Lunar Islamic Calendar: Issues and Answers

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Abstract

The indeterminacy of the first date of an Islamic month creates a nightmare for the *'ulama* and community leaders who are often expected to make a correct judgment on the basis of, at best, hard to verify claims of local moon-sightings or sightings from distant locations. This paper examines the three most critical areas in any discussion of a global Islamic calendar. The first part discusses the inadequacies of various fiqh positions on crucial issues such as the *ikhtilāf maṭāli'*, *khabar*, *shahādah*, etc, and urges the *'ulama* to re-examine their views on these issues in the light of the progress of human knowledge if they expect to improve upon the present chaotic situation. The second part defines the basic issues involved in a purely lunar calendar. It explores in depth the problems involved in switching from the first visible crescent to the conjunction or the observable-calculated or assumed-to-have-become-visible crescent as the criteria for determining the start of a lunar Islamic month. The third part critically evaluates various recent positions taken on these issues, especially the recommendations of the Kuwait (1973) and Istanbul (1978) conferences, as well as the Makkah (1986) and Cairo (1986) meetings. A general consensus about the first date of an Islamic lunar month will develop only if the proposed criterion is not in an apparent contradiction with the Qur'an and the Traditions, conforms to the basic astronomical data, and is reasonably accurate in predicting the beginning of the lunar month.

Introduction

The day of the Islamic month which is the basic unit of every calendar begins at sunset when the solar disk completely disappears below the horizon, and ends at sunset next day.[1] The beginning and the duration of an Islamic month, as defined and practiced since the earliest Muslim community in Madinah, depends on the earliest visible waxing crescent and the time which elapses from one crescent to the next.[2] It may be 29 or 30 days,[3] but not necessarily in any fixed order such as alternately, as several calendar makers have assumed.[4]

The synodic month—the average time between successive lunar conjunctions—as derived from the mean orbital elements, is variable from occasion to occasion (from 29.26 days to 29.80 days) with a mean in the long run of about 29.53058818 days. For 1987, it was 29 days 12 hours 44 minutes and 2.9 seconds (Astronomical Almanac, 1987:D.2). Hence, an Islamic calendar based on a visible lunar crescent (from the surface of the earth), like any lunar calendar, has to grapple with several major problems, especially the following:

1. A visibility curve[5] (extending westward in a parabolic shape).
2. Limits on the visibility[6] in higher (40°–80°) latitudes.

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1. On this point there is a consensus though the Shi'ahs differ slightly about the exact time of the sunset.

2. Bukhari: "Don't fast unless you see the crescent (of Ramadan), and don't give up fasting until you see it (the Shawwal crescent)." (3:130 in Khan 1976)

3. "The month is like this (ten fingers times three), and also like this (ten times two plus nine fingers)." Bukhari. (3:132 in Khan 1976)

4. V. V. Tsybulsky, *Calendar of Middle East Countries* (Moscow: Nauka, 1979); V. Illingworth, *Facts on File Dictionary of Astronomy* (New York: Facts on File Publication, 1985); and W. M. O'Neil, *Time and the Calendars* (Sydney: Sydney University Press, 1975).

5. S. K. Abdali, "On the Crescent's Visibility," *Al-Ittihad* 16, no. 1 & 2 (1979). He discusses some of the difficulties associated with the lunar visibility curve. The proposed international lunar date line will run north-south at X—the easternmost point of first visibility, instead of the actual parabolic curve. Except some minor adjustments to accommodate the political boundaries the LDL may not be moved eastward, as it will amount to declaring Islamic occasions in those areas a day ahead where the crescent's visibility was not possible that evening.

6. Ibid. Figures 1 and 2 both attest that the first visibility beyond 60° N/S latitudes may not occur several days after the conjunction thereby making many months 30, 31, and even 32 days.

3. An ever shifting lunar date line,[7] resulting in every lunar month being of 29 and 30 days simultaneously[8] (though in different geographical regions).
4. Indeterminacy.[9]

From time immemorial, calculations based on observations have been made to predict the first visibility of the crescent. The Babylonians, the Jews, the Hindus, and later the Muslim astronomers (al-Khwarizmi, al-Battani, al-Biruni, etc.) have suggested various criteria. Recently, the efforts of Abdali (1979), Minai (1980), Ilyas (1984), and others have brought into focus the issues related to the crescent's first visibility, and how modern astronomy (not to be confused with astrology—the prediction of future events) helps us solve some of the complications associated with a global Islamic calendar. Abdali (1979) used al-Biruni's criterion and Danjon's (1932)[10] limits on crescent visibility and calculated[11] the moon's position for the day/date of the conjunction and the day following it to predict the chances of the first visibility in various regions (see the table Data for Crescent Information following the this article) of the

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7. If we compare the VCs of Sha'ban, Ramadan and Shawwal 1399 in Figures 1 and 2 we notice that: 1) the first visibility of Sha'ban's moon started somewhere in the Arabian Sea; 2) Ramadan in the Pacific; and 3) Shawwal in the Atlantic. Also see M. Ilyas, "Calendar Calculation System," *Rabitah Journal* May (1981) and M. Ilyas, *Islamic Calendar, Time and Qibla* (Kuala Lumpur: Berita Pub. Bhd, 1984).

8. The area between the Arabian Sea and the Pacific Ocean had 30 days of Sha'ban; the area between the Pacific and Atlantic Oceans had 30 days of Ramadan in 1979 (1399). On the other hand, the area before the Arabian Sea had 29 days of Sha'ban, and the area between the Atlantic and the Pacific Oceans had 29 days of Ramadan. The VCs of each month attest to this basic fact of the lunar Islamic months.

9. Abdali, "On the Crescent's Visibility" and S. K. Abdali, "Notes on the Data for Crescent Observation" (unpublished, 1985). H. A. Minai, "Sightability of the New Moon," *Islamic Order* 1, no. 1 (1980); Omar Afzal, "Witness or Calculation," *Tahrik* 4, no. 1 (1982), Ilyas (1984).

10. Abdali, "Notes on the Data for Crescent Observation."

11. Committee for Crescent Observation (CFCO) data for 1973–1989. Also see LeRoy E. Doggett and P. K. Seidelmann, "Calculation and Observing the Crescent Moon," (unpublished, 1987); and B. D. Yallop, "First Sighting of the New Moon in 1987," RGO Ast. Inf. Sheet (1987) and , B. D. Yallop, "First Sighting of the New Moon in 1988," RGO Ast. Inf. Sheet (1988) and others for calculations.

globe. The data collected since 1979[12] strongly indicates that the observability of the crescent may easily be predicted in all cases fairly accurately with the exception of a very few months when the variables are very close to the minimum limits on visibility.[13] By testing it against more verifiable observational data, obtained over a period of time, Abdali's computations may further be improved for accuracy.

Ikhtilāf Maṭāli/Khabar/Shahādah

The issues of the longitudinal-latitudinal variations at sunset, the testimony of the witnesses, and communication of the news of the first visibility have remained the focal points[14] in any discussion of the topic

12. The Committee for Crescent Observation based in Ithaca, New York (USA) with more than 45 affiliated committees over North and South America, Europe, and Asia has been collecting this data since 1979. It also verified the data against the claims of sightings and official/local announcements, declarations of *'Idayn*, Ramadan, etc., in various countries since 1972.

