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Cultural Heritage and Astronomy: Geographic Perspectives

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Abstract

Astronomy has significantly influenced cultural heritage, shaped human understanding of the universe and informing geographic research. This study examines the association among cultural heritage and astronomy, prominence geographic perspectives on the role of heavenly events in determining human culture. Archaeoastronomy, cultural scenery investigation, and GIS spatial analysis expose how astronomy stimulates cultural uniqueness, rituals, and ethnicities. Examples include ancient constructions united with celestial bodies its good example of Konark Sun temple, observatories in Jaipur several temples in India Stonehenge, Chichen Itza and lunar calendars enlightening agricultural practices. Cultural heritages promote significantly national identity and unity it's also splendid contribution in astronomical, historical and geographical monuments, sites, architectures and mythical phenomenon. In core, the study of astronomical heritage connections science and humanities, positive that the observation of the heavens is an essential characteristic of human cultural evolution.

Keywords: Astronomy, Cultural Heritage, Solstice and Equinox.

Introduction

Astronomy and cultural heritage involve the study of how human societies during history experiential, understood, and unified celestial singularities into their cultures, sacraments, and daily subsists. Astronomy is probably the oldest of all the sciences (Morisonpn 1). This field ties scientific observation with anthropology, investigative touchable locations similar observatories and intangible knowledge like navigation or mythology. It has been guiding to future generation also promotes knowledge about celestial bodies, planetary motion, agricultural practices and routine life. It is major chronology of calendar, sundials, seasonal migration and human rituals.

Objectives

1. Analyze astronomical influences on cultural heritage sites.
2. Understand cultural perceptions of celestial events.
3. Explore astronomy's role in shaping cultural identity.

Data & Methodology

This research paper mainly based on case studies examine specific cultural heritage sites with astronomical consequence Jantar Mantar, Jaipur; ancient temples associated with solstices and lunar. Methodology contains a review of prevailing literature on cultural heritages development. elated to astronomical and geographical places. The total examination for the present investigation is based on secondary data. The secondary data is composed from different websites, project reports, astronomical articles, and world (UNESCO) reports with history and research papers, etc.

Calendars and Agriculture: Earliest civilizations, counting Egyptians, Greeks, Sumerian, Romans, Babylonians, Indus, Gregorian and Mayans, operated astronomical observations to generate calendars, which were crucial for agricultural rotations, such as forecasting Nile floods, climatic season, and seasonal migration based on totally Earth and stars observation. In India major festivals and shrines related to agriculture practices and agricultural practices depend on solar and lunar movement.

Monuments and Architecture: Many cultural places were built to bring into line with heavenly events solstices, equinoxes, and eclipses representing a physical connection to the sky, such as Jantar man tar in Delhi, Sun temple in Konark, many temples in India sculptures

Jantar Mantar in Jaipur: A UNESCO World Heritage site featuring nineteenth large-scale masonry instruments, including the is a celestial masterwork settled in the heart of Jaipur. Constructed by the visionary sovereign Maharaja Sawai Jai Singh II, this astronomical observatory attitudes as a witness to human inventiveness and the voracious thirst for knowledge. Immerse yourself in a kingdom of detailed calculations and geometric devices that disentangle the anonymities of time, celestial bodies, and planetary activities.

Samrat Yantra, the world's largest sundial, accurate to within two seconds.

Mudumal Megalithic Menhirs in Telangana: A location highlighting menhirs dating back 3500-4000 years, settled to align with celestial events, reflecting olden cultures' considerate of celestial wonders.

Hanle Observatory in Ladakh: India's initial Dark Sky Reserve, positioned at an elevation of 4,500 meters, contribution exceptionally original atmospheres for astronomy

These sites demonstrate India's significant contributions to astronomy and its rich cultural heritage.

Stonehenge: It is an ancient monument in England excellently associated with the solar cycle, substitute as a monumental calendar. Its axis brings into line with the summer solstice sunrise in northeast and winter solstice sunset in southwest. The stones possible pursued seasons, with the sun forming rays straight into the monument's center during this essential time.

Sun Temple in Konark: Built as a massive solar chariot, its architecture allows the first rays of the sun to brighten the main shrine during equinoxes. Konark Sun Temple in Odisha, a UNESCO World Heritage Site, is a leading example of astronomical inheritance, premeditated as a immense chariot for the Sun God in India called 'Surya' with 24 complex stone wheels operational as sundials to pathway time. Constructed by King Narasimha deva first. Its Twelve sets of wheels, seven horses, and accurate alignment to the sun showcase innovative medieval Indian astronomical and architectural acquaintance.

Sringeri Vidyashankara Temple: Topographies 12 pillars representing the zodiac signs; the sunrays attack precise pillars to mark each solar month. The in Sringeri established is a 14th-century architectural masterwork combination Hoysala and Dravidian elegances, exactly designed as an operative solar calendar. It structures Twelve columns representing the zodiac sig on which sun rays fall in sequential order each month, acting as a accurate, antique astrophysical tool.

