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DATING MEGALITHS OF EASTERN DECCAN: AMS RADIOCARBON EVIDENCE FROM THE MUNNERU VALLEY

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Abstract

The Eastern Deccan is characterized by a dense and diverse distribution of megalithic monuments, yet their chronological framework has remained poorly defined due to the absence of directly dated archaeological evidence. This study establishes an absolute dating framework for Eastern Deccan megaliths through scientific dating of cremated human remains recovered from megalithic burial contexts in the Munneru landscape of the Khammam region, a tributary of the Krishna River. The results provide the first secure absolute dates for megalithic activity in this region and constitute a critical temporal anchor for South Indian prehistoric sequences. By integrating absolute dating with archaeological and landscape data, this research addresses a long-standing gap in Deccan megalithic studies and contributes to broader debates on the emergence, development, and regional variability of megalithic traditions in peninsular India. The established chronological framework offers a robust foundation for future interdisciplinary research on cultural interaction, landscape use, and prehistoric traditions across the Eastern Deccan.

Keywords: Eastern Deccan, Munneru Landscape, Megalithic Monuments, Khammam Region, Absolute Dating, South Indian Prehistory

Introduction

The megalithic tradition of peninsular India represents one of the most enduring and regionally varied expressions of prehistoric cultural practice. Characterized by substantial diversity in monument form, mortuary architecture, and landscape setting, megalithic monuments have long been central to discussions of Iron Age social organization, ritual behavior, and technological change in the Deccan and adjoining regions.[1] Extensive archaeological research in the Northern, Western, and Southern Deccan has produced well-documented typological frameworks and broad relative chronologies, forming the basis for regional cultural syntheses.[2] In contrast, the Eastern Deccan has received comparatively limited archaeological attention, particularly with respect to the establishment of secure absolute chronological frameworks.[3]

Existing interpretations of megalithic traditions in the Eastern Deccan have largely depended on typological comparison and relative dating derived from material associations with better-studied regions of the plateau.[4] While such approaches have contributed to preliminary cultural classification, the absence of systematically dated contexts has constrained efforts to integrate Eastern Deccan megaliths into broader regional and interregional prehistoric narratives.[5] As a result, questions concerning the timing, development, and regional variability of megalithic practices in this zone remain insufficiently resolved.The Munneru landscape occupies a geographically and culturally significant position within the Eastern Deccan. Located between the Lower Godavari region and the Krishna River basin, it forms a transitional corridor linking the

[1] Leshnik, Lawrence S. *South Indian Megalithic Burials*. Munshiram Manoharlal, 1974, pp. 1–12.
[2] Allchin, F. R., and Bridget Allchin. *The Rise of Civilization in India and Pakistan*. Cambridge UP, 1982, pp. 327–341.
[3] Paddayya, Krishna. "Megalithic Cultures of South India." *Indian Archaeology in Retrospect, Vol. I: Prehistory*, edited by S. Settar and R. Korisettar, Manohar, 2002, pp. 381–394.
[4] Moorti, U. S. *Megalithic Culture of South India: Socio-Economic Perspectives*. Ganga Kaveri Publishing House, 1994, pp. 15–29.
[5] Paddayya, Krishna. "Megalithic Cultures of South India," pp. 386–389.

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interior Deccan Plateau with the Eastern Ghats. This setting suggests a potential role in facilitating mobility, interaction, and the transmission of cultural practices across peninsular India. Despite this strategic position and the presence of numerous megalithic monuments, the Munneru region has lacked absolute chronological data capable of anchoring archaeological interpretations within a reliable temporal framework.[6]

Addressing this gap, the present study establishes an absolute chronology for selected megalithic sites in the Munneru landscape through the scientific dating of cremated human remains recovered from securely associated burial contexts. By integrating targeted excavation with absolute dating methods, the study provides a robust temporal framework for reassessing the emergence and development of megalithic traditions in the Eastern Deccan. This approach enables a critical evaluation of existing typological models and contributes new data for understanding regional variability and patterns of cultural interaction across the Deccan Plateau.

By situating the Munneru landscape within an absolute chronological sequence, this research advances current knowledge of Eastern Deccan prehistory and strengthens comparative perspectives on megalithic traditions across peninsular India. The results offer a foundation for future interdisciplinary investigations that integrate archaeology, landscape analysis, and archaeological science in the study of South Asian protohistoric societies.

The present study focuses on megalithic monuments located within the campus of S.R. & B.G.N.R. Government Arts & Science College, Khammam (17° 15′ N, 80° 09′ E), situated on the left bank of the Munneru River, a tributary of the Krishna. Historically, Khammam town preserves a dense distribution of megalithic monuments, although many have been lost due to urban development. Within the college campus, more than thirty monuments survive, including eight barrows, one stone circle with an associated stone alignment, and several additional stone and cairn circles. The site has experienced significant disturbance from construction and other developmental activities, resulting in the partial burial or disappearance of some monuments.

