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The Age of Australian Rock Art: A Review

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Abstract

The growing corpus of 'direct dates' for rock art around the world has changed the way researchers understand rock art. 'Direct dating' refers to methods for obtaining chronometric ages through the dating of material directly associated with motifs, thus providing minimum, maximum or actual ages. Materials associated with rock art that may be directly dated include the original media (e.g. beeswax), organic binders found in pigment, or natural coatings (e.g. wasp nests) which can either provide a *terminus ante quem* or *terminus post quem* for art. In Australia, 432 direct dates for rock art are now available, providing the basis for developing absolute chronologies for rock art regions and specific periods within them. In this paper we review the dating results but caution against using them to derive broad interpretations, especially continent-wide narratives and global comparisons.

Introduction

Only five reviews of the direct dating of Australian rock art have been undertaken. Bednarik (2002) presented a critical review of the processes for dating rock art but did not examine the direct dating of rock art in Australia in detail. David *et al.* (1999) reviewed absolute dates for rock art in southeast Cape York Peninsula, while McDonald (2000) reviewed AMS determinations along with methodological issues for sites in the Sydney Basin. Watchman (2001) provided a more geographically extended review, including sites from both northern and southern Australia. However, Watchman only provides a general discussion of rock art dating in each region, noting exceptional sites and case studies, and is limited to a single-page table of examples of chronometric ages for each region. Finally, Franklin (2004) provides the most comprehensive review of direct dating of Australian rock art, reporting 57 sites with dated rock art. Franklin does not, however, include the dates for each site. A detailed review of chronometric ages on Australian rock art and the impact of their distribution on our understanding of rock art in Australia has therefore, until now, been missing from the literature.

This study addresses this gap by compiling an extensive dataset of direct dates on Australian rock art, examining the spatial and temporal distribution of these data and identifying issues for regional and continental-wide narratives of rock art chronologies. It should be noted that we make no attempt to review dates from archaeological deposits associated with rock art although reference is made to some of these ages in the discussion below.

Methods

Uncalibrated dates were assembled from published sources along with details of site location, dated images, material sampled and dating method used. Uncalibrated ages were calibrated using OxCal (Bronk Ramsey 2009) and the INTCAL09 (Reimer *et al.* 2009) and SHCAL04 (McCormac *et al.* 2004) calibration curves,

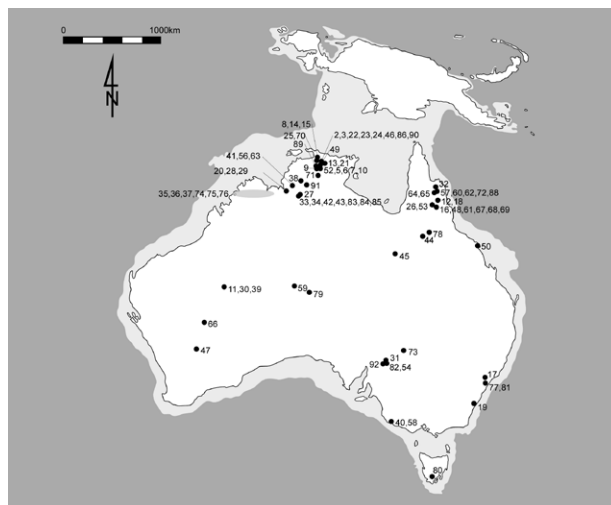


Figure 1 Location of sites included in this analysis. Note that Native Animals (NSW) and Pete's Chase (QLD) are not shown as location information is not available.

north and south of 18°S respectively. Ages were not calibrated where sample materials were not reported. For the purposes of examination, ages disputed by either the initial investigators or subsequent commentators were not considered in the analyses below, though they are included in the regional statistics and Table S1 (supplementary information).

Dataset

The dataset contains 432 determinations from 92 sites located in all environmental regions of Australia (Figure 1, Table S1). Of these 432 determinations, 29 (6.7%) have been rejected by either the initial investigators or refuted by subsequent studies. The first direct date for rock art in Australia was reported in 1987 (Watchman 1987), though chronometric ages associated with rock art (e.g. from adjacent archaeological deposits) have been reported since 1968 (Polach *et al.* 1968). Most determinations (96.9%) have been obtained since 1990.

