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APPLICATION OF MODERN TECHNOLOGY IN THE INTERPRETATION OF ASTRONOMICAL HADITH: AN ANALYTICAL STUDY

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Abstract

Astronomical Hadith, which include Prophetic traditions related to celestial phenomena such as moon sighting, prayer times, eclipses, and the determination of the qiblah, remain highly relevant in contemporary Islamic studies. However, many classical interpretations of these narrations were developed within historical contexts that lacked access to modern scientific instruments and digital technologies. This has created challenges in addressing present-day issues such as differences in lunar calendar determinations, inconsistencies in moon sighting practices, and limited integration between traditional Hadith scholarship and modern astronomical knowledge. Therefore, a renewed analytical framework is needed to reinterpret astronomical Hadith through contemporary technological advancements. This study aims to examine the interpretation of astronomical Hadith through modern technology and to evaluate how scientific tools can contribute to a more accurate and contextual understanding of these traditions. Specifically, the study seeks to identify the major themes of astronomical Hadith, analyse their classical and contemporary interpretations, and assess the role of modern technology in enhancing their practical application. The research employs a qualitative library-based methodology using an analytical and interdisciplinary approach. Primary sources include canonical Hadith collections and classical commentaries, while secondary sources consist of recent scholarly articles in Islamic studies, astronomy, and digital technology. Data are analysed through content analysis and comparative interpretation between traditional scholarship and modern scientific findings. The study finds that modern technologies such as telescopes, satellite imaging, astronomical software, geographic positioning systems, and artificial intelligence offer valuable support in understanding and applying astronomical Hadith. These tools can improve precision in lunar observation, prayer time calculation, and qiblah determination while preserving the textual authority of Hadith. The study concludes that constructive integration between Hadith scholarship and

	modern technology can provide a balanced and practical framework for addressing contemporary astronomical issues in the Muslim world.
	Keywords: *Astronomy, Hadith, Modern, Technology, Islam*.

INTRODUCTION

Astronomical Hadith refers to Prophetic traditions that discuss celestial phenomena and their relationship to acts of worship and daily life, including moon sighting for Ramadan, prayer times based on solar movement, eclipse prayer, and qiblah orientation. These narrations have historically played a central role in shaping Islamic ritual practice and the development of Muslim scientific traditions.

Classical Muslim scholars relied on direct observation and the scientific knowledge available in their time to interpret these Hadiths. However, rapid technological advancement in astronomy and digital sciences has created new opportunities and challenges for contemporary interpretation (Salimpour & Fitzgerald, 2024).

One of the most debated issues in modern Muslim societies concerns lunar calendar determination, particularly the beginning and end of Ramadan and the celebration of Eid. Differences between naked-eye moon sighting, telescopic observation, and astronomical calculation often lead to inconsistent decisions among Muslim communities.

While classical jurists generally prioritized physical sighting, modern scholars increasingly examine whether advanced observational tools may be considered valid extensions of the same principle (Rasheed et al., 2025). This demonstrates the need to revisit astronomical Hadith through an informed and methodologically balanced lens. Another important area relates to prayer time calculation and qiblah direction.

Historically, Muslims used solar shadows, stars, and simple instruments for determining time and direction. Today, satellite navigation systems, geographic information systems (GIS), mobile applications, and astronomical software can determine these matters with extraordinary precision. Such developments raise significant scholarly questions regarding the relationship between traditional textual interpretations and modern scientific certainty (Naeem, 2025).

Furthermore, eclipse-related Hadith provide an example of how Islamic teachings corrected superstition by linking unusual celestial events with reflection and prayer rather than mythical explanations. In the modern era, eclipses can be predicted centuries in advance through orbital calculations. This offers an opportunity to demonstrate the compatibility of authentic Hadith teachings with contemporary astronomical knowledge (Morrison, 2022).

Despite these advances, a gap remains between traditional Hadith studies and modern technological applications. Some approaches adopt rigid literalism and resist scientific tools, while others impose forced scientific meanings onto sacred texts. Both tendencies risk weakening sound interpretation. Therefore, an interdisciplinary framework that combines Hadith methodology, fiqh principles, and modern astronomy is increasingly necessary.

This study aims to examine the interpretation of astronomical Hadith through modern technology using an analytical approach. It explores key themes of astronomical Hadith, evaluates contemporary technological tools relevant to their application, and proposes a balanced framework for integrating scriptural authenticity with scientific advancement. Such a study is significant for promoting unity in Muslim practice, enhancing scientific literacy, and strengthening the relevance of Hadith studies in the digital age.

