> "Akk. *tarbaşu* 'pen, fold'. … The larger type of halo called *supūru* is not so far attested in diaries."[35]

Therefore, it is the word *tarbaşu* describing the common 22° halo which is used in VAT 4956. Neugebauer and Weidner note the same in their 1915 study of the tablet and add,

> "Halo observations are mentioned quite often in our text. Obv. 3, 5; Rev. 3, 8 report on halos around the sun; Rev. 6, 7, 14, 15 on halos around the moon. The latter are particularly important; indeed, as it is regularly stated which stars and constellations were seen in the halo, an important clue is given for identifying them by approximately fixing the limits."[36]

Lunar halos can only be a useful aid for identifying stars and constellations if we simulate the observation on the correct date. On the website's 587 BCE date, the Pleiades (already well-attested in numerous earlier texts) fell over 6° beyond the 22° halo limit which mismatches the tablet. In contrast, on the correct date for Šabatu 6,

	Angular separation from Moon	
	February 27, 587 BCE 21:00	February 17, 567 BCE 21:00
Alcyone	28°28'	19°22'
Aldebaran	17°39'	08°57'
Chariot "Northern part of Taurus" (β Tauri)[37]	10°24'	09°01'

[34] For a quick overview on halos, see http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/opt/ice/halo/22.rxml and http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/opt/ice/halo/46.rxml. Accessed August 6, 2020.

[35] Sachs & Hunger, *op. cit.,* p. 33; Gelb, I.J., et al. (1956–2010) *The Assyrian Dictionary of the Oriental Institute of the University of Chicago*. Chicago: The Oriental Institute of the University of Chicago. Vol. 15, p. 398; Vol. 18, p. 221-2.

[36] O'Maly, A. (2011) *English translation of "Ein astronomischer Beobachtungstext aus dem 37. Jahre Nebukadnezars II (-567/66)" by Paul V. Neugebauer and Ernst F. Weidner (1915)*, [p. 41]. Available at https://www.academia.edu/1649244/English_translation_of_Ein_astronomischer_Beobachtungstext_aus_dem_37_Jahre_Nebukadnezars_II_567_66_by_Paul_V_Neugebauer_and_Ernst_F_Weidner_1915_. Accessed August 23, 2020.

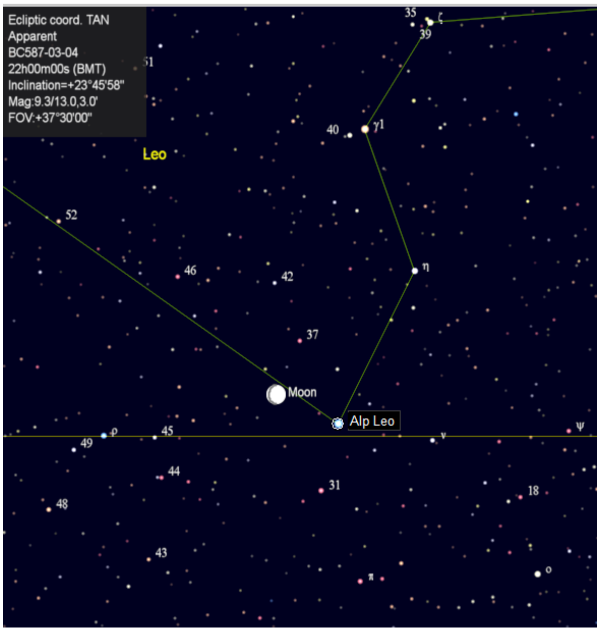
[37] Hunger, H. and Pingree, D. (1999). *Astral Sciences in Mesopotamia*, Leiden: BRILL, p. 271. I have used the 'northern reins of the Chariot' (β Tauri) as the reference here.

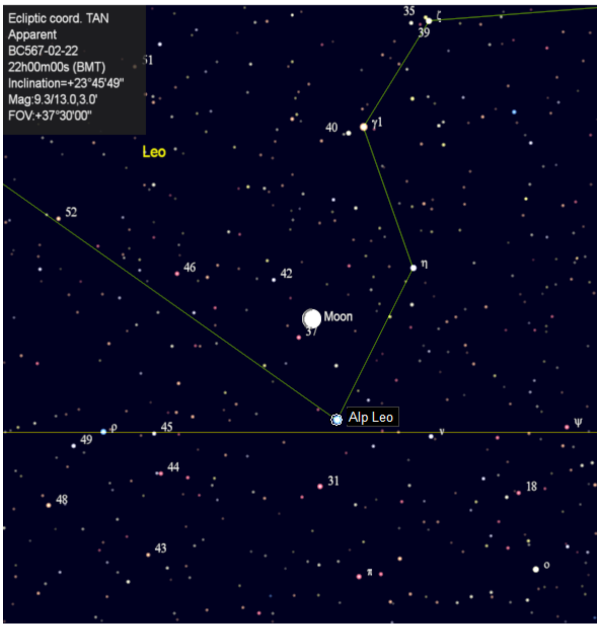
i.e. February 17, 567 BCE, the Moon was 19°22' away from the cluster and thus within the halo's parameter.