Methods and Media

Two methods have been used to date rock art in Australia: ¹⁴C (96.7%, n=418) and optically stimulated luminescence (OSL) (3.2%, n=14). Beeswax figures are the most commonly dated art media in Australia (47.9%), followed by paintings (24.7%) and engravings (13.1%). Drawings are the next most numerous dated medium (8.5%), with cupules (3.9%) and finger flutings (0.9%) contributing only small numbers of dates (Figure 2). Painting sites in rockshelters are the most commonly dated site type (41.3%) with engraving sites (open air and some shelters) following with 23.9% of sites dated. Shelter sites containing beeswax figures also contribute significantly (25%), followed by drawings (10.8%), cupules (5.4%) and finger fluting sites (2.1%) (Figure 2).

Age determinations have been either rejected or questioned at several sites. These include a direct date taken from a beeswax motif located at Gunbirdi I, Northern Territory, rejected by the investigators owing to sampling preparation problems (Nelson *et al.* 2000). A series of determinations for engravings

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at Karolta 1, South Australia, has been disputed (Dorn *et al.* 1992; Nobbs and Dorn 1993; Watchman 1992). A date from a large, black-pigmented curvilinear motif at Gnatalia Creek, New South Wales, reported as 29,795±420 BP (AA-5851) is also considered unlikely (McDonald 1998, 2000; McDonald *et al.* 1990; Watchman 1992). Gillespie (1997) has disputed on the grounds of possible contamination and problems with the dating procedures, a ¹⁴C age obtained for a hand stencil at Laurie Creek, Northern Territory (also see Nelson 1993), and ages for paintings at Wargata Mina, Tasmania (Loy 1994; Loy *et al.* 1990). Four determinations (ANU-773, ANU-774, ANU-775, ANU-776) taken from two charcoal drawings of macropods at Upside-Down-Man, New South Wales, are believed to be contaminated by younger materials (McDonald 2008).

The Regional Data

The density of sites and quantity of determinations from different regions of Australia impacts on our understanding of the spatial and temporal distribution of Australian rock art. The number of sites and ages obtained from rock art, along with the identified media, in each state/territory are examined below. This analysis allows spatial biases both within states/territories and across the continent to be identified.

Queensland

In Queensland 70 ages were obtained from 25 sites concentrated in Cape York. Sites from Queensland contribute 27.1% of the total site dataset and 16.2% of the total date dataset. Three media were dated in Queensland: paintings (48.5%), engravings (17.1%) and drawings (30%), with a further 4.2% of determinations coming from an unreported medium. The distribution of dated media in Queensland overlaps significantly, with 73% of sites containing either paintings or engravings and a further 26.9% containing dated drawings. Five sites have had more than one medium dated (Echidna's Rest, Kennedy River, Quinkans B6 Shelter, Walkunder Arch Cave, Yam Camp). Queensland is the only state in which more than one medium is routinely dated at the same site.

Northern Territory

In the Northern Territory there are 244 determinations from 46 sites. These sites contribute 50% of the total site dataset and 56.4% of dates. Four rock art media have been dated in this region: beeswax figures (74.1%), paintings (13.5%), engravings (5.7%) and cupules (6.5%). Sites where beeswax figures were dated make up 47.8% of the sample and include Anbarndarr I, Djulirri I and II, Gunbirdi I, II and II, Peyi, Yarrangulnja, Yikarrakkal and Yiwarlalray (Nelson *et al.* 2000). Painting sites contribute 30.4% of the Northern Territory sample, while engraving sites contribute 13% and the four cupule sites (Jinmium [KR1 and KR10], Granilpi and Wiyuwuti) (Watchman *et al.* 2000) contribute 8.6% of the sample. Only one site has had more than one medium dated in the Northern Territory (Laurie Creek, Gillespie 1997; Loy 1994). The dominance of dated beeswax figures in this region means that while the chronology of this medium is now quite well understood, the three remaining media (paintings, engravings and cupules) remain largely disarticulated from a regional chronology.

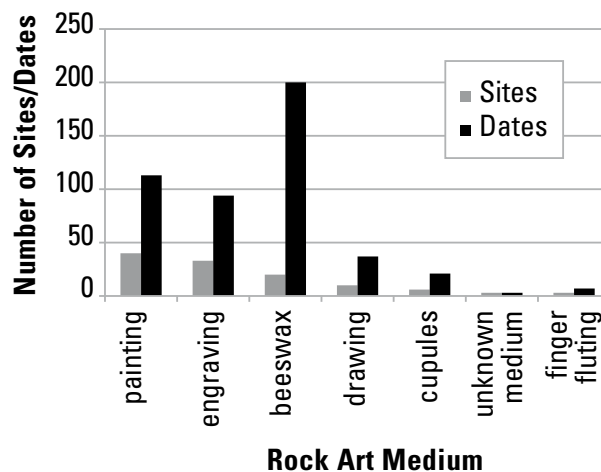


Figure 2 Number of determinations and number of sites containing each rock art medium.