13. The crescents for the months of Ramadan 1407 (1987) and Safar 1408 were good examples. According to both Abdali and Doggett, the Ramadan crescent could not be seen from Brunei to Morocco before the evening of April 29, 1987. However, in all the 48 contiguous United States the chances of its visibility on April 28 were fairly high. Confirmed reports of sightings were received only from Washington D.C., southwestern states and the west coast. On a clear and cloudless horizon, despite diligent search until after the moonset time, a large number of observers in southeastern and central states were unable to see any trace of the crescent. Why was it not visible from Georgia to Tennessee, Texas, and New Mexico where atmospheric conditions were also favorable and the calculations showed good chances of its visibility? The answer may be the horizontal distance of the moon from the sun which was only 0°–2° and its age (22–25 hours) at the sunset in those areas. Though many limits on the crescent's visibility were met, these two factors made the difference. For Safar 1408, a 42- to 44-hour old moon could not be seen on September 24, 1987 in eastern and midwestern states.

14. The Kuwait, Istanbul, Makkah and Cairo conferences, M. Kahf, "Determination of Islamic Occasions and the Islamic Calendar," *Al-Ittihad* 17, no 2 (1980), Shahabuddin, "Determination of Islamic Month and Occasions," *Tahrik* 3, no. 2 (1982); Afzal, "Witnesses or Calculation"; Ali R. Abuzaakouk, "Legal Decisions about the Sighting of the New Moon of Ramadan" (unpublished). The books of traditions and their commentaries, fiqh books and innumerable tracts and articles appearing on this and related issues supporting or refuting one line of argument testify to the keen interest. Unfortunately, the tech-

among the Muslim scholars. These three important issues can easily be resolved if the *'ulama* and Muslim community leaders keep the following in mind:

1. A crescent cannot be sighted before the instant of conjunction.
2. Because of the spherical shape of the earth, a crescent, like the sun, is not visible everywhere at the same instant. It takes 24 hours for the earth to rotate. Therefore, it takes the same time for the crescent to become visible over the globe (within 0°–40° north/south[15]), as the following figure shows:

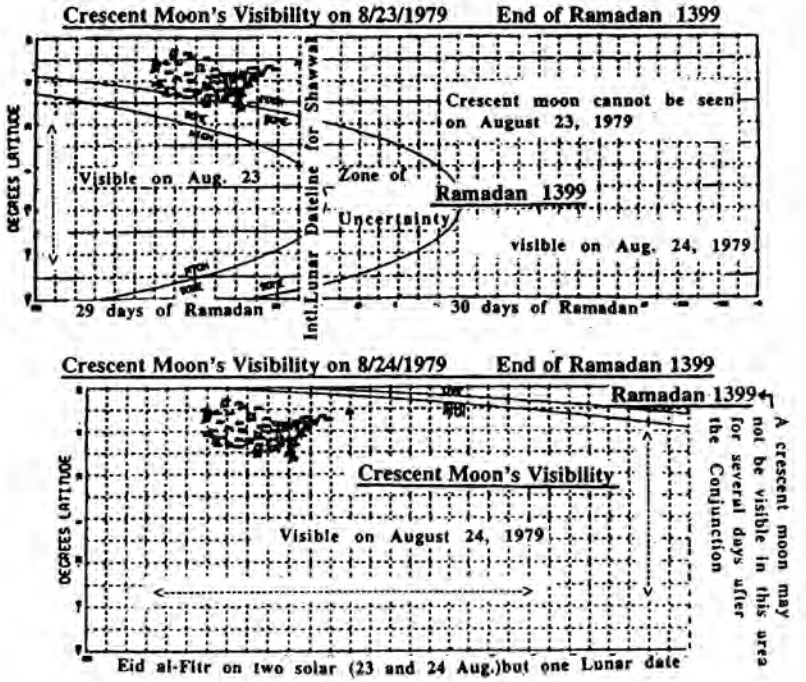

Figure 1.

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nical aspects of the crescent's visibility are pushed aside in favor of trivial though popular issues such as the number of witnesses, communication of the news of visibility. The *'ulama* in the U.K. and Europe, as late as August 1987, were insisting that eyewitnesses who claimed to have seen a crescent when the moon was only 4.8 hours old on May 27, 1987 are "correct" and the large number (9+3=12 from two places) proves that all observatories and their calculations are *wrong*.

15. The earliest visibility for various months in 1988 varies from as far north as just east of Japan to as far south as just north of New Zealand.

3. A lunar day/date will rarely coincide/overlap with the solar day/date. The first lunar visibility will seldom, if ever, occur at the International (solar) date line.[16] Moreover, the solar day begins at midnight whereas the lunar Islamic day begins at sunset.
4. A lunar day/date will generally extend over two solar days/dates, though never to more than two,[17] as Figure 1 shows.
5. Under normal atmospheric conditions, when the crescent first becomes visible after the sunset[18] at location X on the globe, all locations within a certain parabolic curve west, northwest, and southwest of X will see the crescent. The whole world from the west of X to the east of X will see it within the next 24 hours (a single lunar day/date spanning two solar day/dates).
6. Places in the region east of point X outside the visibility separator curve will not see a crescent until the next day. In other words, the first visibility cannot extend eastwards beyond the initial point X.
7. A crescent is always visible on the 30th. day.[19]

The assertions made above considerably change our understanding of the problems associated with the beginning of an Islamic month, especially the *ikhtilāf maṭāli'* (horizons, in the sense that there are multiple points from which to observe the horizon), *khabar* (news), and *shahādah* (eyewitness accounts).

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16. Figure 1 shows that the first visibility of Ramadan 1399 began on August 23, 1979 in the Atlantic, and not at the International Date line. The visibility extended to areas west-N/S west of the initial point at their sunset time until the whole world between 0° and 60° N/S latitude saw the crescent within 24 hours (a lunar day out of two solar dates) by August 24.

17. The first visibility cannot extend eastward from the initial point on August 23, 1979.

18. Figure 2 shows the parabolic shape of the visibility separator curve for Sha'ban, Ramadan, and Shawwal 1979 (1399).

19. RGO Astronomical Information Sheet #6, Danjon (*L'Astronomie*, Feb. 1932), Flammarion Book of Astronomy (English Trans. 1964), and other books on the astronomy of the moon. The Muslim *'ulama* should note the drastic implications: if a crescent is not visible on the 30th day then the beginning of the month was wrong, even if attested by hundreds of witnesses from several places. Ibn Abbas asked Kuraib to fast on the 31st day of Ramadan when the crescent was not seen in Madinah (though it was his 30th day, according to his own sighting in Syria) but only the 29th day according to the sighting in Madinah. Nowadays Muslims celebrate the *'Id* on the 31st day, irrespective of whether the crescent becomes visible or not.

First, the whole world is certainly not one *maṭla'* (horizon) at the instant the crescent is first sighted at point X. It becomes one *matla'* in a 24 hour period. (See Figures 1 and 2.)