LITERATURE REVIEW

The study of astronomical Hadith through modern technology lies at the intersection of Islamic studies, astronomy, and digital transformation. Existing literature demonstrates growing scholarly interest in revisiting classical religious sources in light of contemporary scientific developments. However, much of the research remains fragmented, with some

studies focusing on scriptural interpretation, others on Islamic astronomy, and still others on technological tools.

This review examines major scholarly trends related to astronomical Hadith, classical interpretations, modern astronomy, and digital applications. One important strand of literature concerns the historical relationship between Islam and astronomy. Scholars have shown that astronomy occupied a central role in Muslim civilization due to its practical importance for determining prayer times, lunar months, qiblah direction, and eclipse observation.

Morrison (2022) explains that post-classical Muslim scholars did not separate astronomy from ethics and theology but often viewed cosmic order as evidence of divine wisdom. This indicates that scientific observation of celestial motion was historically integrated with religious reflection. Similarly, North (2008) notes that Muslim astronomers made substantial contributions to observational astronomy, mathematical models, and navigational science, particularly during the medieval period.

Another body of research focuses specifically on scriptural references to celestial motion. Ahsan (2012) argues that Qur'anic verses describing the movement of the sun, moon, and stars have inspired generations of Muslims to explore astronomy. Although these verses are theological rather than technical, they encourage observation, reasoning, and appreciation of cosmic regularity.

Naeem (2025) extends this discussion by analysing contemporary interpretations of Qur'anic cosmology and scientific phenomena. He suggests that scriptural references should be approached cautiously, avoiding exaggerated claims of "scientific miracles" while recognizing the intellectual openness of the Qur'an toward natural inquiry. These studies are relevant because astronomical Hadith function similarly: they are not scientific manuals, yet they contain references that invite practical and reflective engagement with celestial phenomena.

With regard to Hadith studies, Rasheed et al. (2025) provide one of the more direct contemporary discussions linking Quranic and Hadith materials with astronomy. Their study examines lunar sighting, eclipses, and prayer times from both jurisprudential and scientific perspectives. They conclude that Islamic sources support systematic observation and rational inquiry, particularly where worship depends on celestial cycles.

This is significant because it demonstrates that classical Hadith interpretation can be revisited without undermining textual authenticity. However, the authors also note persistent disagreements among Muslim communities regarding the use of calculation (*hisab*) versus physical sighting (*ru'yah*) in determining Islamic months. The issue of moon sighting has attracted considerable modern attention. Advances in telescopes, astronomical software, and satellite imaging have transformed the ability to observe lunar visibility.

Yet scholarly disagreement remains regarding whether these tools merely assist traditional sighting or replace it. Some juristic schools continue to prioritize naked-eye observation, while others permit optical enhancement or predictive calculations. This tension illustrates the broader methodological challenge of integrating technology into religious interpretation.

Existing literature suggests that technological certainty does not automatically resolve jurisprudential diversity, since legal reasoning depends not only on empirical data but also on interpretive principles (Rasheed et al., 2025). Digital technology has also reshaped practical Islamic astronomy. Modern mobile applications now provide prayer times, qiblah direction, eclipse alerts, and Hijri calendar projections.

Salimpour and Fitzgerald (2024) argue that astronomy education increasingly reflects cultural and technological contexts, meaning that digital tools influence how communities understand celestial knowledge. In Muslim contexts, this implies that technology is not merely instrumental but pedagogical, shaping public religious literacy. However, overdependence on poorly calibrated applications may also create inaccuracies or unquestioned trust in automated systems.

Recent studies in space science and orbital mechanics further enrich this field. Hamwdi (2026) reviews advances in celestial mechanics and astrophysics, highlighting the role of computational modelling, predictive algorithms, and precision orbital analysis. While not directly focused on religion, such developments are relevant for eclipse prediction, lunar motion, and calendar calculations.

Likewise, modern astronomical systems based on satellite navigation and real-time data improve the accuracy *of qiblah* orientation and solar timing. This shows that contemporary astronomy can provide practical support for interpreting and applying astronomical Hadith. Despite these advances, several research gaps remain. First, many Islamic studies publications discuss Hadith texts without sufficient engagement with current astronomical science.