Some Astronomical Features in Vidyashankara Temple:

- **Solstice Patterns:** The structure aligns with the sun's track, exactly coloration the winter and summer solstices.
- **Architectural Accuracy:** The temple was constructed to endure times of withstanding, with the columns intended to cast particular, time-telling shadows on the base.
- **Zodiac Columns:** The twelve columns in the mandapa are inscribed with the symbols of the zodiac it called in India 'Rashi'
- **Solar Configuration:** Each morning, the sun's rays arrive the temple and assault the specific pillar equivalent to the Hindu solar month, showcasing progressive understanding of the ecliptic. This "Temple that pathways the Sun" is situated in Sringeri, Karnataka state of India and assists as evidence to the reflective information of astronomy and geometry in early India.

Astronomy in traditional Indian festivals it is Diwali, Makar Sankranti and Rath Saptami

Megalithic Sites: Sites like Byse in Karnataka show evidence of astronomical alignments dating back thousands of years, specifically oriented toward solstice sunrises.

The stone circles of Junapani: are early megalithic circles in Juna Pani adjoining Nagpur city of Maharashtra. There are about 300 such stone circles renowned around Junapani. A variety of iron substances with daggers, horizontal axes with cross-ring closures, hoes, rings, bracelets, horse bits, chisels with long knife-edges, and pointed tongs, possibly covered with a wooden handle.

Lonar lake in Buldhana : in is national Geo-heritage monument Salt Lake situated in Buldhana district of Maharashtra state in India. Which was created by meteor impact during the Pleistocene period and it is the only known hyper velocity impression crater in basaltic rock everywhere on Earth. The meteor crater rim is about 1.8 km in diameter.

Machu Picchu in Peru. It is one of the assets of ancient astronomy. The Incas constructed this place with a deep empathetic of celestial movements, positioning structure like the Intihuatana stone and temple of the Sun with solstices and equinoxes. They pursued the sun, moon, and stars, using this knowledge for agriculture, sacraments, and navigation. the location enterprise imitates their admiration for the cosmos, unification spirituality and science. This heritage sites famous for study and research of archeologist, geographer, astronomer and tourist persons.

Nebra Sky Disc in Germany: is a 3,600-year-old Bronze Age objects revealed in Germany, familiar as the world's oldest concrete description of the cosmos. The thirty-two cm bronze disc structures gold pieces representing the sun or full moon, a semicircular moon, and the Pleiades star collection, used for astrophysical tracking a night sky with thirty-two stars. Later embellishments comprised skyline arcs to scratch solstice points and sun boat and astronomical clock. it assisted as an applied guide for agricultural judgment and activities like of sowing, garnering and harvesting. This is also guides sacred and high-status ceremonial object.

- **Navigation:** Stars and constellations served as essential guides for, for example,
- **Cosmology and Myth:** Celestial bodies are often embodied in mythology, such as the Japanese Tanabata festival, which is created on the stars Vega and Altair. The Mythological cosmology is extremely knotted to religious and cultural backgrounds, such as the Hindu perception of 'Pancha Maha Bhuta' five fundamentals or the special confidence on the stars and planet.
- **Cultural Preservation:** The UNESCO Astronomy and World Heritage Initiative recognize, protects, and promotes the preservation of tangible sites and intangible knowledge relating to astronomical heritage. Astronomy continues to influence culture by providing a universal perspective on human existence

and influencing modern navigation and timekeeping systems. Ancient and medieval Indian structures were often designed as "calendrical devices" to track celestial events:

- **Current Expansions in 2026**

Dark Sky Festivals: In February month 2026, the **South Downs Dark Skies Festival** distinguished its 10th anniversary as an International Dark Sky Standby, highlighting the importance of preserving natural night skies over cultural landscapes.

Technological Integration: Archaeological sites like **Udayagiri** in India are progressively studied using contemporary cosmological software to authorize that supports, such as the Delhi Iron Pillar, were originally situated to mark the summer solstice.

New Nominations: Scientific sites like the **Historic Astronomical Observatories of Ireland** in Birr, Dunsink, and Armagh are under consideration for UNESCO status in 2026, importance their role in the development of modern extragalactic astronomy.

Conclusion

Astronomy suggestively impacts cultural heritage, shaping human understanding of the universe and informing geographic standpoints. Understanding these relationships can promote cultural preservation and indebtedness, highlighting the importance of interdisciplinary approaches to heritage conservation. Celestial events shape cultural identity and traditions Astronomy influences cultural landscape enterprise and alignment. Astronomy acts as a bridge between ancient civilizations and modern science, with historical knowledge enduring to inform current understanding. Astronomical heritage includes not just physical observatories and instruments, but also the stories, calendars, and traditional knowledge indigenous astronomy.

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Conflicts of interest

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