Typologically, the monuments are predominantly stone circles, constructed with large dressed or undressed boulders arranged in circular formations enclosing burial deposits. Their preservation within the campus provides a unique opportunity to study the integration of funerary architecture within the broader settlement landscape of the Eastern Deccan. Archaeological excavation conducted in 2012 yielded a funerary assemblage, among which three cremated bone samples from Stone Circles I, II, and III were recovered and subsequently subjected to radiocarbon dating[7].

Megalithic Monuments of the Munneru Valley

Geographical and Physiographic Context

The Munneru Valley lies well within the **Eastern Deccan**, a major physiographic subdivision of the broader Deccan Plateau of peninsular India. The Deccan Plateau extends southward from the Satpura and Vindhya ranges in the north, is bounded by the Western Ghats to the west and the Eastern Ghats to the east, and slopes gently toward the Bay of Bengal, with major river systems such as the Godavari and Krishna draining eastward across its expanse. Its eastern extent encompasses the plateau landscapes of Telangana and Andhra Pradesh, within which the Munneru River and its tributaries

[6] Moorti, U. S. *Megalithic Culture of South India: Socio-Economic Perspectives*. Ganga Kaveri Publishing House, 1994, pp. 21–24.

[7] The excavations were conducted by the present author in collaboration with the University of Hyderabad, in association with the Department of State Archaeology, Telangana, and with the necessary permissions granted by the Archaeological Survey of India. Scientific coordination and facilitation of laboratory analyses were undertaken in collaboration with the Centre for Cellular and Molecular Biology (CCMB), Hyderabad, while Accelerator Mass Spectrometry (AMS) radiocarbon measurements were carried out at the Beta Analytic Radiocarbon Dating Laboratory, Miami, Florida, USA.

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flow through undulating terrains characteristic of the Eastern Deccan. This positioning situates the Munneru Valley squarely within the eastern physiographic and cultural landscape of the Deccan, where human settlement and mortuary traditions such as megalithic monuments developed in response to distinct topography, drainage patterns, and ecological settings.

The Munneru River originates at Yelibuligutta, near Kistapuram village in Gudur taluk, Warangal district, and flows southwards for approximately 154 km, draining the Yellandu and Khammam taluks before joining the Krishna River. Its tributaries—including the Paleru, Akeru, and Wyra rivers—traverse the region, forming natural corridors that likely influenced settlement patterns and the distribution of mortuary sites.

Megalithic Monuments: Typology and Spatial Organization

Within Khammam district, the Munneru Valley preserves a dense and spatially organized network of megalithic monuments, including stone circles, cairn circles, barrows, menhirs, and dolmens, which collectively reflect the funerary practices and settlement organization of protohistoric communities in the Eastern Deccan. These monuments exemplify broader patterns observed across the Eastern Deccan, where similar megalithic traditions demonstrate regional continuity in ritual architecture, site placement, and integration of mortuary landscapes within settlement territories.

Most monuments are located on hillocks, slopes, or laterite tablelands—areas unsuitable for cultivation—and are typically placed at some distance from habitation sites. This placement indicates a ritual and symbolic separation of the dead from living spaces, while remaining within the broader territorial range of contemporary communities. Many sites are oriented toward fertile valley plots or watercourses, reflecting careful integration of mortuary landscapes into the surrounding environment and a connection between ecological resources and social organization. Environmental factors, including soil type, annual rainfall (600–1,500 mm), and proximity to water, further shaped site selection, while social norms likely contributed to their preservation, with communities generally refraining from disturbing burial monuments. Some of the megalithic sites preserved their ritual and cultural significance across successive generations. Notably Nelakondapally later witnessed Buddhist activity, reflecting continued sacred use of the landscape. Kokkireni is situated adjacent to Mudigonda Chalukya temples, linking megalithic ritual spaces with medieval religious structures.Kusumanchi lies within the Kakatiya temple region, demonstrating integration of megalithic monuments into subsequent temple-centered landscapes.

These patterns demonstrate that funerary landscapes of the protohistoric period were respected, reused, and integrated into later religious and social frameworks, highlighting the enduring sacred value of these sites and their role in shaping regional cultural continuity.

