

The Archaeological Identification of the Majapahit Royal Palace: Prapañca's 1365 Description Projected onto Satellite Imagery

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‘As with all archaeological site detection from space, features must be detected on the ground before any claims can be made.’ Sarah Parcak (2009: 119)

Introduction

Succeeding his father in the Buddhist office of the Kingdom of Majapahit in East Java, Prapañca probably served for a brief period as the minister of Buddhist religious affairs when he accompanied King Hayam Wuruk (reigned 1350-89) during his royal journey through East Java in September-October 1359. Although he had long since started composing his text *Deśawarnana* (literally, ‘The Depiction of Districts’), it was not until Tuesday, 30 September 1365, when Prapañca took his iron stylus and scratched the final words in palm leaves of what we now consider to be the most important historiographical text of medieval Java. Among the Balinese who preserved the text, Prapañca's historiography is also known under its Javano-Sanskrit title *Nāgarakṛtāgama* which freely translates as ‘The Precept of Past Statecraft’. In his text, Prapañca includes a detailed description of the layout of the royal palace and the court town of Majapahit.

Over the past six years, we have published several articles focussing on the archaeological discoveries of a number of authorities on Majapahit-Trowulan archaeology. During this time, we have been able to make a careful evaluation of the available sources assisted by appropriate onsite observations and GIS (Geographic

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Information Systems) techniques (cf. Subagio and Poniman 2010). One of our principal research aims has been the layout of the Majapahit royal palace. In this article, we will present a mapping of the Majapahit royal palace in accordance with Prapañca's *Nāgarakṛtāgama* 8-11 account. On the basis of existing archaeological data, we will show that the site of the 14th-century royal palace can be identified in the Kēḍaton area of the East Javanese town of Trowulan. The core of this article is a detailed description of the palace layout based on Stutterheim's 1948 translation of Prapañca's account. This description in turn has been plotted against onsite cartographic identifications and then projected onto high-resolution satellite imagery. We will commence with the archaeological identification of the site of the Majapahit royal palace, as the last remains of its walls have vanished brick by brick over the past century.

The archaeological identification of the Majapahit royal palace

In his article on archaeological epistemology, philosopher of science, Peter Kosso, refers to the prevailing rule of thumb in this field: "Given the evidence available and the standards of comparing justification, the standard model is the responsible choice" (Kosso 2006: 21). During the century-long search for the Majapahit royal palace, Kosso's 'standard model' dominated research methodologies, but not always in a very responsible manner. All too often, vital archaeological evidence appears to have been discarded, withheld or intentionally obfuscated. We will argue that the archaeological identification of the Majapahit royal palace site is, in fact, very much more straightforward than hitherto believed.

In the early 1830s, Trowulan villagers guided the Dutch Resident of Surabaya, Hendrik J. Domis (1781-1842, in office 1831-4), to the spot of the vanished Majapahit *kraton* ('royal palace'). From the site details and directions given in Domis' travelogue (cf. 1834: 90), it is clear that local tradition situated the Majapahit royal palace in the hamlet of Kēḍaton (Figure 1). Indeed, ever since 1890, when the Dutch mining engineer Rogier D.M. Verbeek (1845-1926) published the 1815 notes of the Javanese-Dutch army engineer Captain Johannes W.B. Wardenaar (1785-1869), archaeologists have actually known that oral traditions locate the site of the vanished Majapahit royal palace in Kēḍaton, literally 'Royal Palace' (Verbeek 1890: 5). In a series of articles between 1908 and 1914 – subsequently republished in his 1917-18 collected works and in a separate monograph in 1919, Hendrik Kern (1833-1917), the famous Leiden scholar of Sanskrit and Old Javanese studies, published a critical edition of the *Nāgarakṛtāgama* with a Dutch translation. Since then, the reconstruction of the layout of the Majapahit royal palace and court town on the basis of Prapañca's description has dominated Majapahit-Trowulan archaeology. However, in 1978, after more than a half century of intensive research, the last Dutch Head of the

Archaeological Service (*Oudheidkundige Dienst*), August J. Bernet Kempers (1906-92, in office 1947-53), reviewed progress to date and came to a startling conclusion:

One simply, as it were, has to traverse the terrain with his [Prapañca's] text in hand to be able to determine *what* was situated *where*. [But] nothing that is left on site actually corresponds with the man's [Prapañca's] description. So all of the [Trowulan] remains apparently date from later periods *or* were situated outside the described city quarters.¹

In his explanatory comments on Kern's work (1919: 254), art historian and former Head of the Archaeological Service, Nicolaas J. Krom (1883-1945, in office 1913-15/16), was the first to publish a reconstructive schematic plan of Prapañca's description of the Majapahit royal palace. Krom clearly had the Kēḍaton landscape in mind when he drafted his 1919 reconstructive plan, but his rather ambiguous statements regarding the siting contributed to the confusion amongst archaeologists, as Bernet Kempers subsequently concluded in 1978 (cf. Krom 1923, 2: 188; Kern 1919: 254).² Another reason for the disordered state of Majapahit-Trowulan archaeology is that the map, to which Wardenaar's notes refer, was considered lost for almost two centuries. It was only in March 2008, that the present authors traced the Captain-Engineer's original 1815 *Plan of Majapahit* in the British Museum (Gomperts, Haag and Carey 2012a).³ However, in the Kēḍaton hamlet, Wardenaar's 1815 plan only shows twenty-six bamboo houses including a brick-lined earthwork at a place called Siti Inggil (Figure 1, N). This rediscovery prompted our initial research question: was Kēḍaton indeed the site of the 14th-century Majapahit royal palace? In order to answer this, we will start with a brief review of the previous ninety years of archaeological research on the Kēḍaton area.

In 1924, the regent (*bupati*) of Mojokerto in East Java, R.A.A. Kromodjojo

¹ Translation of Bernet Kempers' Dutch (1978: 20-1): '*Men behoeft, zou men zo zeggen, met zijn tekst in de hand het terrein maar te doorwandelen om te bepalen wāt wāār lag. In werkelijkheid klopt nu praktisch niets meer van wat er nog staat met 's mans beschrijving. Blijkbaar was dat allemaal uit later tijd of lag het buiten de daarin beschreven stadsgedeelten.*'

² As with Stutterheim's July 1941 mapping (Gomperts, Haag and Carey 2008a; 2008b), Krom's siting of the watchtower's 'dome' (no. 1, Dutch *koepel*, *Nāgarakṛtāgama* 8.2a: *panggung*) and the open pavilion (no. 13, *Nāgarakṛtāgama* 9.4d, 11.1a: *witāna*) in his 1919 reconstructive plan (Kern 1919: 254), correspond respectively to the Panggung Islamic shrine and Siti Inggil earthwork at Kēḍaton (Kern 1919: 40, 44, 46-7, 253-4; cf. Krom 1920, 2: 111).

³ After the British Museum sent us a new and higher resolution scan of Wardenaar's *Plan of Majapahit* in March 2012, we had to revise our previous statements (Gomperts, Haag and Carey 2012a: 179-180). We now conclude that the 1815 plan, including the accompanying drawings in the British Museum, are Wardenaar's originals and not copies, and that he drew his 1815 plan in a scale of 1 Rhineland inch to 75 Rhineland rods/900 Rhineland feet (1: 10,800).

Adiněgoro (in office 1894-1916), began a collaboration with the Dutch architect Henri Maclaine Pont (1884-1971), who had then just moved to Trowulan. This resulted in their 1924 *Map of the Majapahit Terrain*. In the Kěḍaton area, this map shows brick remains and three double rows of stone pediments which probably supported the bamboo or wooden posts of open pavilions (Figure 2). Two years later, Maclaine Pont published a further plan of the archaeological remains and brick structures of the Trowulan area. His 1926 *Map of Majapahit Archaeological Remains* remains a major source to this day (Figure 3). Although his 1926 map convincingly indicates the largest density of mapped brick remains and brick walls in the Kěḍaton hamlet (Figure 3), and he clearly envisages Krom's 1919 schematic plan in this archaeological landscape, Maclaine Pont (1925: 42-5, 162-3) stubbornly opposed the Kěḍaton siting of the 14th-century royal palace (Stutterheim 1948: 5 n. 14).⁴ In his memoirs, written some forty years later, he recollected that the Dutch archaeologist, Pieter V. van Stein Callenfels (1883-1938), had steadfastly supported the Kěḍaton siting, clearly inspired by his close friend Krom's 1919 schematic plan based on Prapañca's description (Maclaine Pont 1968-9, 3: 47; cf. Krom 1923, 2: 188). Indeed, during his May 1928-August 1929 temporary headship of the Archaeological Service, Van Stein Callenfels used his new-found authority to commission the Austrian architectural engineer, Bruno Nobile de Vistarini (1891-1971) (Figure 18), to undertake a series of excavations over a large area in the Kěḍaton hamlet (Borghart 1929: 13; Bosch 1930: 133; Maclaine Pont and Vistarini 1930: 153). Referring to his own 1926 mapping, Maclaine Pont also recalled these Kěḍaton excavations:

Vistarini was instructed [by Van Stein Callenfels] to unearth entirely all walls marked in this part of the map [Figure 3].⁵

Between May and August 1929, Maclaine Pont and Vistarini (1930: 155) traced some 250 metres of east-west running walls on the eastern side of the Islamic shrine called Panggung (Figure 4). Since Maclaine Pont was on furlough in the Netherlands between 11 September 1929 and 7 September 1930, the Kěḍaton

⁴ The following quotation from one of Maclaine Pont's articles summarises the Dutch architect's archaeological approach: '... *het centrum van Madjapahit's kraton: de Menak Djinggo ruïne, die hoewel nog niet onderzocht...*' ['the centre of the Majapahit kraton: the ruins of Menak Jinggo, which although not yet investigated...'] (Maclaine Pont 1927b: 173). So, without even attempting to investigate the Menak Jinggo remains in Trowulan, Maclaine Pont had already jumped to the conclusion that it was the site of the Majapahit royal palace and the centre of the court town, a vivid illustration of the Delft-trained architect's penchant for pseudoarchaeological methodology (cf. Fagan 2006: 28-9).

⁵ Authors' translation of Maclaine Pont's original Dutch text (1968-70, 2: iv): "...*Vistarini, kreeg de opdracht in een deel van dit stadsplan alle ingeschetste muurwerken van het plan geheel bloot te leggen...*"

excavations fortuitously proceeded under the sole supervision of the Austrian architectural engineer.⁶ In January–September 1930, Vistarini’s team systematically traced and partially uncovered masonry walls over an 800-metre stretch, measuring a robust 2.0–2.25 metres across. They also excavated a subterranean brick-walled drain along the inner palace walls, an oblong pond measuring eighty to 100 metres by forty to fifty metres, walled and floored with bricks (Figures 4 and 8). For the first time in the history of Trowulan archaeology, someone had excavated the spot of the traditional siting of the Majapahit royal palace in the Kēḍaton hamlet and produced tangible archaeological evidence, namely brick walls.

In his first publication on the subject in 1932, the Dutch archaeologist, Willem F. Stutterheim (1892–1942), refers to Ma Huan’s account of Chinese naval expeditions in 1405–33, *The Overall Survey of the Ocean’s Shores* (1451). According to Ma Huan, all four major towns of early 15th-century Java – Tuban, Grēsik, Surabaya, and Majapahit – “*have no city walls*” (Stutterheim 1932: 107, original italics maintained). Although he does not refer to the Austrian architectural engineer’s 1931 report, Stutterheim actually advanced an important re-interpretation of Vistarini’s 1931 excavation plan (Figure 4). Nine years later, when serving as Head of the Archaeological Service (1936/7–42), he would return to this re-interpretation. The timing could hardly have been more dramatic. As war loomed over the Indies, the chief archaeologist decided to revive Majapahit archaeology. In July 1941, he finished his monograph on Prapañca’s description, which was posthumously published in 1948 (Stutterheim 1948: 118). However, he deliberately obfuscated the Kēḍaton ground truth in his reconstructive mapping of the 14th-century Majapahit royal palace (Stutterheim 1948: 124–5 Map III). Using GIS software, we were able to prove beyond a shadow of doubt that Stutterheim used Vistarini’s 1931 excavation plan (Figure 4) and subsequently plotted Prapañca’s description onto the 1941 topographic map (Gomperts, Haag and Carey 2008b: 414–7 Figs. 1–4). Stutterheim (1948: 5 n. 14, 118) evidently situated Krom’s 1919

⁶ Kees Briët and Werner Kraus kindly assisted us with genealogical research on the family of Bruno Nobile de Vistarini (Figure 18). Born into an Austrian noble family of north Italian descent in Leitersberg (present-day Košaki in Slovenia) on 8 April 1891, Vistarini became fascinated by Heinrich Schliemann (1822–90) and his 1871–2 search for the Homeric city of Troy during his school years at the Imperial-Royal State Gymnasium in Marburg an der Drau (present-day Maribor in Slovenia) (Glowacki 1909: 37, 44). After his graduation as an architectural engineer (*Diplom-Ingenieur*) at Graz Technical University, he moved to the Netherlands East Indies in c. 1920, establishing his own architecture firm in Surabaya where he made a professional career for himself as an architect-engineer during the interwar years. Interned by the Dutch colonial authorities after the fall of Holland in May 1940, Vistarini was eventually deported to India, probably in January 1942. In 1947, after returning to Austria at the end of the war, he became city architect (*Oberbaurat*) of the heavily war-damaged town of Knittelfeld in Steiermark which he was tasked with rebuilding. He remained fascinated by archaeology for the rest of his life. Passing away in Knittelfeld on 8 December 1971, he bequeathed his books on Egyptian archaeology to his wife’s granddaughter, Caroline Lemei. (Personal communications, 11–12 March 2014.)

schematic plan (Kern 1919: 254) in the Kēḍaton archaeological landscape in July 1941 (cf. Krom 1923, 2: 188). In that month, he commissioned the pre-historian, Wim J.A. Willems (1898-1964), to excavate the Siti Inggil earthwork situated at the very centre of the traditional Kēḍaton siting of the Majapahit royal palace (Figure 1 N). Willems proceeded with his excavations from July to December 1941. Eight years later, Bernet Kempers published a summary of these excavations based on the inspection report of the Archaeological Service's architectural engineer, Vincent R. van Romondt (1903-74, in office 1931-53), and the pottery analysis of the ceramics expert, Egbert W. van Orsoy de Flines (1886-1964), who dated the majority of the pottery sherds found during the Siti Inggil excavations to the 14th and 15th centuries (Bernet Kempers 1949: 45). Since Willems excavated only fifty metres to the south-east of the site of Vistarini's 1930 diggings, Van Orsoy de Flines' ceramics analysis provides a dating for the excavated walls. Separately, Willems' son, Erik, made some thirty of his father's 1941 Kēḍaton excavation photographs available to us. Amongst this unique photographic record, there are images of two double rows of large brick blocks, measuring some eight metres by eleven metres and eight metres by twenty metres respectively, and probably representing the foundations for robust wooden superstructures (Figures 10-12).