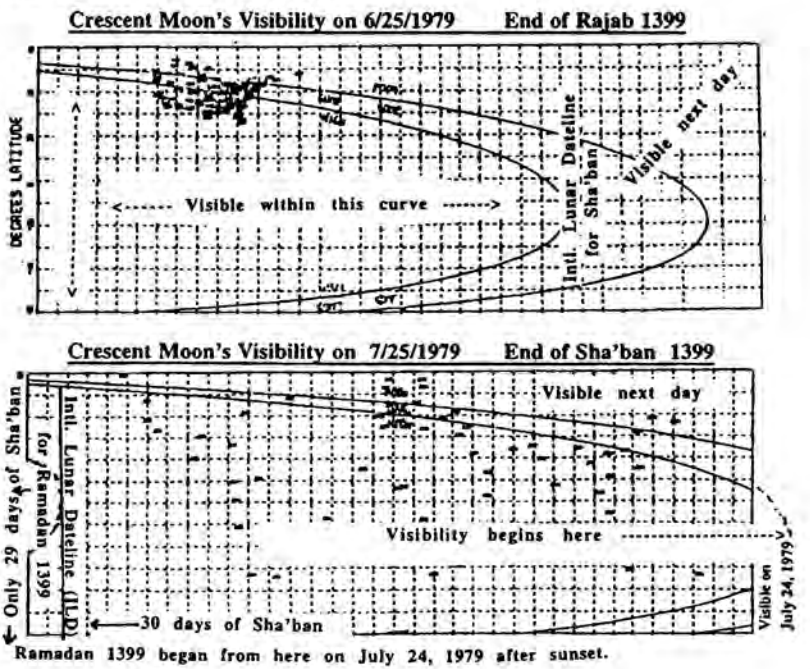

Figure 2.

Second, a new Islamic (30th) day of the month has already begun for the places east of the initial sighting (point X) as the sun and the moon have already set there. They will see the crescent only the next day, but not before.

Third, if the crescent is not sighted in locations west, northwest, and southwest of X (the eastern-most point of initial sighting) then the claims of sighting at X must be carefully evaluated and generally disregarded if the calculations also strongly point against it.

Fourth, if the new crescent is not visible at X on the 30th day then the testimony regarding the beginning of the month must be false.[20]

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20. The *'ulama* in Saudi Arabia, Kuwait, Egypt, etc., and the ISNA Fiqh Committee in the USA insist on celebrating *'Id* on the 31st day, even if the moon is not sighted on the 30th day. The hajj in 1987 and many other occasions were declared because of a misinterpretation of the 29/30-day hadith. An Islamic

• IKHTILĀF MAṬĀLI'

If we declare the beginning of an Islamic month for the whole world the instant a crescent is sighted at X, assuming the whole world to be one *maṭla'* (horizon) then we run into several problems. In some areas the sun has yet to set. What day/date will be assigned for the remainder of the day (until sunset) for those areas? In some regions it is high-noon, in others it is sunrise, and still in some others it is midnight. How will the day and date be determined for all these areas? If we extend the day/date to the next sunset, then what is the gain?

Accepting the physical reality of *ikhtilāf maṭāli'* means determining the Islamic date from the local sunset time, which is the only way to determine the beginning of an Islamic day/date. It does not mean chaos or celebrating Islamic occasions on 3 or 4 different days, as we often encounter now. It means unifying the whole Muslim *ummah*, all over the globe, on a single lunar day/date, which starts at the sunset time from the eastern-most point of visibility moving westward until the rest of the world sights the crescent over the next 24 hours, the length of a day on the earth.

• LUNAR DATE LINE

Ikhtilāf maṭāli' is intertwined with the issue of a lunar date line. Every calendar needs a date line. The question is how to define the lunar date line (LDL)?

A lunar date line differs from the universally accepted solar date line (international date line or IDL) in several ways. IDL is longitudinal. It runs north-south along the 180° longitude with some minor adjustments. IDL is fixed for all months of the year, and for all years. The new day begins at IDL at 12.00 mid-night. There is always a difference of one day at 180° West and 180° East, although the two are on the same longitudinal line. Two islands straddled only 100 yards apart at IDL will have two dates, the one west of 180°E having a weekday one day ahead of the one east of 180°W.

A lunar date line (LDL), if the criterion is moon's visibility, is of the shape of a parabolic curve. It extends along the visibility curve (VC) west/north-south west, and has the latitude through X as the axis of sym-

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month cannot be more than 30 days only if the month was started on a correct date. For more details see the Committee for Crescent Observation (see footnote 12). The majority of the Muslim jurists have shown a consensus on this issue. For details see Tirmidhi (*Bab al-Saum. . .*), *Al-Fiqh 'Ala Madhāhib al-'Arba'*, Vol. 1, Afzal's letter to ISNA FC (1982–1986), etc.

metry. LDL is not fixed; it changes every month. The Islamic lunar date line begins at the sunset along the VC. Areas inside the curve will have a date ahead of those which are outside it. The instant of a new lunar date is not the same time of the clock everywhere on the globe.

If we define the LDL as a longitudinal north-south line through X, instead of the visibility curve, to eliminate some of the problems mentioned above, we may start a new date at a fixed-clock time all over the globe. However, it will not solve the rest of the problems. We will include regions of nonvisibility into a lunar date line. The regions of the earth north of latitude 50°N and south of 50°S may not sight a new crescent after 30 days of the previous month. As the sunset time changes constantly the LDL will have to change with it. Besides, LDL shifts continually every month.

• SHAHADAH

An eyewitness is accepted only when the possibility of an event to occur is physically present. When the possibility does not exist or cannot be verified independently then the most reliable witness account cannot be acceptable and must be rejected. The Qur'an and the Sunnah do not ask the Muslims to believe witnesses when they are verifying an event which is nonexistent or physically impossible. The Qur'an counts some guessing as a sinful act, and the Messenger Muhammad advised us to be an eyewitness only when the event was visible to us as clearly as the sun is visible to all. But if the claims of moon sightings by the Muslim eye-witnesses and their unconditional acceptance by the *'ulama*/jurists and Muslim community leaders in Muslim lands and decision-making bodies[21] during the last three years (1985-1987) are any indication then the Muslims have seen the impossible. They have seen a waxing crescent 1–2 days before the new moon phase,[22] 0 to 10 hours after the conjunction,[23]

21. CFCO's meticulously kept "International Rumor Register" shows beyond any doubt that the Muslims in all parts of the world claim crescent sightings ranging from absurdly impossible to strongly suspicious. In compiling this register CFCO recognized reporting, investigating, and diagnosing of all reports or rumors of suspected cases of crescent sighting are essential to maintain the confidence in the compiled data of observations. These reports were collected from orally conveyed information, news reports, official declarations, astronomical journals, etc.