Village-Wise Distribution of Megalithic Monuments

S.No	Village / Town	Coordinates (Lat, Long)	Monument Types	Key Observations
1	Jupeda	17° 29′ N, 79° 86′ E	Stone circles	>20 stone circles at village entrance
2	Kakaravayi	17° 31′ N, 79° 83′ E	Stone circles	Trimmed boulders arranged in circles
3	Khammam Town (College Campus)	17° 15′ N, 80° 09′ E	Stone circles, barrows, cairn circles	30+ surviving monuments; 8 barrows, 1 stone circle with alignment; excavated 2012 yielding cremated remains from Circles I–III

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S.No	Village / Town	Coordinates (Lat, Long)	Monument Types	Key Observations
4	Khanapuram	17° 36′ N, 80° 21′ E	Cairn packs	15+ structures; circular arrangements of granetoid orthostats
5	Kokkireni	17° 00′ N, 79° 77′ E	Menhirs, dolmens	4 menhirs, 3 dolmens near village entrance; adjacent to Chalukya temples
6	Kusumanchi	17° 22′ N, 79° 95′ E	Menhirs, alignments	Later religious centre during Kakatiya period
7	Madhira	17° 05′ N, 80° 41′ E	Cairn circles	Circular boulder arrangements with rubble packing
8	Nelakondapalle	17° 25′ N, 79° 41′ E	Menhirs, cairn circles	Archaeological mound “Biragi Gutta”; Black & Red Ware, Red Ware sherds; Buddhist activity
9	Velugumatla	17° 22′ N, 80° 18′ E	Cairn circles, dolmens	Small-scale village site monuments
10	Wyra	17° 19′ N, 80° 35′ E	Cairn burials	Excavated and declared protected during Nizam period

This distribution demonstrates the spatial integration of funerary sites within settlements, proximity to water sources, and selection of ecologically and socially significant landscapes. Many sites remain partially preserved despite modern development, offering critical insights into protohistoric settlement organization, mortuary architecture, and cultural continuity in the Eastern Deccan.

Chronology of the Deccan Megaliths

The megalithic culture of the Deccan represents a long and regionally differentiated cultural tradition that unfolded within the broader framework of the South Indian Iron Age. Archaeological research across the Deccan Plateau demonstrates that megalithic burial practices evolved gradually from earlier Neolithic and Chalcolithic cultural contexts and became firmly established by the early first millennium BCE. Rather than constituting a sudden or uniform phenomenon, Deccan megalithism reflects a prolonged chronological sequence of continuity, conservatism, and transformation shaped by ecological diversity, technological change, and region-specific cultural trajectories. This temporal development was marked by interactions among multiple cultural and ethnic groups, through which diverse communities participated in the shared adoption, adaptation, and reinterpretation of mortuary practices and material symbols, resulting in a broadly interconnected yet internally varied megalithic tradition over time.

Scholars have long emphasized that the Deccan Plateau—bounded by the Vindhya and Satpura ranges in the north and flanked by the Western and Eastern Ghats—functioned as a vast cultural mosaic rather than a homogeneous zone. Within this landscape, the Eastern Deccan, encompassing present-day Telangana and adjoining Andhra Pradesh, developed its own variants of megalithic traditions while remaining connected to wider peninsular networks through river corridors such as the Godavari, Krishna, and their tributaries, including the Munneru. The chronology of Deccan megaliths must therefore be understood both at a pan-Deccan scale and through regionally grounded sequences.

The megalithic culture of the Deccan represents a long and regionally differentiated cultural tradition that emerged within the broader framework of the South Indian Iron Age. Archaeological research across the Deccan Plateau demonstrates that megalithic burial practices developed gradually from earlier Neolithic and Chalcolithic cultural contexts and became firmly established by the early first millennium BCE. Rather than constituting a sudden or uniform phenomenon, Deccan

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megalithism was neither uniform nor synchronous, but rather a **regionally differentiated and temporally extended phenomenon** shaped by local ecological conditions, technological innovation, and multi-ethnic cultural interactions. Based on earlier scholarship, the Peninsular Iron Age megalithic phase is generally attributed to c. 1100 BCE–100 BCE; however, in Tamil Nadu, megalithic practices appear to have persisted even after 600 CE. Excavated sites such as Brahmagiri, Hallur, and Hyderabad in the Deccan, along with Paiyampalli and Vallam in Tamil Nadu, reveal earlier phases of this chronology, indicating that the onset and development of megalithism were not uniform across the region. Absolute dating techniques, including radiocarbon (C^{14}), thermoluminescence (TL), and optically stimulated luminescence (OSL), support these temporal variations, providing evidence for both early and prolonged use of megalithic monuments in different sub-regions of the Deccan[8]. The chronology of megalithic sites across the Deccan Plateau, established through these absolute dating methods, reveals significant regional variation in the emergence, development, and persistence of megalithic practices. Table -1 provides a comparative summary of these absolute dates[9], highlighting the temporal distribution of megalithic activity across the Western, Northern, and Southern Deccan.