Second, some scientific discussions of Islamic practices neglect the methodological depth of Hadith criticism and jurisprudence. Third, limited literature proposes a comprehensive framework that balances textual authenticity, scientific reliability, and public usability. As Morrison (2022) notes in a broader sense, the historical Muslim tradition often integrated multiple disciplines rather than isolating them.

In summary, the literature indicates three major conclusions. First, astronomy has always held practical and intellectual significance in Islamic civilization. Second, astronomical Hadith continue to shape contemporary issues such as Ramadan, prayer scheduling, and eclipse practice. Third, modern technologies provide unprecedented tools for precision, but their use requires careful jurisprudential and methodological reflection.

Therefore, the present study addresses an important gap by analytically examining how astronomical Hadith may be interpreted through modern technology within an interdisciplinary framework.

ASTRONOMICAL HADITH

Astronomical Hadith refers to Prophetic traditions that address celestial phenomena and their relationship to worship, timekeeping, and natural observation. These narrations do not present astronomy as an independent scientific discipline in the modern sense, but they establish practical principles through which early Muslims understood the movement of the sun, moon, stars, and eclipses.

In the classical Islamic tradition, Hadith served as a foundational source for determining ritual obligations and guiding communal life. As a result, many aspects of early Islamic astronomy developed in close connection with these narrations (King, 2021).

One of the most significant themes in classical astronomical Hadith is the observation of the moon for determining the Islamic lunar calendar.

The Prophet Muhammad (PBUH) stated: *"Fast when you see it and break your fast when you see it"* (Ṣaḥīḥ al-Bukhārī; Ṣaḥīḥ Muslim). This Hadith became the central textual basis for beginning and ending Ramadan through moon sighting (*ru'yah*). Classical jurists interpreted this narration differently depending on legal methodology and regional practice.

Some scholars required direct local sighting, while others accepted testimony from distant regions. Ibn Rushd and al-Nawawī discussed these differences extensively, demonstrating that astronomical Hadith were closely tied to jurisprudential reasoning rather than simple literalism (Rasheed et al., 2025). Another important category concerns prayer times based on the apparent movement of the sun.

Numerous Hadith describe the beginning of the five daily prayers according to solar positions: dawn for Fajr, the sun's decline for Ẓuhr, shadow length for ʿAṣr, sunset for Maghrib, and twilight disappearance for ʿIshāʾ. These narrations enabled Muslims to regulate worship before the development of clocks or modern instruments. Classical scholars carefully examined seasonal and geographical differences when applying these Hadith, especially in regions with varying daylight durations (King, 2021).

The use of sundials and observational methods in early Islamic societies reflects the practical implementation of these traditions. Hadith concerning eclipses also played an

important role in correcting superstition. When a solar eclipse occurred during the lifetime of the Prophet ﷺ, some people linked it to the death of his son Ibrahim. The Prophet rejected this belief and declared that the sun and moon are signs of Allah and do not eclipse because of anyone's death or birth.

He instructed believers to pray and remember God during such events. Scholars note that this narration redirected public understanding from mythological explanations to reflective and observational awareness (Morrison, 2022). In this sense, classical astronomical Hadith encouraged rational engagement with unusual celestial events. The determination of qiblah direction also involved celestial guidance.

Although the Kaʿbah in Makkah remained the fixed point of orientation, classical Muslims often used the sun, stars, and seasonal rising points to estimate direction when travelling. Some jurists permitted approximation when certainty was unavailable, while Muslim astronomers later developed mathematical methods for more precise calculation. These developments illustrate how Hadith principles were complemented by astronomical science rather than opposed to it (North, 2008).

Another classical theme is the use of stars for navigation. While the Qur'an explicitly mentions stars as guides, Hadith literature and early Muslim practice also recognized their practical value in travel and orientation. In desert and maritime environments, knowledge of star positions was essential. This contributed to the later flourishing of Islamic astronomical tables, instruments, and observational science (Saliba, 2019).

Classical Hadith scholars also paid close attention to authenticity and interpretation. Narrations related to celestial matters were evaluated through isnād criticism and contextual analysis, ensuring that practical rulings were based on reliable reports. This demonstrates that classical astronomical Hadith were not merely accepted uncritically, but studied through rigorous scholarly methods. As Brown (2017) notes, Hadith scholarship historically combined textual preservation with legal and social application.