Western Australia

Sites located in Western Australia make up 8.6% of the sample (n=8): Bush Turkey Dreaming site, Kaalpi Site, M23, Mount Manning, Serpent's Glen, and three unnamed sites in the Kimberleys. Sixty-six determinations were taken from these eight sites, contributing 15.2% of the sample. Four media have been dated in Western Australia: paintings (54.5%), beeswax figures (39.3%), drawings (4.5%) and cupules (1.5%). Painting sites contribute 75% of the sample. Two sites containing drawings, beeswax and cupules, both located in the Kimberleys, each contribute 12.5% of the sample. Only one medium (in this case painting) has been preferentially dated in Western Australia, creating a situation where this medium is beginning to build a more robust chronology than the remaining media found in the region.

South Australia

Six rock art sites have been dated in South Australia, making up 6.5% of the sample: Karolta 1, Malangine Cave, Panaramittee, Prung-Kart Cave, Wharton Hill and Yunta Springs. Thirty-two (7.4%) determinations have been taken from these sites and date only two media – engravings (87.5%) and finger flutings (12.5%). South Australia is the only state where finger flutings have been dated – Malangine Cave and Prung-Kart Cave (Bednarik 1998). In South Australia, therefore, 66.6% of sites with dated rock art are engraving sites, with the two finger fluting sites making up 33.3% of the state's sample. Engraving sites, having been preferentially dated, have produced a skewed view of the overall rock art chronology in South Australia, with all other media currently having very few or no data available. Most engraving results are controversial as outlined above.

New South Wales

Eighteen (4.1%) determinations have been taken from six (6.5%) sites located in New South Wales: Emu Cave, Gnatalia Creek, Native Animals, Sturt's Meadows, Upside-Down-Man and Waterfall Cave. Here, three media have been dated: drawings (72.2%), engravings (16.6%) and paintings (11.1%). Once again, only a single medium was dated at each of the six sites identified. Of these sites, 16.6% had paintings dated, 33.3% engravings and 50% drawings. New South Wales is the only state in which drawings have been preferentially dated.

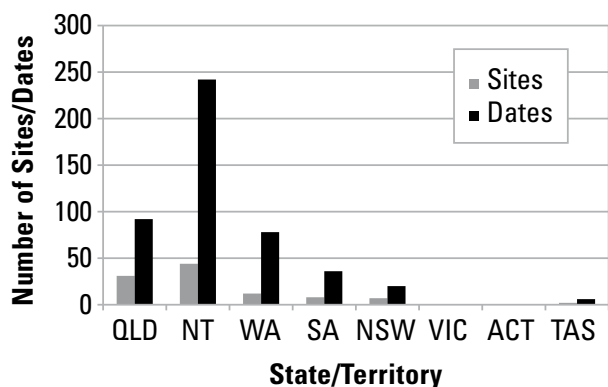


Figure 3 Number of dated rock art sites and number of determinations in each state or territory.

Tasmania

Only one (1%) rock art site has been dated in Tasmania, Wargata Mina (Loy *et al.* 1990), resulting in two determinations (0.4% of sample).

Victoria and the Australian Capital Territory

No rock art has been dated in either Victoria or the Australian Capital Territory.

Dating Media: The Current Evidence

Thirty-seven (8.5%) ages placed the sampled art in the Pleistocene. However, the majority of ages are younger than 5000 BP, with almost half younger than 500 BP (48.3%; $n=206$). Armitage *et al.* (2001) have shown that radiocarbon ages obtained for rock art may be 100–200 years older than the actual age of the image owing to problems with small sample size, the ‘old wood’ effect and contamination from carbon-bearing minerals. This 100–200 year discrepancy may have significant implications for defining fine-scale temporal trends in rock art media in each region and the continent as a whole.