Table -1

Megalithic Phase	West Deccan (Karnataka)	South Deccan (TN + Andhra [Rayalaseema])	North Deccan (Maharashtra)
Early Megalithic c. 1100–800 BCE	1. Brahmagiri: 3670 ± 40 BP (~1760–1680 BCE), 3620 ± 40 BP (~1710–1630 BCE) **[c14]** earlier than McIntosh Early Megalithic Phase	1. Paiyampalli (TN): 3570 ± 105 BP, 3340 ± 100 BP (~1725–1490 BCE) **[c14]** 2. Vallam (TN): 2980 ± 110 BP, 2920 ± 140 BP (~1725–1490 BCE) **[c14]** 3. Palavoy (Andhra, Rayalaseema): 3390 ± 95 BP (~1725 BCE) **[c14]** Above three sites are earlier than McIntosh Early Megalithic Phase 4. Ramapuram (Andhra, Rayalaseema): 3280 ± 110 BP, 3240 ± 110 BP (~1130–900 BCE) **[c14]**	1.Adam: 3080 ± 120 BP (~1130–900 BCE) **[c14]** 2. Naikund: 2565 ± 105 BP, 2495 ± 105 BP, 2455 ± 100 BP (~1100–800 BCE) **[c14]** 3. Takalghat: 2565 ± 105 BP, 2505 ± 100 BP (~800–600 BCE) **[c14]**
Middle Megalithic c. 550–300 BCE	1. Halingali: 1970 ± 95 BP (~200–50 BCE) **[c14]**	1.Veerapuram (Andhra, Rayalaseema): 3150 ± 140 BP, 2870 ± 140 BP, 2830 ± 140 BP, 2090 ± 140 BP, 1780 ± 140 BP (~500–350 BCE) **[c14]** 2. Pappinayakkanpatti (TN): 2040 ± 150 BP (~500–350 BCE) **[c14]** 3. Alagankulam (TN): 380–205 BCE **[c14]** 4. Siruthavoor, Dolmen 4 (TN):	1. Adam: 2710 ± 110 BP (~900–700 BCE), 2410 ± 70 BP (~550–400 BCE), 2390 ± 60 BP (~500–400 BCE) **[c14]**

[8] Morrison, K.D. *Brahmagiri Revisited: A Re-analysis of the South Indian Sequence.* In C. Jarrige & V. Lefevre (eds.), *South Asian Archaeology 2001*, 257–62. Paris: Recherche sur les Civilisations–ADPF, 2005. Thomas, P.J., P. Nagabhushanam, and D.V. Reddy. "Optically Stimulated Luminescence Dating of Heated Materials Using Single-Aliquot Regenerative-Dose Procedure: A Feasibility Study Using Archaeological Artefacts from India." *Journal of Archaeological Science* 35 (2008): 781–90.

[9] Sudyka, Joanna. "The 'Megalithic' Iron Age Culture in South India: Some General Remarks." *Analecta Archaeologica Ressoviensia*, vol. 5, 2011, pp. 359–440.Smriti, Haricharan, Hema Achyuthan, and N. Suresh. "Situating Megalithic Burials in the Iron Age–Early Historic Landscape of Southern India." *Antiquity*, vol. 87, no. 336, 2013, pp. 488–502.

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Megalithic Phase	West Deccan (Karnataka)	South Deccan (TN + Andhra [Rayalaseema])	North Deccan (Maharashtra)
		~330 BCE **[osl]**	
Late Megalithic c. 300 BCE – CE 600+	—	1.Siruthavoor, Cist 6 (TN): CE 346 ± 45 **[osl]** 2. Siruthavoor, Urn 8 (TN): CE 487 ± 74 **[osl]** 3. Siruthavoor, Cist 3 (TN): CE 619 ± 28 **[osl]** 4. Vallam (TN): CE 610 ± 105 **[c14]** 5. Kanchipuram (TN): CE 1070 ± 120 **[c14]** 6. Adichannallur (TN): CE 1150 ± 100 **[c14]** 7.. Kodumanal (TN): CE 1550 ± 90 **[c14]**	1. Adam: 2100 ± 95 BP (~245–55 BCE) **[c14]**

Within this broader chronological framework, the Eastern Deccan occupies a transitional zone

extending toward the eastern coastal plains. Archaeological evidence from Andhra Pradesh and Telangana—including sites distributed along the Godavari–Krishna drainage system within the Eastern Deccan—demonstrates that megalithic burial traditions were firmly embedded in this region.[9] The Munneru Valley, as an important tributary corridor of the Krishna River system, fits squarely within this Eastern Deccan cultural landscape.

The dense concentration of megalithic monuments in the Munneru Valley should therefore be understood not as a peripheral or derivative phenomenon, but as a regionally rooted expression of a broader Deccan mortuary ideology, shaped by local ecology, settlement patterns, and social organization. Evidence from South Indian Iron Age sites supports the view that Eastern Deccan communities actively participated in, and locally reconfigured, megalithic traditions over several centuries.[10] This extended temporal span also helps explain why certain megalithic locations continued to be ritually venerated by later generations, transforming funerary monuments into enduring cultural landmarks within the landscape. Once a secure chronological framework is established, the broader cultural sequence—encompassing mortuary practices, settlement dynamics, and social change—can be interpreted with far greater clarity and confidence.