Despite their historical significance, classical astronomical Hadith were interpreted within the scientific knowledge available at the time. Early scholars relied on observation, inherited astronomy, and regional experience rather than telescopes, satellites, or computational models. Yet their methodologies reveal intellectual flexibility, especially where jurists considered public welfare, certainty, and practical ease.

This legacy remains highly relevant for modern discussions on moon sighting, prayer times in polar regions, and digital qiblah tools. In conclusion, classical astronomical Hadith formed a practical framework through which Muslims understood celestial phenomena in relation to worship and daily life. Themes such as lunar observation, prayer times, eclipses, qiblah direction, and navigation demonstrate that these narrations were deeply connected to empirical observation and communal order.

Far from opposing science, classical Islamic scholarship often integrated Hadith guidance with developing astronomical knowledge. This historical foundation provides an essential basis for contemporary reinterpretation through modern technology.

APPLICATION OF MODERN TECHNOLOGY

Modern technology has profoundly transformed the understanding and practical application of astronomical knowledge in both scientific and religious contexts. In relation to astronomical Hadith, technologies such as telescopes, satellites, digital software, mobile applications, artificial intelligence (AI), and geographic information systems (GIS) now provide accurate tools for observing celestial phenomena and implementing Islamic practices.

These innovations have enhanced precision in matters traditionally linked to observation of the sun, moon, and stars, while also raising new methodological questions regarding the integration of technology with scriptural interpretation (Hamwdi, 2026). One of the most significant technological applications is the use of optical telescopes and digital imaging systems for moon sighting.

Historically, the beginning of Ramadan and Eid depended on naked-eye observation of the crescent moon. Today, observatories use telescopes, charge-coupled device (CCD) cameras, and image enhancement software to detect lunar visibility under difficult atmospheric conditions. These technologies improve the reliability of moon sighting and reduce uncertainty caused by weather or light pollution.

Contemporary researchers note that digital lunar observation has become increasingly important in coordinating Islamic calendars across countries (Rasheed et al., 2025). Another major advancement is the role of astronomical software and simulation systems. Programs such as Stellarium, Redshift, and specialized observatory software can calculate moon phases, eclipse timing, planetary movement, and prayer schedules with remarkable precision.

Such tools allow scholars and institutions to verify astronomical events in advance and compare observational claims with scientific data. Computational astronomy has therefore become essential for educational institutions, observatories, and religious councils seeking evidence-based decisions (Salimpour & Fitzgerald, 2024). Satellite technology has also revolutionized astronomical applications.

Satellites provide real-time weather imaging, atmospheric monitoring, and precise geographic data that support moon sighting operations and solar calculations. Cloud cover data, horizon mapping, and environmental visibility reports help determine whether crescent observation is feasible in specific regions. In addition, satellite systems enable accurate time synchronization across the world, which is vital for prayer time schedules and fasting regulations (Samir, 2025).

One of the most widely used modern applications is the Global Positioning System (GPS) for qiblah direction and navigation. Historically, Muslims relied on stars, local geography, and approximate methods to determine the direction of Makkah. Today, smartphones, smartwatches, and digital compasses can calculate qiblah direction instantly using satellite coordinates.

Geographic Information Systems (GIS) further improve accuracy by integrating mapping data and spatial calculations. This has made qiblah determination more accessible, particularly for travellers and Muslim minorities living far from traditional centers of Islamic scholarship (Yusoff & Ahmad, 2023). Modern technology has also enhanced prayer time calculation systems.

Prayer times depend on solar altitude, twilight angles, and geographic location. While classical Muslims used direct observation of shadows and sunrise or sunset, contemporary systems use astronomical algorithms and location-based data to generate highly accurate prayer schedules. Mobile applications now provide automated alerts, calendars, and local adjustments, benefiting millions of users worldwide.

However, scholars note that differences in twilight standards and juristic methods still require careful calibration (Naeem, 2025). A rapidly developing area is the use of artificial intelligence and machine learning in astronomy. AI systems can analyse large volumes of observational data, detect lunar patterns, predict orbital movement, and improve weather forecasting for astronomical events.

In satellite operations, AI is used for trajectory management and anomaly detection. These technologies may eventually support automated moon visibility forecasting and more efficient management of astronomical observatories (Wang, 2025). Another important field is virtual learning and digital education platforms. Online courses, augmented reality simulations, and interactive sky maps help students understand lunar cycles, eclipse phenomena, and celestial mechanics.