In the early 1980s, the Indonesians revived Majapahit archaeology, both at a local level in Trowulan and by assembling a large multi-disciplinary and cross-departmental team at the national level. Using Prapañca's Old Javanese *Nāgarakṛtāgama* text (8.2b), the leading archaeologist and head of the Indonesian Archaeological Service at Trowulan (Dinas Purbakala), Abu Sidik Wibowo (1936-85), authoritatively linked Krom's references to the Majapahit royal palace to the Kēḍaton area in 1980 (Wibowo 1980: 15, 29 n. 2). The following year (1981), Kardono Darmoyuwono (1928-84), an Enschede ITC-trained geomorphologist and remote sensing scientist, headed up a large team of archaeologists and earth scientists. On the basis of Slamet Mulyana's translation (1979: 276-8; 2006: 341-4) of the *Nāgarakṛtāgama* 8-10 into Indonesian, he identified the site of the Majapahit royal palace in the Kēḍaton hamlet (Darmoyuwono *et al.* 1981: 2-5).⁷ On site, they identified the 700-metre long brick foundations of the western outer palace walls on the western side of the Kēḍaton hamlet, marking them in explicit reference to the *Nāgarakṛtāgama* text (8.1b) on an aerial photograph which the Indonesian National Survey (Bakosurtanal) issued as an archaeological map in 1983 (nos. 6-7; cf. Darmoyuwono *et al.* 1981: 4).⁸ In 2008, another Indonesian archaeological

⁷ Professor Aris Poniman, a member of Darmoyuwono's scientific team in the early 1980s, informed us that although his team leader consulted archaeologists, Darmoyuwono himself was responsible for the final archaeological identifications on the 1983 Bakosurtanal map. (Personal communication, Cibinong, 8 April 2014.)

⁸ The 1983 Bakosurtanal map also shows the presumed medieval 'canals' in the Trowulan landscape which lack scientific basis and the perspective of hydrological engineering (Gomperts, Haag and

team re-initiated the search for the Majapahit royal palace, concentrating their diggings within 30-80 metres of Vistarini's 1930 excavations (Arifin and Permana 2011). The majority of the Chinese coins and Chinese ceramic sherds unearthed during this last excavation can be dated to the Yuan (1271-1368) and Ming (1368-1644) periods (Arifin and Permana 2011: 157, 179 Tables 7.3 and 8.2).

We have now gathered sufficient archaeological evidence to make a positive identification of the site of the 14th-century royal palace of Majapahit without referring to the *Nāgarakṛtāgama*. First, the site is called Kēḍaton which means 'Royal Palace' in Javanese (Figure 1). Second, local oral traditions also identify the excavated area as the site of the Majapahit royal palace (Domis 1834: 90; Verbeek 1890: 5). Third, the series of stone dies and brick blocks point to the earlier presence of pillared pavilions with wooden superstructures (Figures 2, 10-12). Fourth, the largest density of brick remains on Maclaine Pont's 1926 map appears in the Kēḍaton area (Figure 3). Fifth, Vistarini (1931) excavated substantial walls in Kēḍaton in 1930 (Figure 4). Sixth, the 1983 Bakosurtanal map (nos. 6-7) identifies the western palace walls, as we would expect, on Kēḍaton's western side. Seventh, the locally excavated ceramics and coins date predominantly to the 14th and 15th centuries, precisely Majapahit's zenith as the royal capital of an extensive empire (Bernet Kempers 1949: 45; Arifin and Permana 2011: 157, 179 Tables 7.3 and 8.2). Eighth, Ma Huan explicitly only refers to the Majapahit 'palace walls' in the early 15th century (Mills 1970: 86). Indeed, Vistarini's 1931 excavation plan unambiguously refers to 'the 14th-century Majapahit palace walls', instead of Maclaine Pont's intentionally misleading reference to 'city walls' (Dutch, *stadsmuur*) (Figure 4). In the next section, we will describe our methodological approach as it relates to Prapañca's account.

Using maps and Google Earth in text-based archaeology

Sarah Parcak's primer (2009) on satellite remote sensing for archaeology describes how satellite imagery has become available to archaeologists at Google Earth without the hurdle of remote sensing physics (Rees 2005). Vanished structures may reveal distinctive spectral signatures on satellite imagery which, however, may not be visible on the ground. When we projected Vistarini's 1931 excavation plan as a semi-transparent overlay onto high-resolution satellite imagery available at Google Earth (cf. Crowder 2007: 131-40), the footprint of

Carey 2008b: 421 n. 9). Why later Indonesian archaeologists ignored Wibowo (1980: 15, 29 n. 2) and Darmoyuwono's (*et al.* 1981: 4) careful surveying of the Majapahit royal palace site, as exemplified by the 1983 Bakosurtanal map (no. 1), in order to promote the unsustainable 'canal theory' as shown on the same map, is beyond the scope of the present article. But the reader will find some answers in N.C. Flemming's 2006 article 'The Attraction of Non-Rational Archaeological Hypotheses' and Colin Renfrew's introductory comments (2006: xii).

the previously excavated, but now vanished, Majapahit palace walls became immediately apparent. Since our aim is to reconstruct the Majapahit royal palace on satellite imagery in combination with GPS positions collected on site and subsequently processed with GIS software (Eastmead 2012), accurate ground-truth georeferencing was essential (Figure 6). However, we need to emphasise that remote sensing can only be applied to a limited extent in Majapahit archaeology because the Trowulan site is covered by up to three-metre thick layers of mudflow deposits (*lahar*), a situation confirmed by the onsite research of our assisting soil scientist, Adriaan van den Eelaart, and Sartono and Bandonono's earlier geological analysis (1995) as well as Maclaine Pont's earlier references (1927a: 102-3, 105-6, 111-2) to the work of Dutch engineers B. de Haan and J.M.L. Alberti.⁹ Since nearly all the remains have now vanished, great care is required to interpret the local terrain. Furthermore, the methodology of landscape archaeology remains virtually *terra incognita* in current archaeology in Java.

Following the dictum (1985) of the landscape historian, William G. Hoskins' (1908-92), that "The English landscape itself, to those who know how to read it aright, is the richest historical record we possess", we started looking for topographic clues, however small and insignificant, in the Kěḍaton landscape. We were assisted in our quest by the available topographic maps and the archaeological mappings of past and extant remains. Wardenaar's 1815 *Plan of Majapahit* was our starting point here. As already indicated, it marks twenty-six bamboo houses suggesting a population of some 100-150 souls dwelling in the five-hectare residential area of Kěḍaton. These people constituted the transmission chain for the oral tradition on which we rely so heavily today. The rest of the area was covered with forest and scrub (Domis 1834: 90). Following the end of the Java War (1825-30) and the annexation of the Central Javanese courts' last remaining outlying territories (1830-1), the Dutch colonial exploitation of the area began in earnest. Major areas were deforested and converted into sugar cane fields. Layers of top soil were removed to depths of one to seven metres and used for the on-site baking of commercial bricks. However, the first Dutch ordnance map of 1879 shows that the site of the royal palace was still untouched in the 1870s. In fact, the 1879 map only depicts six bamboo houses in the Kěḍaton hamlet suggesting that the majority of the original inhabitants had moved away since Wardenaar's original 1815 mapping. Subsequent ordnance and topographic maps from 1892, 1915, 1925 and 1941, reveal how the Kěḍaton hamlet underwent rapid change, as small plots were cadastrally redistributed to accommodate the influx of Javanese settlers seeking employment in the local sugar industry. As soils with *lahar* deposits were stripped off in massive layers, each map showed different

⁹ The soil scientist Adriaan van den Eelaart, who was responsible for several *lahar* mappings in Bali, kindly performed extensive soil surveys for us at the Majapahit-Trowulan site on 14-16 June 2009, 30 July-3 August 2009 and 25-27 March 2010.

stages in the process of land clearance. Details of the early medieval landscape now began to emerge. Most salient here were alignments. In his 1926 *Plan of the Majapahit Remains*, Maclaine Pont was the first to include an easterly declination of 10°-11°. All structures in the vanished royal city of Majapahit in Trowulan indeed deviate from the four cardinal directions by about 10°-11° east. This is apparent from the alignments of remains as well as from terrain features marked on topographic maps, aerial photographs and satellite images, such as roads, paths, ditches, enclosures, and fields.

Toponymy has always been a potent tool in landscape archaeology. In this regard, a paper by a leading Netherlands East Indies topographer and later Director of the Colonial Topographic Service, Colonel Lambertus F. van Gent (1876-1961, in office 1922-6), offers a useful perspective on Javanese place-name etymology (Van Gent 1916). Van Gent emphasises the importance of oral traditions in the context of Java's historical topography. Inspired by his lead, we will show in the course of our analysis how a few locally known toponyms are key to the archaeological mapping of the descriptions in Prapañca's 14th-century panegyric.

Stutterheim's expert translation and interpretation of Prapañca's description of the royal palace offers the best starting point for further research. Since Stutterheim's posthumously published 1948 monograph is only accessible in Dutch, we will provide a critical review of the Dutch archaeologist's textual interpretation of Prapañca's Old Javanese description of the Majapahit royal palace here.¹⁰ We also include a few other Sanskrit and Old Javanese texts not mentioned by Stutterheim. For example, the circa 6th-century *Mānasāra* and the circa 10th-century *Mayamata* are both familiar Sanskrit texts on Indian architecture, town planning and iconography. In 1899, Groningen-born Sanskritist Jan K. de Cock (1867-1941), obtained a *cum laude* award for his carefully reasoned doctoral thesis on descriptions of early Indian cities appearing in the Sanskrit *Mahābhārata* and Vālmīki's *Rāmāyaṇa* epics, which was also based on Kālidāsa's dramas *Mālavikāgnimitra*, *Śakuntalā* and *Vikramorvaśī* (5th century), Śūdraka's play *Mṛcchakaṭikā* (circa 6th century), and Kalhaṇa's *Rājatarāṅgiṇī* historiography (circa 1150) under the supervision of the Sanskrit professor C.C. Uhlenbeck (1866-1951) at the University of Amsterdam. To this day, this has remained a curiously unknown work amongst Southeast Asian archaeologists. But this neglect is undeserved: in our view, it provides a rich and highly relevant textual perspective for the architectural landscape of Prapañca's description. Among Old Javanese poems, the *Arjunawijaya* (circa 1379) and *Sutasoma* (circa 1385) add a

¹⁰ Since Maclaine Pont (1925: 72) never trained in Indonesian languages and Sanskrit, he failed to understand Prapañca's Sanskrit-influenced metrical Old Javanese (Stutterheim 1948: 2-3, 5 n. 14, 25 n. 75). The Dutch architect's 1925 commentary on the *Nāgarakṛtāgama* and accompanying pseudo-archaeological reconstructions of the city of Majapahit are thus irrelevant in the context of our present work.

few crucial details which support the archaeological reconstruction of Prapañca's description of the Trowulan landscape. The well-known scholar of Old Javanese, Suryo Supomo, convincingly argues that the urban descriptions of Lēngkā in the Buddhist poet Tantular's *Arjunawijaya* spatially refer to 14th-century Majapahit (Supomo 1977, 1: 49-56). The same holds true of Tantular's other Old Javanese poem, the *Sutasoma*. However, both Old Javanese texts also show influences from the Sanskrit epics. For example, in his description of the royal city of Lēngkā in *Arjunawijaya* 2.8-3.9, Tantular draws his inspiration from the account of the royal city of Laṅkā appearing in the *Rāmāyaṇa* (cf. Supomo 1977, 1: 97-8; De Cock 1899: 19-20, 23, 25, 36-7, 43, 45, 63-4, 69, 79).¹¹ Finally, the Old Javanese *Nawanāṭya*, a 14th-century Majapahit text on court etiquette, gives a few significant details regarding the durbar (Pigeaud 1960, 1: 81-6). In the following section, we will look more closely at Prapañca's description of the royal palace. For the Old Javanese text of the *Nāgarakṛtāgama*, we refer to Pigeaud's transcription (1960, 1: 3-75).

The royal palace (*pura*)

All versions of Ma Huan's 1451 account consistently relate that the Majapahit palace walls were either three *zhang* or thirty Chinese feet (*chi*) high, both numbers converting into a height of some ten metres (Gomperts, Haag and Carey 2008b: 418 n.6; cf. Stutterheim 1948: 8; Mills 1970: xv, 87). From all available archaeological evidence, the outer palace walls formed an oblong footprint on the ground as marked by Darmoyuwono (1981: 2-5) on the 1983 Bakosurtanal map (no. 1). Maclaine Pont's 1926 plan shows the tracks of the northern, western and a few northern parts of the eastern outer palace walls in the Kēḍaton area (Figure 3) whereas the 1983 Bakosurtanal aerial photograph (no. 7) provides a more precise mapping of the location of the western outer palace walls. In 1929, Maclaine Pont and Vistarini (1930: 155) traced some 250 metres of east-west running walls on the eastern side of the Panggung shrine (Figure 4), which Stutterheim rightly identified as the northern outer palace walls (Gomperts, Haag and Carey 2008b: 417 Fig. 4).

On site in December 2006-January 2007, we saw a few isolated collections of bricks along the track of the western outer palace walls. But by December 2008, when we again fieldwalked the site, they had all disappeared. Indeed, all the northern outer palace walls have now vanished. The farmer, who owned the agricultural plot, showed us a spot where the foundations of south-to-north and

¹¹ Note that the court cities of Ayutthaya (founded in 1351) and Ngayogyakarta (Yogyakarta, founded in 1755) were named after Rāma's court capital of Ayodhyā on the Sarayū river in the *Rāmāyaṇa*. Appropriately, there is a larger river, which bears the name Kali Sērayu, in the district of Bagēlen just to the west of Yogyakarta.