22. Saudi Arabia, Shawwal 1986, in the USA ISNA 1987, etc.

23. Middle East, especially Saudi Arabia, 1972–1987. ISNA FC 1979–1987.

when the moon was setting before or 0–10 minutes after the sun,[24] after the moonset time,[25] half a day to 2–30 minutes before the sunset,[26] during or before a solar eclipse in their area,[27] 30°–45° degree above the horizon,[28] in almost all directions other than where it might be, and these "miraculous" sightings may continue in the future. Often the *'ulama* who as judges, muftis, imams, etc., decided the beginning of a new Islamic month based on these witnesses. They supported these blatantly false claims of moon-sighting by misplaced arguments such as the following: the Messenger accepted eyewitnesses without question,[29] he has instructed the Muslims against accepting calculations,[30] one of the accepted *madhhabs* (Muslim school of jurisprudence) permits the testimony of a single

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24. In Pakistan on Monday April 27, 1987. Also ISNA FC 1987.

25. In Peshawar, Pakistan, a person claimed on Tuesday, April 28, 1987 that he saw the crescent around 7:30 p.m. The moonset in that area on that day/date was between 7.01 and 7.08 p.m. In Chicago a person claimed to have seen the crescent on Monday evening as well. In India the Imam of Shahi Masjid Delhi claimed to have seen the Shawwal crescent on May 27, 1987. For details see CFCO's Intl. Rumor Register 1979–1987.

26. Two families (of 7 adults and some children) in New York City claimed to have seen the crescent of *'Id* 24 minutes *before* sunset. From Saudi Arabia, Egypt, Pakistan, Yemen, etc., such claims are very common.

27. See Shaikh Tantawi (July 7, 1983), *al-Yamama* (Ramadan 30, 1407), *al-Ahram* 1982–1984, etc., for the crescent-sighting claims *before* or at the solar eclipse, and also Shaikh Baaz' reply in *Al-Mujtama'* (June 1987). Egypt's Ministry of Awqaf announced that March 29, 1987 was the last day of Rajab, and that Sha'ban will begin on March 30. Egypt witnessed a total solar eclipse on March 29, 1987 (*Astro. Almanac* 1987, p. A80 for other details). How the crescent was visible in Egypt on March 29 during a total solar eclipse is a mystery which only its Awqaf Ministry can explain. *Al-Ahram* published the Ministry's announcement and the photographs of the eclipse on the front page the same day.

28. In 1986 in Westchester county, N.Y., one out of a group of three claimed to have seen the Shawwal crescent almost 45° to 50° above the horizon. The other two found no trace of it. In Chicago a witness claimed to have seen a crescent in northeastern direction, instead of where the sun was setting. For Shawwal 1987, the lone witness in Madison (the other two with him failed) claimed to have seen the crescent (of a less than 10-hour old moon) south of the setting sun, 2 to 3 minutes after sunset. The moon had already shifted to the north of the setting sun, and a 29-day old moon's new crescent is hardly visible in the first 3 minutes after the sunset.

29. See, e.g., Abu Dawud, no. 2334.

30. See, e.g., Bukhari, 3:137.

witness,[31] the eyewitnesses are very trustworthy,[32] several witnesses have confirmed the sighting,[33] "how could so many of them be wrong," and the sightings have been reported from several locations/countries,[34] etc. When the moon is not visible on the 30th day, even then, the next day is declared the first day of the next lunar Islamic month because of a wrong interpretation of a tradition,[35] which according to them requires it.

As long as the *'ulama* hide behind these and similar excuses they will persist in their ignorant decisions and keep the Muslims confused and in disarray. The much cherished goal of uniting the whole Muslim world on one solar day[36] is fragmenting the Muslims into two or more hostile

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31. For *'Id* 1987 (May) ISNA FC, MCC Chicago, and several other Muslim communities accepted the single witness of Madison, Wisconsin as sufficient to end Ramadan a day early against all odds, and despite a near consensus of the Muslim jurists that for *'Id* at least two *'adil* witnesses are required. Only Thauri, and in one version Shafi'i permit the testimony of one. Those who had to deal with the problem of false witnesses and mistaken objects required the testimony of such a large group of witnesses from all corners of a town or each mosque in the locality that the *qaḍi* had no doubt left in his mind that the month of Ramadan has really ended. Imam Muhammad and Imam Abu Yusuf (the chief *qaḍi* of the Abbasides, living in Baghdad) required 50 witnesses from every mosque. Imam Abu Ayyub raised the number to 150 witnesses, looking to the prevailing conditions. Imam Malik and Imam Abu Hanifa require a very large number of witnesses on a clear sky.

32. Personal communication with several ISNA FC members during 1979–1987.

33. Saudi Arabia's announcements from 1982 to 1987, Egypt's from 1985 to 1987, etc.

34. Saudi Arabia and ISNA FC members for several years in the recent past.

35. For example, see Saudi Arabia's announcement for the hajj of 1987.

36. Since the Kuwait conference (1973) almost all meetings of the Calendar Commission have concentrated their energies on "Unifying the Muslims" all over the world on a single *solar* day/date. In their rivalry and obsession to "lead the Muslims," Middle Eastern countries have created an enormous confusion. Year after year, they have declared Ramadan and the *'Idayn* a day or two ahead of others. Those who insisted on following the crescent had to wait at least one and sometimes two days for it to become visible (Tunis 1985). At present most of the Muslim communities including those in Europe and North America are praying *'Id* on 2 to 3 different days. (For details see CFCO's announcements 1982–1987). At least in Pakistan, the fall of the Ayub government in 1964 and a constitutional crisis in Malaysia in 1983 can be attributed to the crescent's observability.

groups who often celebrate *'Idayn* on 3 and sometimes on 4 different days. The *'ulama* must take into consideration that:

1. The New Moon phase can very accurately be calculated to the fraction of a second for the next several hundreds of years.
2. Danjon's limit (of 7°) is well supported by observational data collected over a period of time.
3. Even under ideal atmospheric conditions a moon less than 20 hours old is rarely visible (less than a dozen sightings in more than a century[37] are documented). Generally a moon becomes visible between 22 to 32 hours of age. Sometimes even a 35- to 40-hour old moon is not visible as was documented for Muharram and Safar 1408 (August and September 1987).

Together with the other factors mentioned earlier (under the heading *Ikhtilāf al Maṭāli'*) the following broad guidelines may be globally adopted:

1. Claims of moon-sightings: (a) BEFORE the conjunction or 0–10 hours after the new moon phase should be rejected immediately; and (b) 11–18 hours after the new moon phase should also be rejected except if made by professional astronomers, from observatories when the minimum limits on its observability have been met.
2. Claims of sighting an 19- to 22-hour old moon should be carefully evaluated. They may be acceptable only if (a) the minimum visibility limits are met; (b) telescopes or at least binoculars are used to confirm the crescent; (c) the evidence is overwhelming; and (d) supported by visibility in areas west/north-south west of the initial sighting.
3. Claims of sighting a 23- to 32-hour old moon may be acceptable when the minimum visibility limits are met.

• Khabar

When the atmospheric conditions hinder the visibility in areas within the parabolic curve west of LDL, the news of confirmed moon-sighting(s) within the VC will be used to declare the first day of a lunar Islamic month.[38] By transmitting the information of sighting the visibility cannot be extended eastward beyond the easternmost points of VC/LDL.[39]

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37. *Sky & Telescope*, August 1971, and February 1972; J. Ashbrook, *Astronomical Scrapbook* (Cambridge, Mass: Sky Pub. Corp., 1984).