In Islamic education, such tools can bridge the gap between traditional textual study and scientific literacy by making astronomical Hadith more accessible to contemporary learners (Salimpour & Fitzgerald, 2024). Despite these benefits, modern technology also presents challenges. Overdependence on mobile applications without scholarly verification may spread inaccurate prayer times or qiblah data.

Likewise, technological certainty does not automatically resolve juristic disagreements regarding moon sighting or legal authority. Therefore, technology should be viewed as a supporting instrument rather than a replacement for sound scholarship and institutional guidance (Rasheed et al., 2025). In conclusion, modern technology has greatly expanded the practical applications of astronomy in relation to Islamic worship and Hadith interpretation.

Telescopes, satellites, GPS, software systems, and AI have improved precision in moon sighting, prayer times, qiblah direction, and celestial education. When used responsibly within proper scholarly frameworks, these technologies can strengthen both scientific understanding and religious practice in the modern world.

ANALYTICAL DISCUSSIONS

The interpretation of astronomical Hadith through modern technology requires a balanced analytical framework that recognizes both the authority of sacred texts and the benefits of contemporary scientific knowledge. Astronomical Hadith generally address practical matters such as moon sighting, prayer times, eclipse prayer, and qiblah direction. These narrations were revealed within a historical context where direct human observation was the primary means of understanding celestial phenomena.

In the contemporary period, however, telescopes, satellites, computational models, and artificial intelligence offer unprecedented precision. The central question is therefore not whether science should replace Hadith, but how modern tools may assist in understanding and implementing Prophetic guidance responsibly (Rasheed et al., 2025).

One major issue in this discussion concerns the relationship between textual authenticity and technological application. In Islamic scholarship, authentic Hadith remain binding sources of guidance, yet their application often depends on context and method. For example, the Prophetic instruction to begin fasting upon sighting the moon has traditionally been understood through physical observation.

Some scholars interpret this literally and maintain that naked-eye sighting remains essential. Others argue that the objective of the Hadith is certainty regarding the beginning of the lunar month, meaning that telescopes and astronomical calculations may function as legitimate tools to achieve the same purpose. This debate demonstrates that disagreement often concerns methodology rather than rejection of the text itself (Brown, 2017).

Another key analytical point is the distinction between means and ends. Many classical jurists recognized that Islamic law distinguishes immutable principles from changeable methods. The obligation to pray at specific times is fixed, but the means of determining those times may evolve. Early Muslims used shadows, sunrise, and sunset observations, whereas modern societies rely on astronomical algorithms and digital schedules.

The legal objective remains unchanged, while the tools become more precise. This principle suggests that technology can support religious practice without undermining tradition (Kamali, 2020). The issue of moon sighting versus astronomical calculation remains one of the most debated contemporary subjects. Supporters of direct sighting emphasize fidelity to the literal wording of Hadith and the communal spirit of observing the crescent.

Advocates of calculation argue that modern astronomy can determine conjunction, visibility probability, and lunar age with high accuracy, reducing annual disputes over Ramadan and Eid. Scholars note that this conflict often reflects broader tensions between traditional authority and scientific expertise. A balanced approach may involve combining calculations with observational confirmation, thereby preserving both textual continuity and scientific reliability (Rasheed et al., 2025).

Another area of discussion is the use of GPS and digital qiblah systems. Historically, Muslims used stars, landmarks, and geographical reasoning to determine the direction of Makkah. Today, mobile applications and satellite-based systems can calculate qiblah

instantly. While this has greatly benefited travellers and Muslim minorities, concerns remain regarding software accuracy, calibration errors, and user overdependence.

Technology may simplify practice, but users still require basic literacy and scholarly guidance. Thus, convenience should not eliminate critical understanding (Yusoff & Ahmad, 2023). The use of artificial intelligence in religious astronomy introduces further analytical considerations. AI can process lunar visibility data, predict eclipses, optimize observatory systems, and improve prayer-time databases.

However, AI systems depend on human programming, selected datasets, and institutional assumptions. Therefore, technological outputs are not neutral truths but mediated products. Religious decisions based solely on automated systems may risk removing human scholarly judgment, which remains essential in interpreting evidence and addressing exceptional cases (Wang, 2025).

An additional challenge is the tendency toward forced scientific interpretation of Hadith. Some modern writers attempt to prove that every astronomical discovery was explicitly mentioned in sacred texts. While such efforts may aim to strengthen faith, they can weaken scholarship when speculative claims are later disproven. Classical Muslim scholars generally approached scriptural cosmology with humility, focusing on moral guidance and practical benefit rather than exaggerated scientific prediction.