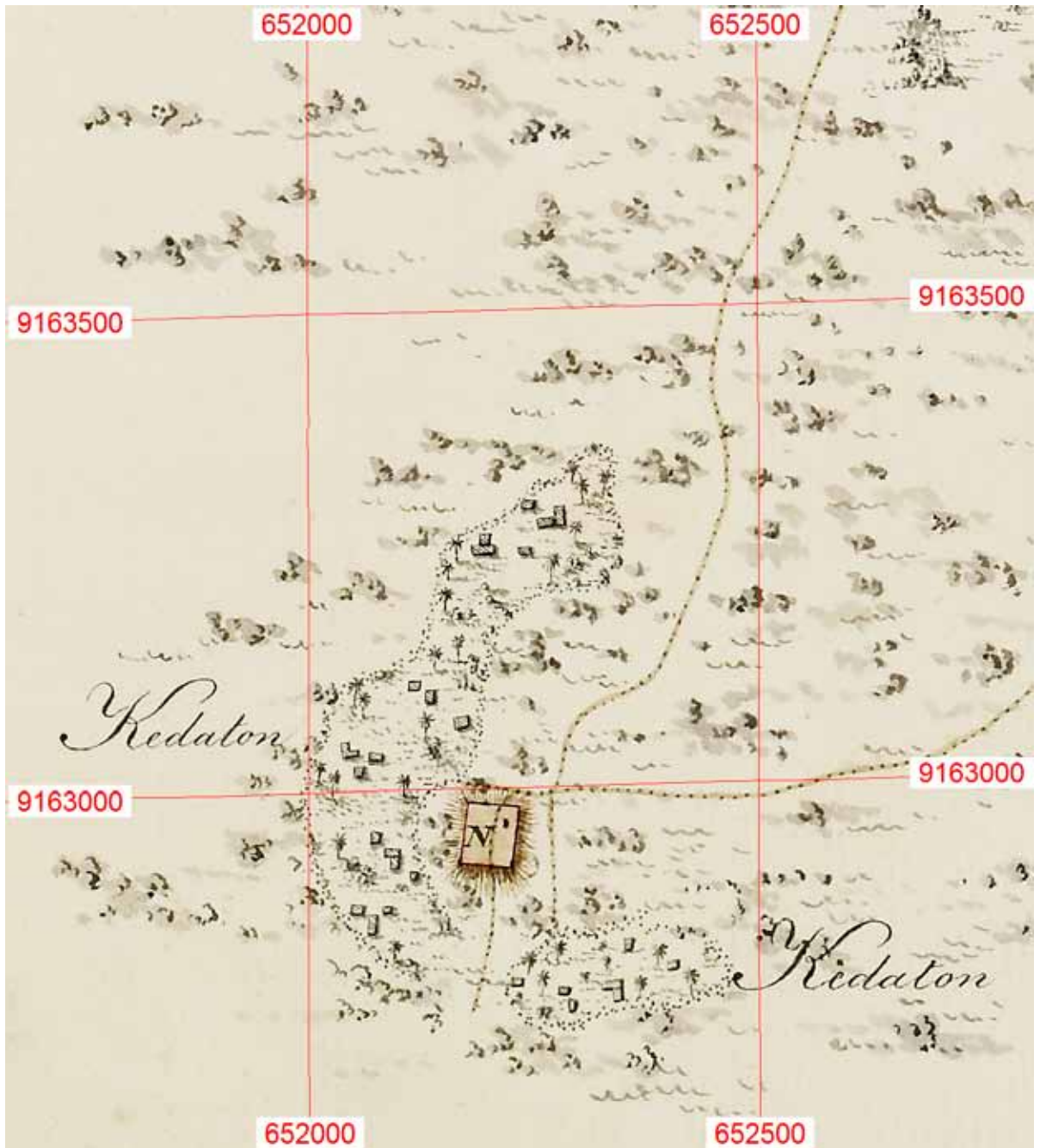


Figure 1. Detail of Wardenaar's 1815 *Plan of Majapahit*, showing the area of the vanished 14th-century royal palace, original scale 1: 10,800, with added WGS84, UTM, zone 49M grids appearing at intervals of 500 m (georeferencing accuracy: 40 m). N. refers to the Siti Inggil earthwork which we identify with the Abode Beyond Compare (*grhānopama*) in *Nāgarakṛtāgama* 9.4c (see Figure 6, #3). The residential area of the Kēdaton hamlet in 1815 falls within the footprint of the palace walls of the 14th-century royal palace (compare with Figure 6). Copyright and courtesy of the Trustees of the British Museum.

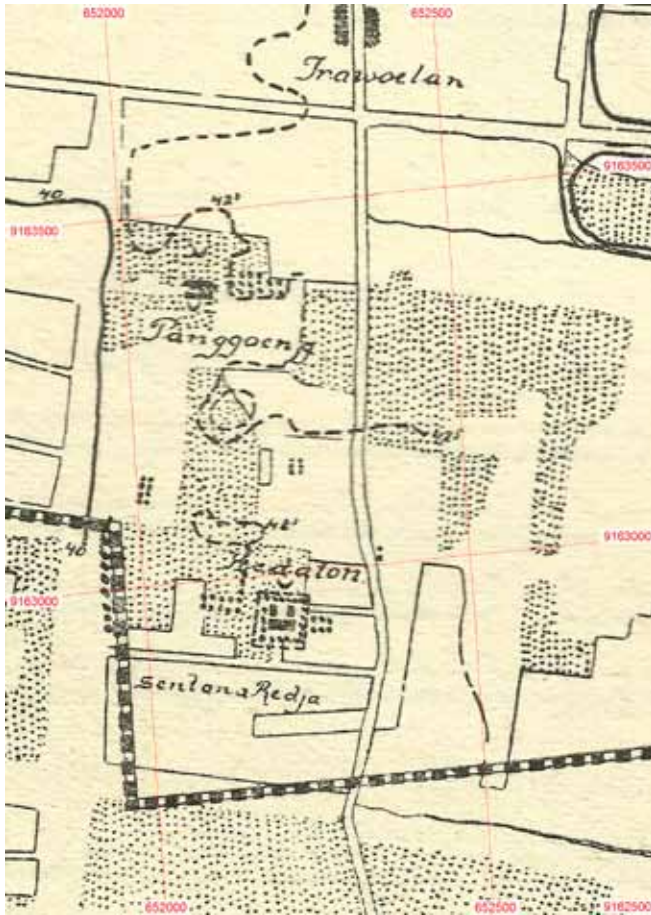
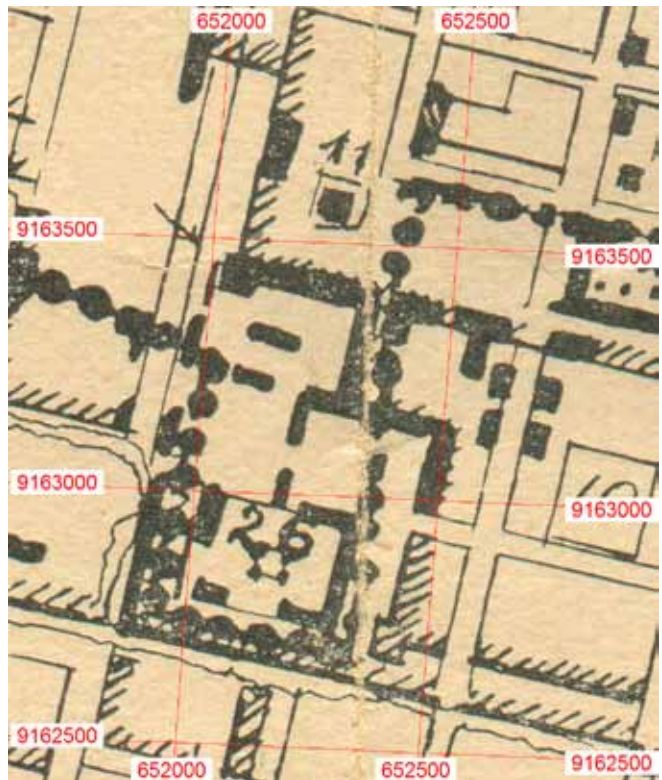


Figure 2 (left). Detail of Maclaine Pont and Kromodjojo Adinēgoro's 1924 Map of the Majapahit Terrain, showing the area of the 14th-century royal palace, original scale 1: 25,000, with added WGS84, UTM, zone 49M grids appearing at intervals of 500 m (georeferencing accuracy: 50 m). The heights above mean sea level were taken from Dutch irrigation maps and are marked to a precision of 0.5 m. The thick Z-shaped line across the southern and south-western part of the plan is to be ignored. The continuously dotted areas represent non-irrigated agricultural fields or *tēgalan*. The loose double rows of larger dots designate stone dies. The solid black bars at Panggoeng [Panggun] and Kēdaton indicate brick structures. Reproduced from Maclaine Pont (1924: 6).

Figure 4 (opposite). Vistarini's 1931 excavation plan of the northern and western parts of the site of the now vanished royal palace of Majapahit (original scale approx. 1: 6,000) with added WGS84, UTM, zone 49M grids appearing at intervals of 200 m (georeferencing accuracy: 25 m). Dutch comments with our translations into English: *Nog bestaand stuk van den stadsmuur*, 'Still extant remains of the city walls [i.e. the northern palace walls]'; *Graf Panggoeng*, 'Panggun Graveyard' [on its north-western corner, the Panggun Islamic shrine (black rectangle)]; *Door Ir. Pont opengelegde muur*, 'Walls uncovered by Ir. [H. Maclaine] Pont'; *Weg naar Sentonoredjo*, 'Road to Sētonorējo'; *Hoek I*, 'Corner I'; *Vijver*, 'Pond'; *goot*, '[subterranean brick-lined] drain'; *Hoek V*, 'Corner V'; *Hoek II*, 'Corner II'; *muur met goot*, 'walls with [subterranean brick-lined] drain'; *gilang*, 'stone slab'; *Hoek IV*, 'Corner IV'; *Hoek III*, 'Corner III'; *gilang met jaartal*, 'stone slab with year number [Śaka 1200 = AD 1278/9]'; *weg*, 'road'. Reproduced from Vistarini (1931: 31).

Figure 3. Detail of Maclaine Pont's 1926 Map of Majapahit Archaeological Remains, showing the area of the 14th-century royal palace, original scale 1: 50,000, with added WGS84, UTM, zone 49M grids appearing at intervals of 500 m (georeferencing accuracy: 75 m). The dotted lines with solid black circles are existing roads. The solid black bars/rectangles represent medieval brick remains. No. 11 refers to brick remains at the hedge depicted in the 1879 ordnance map (Figure 5). We identify these with the *durbar*. No. 26 refers to the Siti Inggil earthwork. Reproduced from Maclaine Pont (1926).



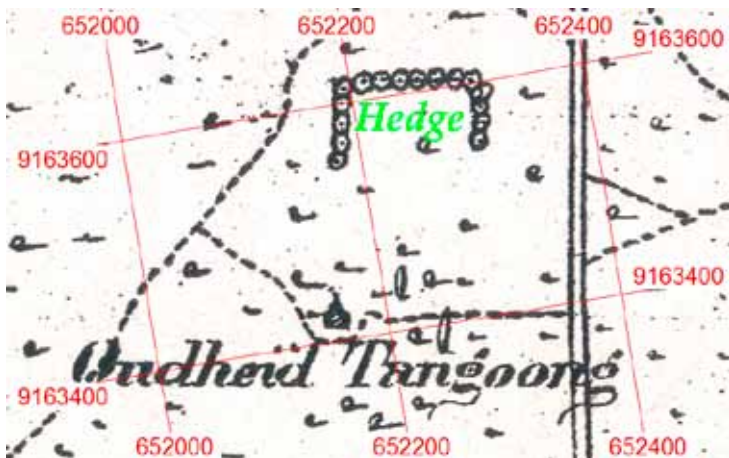
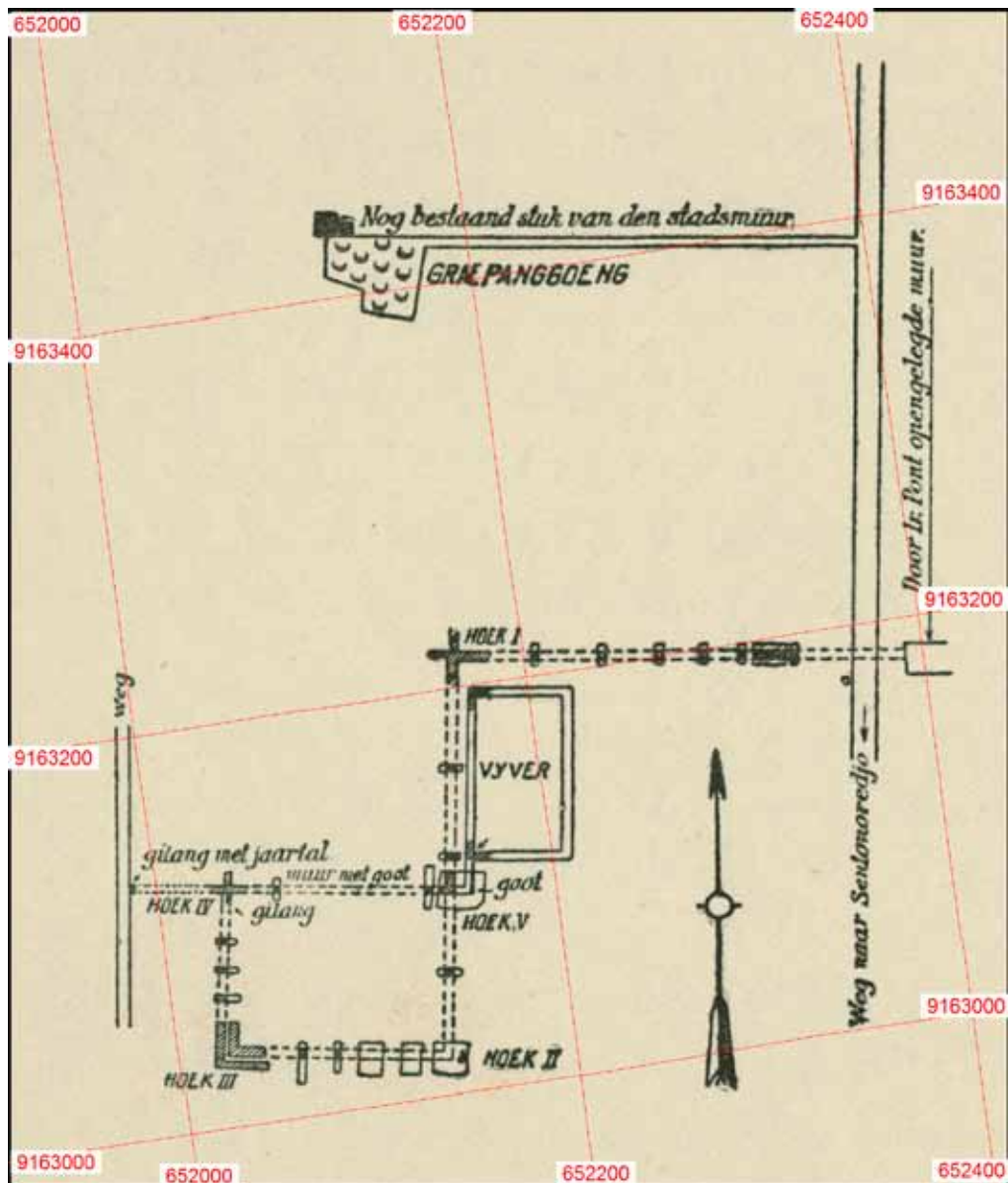


Figure 5. Detail of the 1879 military ordnance map (Surabaya regency, Topographisch Bureau van den Generalen Staf, sheet F.XIII, original scale 1: 20,000) with added WGS84, UTM, zone 49M grids appearing at intervals of 200 m (georeferencing accuracy: 30 m). In the Bonne projection, distances and areas are faithfully presented but the directions are distorted. This is apparent from the orientation of the UTM gridlines. In *Nāgarakṛtāgama* 8.5a-c, Prapañca situates the watchtower (*panggung*, #13) to the south of the durbar (*wanguntur*, #3) which respectively corresponds with the *Oudheid Tangoong* [Oudheid Panggoeng], ‘Medieval Ruins of Panggung’, and the hedge that measures some 130 metres east-west, marking what is called a *punden* (‘locally venerated spot’) in Modern Javanese. In all probability, the hedge demarcated the spot, where according to Wiselius in the early 1870s, the thirty stone dies of the Majapahit *paseban* or ‘audience hall’ originally stood, arranged in three rows at intervals of 4 metres (Veth 1878: 136 n. 1, 140; cf. Van Hoëvell 1849, 1: 181). Courtesy of Amsterdam University Library.