Line 7': Šabatu ? = March 4, 587 BCE / February 22, 567 BCE

α Leonis balanced 1 cubit below Moon

The tablet has no date for this entry but it would have fallen somewhere after day 6 and before mid-month. The Moon is closest to α Leo. on Šabatu 11 for both calendars.





In terms of latitude, the 587 BCE Moon scrapes above α Leo. by less than a degree. The two objects cannot be described as 'balanced' as the Moon has moved noticeably east of the star. In contrast, the 567 BCE Moon and star appear close in longitude.

	March 4, 587 BCE 22:00		February 22, 567 BCE 22:00	
	Lat.	**Long.**	**Lat.**	**Long.**
Moon	+01°10'	+115°49'	+03°13'	+115°06'
α Leo.	+00°21'	+114°05'	+00°21'	+114°21'
Difference	**0°49' = 0.37 cubit**	**1°44' = 0.79 cubit**	**2°52' = 1.30 cubits**	**0°45' = 0.34 cubit**
	Borderline		Match	

Using the website's criteria, the difference from the tablet's measurement of 2.2° (1 cubit) is 1°23' and would render the 587 BCE position borderline. For the 567 BCE date, the Moon's position is consistent with the tablet's detail both in distance and placement.

Line 8': Šabatu 13 or 14 = March 8 or 9, 587 BCE / February 25 or 26, 567 BCE

Sunrise to moonset, 17° (text: 7), not watched

This Lunar Three entry is inconclusive for both 587 BCE and 567 BCE as the entry is undated but I have included it for the sake of completeness.

The conventional year 567 BCE:

The sign for '7' appears at the beginning of the line on a worn edge and the *ADRT I* transliteration notes this figure. '17' is a 'correction' based on the computation found in Neugebauer and Weidner's 1915 study. The authors calculated that the measured interval after opposition amounted to 84 minutes (21°). On this basis, Neugebauer and Weidner concluded the tablet's figure '7' was an error for '17.'[38] However, they may have been unaware that, on this occasion, a sunrise-to-moonset interval could also have been taken *just before* opposition in the morning of February 25 which would have yielded a figure closer to 7°.

February 25, 567 BCE before opposition	**Time**	**February 26, 567 BCE** after opposition	**Time**
Sunrise	06:43	Sunrise	06:42
Moonset	07:02	Moonset	07:38
Difference	**19 min = 4.75°**	**Difference**	**56 min = 14.00°**

Prof. Hermann Hunger stated the number should not have been corrected to '17' here, particularly since the observer says "I did not watch," thereby indicating a calculation.[39] An updated transliteration and translation of the diary have left out the 'correction,' retaining the original '7.'[40]

The website's year 587 BCE:

As with 567 BCE, timing sunrise-to-moonset was also possible before opposition in this month. So, here are the two options for the website's 587 BCE dates:

March 8, 587 BCE before opposition	**Time**	**March 9, 587 BCE** after opposition	**Time**
Sunrise	06:30	Sunrise	06:29
Moonset	06:36	Moonset	07:07
Difference	**6 min = 1.50°**	**Difference**	**38 min = 9.50°**

Because there is no specific date for the sunrise-to-moonset interval and the tablet indicates the figure was computed, we cannot come to any firm conclusions based on it.

[38] Neugebauer, P.V. & Weidner, E.F., *op.cit.*, p. 70-71. Note that Neugebauer and Weidner calculated the interval on Feb. 27, a.m.