Materials and Methods

Site Information The study focuses on the megalithic complex located within the campus of S.R. & B.G.N.R. Government Arts & Science College, Khammam, Telangana (coordinates: 17°15′ N, 80°09′ E), on the left bank of the Munneru River, a tributary of the Krishna River in the Eastern Deccan plateau.

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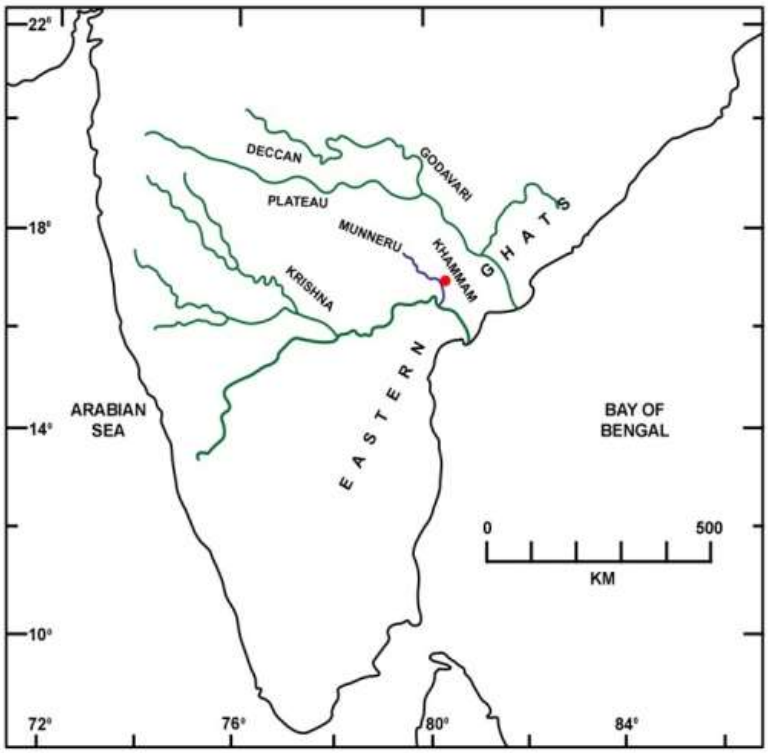
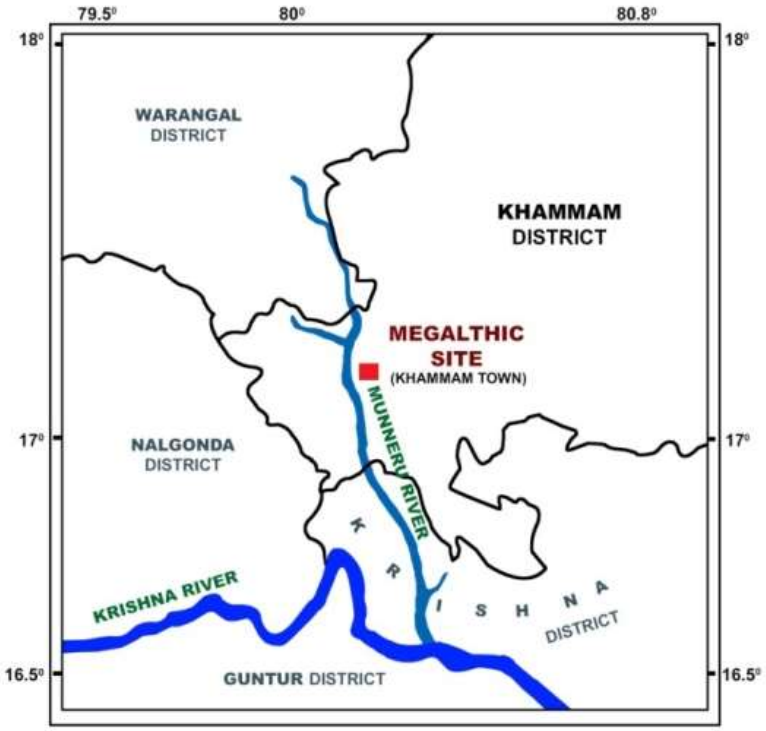