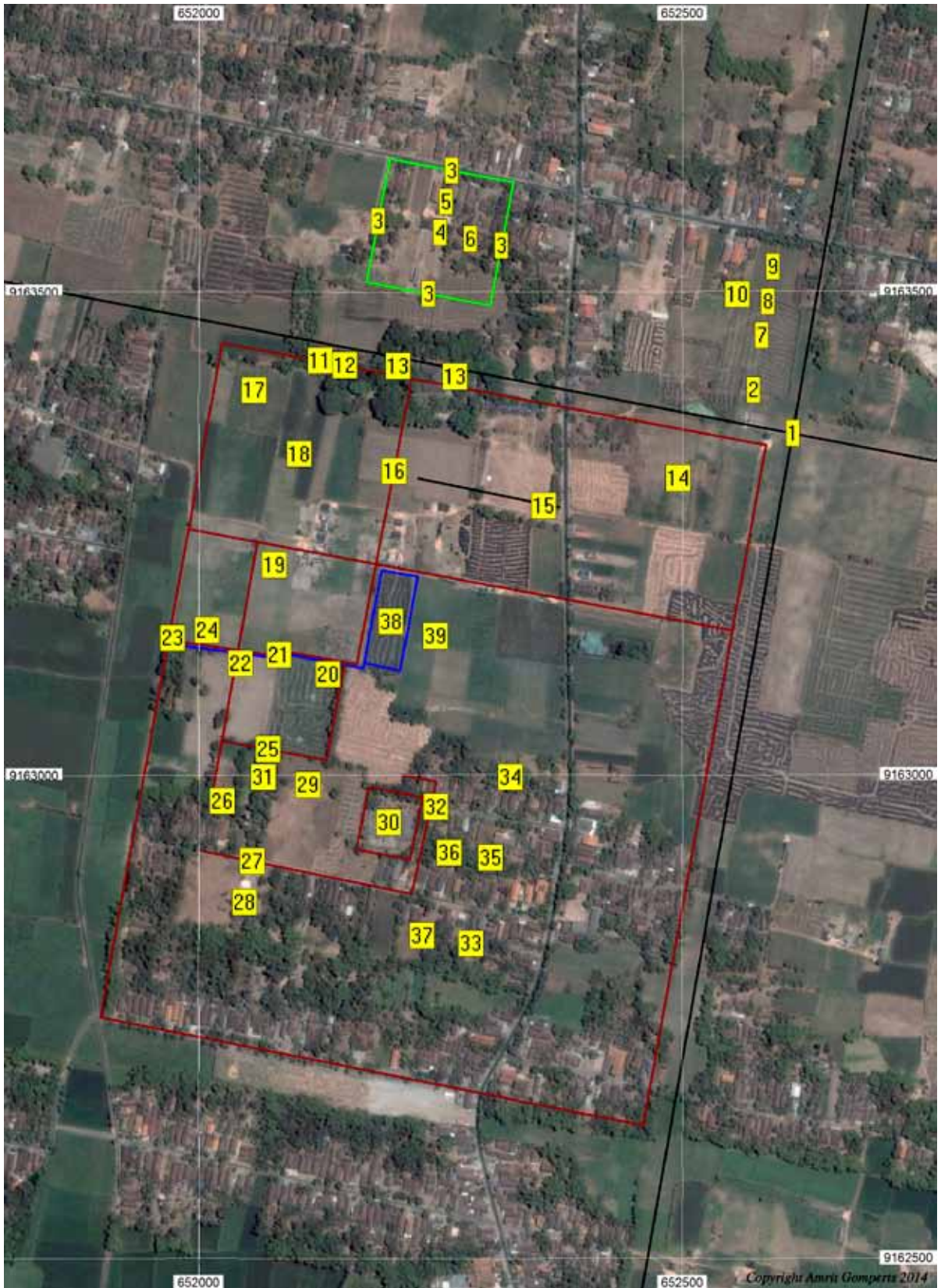


Figure 6. The Majapahit royal palace (brownish red) and the durbar (green) reconstructed on a QuickBird satellite image (scene: 101001000738F301, 2 October 2007, spatial resolution: 0.6 m) with added WGS84, UTM, zone 49M grids appearing at intervals of 500 m (georeferencing accuracy: 1.7 m). For the legend, see the Appendix. Copyright Amrit Gomperts.

Appendix: Legend of plan in Figure 6

Abbreviation Text

AWj	<i>Arjunawijaya</i> (Supomo 1977, 1)
KHWj	<i>Kidung Harṣawijaya</i> (Berg 1931)
Nāg	<i>Nāgarakṛtāgama</i> (Pigeaud 1960, 1: 3-75; Stutterheim 1948).
Naw	<i>Nawanāṭya</i> (Pigeaud 1960, 1: 81-6).
Sut	<i>Sutasoma</i> (Santoso 1975)

No.	Explanation	Old Javanese key words appearing in the textual references
1	Central crossroads	Nāg 8.2d, Sut 103.13a <i>catuspatha</i>
2	Waringin tree (<i>Ficus indica</i>)	Sut 103.13a <i>waringin</i> ; Nāg 8.1c <i>buddhi</i>
3	Durbar, four sentry posts enclosing its area	Nāg 8.3a, 8.5a, 63.4b, 83.6b, 84.7b, AWj 3.3a, Sut 103.10c <i>wanguntur</i> ; Nāg 8.1d, 64.1a, 65.1a, 65.5d, 65.6d, 94.1b, Naw 4a <i>sabhā</i> ; Nāg 66.4b <i>pasabhān</i> ; Naw 3b-4b <i>pangāstryan</i> ; Nāg 8.3a, 9.2a, AWj 3.3d <i>watangan</i>
4	Royal pavilion in the centre of the durbar	Nāg 8.3a, 64.1b, 66.4c, 91.5b <i>witāna</i> ; AWj 3.3d <i>bwat mantēn</i>
5	Open audience-awaiting pavilion in the durbar	Nāg 8.3b <i>weśma panangkila</i> ; AWj 3.3c <i>yaśa panangkila</i>
6	Place of the seated Śivaite and Buddhist clergy in the durbar	Nāg 8.3c <i>nggwan para śaiwa boddha</i>
7	Shrine of the Brahmins	Nāg 8.1c <i>brahmasthāna... jajar</i> ; Nāg 8.4a-b <i>pahoman ajajar... wipra</i> ; KHWj 6.85b <i>pangasthūlan</i>
8	Shrine of the Śivaite	Nāg 8.1c <i>brahmasthāna... jajar</i> ; Nāg 8.4a <i>pahoman ajajar... kaśaiwan</i> ; KHWj 6.85b <i>pangasthūlan</i>
9	Shrine of the Buddhists with three-tiered roof	Nāg 8.1c <i>brahmasthāna... jajar</i> ; Nāg 8.4a-c <i>pahoman ajajar... sogata... susun tiga</i> ; KHWj 6.85b <i>pangasthūlan</i>
10	Stone offering platform	Nāg 8.4b <i>batur patawuran</i> ; KHWj 6.85b <i>pangasthūlan</i>
11	Palace gate	Nāg 8.2a, AWj 3.2c <i>gopura</i> ; Sut 103.10d <i>ghupura</i>
12	Royal watchtower	Nāg 8.2b, 8.5c, Naw 11a <i>pangung</i> ; Sut 103.10c <i>papangungan</i>
13	Stone pillars to which the feet of the royal elephants were chained	AWj 3.4c <i>pagajahan</i>

14	Courtyard	Nāg 8.5a <i>pasewan</i>
15	West-oriented lane	Nāg 8.5b <i>hawan angulwan</i>
16	Doorway	Nāg 8.5a <i>ahēlēt palawangan</i> ; 8.5c <i>mahēlēt [palawangan]</i>
17	Courtyard	Nāg 8.5a <i>ngkânêng jro</i> ; Nāg 8.5c <i>natar</i>
18	Royal cock-fighting pavilion	Nāg 8.5d <i>maṇḍapa pasatan</i>
19	[Courtyard] guarded by the king's troops	Nāg 8.6a <i>ri jronya</i>
20	Doorway through the dividing [wall]	Nāg 8.6b <i>mahēlēt palawangan</i>
21	'Courtyard in the South', guarded by the king's troops	Nāg 8.6a <i>pasewan [i] kidul</i>
22	Stone slab (<i>gilang</i>) appearing on Vistarini's 1931 plan (Figure 4)	–
23	Stone slab (<i>gilang</i>) with inscribed year Śaka 1200 (= AD 1278/9), appearing on Vistarini's 1931 plan (Figure 4)	–
24	Two parallel rows of four stones each, probably foundations of an open pavilion, appearing on Maclaine Pont and Kromodjojo Adinēgoro's 1924 map (Figure 2)	–
25	'Second Gate'	Nāg 8.6a <i>wijil kaping rwa</i> ; Nāg 8.6c, 9.4a <i>wijil ping kalih</i>
26	'Levelled Courtyard', enclosing wall reconstructed according to Vistarini's 1931 excavation plan (Figure 4) and Maclaine Pont's 1926 map (Figure 3)	Nāg 9.3a <i>ngkânêng</i> ; Nāg 9.4a <i>ngkânê jro ... natarnyârata</i>
27	Doorway	Nāg 9.3c <i>lawangan</i>
28	[Courtyard] crowded with the attending servants of the Prince of Paguhan	Nāg 9.3a <i>sar sök de bhṛtya sang śrī nrpati ri paguhan</i>
29	'Amazing Pavilion' identified with the site of Batu Umpak-Umpak (Figure 9), one of the three open pavilions	Nāg 9.4b <i>witānābhinawa</i> ; Nāg 10.1a, 10.3b, 63.1b <i>witāna</i> ; Nāg 89.4b <i>tri-witāna</i>
30	'Abode Beyond Compare' at the Siti Inggil site with the Majapahit ruler's 'Immeasurable Pavilion', the north-eastern one of the three open pavilions, which is now called Caṇḍi Kēḍaton, situated on the north-eastern corner of the site (Figure 10)	Nāg 9.4c-d <i>grhānopama ... witānāprameya</i> ; Nāg 11.1a <i>witāna</i> ; Nāg 89.4a-b <i>uttara-pūrwwa wit[ā]na ... tri-witāna</i>

31	Aśoka tree (<i>Jonesia asoka</i>) under whose shadow the <i>kṣatriya</i> nobles, scholars, saints, Brahmins, the ministers of Śivaite and Buddhist religious affairs, and seven religious exegetists take their respective places	Nāg 9.2d <i>nggwanya... para kṣatriya mwanḡ bhujaṅga</i> ; Nāg 10.3a-b <i>kṣatriya len bhujaṅga ṛṣi wipra... hēb ning aśoka... dharmmādhyaḡṣa kalih lawan sang upapatti sapta</i>
32	‘First Gate’, secluding access to the private royal compounds housing the royal family and the king’s secondary wives	Nāg 11.1b <i>wijil pisan</i> ; Nāg 12.5a <i>purī</i> ; Nāg 47.3c, 74.1a <i>antaḡpura</i> ; Naw 10a <i>strī ring purī</i>
33	Private royal compound (<i>pura</i>) of the Prince of Paguhan, Singhawardhana, and his wife, the Princess of Pajang, Wardhanaduhitā, the sister of King Hayam Wuruk, and their sons and daughters	Nāg 11.1c <i>śrī nrpa singhawarddhana... tiga tang purāpupul</i>
34	Private royal compound (<i>pura</i>) of the Prince of Singhasāri, Kṛtawardhana, the father of King Hayam Wuruk	Nāg 11.1c <i>śrī kṛtawarddhana... tiga tang purāpupul</i>
35	Private royal compound (<i>pura</i>) of King Hayam Wuruk, implied as a third royal compound in reference to the two preceding ones (#33-#34)	Nāg 11.1c <i>tiga tang purāpupul</i>
36	Two parallel rows of three stones each, probably foundations of an open pavilion, appearing on Maclaine Pont and Kromodjojo Adinēgoro’s 1924 map (Figure 2)	—
37	Site floored with hexagonal tiles (Figure 13)	—
38	Brick-walled pond/tank with a subterranean outlet inside the secluded area of the private royal compounds appearing on Vistarini’s 1931 excavation plan (Figure 4), probably fed by a stream from the east	AWj 3.9a <i>lwah ardha midēr ing pura tēka ri dalēm</i>
39	Two parallel rows of three stones each, probably foundations of an open pavilion, appearing on Maclaine Pont and Kromodjojo Adinēgoro’s 1924 map (Figure 2)	—

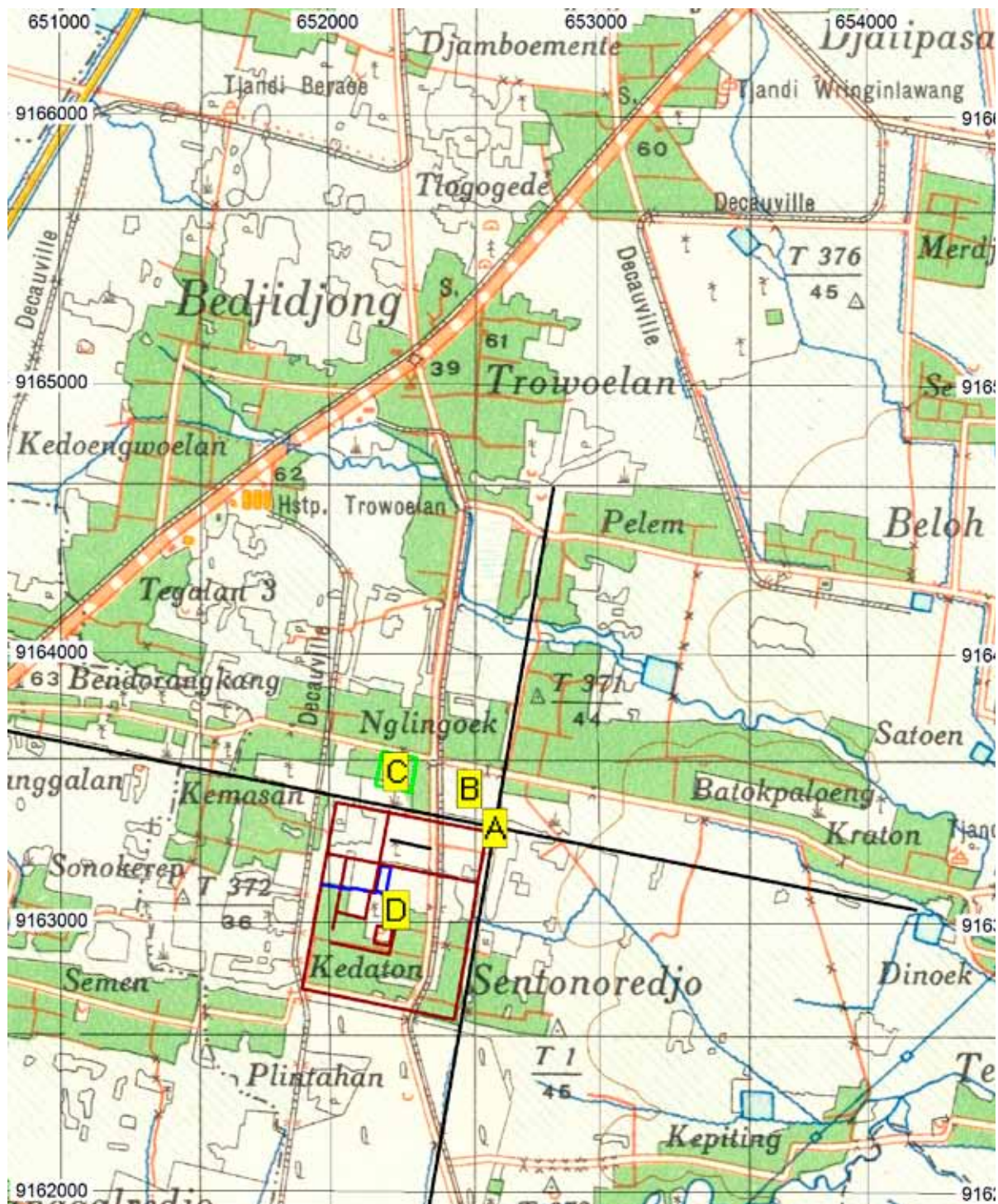


Figure 7. The Majapahit royal palace reconstructed on the 1941 topographic map Modjoagoeng (Topografische Dienst in Nederlandsch-Indië, no. 53/XLI-D, original scale 1: 50,000) with added WGS84, UTM, zone 49M grids appearing at intervals of 1000 m (georeferencing accuracy: 50 m). A. central crossroads (*catuspatha*), B. temple complex (*brahmasthāna*), C. durbar (*sabhā*), D. royal palace (*pura*). Courtesy of Amsterdam University Library.