[39] Hunger, H. (2008) Email to Jonsson, C. O., October 11:

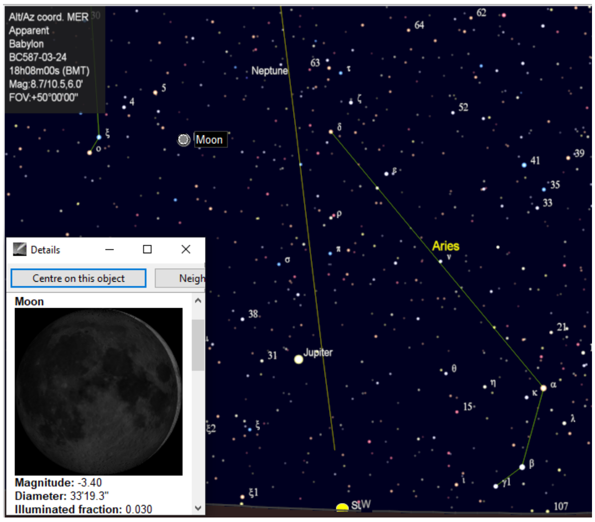
> "I checked my materials for this diary, and it turns out that I simply took over the computation of P.V.Neugebauer. At the time of publication, I had no computer program to find these time intervals on my own, so there was no reason to distrust the earlier authors. In a future edition, one should not 'correct' this number, especially since it is calculated by the Babylonians, as can be inferred from 'I did not watch'."

[40] Online at http://oracc.museum.upenn.edu/adsd/adart1/corpus, under 'AD -567.' Accessed August 23, 2020.

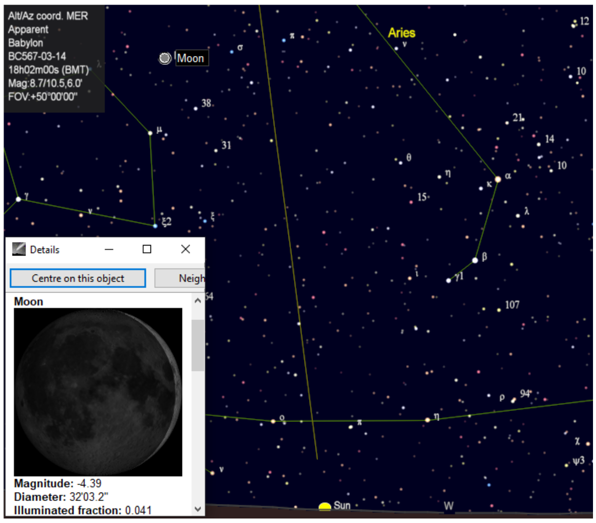
Line 12': Addaru 1 = March 24, 587 BCE / March 14, 567 BCE

Moon visible behind Aries 'while the sun stood there' …

The Moon was behind Aries on both dates and at sufficient angular distance from the Sun for a possible viewing before the Sun had completely dipped below the horizon.



Match



Match

… measured sunset to moonset 25°

Again we see a sunset-to-moonset value that does not work with the chosen 587 BCE date but does fit with the conventional one.

	March 24, 587 BCE	March 14, 567 BCE
Sunset	18:10	18:04
Moonset	19:35	19:47
Difference	**85 min = 21.25°**	**103 min = 25.75°**
	No match	Match

Line 13': Addaru 2 = March 25, 587 BCE / March 15, 567 BCE

First part of the night,[41] Moon balanced 4 cubits below η Tauri (Alcyone)

The 'Rear – Line 13' page displays side-by-side images for March 25, 587 BCE and March 15, 567 BCE:[42]