Location of Munneru



Location of megalithic site in Khammam town

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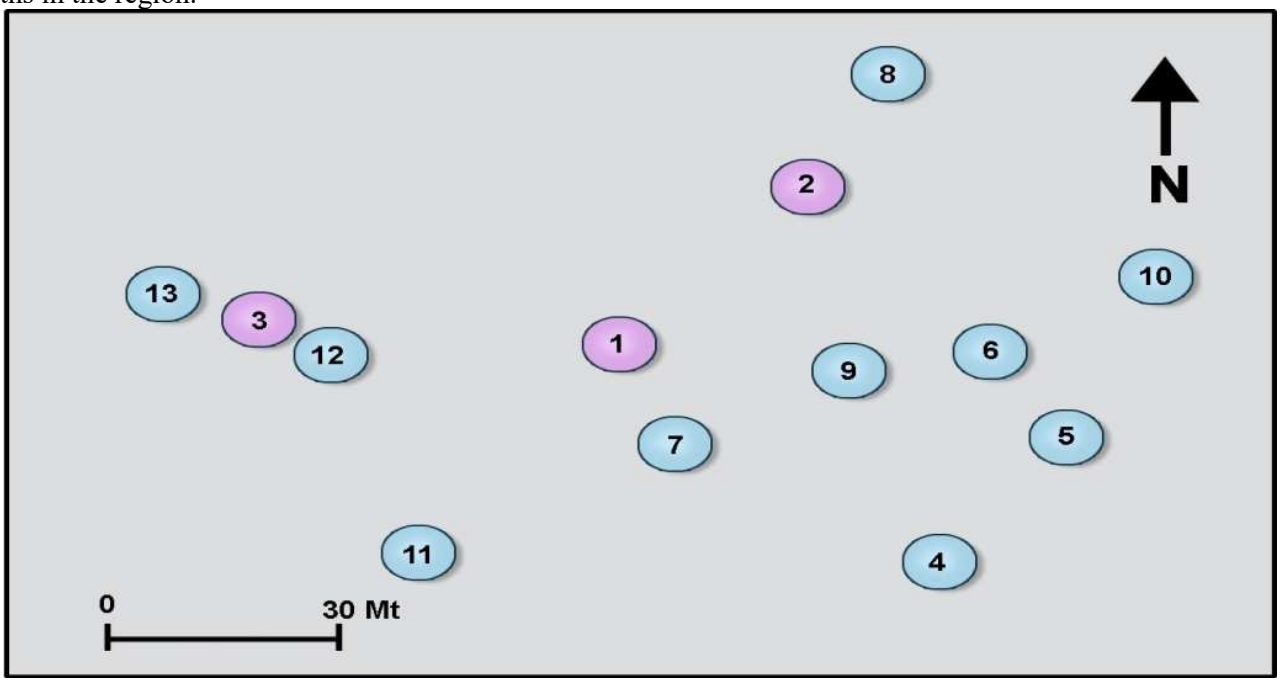
The campus preserves more than 30 megalithic monuments, including stone circles, cairn circles, eight barrows (tumuli), and one stone circle with an associated linear stone alignment. Despite significant disturbance from urban development, construction, and campus expansion over the decades, the site remains one of the best-preserved concentrations of megaliths in the region.



Distribution of Megalithic Stone Circles in the SR & BGNR College Campus

A systematic survey documented 13 stone circles in the north-western sector of the campus forming a loose cluster spanning approximately 100–150 meters, with diameters ranging from 5.84 m to 12.00 m and periphery boulders varying from 4 to 21 per circle.

Stone Circle	Number of Stones	Diameter (in metres)
Stone Circle I	21	9.96
Stone Circle II	19	7.50
Stone Circle III	12	6.89
Stone Circle IV	15	5.89
Stone Circle V	7	7.20
Stone Circle VI	18	8.35
Stone Circle VII	7	5.84
Stone Circle VIII	14	11.50

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Stone Circle IX	8	6.60
Stone Circle X	6	12
Stone Circle XI	8	6.23
Stone Circle XII	7	6.68
Stone Circle XIII	4	6.15

Description of Excavated Stone Circles Archaeological excavation was carried out in May–June 2012, targeting three representative stone circles (designated Stone Circles I, II, and III) selected for their relative preservation, surface visibility, and typological diversity.

Stone Circle I (21 periphery boulders, external diameter 9.96 m): This monument features a distinctive swastika-patterned transept cist, appearing approximately 0.9 m below the present surface. The cist is divided into chambers by orthostat slabs, with a symbolic half-moon port-hole slab (2 ft long, 1 ft wide, 4 inches thick) attached to the northern orthostat. The funerary assemblage was placed on a large basal stone slab (6 ft long, 5 ft wide, 5 inches thick) at a depth of approximately 2.7 m. The chambers contained multiple fractional cremated interments heaped together, predominantly pottery, and five iron objects (a dagger, two spearheads, one wedge-shaped artisanal implement, and one unidentified damaged tool). No artifacts were found outside the chambers.

Excavated Stone Circle – I, (21 periphery boulders, external diameter 9.96 m)

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Swastika-patterned transept cist

Location and context of the bone sample, classified as Category III, was analyzed under Beta Analytic laboratory reference number Beta-387265

Stone Circle II (19 periphery boulders, external diameter 7.50 m). This circle encloses an oblong cist located approximately 0.6 m below the surface. Excavation revealed multiple fractional skeletal remains at a depth of about 1.5 m within the chamber. Pottery sherds were recovered both inside and outside the cist, along with a badly damaged iron agricultural implement (coulter).