Figure 8. Photograph of the now vanished palace walls. On Vistarini's 1931 excavation plan, these walls are marked at the easternmost position from *Hoek I* (see Figure 4). The approximately 2 metre wide inner palace walls apparently consisted of two parallel walls of 90 cm wide, the 30 cm wide void filled with earth and rubble. Reproduced from Vistarini (1931: Plate 24c, photograph collection Oudheidkundige Dienst no. 1005?).

Figure 9 (below). The site of Batu Umpak-Umpak. The octagonal dies measure 61-83 centimetres and 31-34 centimetres in diameter and height respectively. We identify this site with the Amazing Pavilion (*witānābhinawa*) in *Nāgarakṛtāgama* 9.4b (Figure 6, #29). On the right side of the house at the rear, we envisage the spot where the *aśoka* tree in *Nāgarakṛtāgama* 10.3a-b (cf. 9.2d) once stood (Figure 6, #31). Copyright Arnoud Haag.





Figure 10. The site of Caṇḍi Kēḍaton at the Siti Inggil remains. Willems took the photograph from the west towards the east. We identify these remains as the Abode Beyond Compare (*grhānopama*) in *Nāgarakṛtāgama* 9.4c-d (Figure 6, #30). King Hayam Wuruk granted audience seated in the Immeasurable Pavilion (*witānāprameya*) which we identify with the west-facing brick platform Caṇḍi Kēḍaton, depicted on the left side to the rear. The walls seen on the right have now vanished. The brick structures in front were destroyed during the building work on the foundations for the Kēḍaton canopy in July 2013. Copyright and courtesy of Erik Willems, Amsterdam.

Figure 11. The site at the Siti Inggil remains in Kēḍaton in 1941. Willems took this photograph from the centre of the site facing north. According to the Archaeological Service's architectural engineer, Van Romondt, the 'cross' of brick structures possibly formed the foundations of an octagonal tower (Bernet Kempers 1949: 44). Copyright and courtesy of Erik Willems, Amsterdam.





Figure 12. Overview of the excavations of the Siti Inggil remains in Kěḍaton in 1941. Willems took this photograph from the north-eastern corner of the site facing south-west. Copyright and courtesy of Erik Willems, Amsterdam.

Figure 13. Site floored with hexagonal tiles as seen from the west facing east. We would identify this site with the area of the royal compound of Singhawardhana, the Prince of Paguhan, his wife, King Hayam Wuruk's sister Wardhanaduhitā, the Princess of Pajang, and their sons and daughters as in Prapañca's *Nāgarakṛtāgama* 11.1c description. Note the brick drain/ water conduit in the centre on the right side of the photograph. Copyright Arnoud Haag.





Figure 14. A brick-walled medieval well located in the north-western corner of the yard (#17) inside the royal palace, its inner sides measuring 60 cm. Copyright Arnoud Haag.

Figure 15. The western of the two pillars (#13) to which, according to oral tradition, the feet of the royal elephants were chained. In reference to Figure 16, we identify the stone post with the stable of the elephants (*pagajahan*) in Tantular's *Arjunawijaya* 3.4c. Copyright Arnoud Haag.





Figure 16. The King of Tuban seated in royal council in his durbar facing north as the merchants of the Dutch East Indies Company (VOC) approach for an audience on Sunday, 24 January 1599. Note that a mariner drew this plate as can be seen from the attention paid to the sun's position and the shadows cast. Due to its importance for celestial navigation, 16th-century marine officers were particularly interested in such details. In this plate, the shadows correspond to the sun's position around noon time. Drawing reproduced from Keuning's edition (1942: 177) of Jacob Cornelisz. van Neck and Wybrant van Warwijck's logbook of the Second Dutch Navigation to the Archipelago (1598-1602). Copyright and courtesy of the Linschoten Vereeniging.

Figure 17. The easternmost Pura Ulun shrine with its three-tiered palm-fibre roof at Lake Bratan, Bali. According to Prapañca's description in *Nāgarakṛtāgama* 8.4c, the Buddhist shrine (*pahoman... sogata*) has a three-tiered roof (*susun tiga*). The 14th-century Majapahit Buddhist shrine possibly resembled this present-day Balinese one. Copyright and courtesy of Jordy Theiller.



east-to-west brick walls once met in a corner, which he had cleared some years previously.¹² We identify this as the north-western corner of the outer palace walls. We found no traces of the southern and eastern outer palace walls. But, like Stutterheim, we infer their positions from the fact that they were almost certainly bounded by sizeable east-west and north-south running depressions. Measuring twenty to thirty metres wide and 0.5 to four metres deep, these are still visible in the present-day landscape. They constituted the medieval roads, possibly lined with ditches.¹³ Regarding the circumference of the outer palace walls, the various versions of Ma Huan's celebrated account diverge. In Darmoyuwono's reconstructive mapping, as marked on the 1983 Bakosurtanal map (no. 1) and in our own reconstruction, the circumference of the outer palace walls measures 2.6 (± 0.1) kilometres which corresponds to the listed Chinese measure of 'three or four *li*', converting into 1.7-2.2 kilometres (Gomperts, Haag and Carey 2008b: 418 n.6; cf. Stutterheim 1948: 7-8; Mills 1970: xv, 87 n.2). For the rest of our discussions, we recommend the reader to consult the satellite image in Figure 6 and the Appendix for the legend of details #1-#39.

One of the main problems in the interpretation of both Sanskrit and Old Javanese texts concerns architectural terminology. For example, according to De Cock (1899: 14), the words *pura*, *purī*, *nagara* and *nagarī* all denote a court town. In the Sanskrit epics, the designation *antahpura* refers both to the royal palace and the private compounds within the palace (De Cock 1899: 87, 94-100). All this influenced Old Javanese. According to Supomo (1977, 1: 50), "judging by their apparently arbitrary distribution in [Old Javanese] *kakawin* [poems], words such as *kaḍatwan*, *pura*, *puri*, *rājya* and *nagara* seem to have the same lexical reference, namely either to the royal compound, [the royal palace] or to the whole town". Although the semantics of these Sanskrit and Old Javanese terms may appear confusing to the modern reader, their precise spatial and/or architectural meaning often becomes apparent from the context (cf. Stutterheim 1948: 1 n.2, 12, 83-5, 92, 98, 106, 117). For example, Prapañca (8.1a-b) commences his description referring to the high red-bricked walls and the façade (*waktra*) of the *pura* before he enters it.¹⁴ Therefore, *pura* contextually translates as 'royal palace' (Stutterheim 1948:

¹² Bp. Kadiman, personal communication, Trowulan, 13 December 2008.

¹³ The central part of the east-west depression on the southern side of the palace walls has now vanished. An official of the local regency (*kabupaten*) government informed us that, a few years before 2008, the Mojokerto PEMDA government spent some 600 million Indonesian Rupiah (approximately US\$50,000) on large quantities of sand and pebbles for the levelling of this area (Bp. Rachmat Basuki, personal communication, 18 December 2008). In Figure 6, the area referred to is bounded by the north-eastern and south-western corners at WGS84, UTM, zone 49M coordinates 652288 mE, 9162672 mN and 652012 mE, 9162685 mN respectively.

¹⁴ From the *Mayamata* and *Mānasāra* texts, the full spectrum of the architectural connotations of the Sanskrit word *waktra* becomes apparent: 'frieze, porch, entrance, façade, gable, fascia' (Dagens 1994, 2: 387; Acharya 1934, 4: 163).

11). Prapañca employs the word *gopura* in its general meaning as given in the *Amarakośa* Sanskrit text: ‘a *gopura* is the gate of a *pura*’.¹⁵ His *gopura* (8.2a) thus contextually denotes the palace gate here.¹⁶ The Sanskrit epic *Rāmāyaṇa* speaks of palace doors which are closed with iron-reinforced (*kālāyasa*) bars (*parigha*) (De Cock 1899: 44). In Aśvaghoṣa’s 2nd-century Sanskrit poem *Buddhacarita*, the town gates of Kapilavastu are closed with ‘heavy iron beams’.¹⁷ In Prapañca’s description, the Majapahit palace gate also has doors of iron (*wēsi*). The *Sutasoma* adds an important architectural detail regarding the Majapahit palace gate which also appears in the *Arjunawijaya*: “The palace gate (*gupura*) has a nine-tiered top”.¹⁸ The Sanskrit *Mānasāra* and *Mayamata* texts prescribe the number of tiers of the top of palace gates which, according to rank, range between one and eleven. For example, according to the *Mānasāra* 11.131, the top of a palace *gopura* of the *māharāja* class of kings is stated to have nine tiers (Acharya 1934, 4: 106).

In the Sanskrit *Mahābhārata* and Vālmīki’s *Rāmāyaṇa*, descriptions of wall towers (*aṭṭa*, *aṭṭāla*, *aṭṭālaka*) often appear in combination with *gopura* (De Cock 1899: 31-3, 56). The Sanskrit epics also describe the walls of palaces, buildings and cities as white plastered (De Cock 1899: 27, 29 n. 1, 33, 56, 73-4). Regarding the Majapahit royal palace, Prapañca states that the palace gate (*gopura*) is situated to the north of the royal palace, the *panggung* (‘tower, raised platform’) adjoining it on its eastern side. Stutterheim (1948: 20, 25-6) emphasises the fact that, in Prapañca’s description (8.2a), the base of the *panggung* is stuccoed with white diamantine plaster (O.J. *bajralepa* < Skt. *vajralepa*).¹⁹ Since the author describes the white plaster of the *panggung* as seen from outside the royal palace, we must conclude that the *panggung* is situated in the palace walls themselves, exactly like the situation on the ground (Figure 4). Recalling Central Javanese and Balinese court architecture, Stutterheim (cf. 1948: 21-25) rightly argues that Prapañca’s contextual reference to *panggung* should be understood as the royal watchtower, which the king ascends to watch festivities taking place in the court town below. Regarding the siting of the Majapahit watchtower in the Kěḍaton landscape, the local place-name Panggung appears on the 1879, 1892 and 1925 ordnance and topographic maps, all of which refer to the Islamic shrine (Figure 5). In 1887, Verbeek (1891: 230) noticed that the brick base of the Panggung Islamic shrine was covered with white plaster. When Stutterheim (1948: 26) inspected the brick

¹⁵ *Amarakośa* 2.16 (Skt.): *pura-dvāraṃ tu gopuram* (Acharya 1946, 7: 157).

¹⁶ In Old Javanese texts composed in post 15th-century Bali, Third Gate (*wijil ping tēlu*, *wijil ping tiga*, *wijil ping trini*) appears as a designation for the palace gate (cf. Zoetmulder 1982, 1: 423, 2: 1730, 1768, 2201, 2271).

¹⁷ Aśvaghoṣa’s *Buddhacarita* 5.82 (Skt.): *guru-parigha-kapāṭa* (Olivelle 2009: 156).

¹⁸ *Sutasoma* 73.14b (O.J.): *gupuranya tuṇḍa sanga* (Santoso 1975: 349). Cf. *Arjunawijaya* 3.2c (O.J.): *tuṇḍa sanga susun ika ring sagopura-sagopura tēlas inukir* (Supomo 1977, 1: 97).

¹⁹ The 14th-century Old Javanese text on court protocol, *Nawanātya* 11a, confirms the white (*śweta*) stucco of the *panggung* (Pigeaud 1960, 1: 83).

remains, little of this original white diamantine stucco had survived. So, echoing Wibowo (1980: 29 n. 2), we conclude that the former royal watchtower (*panggung*, #12) lives on in the Trowulan landscape in the local toponym Panggung. Our local informant told us that wide and extensive brick remains are buried on the western side of the Panggung shrine which he had recently unearthed and then covered over again.²⁰ Therefore, in accord with Stutterheim (cf. Gomperts, Haag and Carey 2008b: 417, Fig. 4), we situate the position of the vanished palace gate (*gopura*, #11) just by the western side of the Islamic Panggung shrine (Figures 4, 5 and 6). We will proceed with the interior of the royal palace.

In Indian court architecture, the area of a royal palace is organised in walled courtyards which, in the Sanskrit epics *Mahābhārata* and *Rāmāyaṇa*, are called *kakṣā* or *kakṣyā* (De Cock 1899: 88-90). The same architectural principle of arranging courtyards into four-squared spaces enclosed by walls, and filled with open pavilions, trees, shrubs and flowers, is found in modern Javanese and Balinese court architecture.²¹ A similar image emerges from the plan of the layout of the mid-14th to mid-18th century Ayutthaya royal palace (Baker 2013: 86). For the architectural division of spaces in the Balinese royal palace (*puri*) of Klungkung, the Balinese author of the *Kidung Pamañcangah* historiography (1.151) adopts the Old Javanese term *khaṇḍa*, literally, ‘section, division’ (Berg 1929: 19; Gomperts 2011: 62). In Prapañca’s description of the Majapahit royal palace interior, the Old Javanese designations *natar* and *pasewan* appear in the architectural connotation of ‘courtyard’ (Stutterheim 1948: 4, 18, 35, 55-7, 59-61).