The oldest ages for rock art in Australia vary significantly between media. The oldest direct date for paintings is found at Walkunder Arch Cave, Queensland, at $29,700\pm 500$ BP (OZA-390) (Campbell *et al.* 1996); however, if evidence found in association with stratigraphic sections is included, the painted roof fall recovered from Carpenter’s Gap 1, Western Australia, remains the oldest painting, dating to between $33,600\pm 500$ BP (ANUA-7626) and $42,800\pm 1850$ BP (OZD-161) (O’Connor and Fankhauser 2001). A charcoal drawing of a large, curvilinear motif at Gnatalia Creek, New South Wales, has been dated to 6085 ± 60 BP (AA-5850), constituting the oldest (accepted) dated drawing (McDonald 1998; McDonald *et al.* 1990; cf. McDonald 2000), with the next oldest drawing dating to 3350 ± 350 BP (OZB-783) at Mungana Site, Queensland (Armitage *et al.* 2000). The oldest beeswax figure is at Gunbilngmurrung, Northern Territory, where beeswax from a turtle motif was directly dated to 4040 ± 80 BP (CAMS-2300) and 4460 ± 80 BP (OZD-958) (Nelson *et al.* 1995; Watchman and Jones 2002).

Cupules at both Granilpi and Jinnium, Northern Territory, have minimum ages between 2000 and 4000 BP, although one location suggests a minimum of c.11,000 BP (Watchman *et al.* 2000). Most engraved motifs date to less than 5000 years ago, though these remain highly contested. In general, determinations for engravings that survive close scrutiny come from deposits

overlying art (e.g. Rosenfeld *et al.*’s 1981 dates of up to $18,200\pm 450$ BP for Early Man, Queensland). Other indirect evidence supports the contention that engravings were made in the Pleistocene, including a sandstone pecked fragment in Sandy Creek 1 dated to $12,620\pm 370$ BP (Beta-51089) (Morwood *et al.* 1995).

Dated finger flutings remain rare with only three sites, all in South Australia. At Prung-Kart Cave, finger flutings date to 2660 ± 70 BP (ANU-6963) (Bednarik 1998), while at Malangine Cave they date to 5550 ± 55 BP (Hv-10241) and 4425 ± 75 BP (Hv-10240) (Bednarik 1998). Once again, if indirect evidence is considered, the earliest evidence for finger fluting can be pushed back to $21,200\pm 700$ BP (ANU-180) at Koonalda where figure flutings are argued to be associated with determinations for other dated activities at the site (Wright 1971).

Paintings, finger flutings and engravings therefore constitute the oldest art forms identified in Australia, with drawings and beeswax figures appearing much later in the record. Beeswax figures date back to almost 4500 BP, but they do not become common in the archaeological record until after 1500 BP. There is a significant increase in the number of beeswax motifs dating to after 500 BP, with more than half the dates for beeswax falling in this time interval.

In summary, there is a strong upward trend in the number of rock art determinations dating to post-5000 BP, which is clearly driven by the large numbers of determinations for beeswax motifs in this period. When the data are broken down into regions and media, this same pattern is evident in each subset to lesser degrees. These results may reflect increasing population densities across Australia (e.g. Hiscock 2008) and the subsequent need to use and maintain rock art, as well as taphonomic factors within Australia’s archaeological record. Taphonomic factors such as weathering and animal interference can be expected to have impacted each medium differently as determined by their depositional context and composition. This point is particularly important to note as those media most likely to be heavily impacted by taphonomic processes (drawings and beeswax figures) are the last to appear in the archaeological record, indicating that taphonomy may play an important role in the temporal distribution of rock art media in Australia (see Bednarik 2001).

Conclusion

While the chronology of some rock art media, such as beeswax figures in the Northern Territory and northern Western Australia, are currently well-represented, others have been sparingly dated. Currently, this regional- and medium-based focus does not allow for an in-depth understanding of continent-wide rock art narratives in Australia, which would ultimately allow a synthetic chronology to be developed for different media. Consequently, there are still large gaps in our understanding of the use of rock art throughout Australia’s artistic past, especially in terms of the nature and timing of its production before 5000 years ago.

Despite these limitations, the current evidence indicates that rock art origins in Australia reach well back into the Pleistocene. Also, though their exact antiquity is yet to be adequately determined, it appears that several media were introduced at similar times, and that there may be a regional and temporal distribution patterning of media across the landscape. Ongoing rock art direct dating programmes coupled with critical appraisal of results are essential in order to determine whether these early

indications accurately represent rock art chronology in Australia and to provide the basis for closely integrating rock art with other components of the archaeological record.

This review not only has important implications for understanding the changing nature of Australian rock art over time but also that of rock art around the world. A cursory analysis of the literature indicates that even fewer sites and fewer chronometric ages have been obtained in other rock art epicentres such as Western Europe.

Supplementary Information

Supplementary information for this article is available online at www.australianarchaeologicalassociation.com.au.

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