38. Ilyas, *Islamic Calendar, Time and Ibla*. Abdali, "On the Crescent's Visibility."

39. See Figures 1 and 2 for details.

Declaring Ramadan and *'Idayn*, etc. on the news or information in locations east of the initial point of sighting is tantamount to extending the crescent's visibility to locations where its visibility was physically impossible, and starting a lunar/Islamic day/date in those areas a day earlier.

Communicating the news of sighting to areas west of the initial sighting is redundant as a crescent will be seen there anyway at sunset if the atmospheric conditions do not block its visibility. If a crescent is not sighted there under normal atmospheric conditions then the claims of sighting at point X east of it become questionable.

First Visibility

The position of the moon vis-a-vis the sun and the earth can precisely be calculated for the next hundreds of years, and for this reason the new moon date and time is reported in newspapers, almanacs, calendars, etc. ahead of time. The easternmost first visibility of a crescent—the starting point of an LDL—is not predictable with the same precision for several reasons. Atmospheric conditions limit the sighting. Nearly four-fifths of the earth is water and therefore, may not have an observer at the point of first visibility.

• Conjunction or Visible Crescent

A lunar calendar based on the moon's visibility poses certain difficulties. Places in close proximity may have different lunar day/date (and month) as the visibility of the crescent is limited to within a parabolic curve (VC). The famous hadith of Kuraib according to which the Ramadan (and Shawwal) crescents were sighted in Madinah a day later than in Syria, provides a good example. Often the VC will divide a country into two different date regions. The present cry for a unity of Muslim occasions has highlighted this dilemma, especially after the Kuwait (1973), Istanbul (1978), and Makkah (1986) conferences, which emphasized the unity without addressing the real issues. Another problem is posed by the shifting lunar date line (LDL), as a consequence of which every month is 29 and 30 days simultaneously though not at the same place.

The data collected during the past ten years or so, however, indicate that the first visibility of a waxing crescent may be predicted fairly accu-

rately in almost 11 out of 12 months a year and for all parts of the globe. The situation becomes critical in a very narrow band in which accurately pinpointing the first visibility at present appears to be difficult. A combination of factors—the location of the observer, the moon's age (20–27 hours), its angle (8°–10°), the azimuthal separation or when the moon follows the path of the sun very closely, etc.—cause the uncertainty. Because of the accuracy of determining its beginning, some Muslim astronomers advocate making the new moon phase[40] the starting point of the Islamic month. Switching over from the crescent to the conjunction (new moon) as the criterion for the beginning[41] of the Islamic month is filled with its own perils. We may be able to determine the beginning of the month precisely, but will certainly complicate the definition of the (Islamic) day/date.[42] The conjunction may occur at any time of day or night. Thus we would be forced to make many more involved adjustments than would be required when using the visible crescent as the beginning of the month, however indeterminate it may be at present.[43]

• Airborne/Space-bound Visibility (ASV)

A suggestion has been made to accept the ASV as a valid criterion for beginning an Islamic month. Before making such a suggestion the proponents must try to answer the following questions:

1. How far the guidelines in the Qur'an and the Sunnah may be stretched to accommodate airborne/space-bound visibility of the crescent?
2. Will there be any limits of space and time on the ASV? If yes, then how arbitrary would they be and how will they be fixed?
3. How will the ASV be coordinated with the space and time on earth?

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40. A. Namr, *Bain al-Sunnah wa al-Ijtihād* (Cairo: Dar al-Kutub al-Islāmiyah, 1986), and *Majma'ul Buhuth* (1966). In Egypt, *'ulama* were forced to accept the conjunction as the beginning of an Islamic month under Nasser's pressure in 1965–1966. Surprisingly, some astronomers in Egypt claim that a crescent is *visible* at the conjunction (*Al-Muslimoon*, London First issue).

41. Abdali, "On the Crescent's Visibility."

42. *Astronomical Almanac* 1973–1987, etc. In 1987, Egypt declared Ramadan on Wednesday, April 29, because the crescent will become visible the next morning.

43. Namr, *Bain al-Sunnah wa al-Ijtihād*. If the conjunction occurs 1 minute after the sunset in the westernmost part of a country, but 0 to 10 minutes before the sunset in the rest of it, or 1 minute *after* the *suhur* then what should be done?

If the purpose is to observe the moon from the earth at the conjunction, then we can achieve it simply by scanning the moon through an infrared camera. However, one will not find a crescent there. Instead the moon appears to be semi-full at conjunction as we see in Figure 3 below.[44]

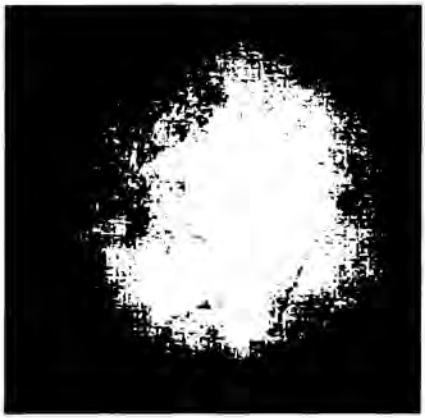

Figure 3.
A synthesis of infrared scans of the Moon (through a passband between 10 and 12 μ in wavelength), showing a view of the lunar face in the light of its thermal radiation (after Shorthill and Saari). Note a conspicuous darkening to the limb of the lunar disk (completely absent on photographs taken through the optical atmospheric window in the scattered light of the Moon).

All forms of ASV have to be excluded from any consideration of the lunar Islamic calendar for several reasons. In the Qur'an, the Sunnah, and the language, the word *"hilal"* is limited to the the "first visible lunar crescent observed from the surface of the earth." Phrases in the Qur'an which mention the phases of the moon, hadith in which the Messenger instructs us to watch for and complete the duration of the month to 30 days, and the words *ru'ya* and *shahādah*, etc., become senseless if ASV is taken to be a valid criterion.[45] For a space observation, the observer's

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44. Z. Kopal, *An Introduction to the Study of the Moon* (1971), p. 338.

45. Kahf in "Determination of Islamic Occasions and the Islamic Occasions and the Islamic Calendar" argues in support of changing the definition of *ru'ya, shahadah*, etc., and on relying heavily on the "news." For arguments against Kahf see Maududi, Mufti Shafi', and others beside Afzal in "Witnesses or Calculation," and Shahabuddin in "Dtermination of Islamic Month and Occasions." Several *'ulama* have tried to write the "final" word on moon sighting, often without any knowledge of the geophysical facts or natural laws which govern the moon's visibility. The key concepts for them are: *shahādah, khabar* and *ikhtilāf maṭāli'. Ikhtilāf maṭāli'*, as it is interpreted by most of the *'ulama*, including the Ankara-based Islamic Calendar Commission, ISNA, Kuwait, Istanbul, Makkah, Cairo and other conferences, is neither the chaos of "For each town, its own sighting," as many influential groups, including all the *muhad-*

position replaces the earth in the measurement of the elongation[46] of the moon. The angular distance depends upon the position of the observer in space and time. For any space-bound observer, whether a human or a camera, the position will constantly change, and may be changed at will. The elongation for such an observer may extend from 0° to 180° and hence the moon's phases may change from the new moon to full moon and again to the new moon (and within a very short span of time), depending on where and when the observation is made. By adjusting his position (and the distance) in space, an observer may see a crescent at any time of day or night, and at any lunar phase as defined from the surface of the earth. If the limits on space and time are defined in terms of the conjunction and within 200 km from the surface of the earth (and all this

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dithīn, schools of fiqh, etc., have argued; nor "The changes in sunset must be totally disregarded."