Having entered the royal palace, Prapañca (8.5.a-b) stands in the courtyard of entrance (#17) and describes a doorway (*palawangan*, #16) that leads on to another courtyard (*pasewan*, #14).²² He enters this courtyard (#14) heading east, makes a reverse turn and describes the west-running lane (*hawan*, #15). Flanked by shady *tañjung* (*Mimusops elengi*) trees, this west-running lane traverses the middle of the courtyard (#14) (see Figure 6). On Vistarini’s 1931 plan, the southern walls and the south-western corner of the courtyard’s western walls are clearly marked (see Figure 4, *Hoek I*). These inner palace walls were some two to 2.25 metres thick (Figure 8). Stutterheim erroneously reconstructs the lane on the western side of

²⁰ Bp. Kadiman, personal communication, Trowulan, 13 December 2008. The spot adjoining the western side of the Panggung shrine is now used for Islamic graves which have been dug on top of the medieval brick remains. This will complicate future excavations there.

²¹ For example, see the three-dimensional artist renderings of the Surakarta *kraton*, the Yogyakarta *kraton*, and the Klungkung *puri* depicted in Tjahjono (1998: 91, 93) and Wijaya (2002: 32, Fig. 3.2 D).

²² The Sanskrit epics *Māhabhārata* and *Rāmāyaṇa* frequently refer to arched doorways (Skt. *torāṇa*) in descriptions of royal palaces (De Cock 1899: 39-43). In Prapañca’s account (8.5a, 8.6b, 9.3d), the Old Javanese *palawangan* and *lawangan* appear in courtyards which, although often swarming with soldiers and servants, are not guarded. Therefore, we translate *palawangan* and *lawangan* as ‘doorway’.

the western outer palace walls. On the satellite image, the existing eastern track of this lane (#15) corresponds to a four-metre wide 170 metre-long path. The western track of the lane (#15) is no longer visible on the satellite image because the local upper soils have been removed to a depth of one to three metres (Figure 6).

Having again exited the courtyard (#14) on its western side, Prapañca (8.5c-d) returns to the courtyard of entrance (*natar*, #17), where he stands to the south of the watchtower (*panggung*, #12). Along the sides of this spacious courtyard (#17), there are various open pavilions (Figure 6). Elsewhere in the *Nāgarakṛtāgama* 17.4c, Prapañca informs us that King Hayam Wuruk was fond of attending cock fights (Robson 1995: 36). Indeed, in the centre of the courtyard of entrance (#17), we find the royal cock-fighting pavilion (*maṇḍapa pasatan*, #18) with its noisy cocks hanging in cages along its sides. Since the cock-fighting pavilion (#18) is located to the south of the *panggung* watchtower (#12), it must also be situated to the south of the palace gate (#11) (Figure 6). Stutterheim (1948: 58 n. 140) rightly argues that this aspect of Javanese court architecture has been preserved in the present-day Yogyakarta palace. We can now present even more convincing evidence. A detailed VOC map of the *kraton* of Yogyakarta dating from circa 1790, shows that the cock fighting-pavilion, which is now called Bangsal Pancaniti, was situated in the centre of the Kēmandungan. This is the entrance courtyard, situated directly to the south of the northern palace gate, the Regol Brajanala (see Knaap *et al.* 2007: 391-2 “w”).²³ All this refers back to the aforementioned Sanskrit texts. In the chapter on court architecture, the *Mānasāra* 40.140 describes the *kukkuṭa-yuddha-maṇḍapa*, literally, the ‘cock-fighting pavilion’ situated either in the northern or southern part of the royal palace (Acharya 1934, 3: 276; 4: 430). In our mapping (Figure 6), the southern and eastern walls of the entrance courtyard (#17) are reconstructed from the marked corner on Vistarini’s 1931 plan (see Figure 4, *Hoek I*).

In the Sanskrit epics *Mahābhārata* and *Rāmāyaṇa*, there are several descriptions referring to terraced courtyards (*vedikā*, *vitardi*) and benches consisting of flat stones (*śilāpaṭṭa*, *śilāpaṭṭaka*, *śilātala*) (De Cock 1899: 42, 66-7, 123). Prapañca also refers to terraced courtyards. In the next stanza (*Nāgarakṛtāgama* 8.6), the author describes two courtyards as one, separated only by a doorway (*palawangan*). This is probably an open doorway (#20) through which he sees the Second Gate (#25) further to the south. Prapañca’s description (8.6) reads as follows: from the courtyard of entrance (#17), the author enters the next courtyard (#19) guarded by the king’s troops. Then, Prapañca goes through the doorway (*palawangan*, #20), leading onto the Southern Courtyard (*pasewan i kidul*, #21)

²³ The Bangsal Pancaniti lost its original function during the British Interregnum (1811-16) when the Yogyakarta Resident, John Crawfurd (1783-1868, in office 1811-14, 1816), a staunch Scots Presbyterian, prohibited cockfighting in July 1813 (Carey 2007: 391). Later, it was used as a court for the execution of capital punishments (Robson 2003: 22, 37-38, 40, Map 1).

which the king's troops also guard. Both courtyards (#19, #21) are terraced (*tumpa*) (Figure 6):

All the dwellings are well-constructed. Their stone foundations (*watwan*), posts (*saka*), timbers (*balabag*) and rafters (*usuk*) also are faultless. (after Robson: 1995: 30)²⁴

In his reconstruction (Gomperts, Haag and Carey 2008b: 417, Fig. 4), Stutterheim overlooks the walled space enclosed by the four corners *Hoek II*, *Hoek III*, *Hoek IV* and *Hoek V* appearing in Vistarini's 1931 excavation plan (Figures 4 and 6, #21). On site, Vistarini excavated a subterranean brick-walled drain running from east to west along the brick walls which separated the two courtyards (#19, #21). It is worth noting here that Maclaine Pont and Kromodjojo Adinēgoro's 1924 map shows contour lines at heights of 40 and 42.5 metres above mean sea level with a precision of 0.5 metre on the northern side of the courtyard (#19) and the southern side of the Southern Courtyard (#21) (Figure 2). On site, the terrain still shows elevation differences up to some two metres. All this may point to the existence of previous terracing here. In the north-western corner of the Southern Courtyard (#21), the Austrian architect found a stone slab (*gilang*, #22), while in the westerly adjoining courtyard, which Prapañca does not describe, Vistarini (1931: 31) maps another stone slab (*gilang*, #23) with the inscribed Śaka year number 1200, corresponding to AD 1278/9 (Figures 4 and 6). This may suggest that the terrain of the royal palace was inhabited before the first Majapahit king, Wijaya, established it there in 1292 (Krom 1931: 354-5). Such stone slabs functioned as holy sitting stones, called *sela gilang* (literally, 'shining stone'), or more succinctly just plain *gilang* in Modern Javanese (cf. Carey 2007: 86 n. 60, 139 Pl. 14, 154, 564-5 n. 175, 573, 579; Miksic 2009). Unfortunately, even in the late 1970s, Wibowo (1980: 18) reported that the *gilang* with the Śaka year 1200 was missing in the collection of the Trowulan museum.²⁵ A few metres to the

²⁴ *Nāgarakṛtāgama* 8.6c (O.J.): *kapwā weśma subaddha watwan ika len saka balabag usuknya tanpa cacadan/...* (Stutterheim 1948: 59).

²⁵ Neither Maclaine Pont nor Vistarini was able to decipher the inscribed Śaka year number '1200' in Old Javanese script. Van Stein Callenfels almost certainly read the inscription. But, rather strangely, his name is not mentioned in Vistarini's report, which the Head of the Archaeological Service, Frederik D.K. Bosch (1887-1967, office 1915/6-1936/7), published in 1931. Accompanied by Vistarini and Maclaine Pont, Bosch inspected the site of the Kēḍaton excavations in November 1930 (Vistarini 1931: 29). Given the scale and importance of the Kēḍaton diggings, one might have expected Bosch to mention Vistarini's primary discoveries—namely the 800-metre stretch of former palace walls and, thus, the confirmation of the traditional siting of the former Majapahit royal palace—in his official statement as published in the annual report of the Netherlands East Indies government. But he did nothing of the kind, confining himself to references to a few inconsequential terracotta objects, which were unearthed during the Kēḍaton diggings, without even mentioning Vistarini's name (cf. Bosch 1931/32: 318). Once again, Bosch's involvement with

north-east of this stone slab, Maclaine Pont and Kromodjojo Adinēgoro's 1924 map shows two parallel rows of four stone dies each, probably quite similar to those appearing as *watwan* (from O.J. *watu*, 'stone' + suffix *-an*) in Prapañca's description (Figures 2 and 6 #24).

After a brief aside in which he describes the various royal bodyguard units and military regiments, Prapañca (9.2c-d) resumes his account of the interior of the royal palace describing the female corps *Bhayangkari* (literally, 'The Terrifiers'), which, on the southern side of the Southern Courtyard (#21), secure the Second Gate at its northern side. On site, the position of the vanished Second Gate (#25) can be accurately reconstructed in the centre of the southernmost inner palace walls mapped on Vistarini's 1931 excavation plan.

Now, Prapañca takes us through the Second Gate (#25) entering the Levelled Courtyard (#26), which we will describe in detail shortly. On the southern side of the Levelled Courtyard (#26), Prapañca (9.3c-d) proceeds through another doorway (*lawangan*, #27) and enters a courtyard (#28), which is full of open pavilions (*maṇḍapa*) and houses (*grha*), guarded by the servants of the king's brother-in-law, the Prince of Paguhan, Singawardhana (see Figure 6). On site, we have to rely on Maclaine Pont's much coarser 1926 mapping for the walls on the southern side of the Levelled Courtyard (#26), and infer the position of the doorway (#27) and the courtyard (#28) to which it leads (Figures 3 and 6).²⁶ We will now return to the Second Gate (#25) in the Levelled Courtyard (#26).

In the Sanskrit epic *Mahābhārata*, the space where the king holds royal council with his ministers is called *mantragrha* which is situated on a slight elevation which the ministers ascend to gather in royal council (De Cock 1899: 80, 115). This space is located in the Levelled Courtyard (#26), which Prapañca describes at length over several stanzas (9.2b-9.3b, 9.4a-11.1a). The Buddhist author (9.2d) refers to the presence of *kṣatriya* nobles and scholars (*bhujangga*) on the southern side of the Second Gate (#25). Going from the north-western corner via the western side to the southern side of the courtyard, he (9.3a-b) describes many buildings crowded with respectfully waiting ministers (*sumantri*) and military commanders (*pinituha ri wīrabhṛtya*). He (9.4) then gives further details about the courtyard (*natar*, #26), which is level and full with buildings, including the Amazing Pavilion (*witānābhinawa*) where those courtiers respectfully awaiting the arrival of their king take their places. Among these are senior officials, the 'noble ones' (*ārya*), and the five official members of the Majapahit royal council, which forms the kingdom's civil and military government, consisting of the Majapahit prime

Trowulan archaeology leaves many unanswered questions (cf. Gomperts, Haag and Carey 2008b: 420 n. 8; 2011: 5; 2012b: 2, 4, 7, 10 n. 19, 18).

²⁶ In our view, more evidence will be needed for the presumed identification of a seventy-metre long east-west oriented brick wall situated some forty metres to the south-west of Batu Umpak-Umpak (cf. Arifin and Permana 2011: 199).

minister (*patih*), the celebrated Gajah Mada, *děmung*, *kanuruhan*, *rangga*, and *tuměnggung* (*Nāgarakṛtāgama* 10.1, 63.1). From the elaborate description of the Śaka New-Year festivities elsewhere in the *Nāgarakṛtāgama* 88.1a-92.1a, it is apparent that there are three open pavilions (*tri-witāna*) in this courtyard (#26). Drawing our focus to the eastern side of the courtyard, Prapañca continues (9.3c-d):

... [as for] the Abode Beyond Compare (*grhānopama*), its structure is majestic, lofty and furnished with the royal insignia. [This is] the place where, seated in the Immeasurable Pavilion (*witānāprameya*), the King grants audience to those who have come into the royal presence. (after Stutterheim 1948: 74; Robson 1995: 31)²⁷

According to Prapañca's description (89.4a-b), the Immeasurable Pavilion was the north-eastern pavilion in the courtyard (#26). The author (10.3) then returns to the southern side of the Second Gate (#25), again making reference to the *kṣatriya* nobles, the scholars (*bhujangga*), sages (*ṛṣi*) and Brahmins (*wipra*), who, together with the two ministers for religious affairs – one Śivaite and the other Buddhist – with the seven religious exegetists of the State Council, stand in the shade of an *aśoka* tree (*Jonesia asoka*). So we possess two directions to the spot where the *kṣatriya* nobles and the scholars (*bhujangga*) are positioned (*Nāgarakṛtāgama* 9.2c-d, 10.3a-b), namely from the south of the Second Gate (#25) and from the side of one of the three pavilions (*witāna*) below the *aśoka* tree. All this is sufficient to reconstruct the entire layout of the Levelled Courtyard (#26).

On site, Prapañca's marvellous description brings everything to life. The enclosed area of the courtyard (#26) is still quite level in comparison to the rest of the landscape. On the east of the Levelled Courtyard (#26), the Abode Beyond Compare (#30) can be identified by the Siti Inggil site, which is an earthwork with excavated brick foundations, measuring some 66 metres north-south by 56 metres east-west and some two metres in height. This bore the name Siti Inggil until the beginning of the 20th century (Figures 1 N, 10-12). According to J. Knebel (1909: 66), a member of the Archaeological Service who interviewed Mangoen Amidjojo, the Trowulan villager guardian of these remains in 1907, a local tradition describes how the Majapahit kings used this platform as their royal seat while granting audiences to their senior officials. At the Central Javanese courts, kings ceremonially grant audience at the *siti inggil* (literally, 'the high ground'). So the Siti Inggil place-name is the appropriate Modern Javanese analogue of Prapañca's Abode Beyond Compare (#30). The pre-historian Willems unearthed major parts

²⁷ *Nāgarakṛtāgama* 9.4c-d (O.J.): ... *ikang grhānopama wangunan ikāśry āruhur sôpacāra/nggwan śrī nātha n paweh sewa ring umarēk umunggw ing witānāprameya* (Stutterheim 1948: 74).

of the Siti Inggil earthwork in 1941 (see Figures 10-12), and, the ceramics expert, Van Orsoy de Flines, dated the excavated sherds to between the 13th and 17th centuries, some pieces going back to before the Majapahit era in the 9th and 10th centuries and the majority of the ceramics dating to the 14th and 15th centuries. This confirms the corresponding dating of this part of the royal palace. According to the architectural engineer Van Romondt (Bernet Kempers 1949: 44-5), the brick remains point to several layers, the brick blocks in the centre possibly forming the foundations of an octagonal tower (Figure 11). On the north-eastern corner of the excavated Siti Inggil, there is a brick platform which is now called Caṇḍi Kēḍaton and measures some 12.60 metres north-south by 8.50 metres east-west with a height of 1.58 metres and stairs to the west. This was in all probability the Immeasurable or north-eastern Pavilion (#30), the spot where King Hayam took his seat facing due west (Figure 10).