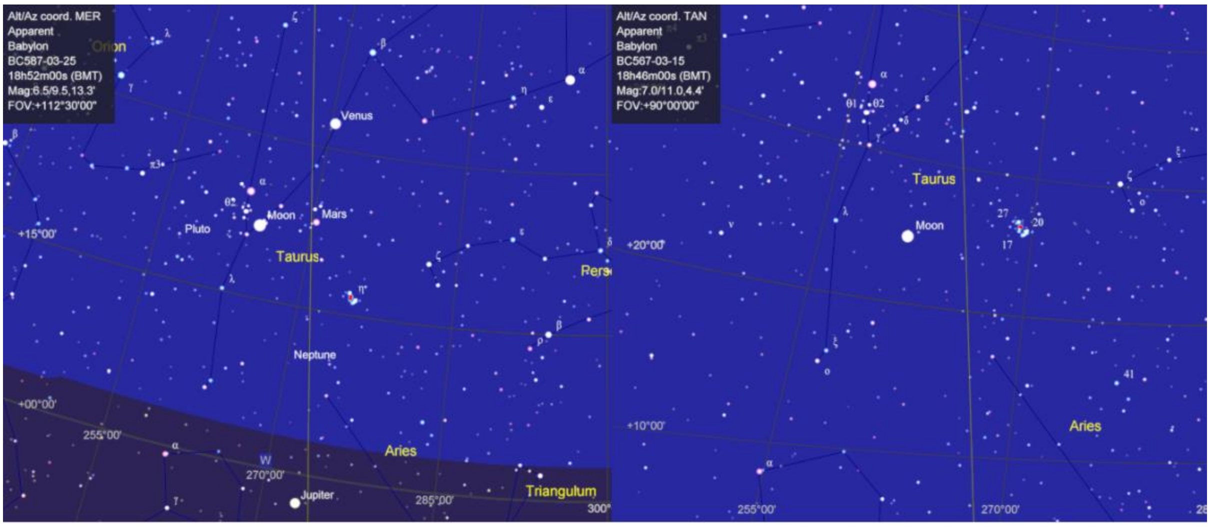
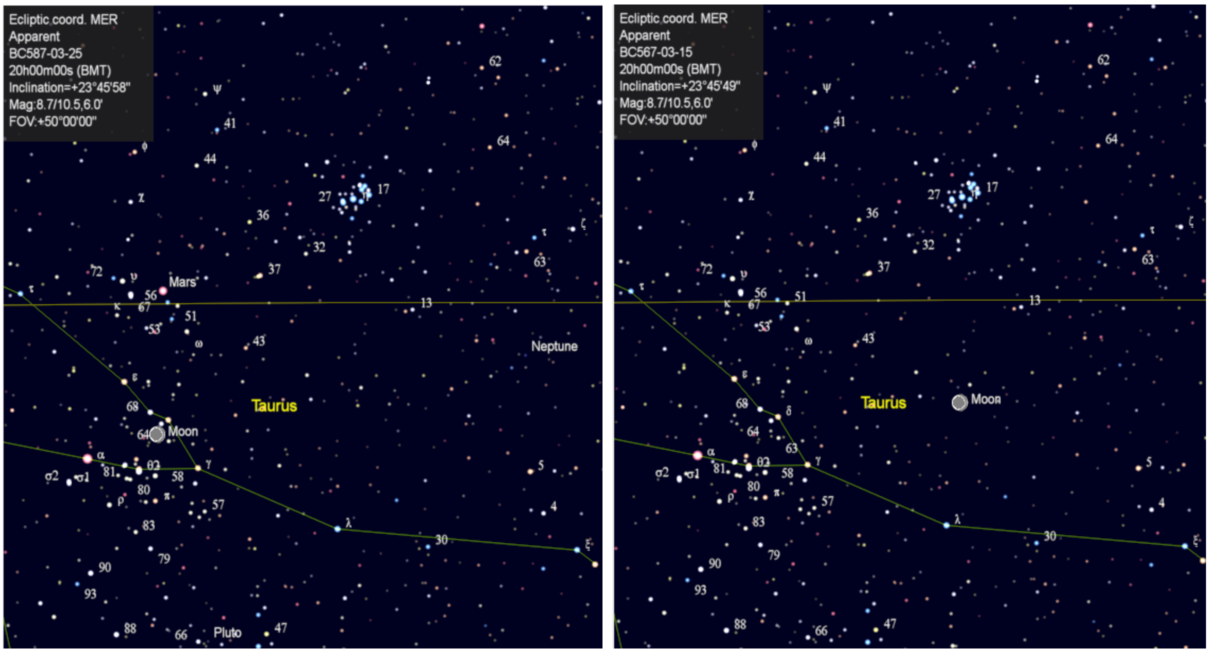


Image taken from VAT4956.com

In reference to η Tauri (marked with a tiny red dot) the author concludes that "in Both [*sic*] years the Moon is not below this star." Again, the author seems to have forgotten that he is using the ecliptic system and is judging positions relative to the horizon instead. Facing the western horizon, the ecliptic path is oriented vertically here (the brown line), and the pictures show that in terms of ecliptic latitude the Moon is clearly below the Pleiades cluster for both years.

The following pictures make this easier to see:



[41] The transliteration includes the detail 'USAN' ('first part of the night') on this line. It is missing from the translation in *ADRT I*.

[42] http://www.vat4956.com/thetablet.php?rearline13. Accessed September 3, 2020.

But can the Moon be described as 'balanced' with the star? In 'the first part of the night,' and as is seen from the picture above and table below, the 567 BCE Moon and η Tauri lie in the same longitude while, for 587 BCE, the Moon is with the Hyades rather than the Pleiades.