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Excavated Stone Circle – II, 19 periphery boulders, external diameter 7.50 m

Oblong cist

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Location and context of the bone sample (Beta-387267), assigned to Category II

Stone Circle III (12 periphery boulders, external diameter 6.89 m). This monument contains an oblong cist constructed approximately 1.4 m below the surface, partially disturbed but well-protected by six distinct soil layers (the uppermost mixed with stone rubble). The capstone had fractured and fallen inward, but the soil fill preserved the grave goods intact. The chamber, filled with red soil mixed with sandy gravel, yielded multiple fractional interments (including six skulls on the basal slab at ~3 m depth), a total of 55 pottery vessels (including two storage pots containing ten smaller pots at the southern end), an iron sickle, and several badly damaged iron implements.

Excavated Stone Circle – III, 12 periphery boulders, external diameter 6.89 m

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Oblong cist at ~1.4 m depth, capstone collapsed, but soil layers preserved the grave goods

Location and context of the bone sample (Beta-387266), assigned to Category III

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Samples Collected for Radiocarbon Dating Three cremated human bone samples were collected directly from the primary cremation deposits in the excavated stone circles during the 2012 fieldwork: One sample from Stone Circle I (from the main chamber assemblage, associated with the swastika-patterned transept cist).Another one sample from Stone Circle II (from the oblong cist chamber fill, associated with fractional skeletal remains).One more sample from Stone Circle III (from the basal deposit of the oblong cist, associated with multiple interments and preserved pottery).

These samples were selected for their calcined appearance (indicating high-temperature cremation >600°C), sufficient recrystallized structural carbonate in the bioapatite fraction, and secure stratigraphic association with the funerary events.

Results: AMS Radiocarbon Dating of Cremated Bone Samples

AMS radiocarbon dating was conducted on three cremated bone samples recovered from **Stone Circles I, II, and III** excavated in 2012 from the premises of **SR&BGNR Government Arts & Science College, Khammam,** located in the Munneru River Valley of the Eastern Deccan. The scientific analysis was carried out in collaboration with the **Centre for Cellular and Molecular Biology (CCMB), Hyderabad,** while radiocarbon measurements were performed at the **Beta Analytic Radiocarbon Dating Laboratory, Miami, Florida (USA)**.[10]

All samples were processed using carbonate extraction from cremated bone, an established and reliable method for dating high-temperature funerary remains. Measurements were carried out using Accelerator Mass Spectrometry (AMS). Conventional radiocarbon ages were corrected for isotopic fractionation using measured $\delta^{13}C$ values and are reported in radiocarbon years before present (BP), where "present" is defined as 1950 CE. Calibration to calendar years was performed using the IntCal13 calibration curve, and calibrated age ranges are reported at 2σ (95%) probability.[11]

AMS radiocarbon determinations obtained from cremated bone samples recovered from three excavated stone circles in the Munneru Valley reveal a clear temporal sequence within the Eastern Deccan megalithic tradition (Table X). The earliest calibrated date was obtained from **Stone Circle II** (Beta-387267), yielding a range of **cal BC 540–395**, representing the **initial phase** of megalithic burial activity at the site. This result indicates that organized megalithic funerary practices in the Munneru Valley were firmly established by the mid–first millennium BC.

The sample from **Stone Circle III** (Beta-387266) produced a conventional radiocarbon age of **2260 ± 30 BP,** calibrated to **cal BC 395–350 and cal BC 305–210**, reflecting an **intermediate phase** of stone-circle construction and use. This phase corresponds to continued mortuary activity marked by oblong cist architecture and an expanded range of ceramic assemblages and iron implements.

The most recent radiocarbon determination derives from **Stone Circle I** (Beta-387265), with a conventional age of **2100 ± 30 BP,** calibrated to **cal BC 305–210**, indicating a **terminal phase** of megalithic activity at the site. This phase is characterized by architectural elaboration, notably the swastika-patterned transept cist, and the presence of diversified iron objects including weapons such as a dagger, suggesting increasing social differentiation and emerging political organization approaching the dawn of the Early Historic period.

Taken together, these AMS radiocarbon determinations demonstrate that the Munneru Valley cemetery represents a **multi-phase mortuary landscape**, spanning several centuries. Despite continuity in core megalithic traditions—such as burial architecture, ceramic styles, and ritual practices—the absolute dates reveal a clear chronological development from early agrarian communities to more complex Iron Age societies in the Eastern Deccan.

[10] Radiocarbon analyses were conducted at Beta Analytic Radiocarbon Dating Laboratory, Miami, Florida, in collaboration with the Centre for Cellular and Molecular Biology (CCMB), Hyderabad.

[11] Talma, A. S., and J. C. Vogel. "A Simplified Approach to Calibrating C^{14} Dates." *Radiocarbon*, vol. 35, no. 2, 1993, pp. 317–322.Reimer, Paula J., et al. "IntCal13 and Marine13 Radiocarbon Age Calibration Curves 0–50,000 Years cal BP." *Radiocarbon*, vol. 55, no. 4, 2013, pp. 1869–1887.