As Morrison (2022) notes, Islamic intellectual history often integrated astronomy ethically and spiritually rather than polemically. At the same time, rigid literalism also presents limitations. Rejecting all modern scientific tools simply because they were absent in the early period may create unnecessary hardship and fragmentation. Islamic legal tradition historically demonstrated adaptability in matters of means, measurement, and administration.

Therefore, the challenge is not choosing between tradition and modernity, but developing principled integration grounded in sound scholarship. In conclusion, the analytical discussion shows that modern technology can significantly enhance the interpretation and application of astronomical Hadith when used within appropriate methodological boundaries.

Sacred texts provide enduring principles, while scientific tools offer improved means of implementation. The most constructive path lies between uncritical technological dependence and rigid textual literalism. An interdisciplinary model that combines Hadith studies, jurisprudence, and astronomy offers the strongest framework for addressing contemporary issues in Muslim societies.

RISK AND CHALLENGES

The interpretation of astronomical Hadith through modern technology presents numerous opportunities, yet it also raises significant methodological, legal, educational, and technological challenges. These challenges emerge from the attempt to reconcile classical religious texts with rapidly evolving scientific tools. While technology can improve precision in matters such as moon sighting, prayer times, and qiblah direction, its integration into religious practice is not always straightforward.

The key challenge lies in maintaining fidelity to Islamic sources while responding effectively to contemporary realities (Rasheed et al., 2025). One of the most prominent challenges is the long-standing debate between moon sighting (*ru'yah*) and astronomical calculation (*hisab*). Classical Hadith emphasize observing the crescent moon to determine the beginning and end of Ramadan.

However, modern astronomy can calculate lunar conjunction, altitude, and visibility with high accuracy. Some scholars accept these calculations as valid tools, while others insist that direct physical sighting remains necessary. This disagreement often results in differing Ramadan and Eid dates across Muslim countries, affecting communal unity and public confidence.

The challenge is therefore not only scientific but also jurisprudential, involving principles of textual interpretation and legal authority (Brown, 2017). A second challenge

concerns the issue of religious authority and institutional coordination. In many countries, multiple bodies claim legitimacy in determining Islamic dates, issuing prayer schedules, or endorsing technological methods.

Some rely on state-sponsored councils, while others follow transnational religious networks or independent scholars. As a result, modern technology does not automatically produce consensus. Even when the scientific data are clear, communities may differ over who has the authority to adopt and implement them. This challenge highlights that technology cannot replace the social role of trusted institutions (Kamali, 2020).

Another major challenge is the risk of overdependence on digital applications. Millions of Muslims now use smartphone apps for prayer times, qiblah direction, and lunar calendars. While these tools are convenient, not all applications use accurate algorithms or verified location settings. Errors in twilight angles, geographic coordinates, or software calibration can lead to inaccurate schedules.

Many users also accept app outputs uncritically without understanding the underlying calculations. This creates a new form of dependency in which convenience may weaken informed religious practice (Yusoff & Ahmad, 2023). The integration of artificial intelligence (AI) also introduces important concerns. AI systems can process astronomical data, predict moon visibility, and optimize observatory functions.

However, AI models depend on datasets, programming assumptions, and human-designed parameters. If these inputs are flawed, the resulting decisions may be misleading. Furthermore, delegating sensitive religious matters entirely to automated systems may marginalize scholarly judgment and ethical reasoning. Technology may assist decision-making, but it should not replace qualified human interpretation (Wang, 2025).

Another challenge is the tendency toward forced scientific interpretations of Hadith. Some contemporary writers attempt to claim that all modern astronomical discoveries were explicitly foretold in Prophetic narrations. While intended to defend religion, such approaches can be academically weak and methodologically problematic. If scientific theories later change, exaggerated interpretations may undermine credibility.

Scholars caution that Hadith should primarily be understood according to language, context, and intended guidance rather than speculative scientific projection (Morrison, 2022). Conversely, rigid literalism presents an opposite challenge. Rejecting all modern tools simply because they were absent in the classical period may create unnecessary hardship, especially in minority contexts or regions with poor visibility conditions.

Islamic legal history demonstrates flexibility in adopting new instruments for measurement, navigation, and administration. Therefore, an inflexible rejection of technology may ignore the dynamic and pragmatic dimensions of the Islamic tradition (Kamali, 2020). Educational limitations also remain significant. Many religious scholars have limited training in astronomy or data science, while many scientists lack grounding in Hadith methodology and jurisprudence.