	March 25, 587 BCE 20:00		March 15, 567 BCE 20:00	
	Lat.	**Long.**	**Lat.**	**Long.**
η Tauri	+03°47'	+24°05'	+03°48'	+24°21'
Moon	-04°47'	+31°17'	-03°46'	+24°28'
Difference	**8°34' = 3.89 cubits**	**7°12' = 3.27 cubits**	**7°34' = 3.44 cubits**	**0°07' = 0.05 cubit**
	No match		Match	

The webpage's 'Note A' then appeals to Gössmann's lexicon of Babylonian star names[43] to allow for the term normally applied to the Pleiades (MUL.MUL) to mean "the whole constellation of the Bull, or the Jaw of the Bull or Mars (amongst others)" and "the brightest star in the Bull of Heaven (α Tauri)." These alternatives do not work here: the Moon is neither below these bodies (except Mars) nor at the distance specified on the tablet, and MUL.MUL's connection with Mars, according to Gössmann, is astrological – not astronomical.

Line 14': Addaru 7 = March 30, 587 BCE/ March 20, 567 BCE

Moon surrounded by halo. Praesepe and α Leonis [stood] in [it ....]

Halo phenomena have already been discussed for Rev. Line 6'. Both years' measurements fall within a 22° halo parameter.

	Angular separation from Moon	
	March 30, 587 BCE	**March 20, 567 BCE**
α Leo.	14°28'	18°16'
Praesepe	08°27'	04°40'
	Match	Match

Line 16': Addaru 12 = April 5, 587 BCE / March 26, 567 BCE

Sunrise to moonset, 1°30'.

The measurement was very small – only 6 minutes. No sunrise-to-moonset interval could be measured for the 587 BCE date because the Moon set 42 minutes before the Sun rose.

	April 5, 587 BCE	**March 26, 567 BCE**
Sunrise	05:52	06:06
Moonset	05:10	06:08
Difference	**-42 min = -10.50°**	**2 min = 0.50°**
	No match	Match

This completes the lunar positions on the Reverse side.

[43] Gössmann, P.F. (1950) *Planetarium Babylonicum oder die sumerisch-babylonischen Stern-Namen*. Sumerisches Lexikon. Roma, Verlag des Päpstlichen Bibelinstituts. Available at https://webspace.science.uu.nl/~gent0113/babylon/downloads/goessmann_planetarium_babylonicum_1950.pdf. Accessed August 30, 2020.

Results

Tablet date	Detail	588/7 BCE	568/7 BCE
Nisanu 1	Moon visible	No match	Match
	behind Bull of Heaven	Match	Match
Nisanu 9	Moon 1 cubit in front of β Vir.	No match	No match
Nisanu 14	Sunrise to moonset 4°	No match	Match
Ayyaru 1	Moon crescent 'thick,' visible 'while the sun stood there'	No match	Match
	Moon 4 cubits below β Gem.	Borderline	Borderline
Ayyaru 26	Moonrise to sunrise, 23° (calculated)	No match	Match
Simanu 1	Moon visible behind Cancer, 'thick' crescent	No match	Match
	Sunset to moonset 20°	No match	No match
Simanu 5	Moon passed east 1 cubit <above/below> β Vir.	Match	No match
Simanu 8	Moon 2½ cubits below β Lib.	No match	Borderline
Simanu 10	Moon balanced 3½ cubits above α Sco.	Borderline	Match
Simanu 15	Sunrise to moonset: 7°30'	No match	Match
	'Omitted' lunar eclipse	Match	Match
Šabatu 1	Moon visible in the Swallow	Borderline	Match
	Sunset to moonset: 14°30'	No match	No match
Šabatu 6	Moon surrounded by halo; Pleiades, the Bull of Heaven, and the Chariot [stood in it ....]	No match	Match
Šabatu 11?	α Leo. balanced 1 cubit below Moon	Borderline	Match
Addaru 1	Moon visible behind Aries 'while the sun stood there'	Match	Match
	Sunset to moonset 25°	No match	Match
Addaru 2	Moon balanced 4 cubits below η Tau.	No match	Match
Addaru 7	Moon surrounded by halo. Praesepe and α Leonis [stood] in [it ....]	Match	Match
Addaru 12	Sunrise to moonset, 1°30'	No match	Match

"The year with consistent results is 588 BC," claims the website.[44] As we can see, when applying the website's conditions and criteria, the year with consistently poor results is 588/7 BCE. The lunar positions again confirm that VAT 4956 is better dated to the year 568/7 BCE.

[44] http://www.vat4956.com/articles.php?13-moon-positions#start. Accessed August 6, 2020.