The first group assumes a fragmented world with no links to hold them together, and the latter group assumes that the earth is flat. This group claims that once the crescent becomes visible at point X on the earth, it becomes binding on all Muslims living anywhere on the globe. Often other variations of the "instant binding" theory such as "All areas which share the same night" are given as a quick solution, without pausing to have a look to the globe. They are unable to realize that all points on earth share the same night, and all places on earth are east or west of each other. A cursory look at the globe and very elementary knowledge of the moon's motion will convince them that their "instant binding" *fatwā* is meaningless. The whole earth sights a crescent in a 24-hour period. The areas where its visibility is problematic may follow the International Lunar Date Line or any other suitable suggestion. The only other major problem for a global Islamic calendar is all months being of 29 and 30 days simultaneously. The Muslims may adopt the solar calendar for their day to day and international dealings, and use the lunar Islamic calendar for their Islamic occasions. There is nothing in the Qur'an and Sunnah that binds the Muslims to a lunar calendar for all purposes, and forbids the use of a solar calendar for other than Ramadan, the *'Idayn*, hajj, etc. Another problematic area is *shahādah*. We must be very clear that though the Messenger Muhammad did not question a witness we are not obliged to accept every testimony. In many situations, the Messenger questioned very prominent companions. Allah rejected all those who blamed A'isha. Ibn Abbas not only questioned Kuraib but rejected both the *shahādah* and *khabar* when it clashed with the actual sighting and forced him to fast 31 days.

46. Elongation is the distance between the sun and a planet, i.e., the angle sun-earth-planet measured from 0° to 180° east or west of the sun. An angle of 0° is called conjunction, one of 180° is opposition.

will be arbitrary) then the observer will see a semi-full moon, and not a crescent.

If the purpose of such an observation is to sight a crescent at the new moon phase from the point of view of the earthbound observer and thus fulfill the requirements of Islam then the experiments performed by NASA are an eye-opener.[47]

• Observed or Defined Crescent

Another suggestion is to go by an assumed observability (though not necessarily visible). The variations of this defined crescent are:

1. The conjunction or the new moon phase: Indonesia, Malaysia, Tunis, Algeria and unofficially Saudi Arabia assume that a crescent is formed at conjunction.
2. One to five minutes after the conjunction at sunset: Egypt officially follows a 5-minute policy, though some want to change it to a 1-minute (Cairo Meeting 1986).
3. A range of hours (18 to 22 hours after the new moon): (Seidelmann, Fadal, and others suggest a range; others suggest a 20- to 45-minute time lag between the sunset and the moonset.)
4. A 5° elongation at sunset (Istanbul Conference).
5. Other variations on parameters like those given above.

Again we face the same dilemma. What is it exactly that we want to define? If it is the *hilal* (the crescent), then we cannot ignore the visibility criterion universally accepted and followed by the Muslim *ummah*. However we define the crescent, will it always be "visible" from the surface of the earth at the defined cut-off point? If not, then how far can it satisfy the Muslims, and how will it be better than the actually visible crescent? The defined crescent may be more "definite" than the observed one but it suffers from all other deficiencies which are associated with the "visible" moon and more. Besides, it is certainly to be resisted by the Muslim *'ulama* and *ummah* because it will be perceived as contradicting the words and the spirit of the Qur'an and Sunnah.

The main advantage of a defined lunar month is that we can precisely calculate the start of the lunar month. But when this advantage is put into practice by drawing the LDL, we run into many difficulties. If the con-

47. Koomen et. al., *Astronomical Journal*, vol. 72 (1967), p. 808.

junction is chosen as the starting time of the Islamic lunar month then we have to start the new month at any hour of the day and night, instead of at sunset as the Qur'an says. Some days of the month will be less than 24 hours and others will necessarily be longer to take care of the fraction. Even then the issue of a shifting LDL is not resolved. If we extend or reduce the day to the next or preceding sunset then we add several more problems. For example, the Islamic day might begin in a few minutes at some places and more than 24 hours later for some others though the two are located in close proximity. Apparently, we have to make many more corrections to keep the definition of the day/date and month in tact. The suggestion to start the Islamic month 1 to 5 minutes after the sunset (Cairo: 1986) suffers from similar drawbacks. Defining the month by a range of moon ages, by the time lag between the sunset and the moonset, or by its elongation (3°–5°) at the sunset are no better than determining the day/date by the conjunction.

Unification of Muslim Dates

Often these suggestions are accompanied by the assertion that all the Muslims should begin their new Islamic month on the same day/date. Those making this plea are driven by their sincere desire to achieve the Muslim unity across all political boundaries. However, it shows their ignorance of some of the basic geophysical facts. At any given instant there are always two solar days/dates on the globe. In reality their suggestion of unity amounts to forcing a solar day/date on an Islamic day/date which are incompatible except for a narrow tropical strip of Muslim lands from Indonesia to Morocco. The Muslims are scattered over all parts of the globe, and we cannot make decisions for a limited group living on one part of the earth, leaving out others on the rest of the earth. If we adhere to the *visible* crescent, as instructed by the Qur'an and Sunnah, the entire Muslim *ummah* will celebrate its occasions on the same lunar Islamic day/date. It will start at the sunset at the first eastern-most visibility of the crescent and expand over a 24-hour period from there all over the globe (though this lunar date will span over two solar dates). In essence, nothing is achieved—the Muslim unity or a better calendar—by defining a new Islamic day/date any other way.

• International Lunar Islamic Date Line (ILIDL)

At this point, it is appropriate to discuss the concept of a fixed International Lunar Islamic Date Line. Often it is suggested that the Muslims fix Makkah *Mukarramah* as the meridian for their calendar. The Jews adapted Jerusalem almost two thousand years ago as the meridian for their luni-solar calendar. However, fixing Makkah, or for that matter any other place on land, will equally complicate the matters. Again, it will force the Muslims to define the Islamic day/date and the length of the month. A calendar based on this suggestion will have to make several major adjustments, including celebrating an occasion on two days instead of one on the model of the Jewish calendar. Without these corrections the Muslims will end up having months of 28 to 31 days.

• Kuwait Conference 1973

The recommendations of the Kuwait conference (1973) included the following:

> ". . . the difference of *maṭāli'* are disregarded among countries separated by long distances as long as they share any part of the night."