This disciplinary divide can produce misunderstandings, mutual suspicion, and shallow public debate. Interdisciplinary education is therefore essential for responsible engagement with astronomical Hadith in the digital age (Rasheed et al., 2025). In conclusion, the challenges of interpreting astronomical Hadith through modern technology include legal disagreements, fragmented authority, unreliable digital tools, AI limitations, forced scientific claims, rigid literalism, and educational gaps.

Addressing these issues requires collaboration between scholars and scientists, stronger institutional frameworks, and a balanced methodology that respects both revelation and empirical knowledge.

CONCLUSION AND RECOMMENDATIONS

This study has examined the interpretation of astronomical Hadith through modern technology by analysing the relationship between classical Islamic sources and contemporary scientific advancements. The findings demonstrate that astronomical Hadith remain highly relevant in the modern era because they address practical religious matters

directly connected to celestial phenomena, including moon sighting, prayer times, eclipse observation, and *qiblah* determination.

Although these narrations emerged in a historical context that relied primarily on direct observation, their underlying objectives continue to guide Muslim communities today. The enduring value of these Hadith lies not only in their legal implications but also in their encouragement of reflection, order, and responsible engagement with the natural world.

The study further shows that modern technology has significantly enhanced the understanding and application of astronomical Hadith. Telescopes, satellite systems, astronomical software, geographic positioning systems (GPS), mobile applications, and artificial intelligence now provide highly accurate tools for observing lunar visibility, calculating prayer schedules, determining *qiblah* direction, and predicting eclipses.

These innovations can reduce uncertainty, improve efficiency, and support informed decision-making by religious institutions. In many contexts, technology has helped make Islamic practices more accessible for Muslims living in non-Muslim countries, remote areas, or urban environments where traditional observational methods may be difficult.

At the same time, the study finds that technology alone cannot resolve all challenges related to astronomical Hadith. Differences in jurisprudential methodology, legal authority, and public acceptance remain significant. Debates over moon sighting versus astronomical calculation continue in many parts of the Muslim world, often resulting in inconsistent Ramadan and Eid announcements.

Likewise, inaccurate digital applications, overreliance on automated systems, and the misuse of artificial intelligence can create confusion rather than clarity. Furthermore, forced scientific interpretations of Hadith or rigid literal rejection of all modern tools both represent unbalanced approaches that weaken sound scholarship. The comparative analysis suggests that there is no inherent contradiction between authentic Hadith teachings and modern astronomy.

Rather, each operates within a different but complementary domain. Hadith provides ethical guidance, ritual principles, and normative objectives, while modern astronomy offers empirical data, predictive models, and technical precision. A constructive relationship between the two requires methodological discipline, scholarly humility, and interdisciplinary cooperation.

Therefore, the most effective framework for interpreting astronomical Hadith in the contemporary era is one that integrates textual authenticity with reliable scientific knowledge. In the recommendations, several key points are proposed. First, greater collaboration should be established between Hadith scholars, jurists, astronomers, and data scientists.

Such cooperation would help produce more balanced rulings and practical solutions regarding moon sighting, prayer schedules, and *qiblah* determination. Joint committees at national and international levels could reduce unnecessary disputes and promote consistency among Muslim communities. Second, Islamic universities and religious institutions should incorporate basic astronomy, data literacy, and technological awareness into their curricula.

Likewise, scientists involved in Islamic calendar or worship-related technologies should receive exposure to Islamic jurisprudence and Hadith methodology. This mutual literacy would strengthen interdisciplinary competence. Third, official religious bodies should evaluate and certify digital applications related to prayer times, *qiblah* direction, and lunar calendars.

Verified platforms would help protect users from inaccurate algorithms and unreliable information.Public education campaigns should also teach users that technology is a helpful tool but not a substitute for scholarly guidance. Fourth, further academic research is needed on artificial intelligence in Islamic astronomy, especially concerning ethical governance, transparency, and decision-making limits.

AI may support observation and prediction, but religious rulings should remain under qualified human supervision. Finally, Muslim communities should promote a culture of unity, flexibility, and evidence-based dialogue in dealing with astronomical differences. Diversity of juristic opinion should be respected, but avoidable fragmentation should be minimized through communication and shared scientific standards.

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