Some comments on the website's examination of the planetary data

None of the tablet's planetary data harmonize with the year 588/7 BCE. Thus, like Furuli, the website proposes alternative meanings of the logographic signs to make the planetary positions open to interpretation. Apparently, the author has unthinkingly picked out bits and pieces from whatever sign list or lexicon he can find online in support. By doing this, he frequently reduces the tablet's entries to astronomical gibberish. It would be tiresome and inordinately time-consuming to run through all the website's reinterpretations and misunderstandings, but to illustrate with just one example, the website has the following box in its discussion of Obverse, Line 11:[45]

Note A

"The 18th, Venus was balanced 1 cubit 4 fingers below α Leonis"

The symbol LUGAL has many meanings

	LUGAL	Can mean: Jupiter; one of the Seven Twin Stars; α Centauri; α Leonis - P. Felix Gössman; Planetarium Babylonicum (1950) pg 89

Regarding the Severn Twin Stars Gavin White wrote in his book Babylonian Star-Lore pg 389, "More often than not it is difficult to distinguish precisly what stars are indicated, indeed, the commentaries seem to delight in equating one set of 'twin-stars' with any other"

In the morning of Month 2 Day 18 588 BC Venus is visible **above** one of the Seven Twin Stars.

The author cites page 89 of Gössmann's lexicon to corroborate alternative meanings of LUGAL. He neglects to mention that on the very next page (p. 90), Gössmann writes that LUGAL refers to Regulus (α Leonis) in VAT 4956. But are the website's alternative translations in any way viable for this line?

Can LUGAL mean Jupiter here?

Gössmann does link the sign LUGAL with Jupiter on p. 90 but under the category of *astrological* texts. VAT 4956 is not such a text; it does not interpret omens or find astrological associations between various gods. It is a tablet of celestial observations from which almanacs and astronomical tables were compiled and which would contribute to the Babylonians' development of mathematical astronomy.[46] These diaries, therefore, require consistent terminology to be of any use.

In any case, on associating LUGAL with Jupiter in the astrological tablets, Dr. David Brown comments,

> "When any of the names are used in the texts herein considered, they only ever refer to one celestial body … at a time. When ^{mul}lugal is used, for example, either Regulus or Jupiter is meant. No single use of ^{mul}lugal refers to both simultaneously."[47]

Jupiter has already been named ^{d}SAG-ME-GAR in the diary; it cannot be assigned to LUGAL as well.

This would clear up the matter were it not for the website's author having already retranslated ^{d}SAG-ME-GAR as Mars! The tablet's Jupiter phenomena do not fit the year 588 BCE and so the author imagines the scribe might be "concealing Mar's [*sic*] true identity" due to it being considered a "'bad news' planet." Rather, as VAT 4956 is a record of observations and measurements, deliberately hiding Mars' identity would be 'bad news' for the scribe guilty of such a fraud and creating confusion.

[45] http://www.vat4956.com/thetablet.php?frontline11. Accessed August 26, 2020.

[46] Sachs, A.J. & Hunger, H., *op.cit*., p. 11-12; Neugebauer, P.V. & Weidner, E.F., *op.cit*., p. 38.

[47] Brown, D. (2000) *Mesopotamian planetary astronomy-astrology*. Cuneiform Monographs, no. 18. Groningen: Styx Publications, Cambridge, UK: Cambridge University Press, p. 63.

As well as postulating Jupiter's acronychal rising was really Mars' acronychal rising[48], the author also claims, "[e]ach time in 588 BC Mars is in the position described on the tablet (front line 13 Rear line 5 Rear line 12)."[49] Of course, Mars is *not* in those positions the tablet describes for ^{d}SAG-ME-GAR and so the author has to arbitrarily redefine numerous other signs to invent a match for his chosen year. The identifications ^{d}SAG-ME-GAR as Jupiter and LUGAL as Regulus are well-attested in the diaries and their stated positions on VAT 4956 fit 568/7 BCE.

Can LUGAL mean 'one of the Seven Twin Stars' here?

The box uses a quote from Gavin White's book to suggest that the 'twin stars' are hard to identify, but then it provides the alternative translation, "Venus was balanced 1 cubit 4 fingers above one of the Seven Twin Stars," and a link to an image of Venus rising above Gemini on the morning of June 19, 588 BCE.[50]

What is meant by 'one of the Seven Twin Stars'? Some Mesopotamian star lists contain star groups arranged in sevens. One of these groups consists of *māšu-* or 'twin' stars that include pairs from Gemini, Orion, Scorpius, and Libra. The identifications of two other pairs of stellar 'twins' are uncertain but they have been tentatively associated with the Lyra and Centaurus constellations,[51] and it is one of *these* stars designated LUGAL. *LUGAL is not used for any of the stars relating to Gemini*. In fact, Gössmann, notes this. On the same page cited in the box, Gössmann identifies "^{mul}LUGAL (to be read: ^{mul}ḪANIŠ)" as one of the 5th pair in the 'seven twin stars' list and equates it with α Centauri.[52]

Can LUGAL mean α Centauri here?