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Table: AMS Radiocarbon Dates from Munneru Valley Megalithic Stone Circles

Stone Circle	Burial Type	Beta Analytic Lab Code	Calibrated Date Range (cal BC, 2σ)	Cultural Phase Interpretation
Stone Circle II	Oblong cist	Beta-387267	540–395 cal BC	Earliest / Initial Phase
Stone Circle III	Oblong cist	Beta-387266	395–350 cal BC	Intermediate / Developed Phase
Stone Circle I	Swastika-pattern transept cist	Beta-387265	305–210 cal BC	Latest / Terminal Phase

Calibration: IntCal13
Material: Cremated bone carbonate
Probability: 95% (2σ)

DISCUSSION

Chronology, Technology, and Cultural Continuity

The AMS radiocarbon determinations from the three excavated stone circles in the Munneru Valley, when evaluated alongside burial architecture and associated material culture, reveal a chronologically structured yet culturally continuous sequence within the Eastern Deccan megalithic tradition.

The earliest phase is represented by Stone Circle II (cal BC 540–395). This oblong cist burial yielded multiple fractional interments and an iron coulter, a tool closely associated with early plough-based agriculture. The relative simplicity of the burial architecture, combined with limited iron equipment and the functional nature of the agricultural implement, suggests an early farming-oriented megalithic community. This phase reflects the initial consolidation of sedentary agrarian lifeways within the region.

The **intermediate phase** is represented by **Stone Circle III** (cal BC 395–350 / extending into cal BC 305–210). This burial exhibits increased architectural complexity, including a carefully stratified cairn with multiple soil layers, a large assemblage of ceramics, and multiple skull interments placed deliberately on the basal slab. The presence of sickle-related and other agricultural iron tools, together with extensive pottery sets—some arranged in nested configurations—indicates intensified agricultural production, surplus management, and elaborated mortuary ritual. These features suggest a mature megalithic phase marked by social differentiation and increased ritual investment.

The **latest phase** is represented by **Stone Circle I** (cal BC 305–210), despite sharing certain ceramic and funerary traits with the earlier circles. This burial is distinguished by its **swastika-patterned transept cist,** a highly formalized and symbolically charged architectural form rarely encountered in earlier megalithic contexts. More significantly, the funerary assemblage includes a **dagger,** spearheads, and specialized iron implements, indicating a pronounced martial component. The introduction of weaponry alongside agricultural tools points to emerging socio-political hierarchies, territorial concerns, and possibly warrior identities, aligning this phase with broader late megalithic developments across the Deccan during the threshold of the Early Historic period.

Although the three stone circles contain overlapping ceramic traditions—Plain Red Ware, Red Slipped Ware, Black-and-Red Ware, and Black Burnished Ware—and share core mortuary practices such as fractional interments and cairn construction, the calibrated radiocarbon sequence demonstrates **gradual transformation rather than cultural rupture.**

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The coexistence of older agricultural tools with later weapon forms underscores continuity of tradition while accommodating innovation.

Taken together, the Munneru Valley evidence supports a **long-lived megalithic cultural continuum,** evolving from early agrarian communities (Stone Circle II), through intensified ritual and subsistence practices (Stone Circle III), to socially stratified and symbolically elaborate burial traditions (Stone Circle I) on the eve of early historic socio-political formations in the Eastern Deccan.

Conclusion:

Toward an Absolute Chronology of Eastern Deccan Megaliths

The AMS radiocarbon determinations obtained from cremated bone samples associated with three excavated stone circles in the Munneru Valley provide one of the few absolute chronological frameworks presently available for megalithic contexts in the Eastern Deccan. The calibrated C^{14} dates establish a coherent age sequence spanning from the Initial Megalithic Phase (Stone Circle II; cal BC 540–395), through a Developed Megalithic Phase (Stone Circle III; cal BC 395–350 and cal BC 305–210), to a Terminal or Transitional Megalithic Phase (Stone Circle I; cal BC 305–210). This sequence aligns closely with observed changes in burial architecture, funerary assemblages, and iron tool typologies, lending internal archaeological support to the radiometric results.

Although the dataset is necessarily limited in size and restricted to cremated bone samples from a single site complex, the use of AMS dating and internationally accepted calibration protocols ensures a high degree of methodological reliability. It is acknowledged that future radiocarbon determinations—particularly from additional megalithic contexts, diverse material samples, and refined calibration curves—may further refine or revise this chronological framework. Nevertheless, until such expanded datasets become available, the Munneru Valley dates serve as a robust chronological anchor for interpreting megalithic cultural processes in the Eastern Deccan.

By grounding archaeological interpretation in absolute, scientifically derived dates, this study moves beyond relative typological sequencing and provides a defensible temporal framework for examining continuity, transformation, and regional variation within the Deccan megalithic tradition. The Munneru Valley sequence thus constitutes a critical reference point for future comparative studies of protohistoric societies in peninsular India.