Obviously it is not based on a sound understanding of the geophysical and astronomical phenomena. Beside assuming that the earth is flat, the participants believed that the sunset is at the same clock time all over the globe. Had they looked at the globe carefully and checked the rotation of the earth they would have realized that every point on the earth shares the same night with all other points.

• Istanbul Conference (1978)

The Istanbul Conference adopted the principle of unifying the Muslim occasions all over the world on a single day. They also disregarded two fundamental facts: the Muslims are spread all over the globe from New Zealand to Alaska and Norway to New Foundland—they are no longer concentrated in a narrow band of tropical countries from Indonesia to Morocco—and Muslim global unity based on the sighted moon is easier to achieve than on an imposed unity by a defined crescent because the sighted moon is less alien to the Muslim tradition.

• Makkah and Cairo Conferences (1986)

In the Makkah meeting some *'ulama* asserted that a moon could be sighted in Saudi Arabia one or even two days ahead of Tunis and Algeria, as was claimed in several preceding years. However, this is totally against acceptable norms and observational facts. If a moon is really sighted in Saudi Arabia on Monday there is no possibility that it will disappear from view on Monday as well as Tuesday in all regions west of it and then appear again on Wednesday for the rest of the world.

The Cairo Conference recommended to reduce to only one minute the present Egyptian practice of starting the new Islamic month whenever the conjunction occurs five minutes before sunset. Anyone who claims that the moon becomes *visible* from the surface of the earth at conjunction might welcome such a suggestion. However, a closer look at this recommendation reveals that it is a variation of the defined moon stated earlier, and assumes that the LDL will always remain in Egypt. Nobody will agree that a crescent is visible from the surface of the earth at or immediately after conjunction.

Summary of Conclusions and Recommendations

After evaluating most of the available options it appears that the *visible* crescent is still the best criterion for determining the Islamic month and occasions. It is simple, very practical, and easily perfected. It is closer to the word and spirit of the Qur'an and Sunnah, and is in conformity with what the Muslim *ummah* all over the world has understood and followed for the last fourteen hundred years.

For practical purposes and to accommodate the political realities, the lunar date line which appears as a parabolic curve may be extended north/south at the point of first visibility. It will take care of the problem for those regions of the globe in which the lunar crescent may not become visible for obvious reasons such as the sun is too high on the horizon though the elongation of the moon has reached beyond the visibility limits. For small political units, the visibility in the foremost corner may be extended for the entire country, but for larger political entities such as Russia, the USA and Canada, Brazil, Australia, China, India, and even Indonesia, Iran, Saudi Arabia, etc., the visibility may not be extended eastward beyond the local time zone. The plea for Muslim unity (For

what reason?) cannot override the fact that the Qur'an and Sunnah require a visible crescent seen from the surface of the earth. Extending the visibility hundreds and thousands of miles east of the sighting to locations where the visibility was out of the question is flouting the Qur'an and Sunnah.

'Ulama must use calculated first visibility for accepting or rejecting the testimony of the witnesses. Hiding behind wrong interpretations of the concept of *ummi*, the 29/30-day tradition, or quoting a *fiqh* which assumes a flat earth by denying the relevance of *ikhtilāf al maṭāli'*, etc., is the root cause of the present confusion. The evidence of visibility and nonvisibility must be accorded equal weight in marginal cases. If the claim of sighting is received from point X which is located east of the point Y and the crescent does not become visible at Y despite clear *maṭla'*, then the claims from X must be disregarded. Similarly, claims by one, two, or a few witnesses on an unobstructed horizon should be closely evaluated.[48]

The present obsession with unity has made many Muslim countries neglect the established geophysical and observational facts. Why should Muslims all over the world celebrate their *'Idayn* and begin their fasting on the same solar day/date instead of the same lunar Islamic date is beyond comprehension.

48. *Nur al-fattah*. See Note 31. There is a simple logic for requiring a large number of witnesses on a clear horizon. If the horizon is clear and hundreds and thousands of eyes are searching for the crescent then only one, two or a few will not see it. A mass observation will take place and at hundreds of places. If a lone witness claims a sighting and nonsighting is confirmed from other places, then he is mistaken.

Data for Crescent Observation

Start of Shawwal 1408
Data for the evening of May 16, 1988
(New Moon Phase: 1988/05/15 22:11 Universal Time)