When addressing similar misinterpretations in his review of Furuli's book, Hunger says that "in astronomical texts, *lugal* can NOT refer to … α Centauri."[53] Crucially, the website has no issue with Venus' identification on this line. Venus travels roughly along the path of the ecliptic and α Centauri lies over 40° below it. The planet and star are never anywhere near each other. Thus, the definition of LUGAL as α Centauri must be ruled out.

None of the three alternative meanings proposed by the website for Obverse, Line 11 are legitimate. The correct translation has Venus above Regulus which is consistent with the conventional date in 568 BCE.

When it comes to deciphering cuneiform writing, one ought first to have a grounding of the language or dialect as well as the culture of the people who wrote it. The rules of grammar, phonology, and context reduce the scope of any possible alternative readings. As Prof. David Marcus explains:

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[48] In 588 BCE, Jupiter's acronychal rising occurred in September – another mismatch with the tablet.

[49] http://www.vat4956.com/thetablet.php?frontline4#note. Accessed August 28, 2020.

[50] http://www.vat4956.com/tabletday.php?BC588-06-19. Accessed August 28, 2020. The box has the line reading that Venus was *below* α Leonis. This is a mistake: the original text has 'above.'

[51] Koch, U. (1995) *Mesopotamian astrology: an introduction to Babylonian and Assyrian celestial divination.* Copenhagen: Museum Tusculanum Press, University of Copenhagen, Carsten Niebuhr Institute of Near Eastern Studies, pp. 198, 199, 208; Koch, J. (1992) 'Der Sternenkatalog

BM 78161,' *Die Welt des Orients*, Bd. 23, p. 47; Weidner, E. (1957-1971). 'Fixsterne' in Weidner, Ernst. and von Soden, Wolfram (eds) *Reallexikon der Assyriologie und Vorderasiatischen Archäologie*, Vol. III, p. 80 (10c). Available at http://publikationen.badw.de/en/rla/index#4099. Accessed August 29, 2020.

[52] Gössmann, *op. cit.* Cf. '183. ^{mul}ḪANIŠ$_2$' p. 73; '265. ^{mul}mâšu' p. 101.

[53] Hunger, H. (2010) http://kristenfrihet.se/kf4/reviewHunger.htm.

> "Interpretation of the signs is assisted by the fact that the scribes practiced vowel and consonant harmony so that there is agreement in normalization between the final vowel or consonant of one sign and the initial vowel or consonant of the following sign. … Where the principle of harmony leads to more than one possibility, knowledge of the grammar and the lexicon determines the correct reading … ***. It has been shown that a combination of three signs in cuneiform could theoretically have over five thousand possible readings, but phonological, morphological, and lexical clues lead to only one correct reading***."[54] [emphasis added]

Moreover, the Diaries have a distinct writing style containing abbreviated or unusual logographic forms specific to the genre.[55] Therefore, care and consideration are needed when translating them so that the result is understandable, consistent, and makes astronomical sense. It is not as simple as opening a book of sign lists and picking any alternative meanings that catch our eye.

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[54] Marcus, D. (2002) 'Akkadian' in Kaltner, J. and McKenzie, S.L. (eds.) *Beyond Babel: A Handbook for Biblical Hebrew and Related Languages.* Atlanta: Society of Biblical Literature, p. 22.

[55] Ossendrijver, M. (2016) 'Translating Babylonian Astronomical Diaries and Procedure Texts' in Imhausen, A. & Pommerening, T. (eds.), *Translating Writings of Early Scholars in the Ancient Near East, Egypt, Greece and Rome. Methodological Aspects with Examples.* Berlin: De Gruyter, p. 125-6; Sachs & Hunger, *op. cit*., p. 36-7.

Appendix

(1) The Babylonian year never started in May

In response to this argument against a 588/7 BCE redating, the website fires out a muddled defence:

> "Not according to Richard A. Parker and Waldo H. Dubberstein in Babylonian Chronology, 626 B.C. – A.D. 45. The latest a year starts during this period according to them is April 26th, just 7 days earlier than May 2nd."

A year start on April 26 is not a year start in May. Hence, Parker & Dubberstein *confirm* that the Babylonian year never started in May.

The first month Nisanu could not fall too far from the spring equinox and certain celestial phenomena had to occur at the right time in the year - not only for religious reasons, but also for agricultural and calendrical ones. As it was, April 22, 568 BCE was already a late new year.