Located some fifty metres to the west of Caṇḍi Kēḍaton, there are two parallel rows of seven octagonal stone foundations on a site now called Batu Umpak-Umpak. These pediments measure 61-83 centimetres and 31-34 centimetres in diameter and height respectively (see Figures 9 and 6, #29). Contrary to Maclaine Pont's absurd reference (1925: 42) to a 'farmhouse' (Malay-Dutch *tani-woning*, cf. Stutterheim 1948: 5 n. 14), the huge stone-hewn foundations were clearly designed to support an impressive wooden superstructure. According to Made Wijaya, a leading expert on traditional Balinese architecture, this would have had heavy wooden beams.²⁸ So we identify the site of Batu Umpak-Umpak with the spot of the Amazing Pavilion (#29), namely the north-western one of the three open pavilions. In accordance with the striking precision of Prapañca's description (9.2d, 10.3b), we spatially infer the position of the *aśoka* tree (#31) at a thirty-metre distance to the south of the Second Gate (#25) and to the west of the western side of the Amazing Pavilion (#29). In several nearby excavation pits, a team of archaeologists recently (2008-11) excavated twelve dated Chinese coins, one originating from the Tang Dynasty (AD 618-906), eight from the Southern Song Dynasty (AD 1127-1279), and four from the Ming Dynasty (AD 1368-1644) (Arifin and Permana 2011: 179, Table 8.2). The statistics of the pottery analysis of the excavated sherds, as we would expect, peak in the Yuan (1271-1368) and Ming (1368-1644) dynasties (Arifin and Permana 2011: 157, Table 7.3).

In the Sanskrit *Mahābhārata* and *Rāmāyaṇa* epics, *antaḥpura* is a designation for the private royal compounds (De Cock 1899: 94-100). In the *Nāgarakṛtāgama* 11.1b-11.2d, Prapañca describes the First Gate that gives access to the private royal compounds. Access through this First Gate is strictly reserved for the royal family, their female servants and the king's concubines. Stutterheim rightly identifies this

²⁸ Made Wijaya (Michael White), personal communication, Trowulan, 12 December 2008.

First Gate with Prapañca's *purī*.²⁹ So as regards the interior of the private royal compounds, the author's description is based entirely on hearsay. To the east of the First Gate (#32), three royal compounds (*pura*) are situated. In the southern compound (#33), the Prince of Paguhan, Singhawardhana resides with his wife, King Hayam Wuruk's sister, Wardhanaduhitā, the Princess of Pajang, and their sons and daughters. In the northern compound (#34), Prince Kṛtawardhana, who is the Prince of Singhasāri and the father of King Hayam Wuruk, dwells. Like Stutterheim (1948: 92, 124-5, Map III no. 22), we contextually surmise that King Hayam Wuruk's compound (#35) is situated between the two aforementioned compounds. Elsewhere in the *Nāgarakṛtāgama* (47.3c, 74.1a), Prapañca tells us that the first king of Majapahit, Dyah Wijaya, who was consecrated as King Kṛtarājasa Jayawardhana (reigned 1294-1309), was established as a Buddhist Jina image in the royal sanctuary in this secluded part of the royal palace (*antaḥpura*). Although we possess little archaeological evidence from this area of the royal compound, Maclaine Pont and Kromodjojo Adinēgoro's 1924 map shows two parallel rows, each of three stone dies (#36), in the area of King Hayam Wuruk's compound (see Figures 2 and 6). In the early 1980s, archaeologists unearthed a site floored with hexagonal tiles (#37) which seem to be associated with the southern royal compound (#31) inhabited by Prince Singhawardhana of Paguhan (see Figure 13). A residential area now covers this area of the royal compounds (#33-#35), which will complicate future diggings there. In the next section, we will devote a few words to water management in the royal palace.

Water management in the royal palace

Vistarini excavated a large pond on the north-western corner of the royal compounds, but Prapañca does not refer to it (see Figure 4). So we will compile the hydrological details from other texts.³⁰ In the Sanskrit *Mahābhārata* and *Rāmāyaṇa* epics, palaces are constructed with moats (Skt. *parikhā*). Wells appear in the interior of these palaces. Inside the *antaḥpura* in the Sanskrit epics, there is a pleasure garden (*pramadāvana*) furnished with ponds, pavilions, trees and flowers (De Cock 1899: 22-28, 50, 65, 69-71, 88, 104, 123). A unique aspect of medieval Javanese court architecture concerns the design of a stream flowing through the

²⁹ Judging from the contexts in which the word *purī* appears in the *Nāgarakṛtāgama* 6.4a, 7.3a, 17.2d, 46.1d, 69.1a, 69.3b, and the reference to the 'women in the *purī*' (*strī ring purī*), which occurs in the Majapahit text on state protocol *Nawanātya* 10a (Pigeaud 1960, 1: 83), we concur with Stutterheim (1948: 83-84) that Prapañca's use of *purī* accentuates the feminine aspect of *pura*, contextually emphasising the area which women inhabit, namely the secluded area of the private royal quarters in the royal palace known in Modern Javanese as the *kēputren*.

³⁰ From the perspective of hydrological engineering, Maclaine Pont's article (1927a) on presumed Majapahit waterworks and reservoirs (*waduk*) has little to recommend it. Since his study does not relate to the Kēḍaton area (Maclaine Pont 1927a), it has no relevance for our work.

palace. The Old Javanese prose adaptation of the First Book of the *Mahābhārata*, the late 10th-century *Ādiparwa*, describes an in-flowing stream: “There was a river called Śuktimatī, its stream originating from Mount Kola, and its water flowed into the royal palace (*kaḍatwan*)”.³¹ The mid-12th century Kaḍiri-originated Old Javanese *kakawin* poem *Bhomāntaka* speaks of an out-flowing channel: “A swiftly flowing stream of clear water came tumbling out of the inner palace (*kaḍatwan*)” (Teeuw and Robson 2005: 75).³² In the context of the Majapahit royal palace, the *Arjunawijaya* tells of a moat which also flows through the interior of the royal palace:

The rivulets branching off from the stream (*lwah*) entirely encircle the royal palace (*pura*) and enter it, further descending into the houses of the female attendants.³³

In its description of the Majapahit royal palace, the *Kidung Pamañcangah* describes the stream flowing through the private royal compounds and the pleasure garden (*taman*) (Gomperts 2011: 64). Inside the private royal compounds, Prapañca (11.2d) provides us with a hearsay description of the blossoming *tañjung* (*Mimusops elengi*), *kesara* (a hairy type of tree) and *campaka* (*Michelia campaka*) trees which may refer to the royal pleasure garden. The author also describes the royal palace moat:

Let us describe the layout of the marvellous royal palace (*pura*); ... [it] is situated amidst deep water [flowing] along [its sides]. (after Robson 1995: 29)³⁴

On site in Trowulan, we could not find any traces of the former palace moats, but the brick-walled pond or tank (#38), which Vistarini excavated, gives a distinct spectral signature on the satellite image, measuring some 100 metres north-south by forty metres east-west. Maclaine Pont and Kromodjojo Adiněgoro’s 1924 map also shows six stone dies, which may have once belonged to an open pavilion located some thirty metres to the east of this tank or pond (see Figures 2 and 6, #39). So we believe that the pleasure garden was situated in this north-western part of the private royal compound. We infer from the patterns of the heights in

³¹ *Ādiparwa* (O.J.): *hana ta nadī śuktimatī ngaranya, lwah ning kolagiri, lāwan ta wwainya umilī tēkēng kaḍatwan* (Zoetmulder 1983: 38).

³² *Bhomāntaka* 1.14a (O.J.): *lwah sangkēng jro kaḍatwan hēning i bañu nikādrēs hilīnyānggaluntang* (Teeuw and Robson 2005: 74).

³³ *Arjunawijaya* 3.9a-b (O.J.): *tūsanya tumēḍun irikang lwah ardha midēr ing pura tēka ri dalēm/ len tang tumēḍun ika ri weśma ning kaka-kakeña ...* (Supomo 1977, 1: 98).

³⁴ *Nāgarakṛtāgama* 8.1a-b (O.J.): *wārñnan tingkah ikang purādbhuta... i t[ē]ngah way ēdran adalēm/* (Pigeaud 1960, 1: 7).

the landscape that the subterranean brick-walled drain, which Vistarini excavated along the walls separating the two guarded courtyards (#19, #21), was the outlet of the pond (see Figure 6, #38, blue). In view of the stream drawn on the 1941 topographic map, the inlet probably originated from the east (Figure 7, blue). However, this water was not intended for drinking. On the site of the Majapahit royal palace and elsewhere in the court town, potable water was drawn from round and square brick or terracotta-walled wells. Directly adjacent on the northern side of Vistarini's pond (#38), we noticed a medieval well with a round opening and a diameter of 64 centimetres and another one some 100 metres further to the east in the area of the royal compounds. On the south-eastern side of the courtyard (#14) with its west-running lane, there were two medieval wells. In the north-western corner of the courtyard of entrance (#17), there were four old brick-walled wells. In the courtyard (#19), we saw three wells, one at the north-eastern corner, and another at the south-eastern corner as well as a well in the centre at the southern side. In the hamlets around present-day Trowulan, not supplied by the main water supply system, villagers still draw ground water from shallow wells with buckets, and use mechanical and electrical pumps for the extraction of drinking water and for household purposes. On the Siti Inggil site of the excavated remains in Kēḍaton, Van Romondt noticed a brick-lined drain (Bernet Kempers 1949: 45), while on the hexagonal tile-floored site, there was also a brick-lined drain (see Figure 13). Likewise, two other brick-lined drains were recently excavated on its western and southern sides (Arifin and Permana 2011: 101, 198-9). All this suggests that Majapahit architects separated polluting waste water from ground water by designing brick-lined conduits and drains to carry away grey water, effluent and sewage.

The central crossroads (*catuspatha*)

Catuspatha is a Sanskrit word for 'a place where four roads meet, a crossroads, or a quadrivium'. In the Sanskrit *Mahābhārata* and *Rāmāyaṇa* epic scenes, the *catuspatha* is a divine place (De Cock 1899: 61, 110). The Ninth Book of the *Mahābhārata* (9.45.25, 9.45.27 and 9.45.38), in particular, refers to the Mothers attending the God Skanda with the names *Catuspatha-niketā* (literally, 'Abiding on the Crossroads') and *Catuspatha-ratā* (literally, 'Living on the Crossroads') (cf. Tokunaga 1996). In the *Mṛcchakaṭikā*, the main character is the impoverished Brahmin merchant Cārudatta who urges his Brahmin jester friend Maitreya: "You too ought to go to the crossroads (*catuspatha*) and offer to the [Divine] Mothers".³⁵ In a Buddhist list of names of the thirty-six hungry ghosts (Skt. *preta*), who appear

³⁵ *Mṛcchakaṭikā* 1.84 (Skt.): *gaccha tvam api catuspathe mātṛbhyo balim upahara* (Acharya 2009: 26).

in the Sanskrit *sūtra* text *Saddharmasmṛtyupasthāna*, the Catuspatha-preta is the ghost dwelling at the *catuspatha* (Wayman 1983: 75-76). Finally, a commentary on the Second Book of Vālmīki's *Rāmāyaṇa*, the *Ayodhyākāṇḍa*, explains: "prominent trees standing on the *catuspatha* [house] the ghosts and the abodes of deities".³⁶ These are recurring features in the two extant descriptions of the Majapahit *catuspatha*.

In line with the Sanskrit texts, Prapañca (8.2d) accentuates the otherworldly aspect of the *catuspatha*, attributing the Old Javanese *ahyang* or 'divine' to the Majapahit central crossroads. Stutterheim (1948: 29 n.76, 124-5 no.8) situates the central crossroads on the north-eastern corner of the royal palace, but considers the siting uncertain. Textual evidence corroborates the correctness of his identification. In a tale appearing in *Sutasoma* 103.10-13, Queen Marmawatī walks at the palace gate (*ghupura*, #11) and the watchtower (*papanggungan*, #12) along the northern palace walls, Tantular giving poetic voice to her wanderings in Old Javanese (see Figure 6):

To the east close to the crossroads (*catuspatha*, #1), there is a [sacred] fig-tree (*waringin*, #2).³⁷

With reference to this sacred *waringin* tree, Prapañca (8.1b-c) employs *buddhi* as a synonym of the Sanskrit *bodhi*, 'sacred fig tree' or *Ficus Religiosa*, in his description of the front of the royal palace (Zoetmulder 1982, 1: 266; Monier-Williams 1899: 734). During our field walks, the villagers informed us that the spot where Stutterheim sites the Majapahit *catuspatha* crossroads forms the northern part of a *punden*, or locally venerated spot known as Wringin Puṭul or 'Broken Off *Waringin* Tree'. Since no *waringin* trees were recently extant at this spot and none are marked on any of the 1879-1941 ordnance and topographic maps, the local toponym Wringin Puṭul may well go back to the 14th century. This may have an historical link to the sacred *waringin* tree which once stood near the Majapahit *catuspatha*.³⁸

³⁶ A commentary on the Bombay version of the *Ayodhyākāṇḍa* (Skt.): *catuspatha-stha-mahā-vṛkṣān devatāvāsa-bhūtān* (De Cock 1899: 110).

³⁷ *Sutasoma* 103.13a (O.J.): *wetanyē harēp ing catuspatha hanēka waringin* (Santoso 1975: 447).

³⁸ Whether there were two *waringin* trees, each surrounded by a low square brick wall, in front of the Majapahit royal palace, like the *waringin kurung* standing in the centre of *alun-alun* squares in Central Java, remains an unanswered question, but the idea of fencing sacred trees goes back to Indian court architecture. In the *Mālavikāgnimitra*, the Prākṛit *bhitti-vediā-bandha* (Skt. *bhitti-vedikā-bandha*) refers to a flowering *aśoka* tree 'furnished with a walled terrace' (De Cock 1899: 66 n. 1). Based on Kālidāsa's Sanskrit court poem *Raghuvamśa*, Monaguna's Old Javanese *Sumanasāntaka* 22.5a and 124.1b gives *patiga ning aśoka* which literally translates 'stone-walled terrace at the base of the *aśoka* tree' (cf. Zoetmulder 1982, 1: 141, 2: 1323; Worsley *et al.* 2013: 122, 312). In the *Mṛcchakaṭikā* 5.38, the Prākṛit *pāāra-veṭṭidaṃ via kaṭṭham* (Skt. *prākāra-veṣṭitam iva kapittham*) translates 'like a wood-apple tree surrounded by a wall' (Acharya 2009: 230-1, 570).