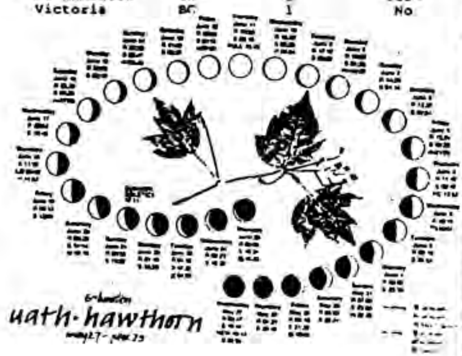
						MOON'S POSITION AT SUNSET					AT CVL TWILT			
Place	LAT DG MN	LONG DG MN	SUNSET HR MN	MOONSET HR MN	CVTWLT HR MN	AGE HOURS	AZIMTH FROM N	HOR DG FR SUN	ALTIT DEG	ANGLE FR SUN	AZIMTH FROM N	ALTIT DEG	VSBLITY CHANCES	CRIT DIFF
DJAKARTA, INDONESIA	6:17S	106:45E	5:44P	6:00P	6:06P	12.6	64.0W	6.8N	3.7	8.1	64.6W	-1.1	POOR	-0.63
KUALA LUMPUR	3:08N	101:42E	6:17P	6:40P	6:39P	13.1	64.7W	6.0N	5.1	8.4	64.5W	0.3	POOR	-0.49
DHAKA, BANGLADESH	23:45N	90:29E	6:34P	7:11P	6:58P	14.4	65.3W	3.2N	7.5	8.9	63.1W	2.7	POOR	-0.27
NEW DELHI, INDIA	28.40N	77:13E	7:06P	7:49P	7:31P	15.4	65.2W	2.3N	8.3	9.4	62.4W	3.4	POOR	-0.19
KARACHI, PAKISTAN	24:59N	73:05E	6:45P	7:27P	7:10P	15.6	65.4W	2.9N	8.2	9.5	63.0W	3.4	POOR	-0.20
TEHRAN, IRAN	35.:45N	51:30E	7:03P	7:58P	7:32P	17.4	64.8W	0.6N	9.5	10.3	61.0W	4.5	SOME	-0.09
KUWAIT, KUWAIT	29:04N	47:59E	7:33P	8:22P	7:59P	17.4	65.4W	1.9N	9.3	10.3	62.6W	4.4	SOME	-0.10
MAKKAH, S. ARABIA	21:27N	39:45E	6:53P	7:37P	7:17P	17.7	65.6W	3.3N	9.1	10.5	63.7W	4.2	SOME	-0.11
ANKARA, TURKEY	39.55N	32.50E	6.58P	8:01P	7:29P	18.8	64.3W	0.6S	10.1	11.0	59.9W	5.1	SOME	-0.02
CAIRO, EGYPT	30:03N	31:17E	6:42P	7:35P	7:08P	18.5	65.5W	1.6N	9.9	10.8	62.6W	5.0	SOME	-0.04
TRIPOLI, LIBYA	32:50N	13:13E	8:00P	8:59P	8:27P	19.8	65.5W	0.8N	10.6	11.5	62.3W	5.7	HIGH	0.02
RABAT, MOROCCO	33:59N	6:47W	7:22P	8:26P	7:50P	21.2	65.7W	0.2N	11.3	12.1	62.3W	6.3	HIGH	0.09
FRANKFURT, GERMANY	52:20N	14:31E	7:53P	9:21P	8:36P	20.7	60.0W	4.0S	10.4	11.9	52.2W	5.2	HIGH	0.02
ROME, ITALY	41:52N	12:37E	7:24P	8:33P	7:56P	20.2	64.2W	1.4S	10.7	11.6	59.4W	5.7	HIGH	0.04
PARIS, FRANCE	48:51N	2:20E	8:27P	9:50P	9:06P	21:3	62.1W	3.3S	10.9	12.1	55.5W	5.7	HIGH	0.06
LONDON, ENGLAND	51:30N	0:07W	7:48P	9:17P	8:29P	21.6	60.8W	4.1S	10.8	12.3	53.3W	5.6	HIGH	0.06
MADRID, SPAIN	40:26N	3:42W	8:25P	9:36P	8:57P	21.2	64.8W	1.3S	11.2	12.1	60.3W	6.2	HIGH	0.09
ST. THOMAS, VIRGIN	18:21N	64:56W	6:47P	7:46P	7:10P	24.6	65.7W	3.6N	12.4	13.7	64.3W	7.6	HIGH	0.22
ALBANY, NY	42:39N	73:45W	8:12P	9:38P	8:44P	26.0	65.5W	3.2S	13.3	14.4	60.7W	8.1	HIGH	0.30
NEW YORK, NY	40:45N	74:00W	8:08P	9:31P	8:39P	25.9	65.9W	2.6S	13.3	14.4	61.4W	8.3	HIGH	0.30
MIAMI, FL	25:47N	80:12W	8:00P	9:09P	8:25P	25.8	66.4W	1.6N	13.4	14.3	64.2W	8.5	HIGH	0.30
ATLANTA, GA	33:45N	84:24W	8:33P	9:50P	9:00P	26.4	66.6W	0.7S	13.7	14.6	63.4W	8.8	HIGH	0.33
INDIANAPOLIS, IN	39:46N	86:10W	7:54P	9:19P	8:24P	26.7	66.2W	2.5S	13.7	14.8	62.0W	8.6	HIGH	0.34
CHICAGO, IL	41:52N	87:38W	8:05P	9:33P	8:37P	26.9	65.9W	3.2S	13.7	14.9	61.3W	8.6	HIGH	0.34
NEW ORLEANS, LA	29:57N	90:04W	7:47P	9:02P	8:14P	26.6	66.7W	0.3N	13.9	14.7	64.0W	8.9	HIGH	0.34
ST. LOUIS, MO	38:38N	90:12W	8:07P	9:31P	8:37P	26.9	66.4W	2.2S	13.9	14.9	62.4W	8.8	HIGH	0.35
HOUSTON, TX	29:45N	95:22W	8:08P	9:23P	8:34P	27.0	66.7W	0.3N	14.1	14.9	64.0W	9.1	HIGH	0.36
DENVER, CO	39:45N	104:59W	8:09P	9:37P	8:40P	28.0	66.5W	2.8S	14.3	15.4	62.3W	9.2	HIGH	0.39
TUCSON, AZ	32:13N	110:58W	7:16P	8:36P	7:43P	28.1	67.0W	0.6S	14.6	15.4	63.9W	9.6	HIGH	0.41
SAN DIEGO, CA	32:43N	117:09W	7:41P	9:03P	8:09P	28.5	67.0W	0.8S	14.8	15.6	64.0W	9.8	HIGH	0.43
LOS ANGELES, CA	34:03N	118:14W	7:49P	9:12P	8:16P	28.6	67.1W	1.3S	14.8	15.7	63.8W	9.8	HIGH	0.43
PORTLAND, OR	45:31N	122:41W	8:36P	10:17P	9:11P	29.4	65.8W	5.0S	14.5	16.1	60.3W	9.3	HIGH	0.44
HONOLULU, HAWAII	21:19N	157:52W	7:03P	8:21P	7:27P	30.9	66.4W	2.4N	15.8	16.8	64.8W	10.9	HIGH	0.54

Observations made on April 28, 1987 (Tuesday)

Results of Observations (Organized by Mr. Dogget & Seidelmann of U.S.Naval Observatory)

City	ST	No. of Observers	Crescent Sighted	Binoculars Used	Weather
Hanover	NH	1	No		snow
Weston	MA	1	No		snow
Cambridge	MA	4	No		snow
Montpelier	VT	1	No		snow
Glastonbury	CT	1	No		clouds
Stormville	NY	1	No		clouds
Hamilton	NY	1	No		clouds
Ithaca	NY	1	No		clouds
Ocean City	MD	1	No		clouds
Washington	DC	10	Yes & No	Yes & No	haze & clou
State College	PA	1	No		clouds
Easton	PA	1	No		clouds
Blackstone	VA	2	Yes & No	No	
Chapel Hill	NC	1	No		clouds
Greenville	NC	1	No		clouds
Boone	NC	17	Yes & No	Yes & No	clear, haze
Tampa	FL	3	No		clear, haze
Fort Myers	FL	1	Yes ✓	Yes	
Atlanta	GA	2	No	No	clear
Macon	GA	1	No	No	haze
Columbus	OH	1	No	No	cloudy
Warren	MI	1	No		clouds
Lansing	MI	1	Yes ✓	Yes & No	haze
Tuscaloosa	AL	1	No		haze
Chicago	IL	5	No		clear
New Orleans	LA	1	Yes ✓	No	
St. Louis	MO	1	No		clouds
Columbia	MO	7	No		clouds
Des Moines	IA	1	No	Yes	vapor tra
Austin	TX	2	Yes ✓		
Mt Locke	TX	82	Yes ✓	Yes & No	
Denver	CO	1	No		clouds
Rocky Ford	CO	1	No		clouds
Socorro	NM	1	No		haze
VLA	NM	2	No		clouds
Tucson	AZ	1	No		clouds
Flagstaff	AZ	1	No		clouds
Salt Lake City	UT	1	Yes ✓	Yes	cloud bar
Walla Walla	WA	10	No		thunderst
Costa Mesa	CA	1	No		clouds
Santa Barbara	CA	2	No		clouds
Oakland	CA	1	No		fog
Los Angeles	CA	1	No		cloudy
Pasadena	CA	2	No		fog
Mt Hamilton	CA	1	Yes ✓		clouds
Victoria	BC	1	No		


معهد الارصاد يؤكد :
ميلاد هلال شهر رمضان
حدث فجر امس فلكيا




غدا اول شهر رمضان المعظم
اليوم هو المتمم لشهر شعبان

Egpyt has a solar eclipse on March 29, 1987. How could they really SEE a crescen