The choice of a May new year for 588 BCE was a forced consequence of Furuli's 'point of departure,' namely, the omitted lunar eclipse that the tablet placed in Month III. Counting backwards from the summer eclipse which occurred on July 15, Furuli arrived at May 2 for the start of Month I.[56] The website has adopted the same calendar resulting from Furuli's flawed premise.

(2) Controversial Moon Sightings

To introduce the possibility that new crescents could have been visible on the chosen 588 BCE dates for Months I and III, the website cites Dr. Louay J. Fatoohi's 1998 thesis[57] which lists and discusses an unprecedented naked-eye observation of a crescent aged 14 hours 36 minutes.[58] The possibility of an exceptionally young Moon being seen in Month III is immediately falsified by the tablet's note about a 'thick' crescent and its accompanying sunset-to-moonset measurement. This leaves 'controversial' Month I.

The circumstances surrounding the unusual naked-eye observation reported in Fatoohi, however, are quite different to those of the ancient Babylonians. According to Bradley E. Schaefer's description of these and other Moonwatch events, which data Fatoohi was drawing from in his study, a group of observers were up a mountain at 1524 meters above sea level, had brought optical aids, and had "pre-calculated the position of the Moon (with respect to the sunset point) for a specific time so they knew exactly where to look."[59] Only one in the group reported that he successfully spotted the Moon with the naked eye.

Apart from the ancients not having modern time-keeping and optical technologies to help them, Babylon lies on a low plain about 34 meters above sea level. High buildings or walls could offer a prime vantage point to view the horizon but they are nowhere near sufficiently elevated to facilitate viewing a Moon so young.

After reviewing reports of the lowest limits of visible new moons, Fatoohi concluded:

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[56] Furuli, *op.cit*., p. 371.

[57] Fatoohi, L.J. (1998) *First Visibility of the Lunar Crescent and Other Problems in Historical Astronomy*. PhD thesis. University of Durham, p. 52: Table 3.1, ref. no. 487, 488, 489; p. 99f. Available at https://core.ac.uk/download/pdf/108191.pdf. Accessed September 28, 2020.

[58] http://www.vat4956.com/articles.php?new-moon-sightings#start. Accessed September 28, 2020.

[59] Schaefer, B. E. (1996) 'Lunar Crescent Visibility,' *Quarterly Journal of the Royal Astronomical Society*, Vol. 37, p. 760. Available at http://adsabs.harvard.edu/full/1996QJRAS..37..759S. Accessed September 28, 2020.

> "The crescent with the smallest elongation that has been seen by the unaided eye and whose detection did not include the use of optical help nor watching from a high place is that of observation 318 which was 9.1° away from the sun at sunset."[60]

Observation 318 dates to November 28, 1913 and involved a Moon aged 16 hours.[61]

The crescent of May 2, 588 BCE (Month I) fell below the 9.1° angular distance from the Sun at sunset and so would not have been visible to the Babylonians' unaided eyes.

(3) Which year's month lengths harmonize with the ones given on the tablet?

The website makes the following claim:

> "The only way to make any year match the pattern recorded on the tablet is if young new moons were observed. The only year that matches completely is the year 588 BC."[62]

3 out of 5 dates the website uses for its month beginnings in 588/7 BCE are *before* the young new moon could be sighted. If the crescent could genuinely be observed,[63] the pattern of month lengths turn out to be the opposite of that detailed on the tablet.

Tablet		**588/7 BCE**		**568/7 BCE**	
Month	***Month length (days)***	*Visible new crescent date*	*Month length (days)*	*Visible new crescent date*	*Month length (days)*
XII_2	**29**	Apr. 3	30	Apr. 22	29
I	**30**	May 3	29	May 22	30
II	**29**	Jun. 1	30	Jun. 20	29
III	**-**	Jul. 1	29	Jul. 20	30
X	**29**	Jan. 24	30	Jan. 14	29
XI	**30**	Feb. 23	29	Feb.12	30
XII	**29**	Mar. 24	30	Mar. 14	29

Contrary to the website's claim, the only year matching the tablet completely is the year 568/7 BCE.

60 Fatoohi, *op. cit.,* p. 101.
61 Fatoohi, *op. cit.,* p. 46, Table 3.1, col. 19.
62 http://www.vat4956.com/articles.php?month-lengths#start. Accessed September 27, 2020.
63 Anderlič, *op. cit.*; Fatoohi et al, *op. cit.*, p. 59; Parker & Dubberstein, *op. cit.*, p. 28.