On the 1941 topographic map, the contours of the four vanished arterial roads intersecting at the crossroads – with an easterly rotation of 10°-11° – are clearly visible (see Figure 7, #A). On high-resolution satellite imagery, their tracks give distinct spectral signatures (Figure 6, #1). In the landscape, the cross sections along the tracks of the northern and southern axial roads reveal local depressions of some 0.5-4.0 metres with widths of twenty to thirty metres. These certainly indicate the previous presence of roads. Although we searched for traces of medieval pavements on site, we could find not a single spot with stone linings or other material (cf. Parcak 2009: 123). However, on the 1918 topographic map, the first 100 metres from the central crossroads to the south is marked as an unsurfaced two to four metre wide dirt road or pack trail. But by 1925, this had disappeared. As these lands are now under intensive agricultural use, we surmise that their top layers have been removed and the remaining soils cleared of previous stone structures, cobbles, rocks, pebbles, gravel and brick aggregate known locally as *growol*.³⁹

The durbar (*sabhā*)

In the Sanskrit *Mahābhārata* and *Rāmāyaṇa* epics, *sabhā* is the space or building which is part of the royal palace, where the throne (*siṃhāsana*, literally ‘lion’s seat’) is erected and where kings gather in counsel with their dignitaries and court priests. It is the vibrant centre of court life. The king’s subjects arrive in the *sabhā*, entering on foot, riding in carts, or mounted on horses or elephants depending on their status. The consecration of kings, royal audiences, royal judiciary hearings and state festivities take place in the *sabhā*, which may be furnished with wells and ponds (De Cock 1899: 101-107). Since the Moghul period (1526-1857), the Persian word *darbār* came into use, ultimately entering

³⁹ In the Old Javanese *Sumanasāntaka* 28.17b, roads (*mārga*) are lined with pebbles/gravel (*karikil*) (Zoetmulder 1982, 1: 808; Worsley et al. 2013: 146). Moreover, during his journey through Java between July and October 1861, the British naturalist and explorer, Alfred Russel Wallace (1823-1913), visited the Majapahit-Trowulan remains. In his famous work on the Malay Archipelago (1869), he devotes all of fifteen lines to this visit: “Traces of buildings exist for many miles in every direction, and almost every road and pathway shows a foundation of brickwork beneath it—the paved roads of the old city” (Wallace 1869: 111). The Dutch preachers, Wolter R. Baron van Hoëvell (1812-79) and Stephaan A. Buddingh (1811-69), also visited Trowulan in 1847 and 1853 respectively. The two clergymen witnessed the early demolition process of the extant Majapahit remains of the former royal city, their medieval bricks being re-used for the construction of sugar factories and the paving of roads (Van Hoëvell 1849, 1: 173; Buddingh 1859, 1: 320). In his critical review of the naturalist’s travelogue some six decades later, Stutterheim (1927: 195), rightly notes that Wallace saw little more of Trowulan than the split gate of Wringin Lawang. The British explorer’s reference to ‘medieval brick-laid roads’ is a pure invention. What Wallace saw were not ‘the paved roads of the old city’, but the recently laid 19th-century roads that had been paved for convenience and economy with medieval bricks.

the English language as ‘durbar’.⁴⁰

In the Old Javanese *Nāgarakṛtāgama* 8.3, 63.4b, 64.1, Prapañca’s references to the durbar show strong influences from Sanskrit texts. For the designation of durbar, the Buddhist author employs the Sanskrit word *sabhā*, its Old Javanese derivation *pasabhān* (literally, ‘the place of the *sabhā*’), and the Old Javanese word *wanguntur*, which, in later texts, is often rendered in its nasalized form as *manguntur*. Prapañca also informs us that “the king is blessed, appearing in the durbar (*wanguntur*)” (Stutterheim 1948: 31).⁴¹ This explains the etymology of two other Old Javanese designations for the durbar, *pangastryan* and *pangastryanan*, which literally translate as ‘the place where the blessing or consecration of the king takes place’.⁴² Regarding the design of the royal space in front of the palace, the 13th-century Old Javanese poem *Sumanasāntaka* (circa 1204) states: “The form of the durbar (*pangastryanan*) is a geometrical square”.⁴³ Another Old Javanese designation for the durbar is *watangan* (literally, ‘sentry posts’) referring to the soldiers stationed with their pikes or lances (*watang*) along the perimeter of the external courtyard (cf. Stutterheim 1948: 35-6, 67). Stutterheim (1948: 30-47) rightly argues that the function and design of the present-day northern *siti inggil* in the Central Javanese courts of Yogyakarta and Surakarta evolved from the Majapahit durbar. From the West Javanese pilgrim Bujangga Manik’s account, we learn that the Majapahit durbar (*manguntur*) was still extant when he visited the royal city at the end of the 15th century (Noorduyn and Teeuw 2006: 258). The Balinese authors of the *Kidung Pamañcangah* were still able to site the Majapahit durbar (*pangastryan*) in the Trowulan landscape at the beginning of the 18th century (Gomperts, Haag and Carey 2010: 13, Fig.3, no. 4; Gomperts 2011: 64-6, 69 no. 3). Even as late as the 1870s, Trowulan oral tradition continued to maintain this siting of the Majapahit *paseban* or ‘audience hall’, as can be seen in Dutch geographer, Pieter J. Veth’s, Java monograph (1878: 140; cf. 1896: 211-2). Veth’s source for this information appears to have been Jacob A.B. Wiselius (1844-88), a Javanese-speaking member of the Indies colonial administration, who visited the Trowulan remains and collected ‘a treasure of data’ about the site of the Majapahit

⁴⁰ As the Modern Javanese *siti inggil* does not appeal to the proper architectural impression of the medieval Javanese exterior courtyard *sabhā* (Figure 14), we decided, following Pigeaud (1963, 5: 280), to use the English word ‘durbar’ in its original Indian meaning instead (cf. Yule and Burnell 1903: 331).

⁴¹ *Nāgarakṛtāgama* 84.7b (O.J.): *nṛpati [h]inastryan mijil i wanguntur* (Stutterheim 1948: 31; Zoetmulder 1982, 1: 147).

⁴² The Old Javanese *angastryani* denotes “to bless (strengthen a person’s *śakti* [spiritual power] by means of ritual acts, prayers, *mantras*, etc.)” (Zoetmulder (1982, 1: 147).

⁴³ *Sumanasāntaka* 20.1b (O.J.): *tingkah ikang pangastryanan amarpāt...* (Zoetmulder 1982, 1: 147; Worsley et al. 2013: 116, footnote Q). Compare *Smaradahana* (c. 1182-5) 1.20a (O.J.): *parpāt ning watangan...* (Zoetmulder 1982, 2: 1316).

court capital in the early 1870s (Veth 1896: 207).⁴⁴ Prapañca's references to the Majapahit durbar are so detailed that we can reconstruct the durbar site with great veracity. We will first discuss the siting of the durbar and then describe its layout.

For several reasons, we envisage the Majapahit durbar some 100 metres further to the east - southeast of Stutterheim's siting (Gomperts, Haag and Carey 2008b: 415 Fig. 2 no. 10). In his description in *Nāgarakṛtāgama* 8.5a, Prapañca enters the royal palace. Before passing through the gate (#16) of the courtyard (#14) with the west-oriented lane (#15), the author states that he is situated to the south of the durbar (*wanguntur*). So, standing in the entrance courtyard (#17), the durbar is situated to the north of the watchtower (*panggung*, #12) (see Figure 6). On the 1879 ordnance map, a hedge appears some 200 metres to the north of the Panggung Islamic shrine, where the watchtower (*panggung*, #12) once stood (Figure 5). This was before the area became inhabited again at the end of the 19th century, as shown on the 1892 ordnance map. Measuring some 130 metres in length in an east-west axial direction, such a hedge points to the existence of – what in Javanese is called – a *punden* or sacred spot (Figure 5). At the time of the survey of the 1879 ordnance map in 1871-2, this hedge was the only significant topographic feature standing in the area where, according to Wiselius' information, Trowulan oral tradition situated thirty stone dies at the spot of the Majapahit *paseban* or 'audience hall' in the early 1870s (Figure 5).⁴⁵ At the same

⁴⁴ Despite Veth's explicit references (1878: 136 n. 1; 1896: 196-7 n.1, 207 n. 1), we were unable to trace the 'Wiselius MS' in the 1875-88 Wiselius-Veth correspondence (BPL 1756) in the Leiden University Library western manuscript collection.

⁴⁵ Based on a careful reading of Domis (1834: 90), Van Hoëvell (1849, 1: 181) and Verbeek (1890: 11 no. 10, Map), we interpret Veth's understanding of Wiselius' manuscript (1878: 136 n. 1, 140; 1896: 196-7 n.1, 207 n. 1, 211-2) as follows: In an open space somewhere between the southwestern end of the Balong Dowo pond (corresponding to WGS84, UTM, zone 49M coordinates 652341 ±10 mE, 9163857 ±10 mN) and the area to the east of the Panggung shrine (corresponding to coordinates 652238 ± 32 mE, 9163411 ± 5 mN) in 1847, thirty stone dies were arranged in three rows, spaced twelve feet apart. According to Wiselius' testimony of local tradition in the early 1870s, the thirty stone dies once supported the pillars and the roof of the Majapahit *paseban* or 'audience hall', which were reused for the construction of the Dêmak mosque. Note that the 3×10-pillared structure also is found in the traditional Balinese long-house (*bale lantang*) where it appears in temple yards and/or is used for communal gatherings (Wijaya 2002: 19 Pl. H, 135 Pl. F). At some point between 1847 and 1887, namely between the visits of Van Hoëvell and Verbeek, the thirty stone dies were relocated to the area to the east of Panggung along the path leading to this Islamic shrine, where Domis also saw stone dies in the early 1830s. This corresponds with the three-row situation shown on Maclaine Pont and Kromodjojo Adinëgoro's 1924 map (Figure 2). Since this second site of the stone dies coincides exactly with the northern palace walls (Figure 4), it could not have been the place of the Majapahit durbar. At this selfsame spot, the Pëndopo Agung was erected during the last months of 1966. Referring to the 1966 situation, Wibowo (1980: 6-7) believed that twenty-six stones were arranged in an area measuring seventy-five metres east-west by ten metres [north-south] with a[n easterly] deviation of 10°, each east-west row counting ten stones spaced at intervals of 7.5 m. However, the archaeologist himself was not convinced of the correctness of the survey of his fieldworkers and rightly so (cf. Wibowo 1980: 10, 'Apabila...

place, Maclaine Pont mapped important brick remains on his 1926 map (Figure 3, no. 11). In our estimation, the hedge in all probability demarcated the site where the Majapahit *paseban* or ‘audience hall’ probably once stood, that is the area of the durbar (Figure 6, #3). This is corroborated by further relevant evidence relating to the presence of the nearby royal elephant pillars.

In Indian culture and throughout Indianized Southeast Asia, elephants are important symbols of kingship. Elephant stables are thus an essential aspect of court architecture, as narrated in the Sanskrit *Mahābhārata* and *Rāmāyaṇa* epics (De Cock 1899: 113). The elephants were chained by their feet to a post or pillar, called *ālāna*. The Sanskrit term and its proper function is attested in the Old Javanese *Rāmāyaṇa Kakawin* 11.2c (Zoetmulder 1982, 1: 43), which can be dated to as early as circa AD 905-930. In Java, the importance of the royal elephants near the durbar becomes apparent from a drawing in Admiral Jacob Cornelisz. van Neck (1564–1638) and Rear Admiral Wybrant van Warwijck’s (1566/1570-1615) logbook of the Second Dutch Navigation to the Archipelago (1598-1602). This shows the King of Tuban seated in royal council in the durbar flanked by thirteen royal elephants with their feet chained to their posts, as the merchants of the Dutch East Indies Company (VOC) appear in audience before him on Sunday, 24 January 1599 (Figure 16).

In conjunction with the elephant stables, the Sanskrit *Mahābhārata* and *Rāmāyaṇa* epics also mention the horse stables (De Cock 1899: 113). Referring to the area in front of the Majapahit royal palace, the poet Tantular describes the stables of the elephants and the horses in proximity of the durbar (*wanguntur*) in the following passage from the *Arjunawijaya*:

It is crowded with heroic troops [and] brave warriors. There are very vigorous
ensigns (*taṇḍa*) in command [of them]. The high rising stables of elephants
(*pagajahan*) and horses (*paturagan*) are also close by. (after Supomo 1977,
2: 187)⁴⁶

Prapañca does not refer to the elephant stables, but we do possess tangible archaeological evidence which concords with Tantular’s poem. On site, there are

benar’ [‘If... correct’]). If the total length of ten stones standing in a row amounts to seventy-five metres, they must be spaced at intervals of 75 m / (10-1) = 8.3 metres, not 7.5 meters. Correcting Wibowo (1980: 6-7), the guard of the Pëndopo Agung complex declared to us that in 1966 most of the stone dies were irregularly scattered over an area of some twenty-five metres by twenty-five metres. (Personal communication, Bp. Muntholip, 4 April 2014)

⁴⁶ In continuation of the stanza 3.3—*wanguntur... ngkânê dalêm... yaśa panangkilan... watangan...* which all refer to the space of the durbar (cf. *Nāgarakṛtāgama* 8.3a-b, Stutterheim 1948: 30-47, 124-5 Map III nos. 10-13)—the *Arjunawijaya* 3.4b-c verses (O.J.): *sök dening aśura-bala wīra-yodha hana taṇḍa subala pamukha/ mwan tang pagajahan aruhur wangunya juga len paturagan apēḍēk* (Supomo 1977, 1: 97).

two stone pillars, situated respectively some fifty-five and 115 metres to the east of the Panggung shrine (#13), to which, according to oral tradition, the feet of the royal elephants were tied (Verbeek 1890: 11-12). The western elephant's pillar still exists (see Figure 15). A part of the eastern one is buried below the surface, its position pinpointed to us by the guardsman of the Pëndopo Agung complex.⁴⁷ So, with reference to the excavated brick remains of the northern palace walls marked on both Maclaine Pont's 1926 map and Vistarini's 1931 excavation plan, and the positions of the two elephant's chaining posts on site, we estimate that they were situated some three to five metres to the north of the northern palace walls and some eighty metres to the south of the southern side of the durbar (Figure 6, #13).

Regarding the layout of the durbar, Prapañca (8.3) goes on: "The durbar (*wanguntur*) is wide and spacious, the sentry posts (*watangan*, #3) arranged at the four cardinal directions".⁴⁸ The open royal pavilion (*witāna*, #4) houses the throne (*singhāsana*) in the centre of the durbar.⁴⁹ Located to the north of the royal pavilion, the religious officials (*bhūjangga*) and counsellors (*mantri*) are seated in assembly in the audience-waiting pavilion (*weśma panangkilan*, #5), respectfully waiting for the king. Situated to the east of the royal pavilion, the Śivaite and Buddhist clergy are seated (#6), probably on the ground, holding their disputations and purificatory ceremonies during solar and lunar eclipses (*grahaṇa*) which occurred in the month *Phalguna* (Robson 1995: 29) (see Figure 6). In the *Arjunawijaya* 3.3d-3.4a, the open royal pavilion is called *bwat mantēn* and is roofed with palm fibres (*hēduk*). Elsewhere in *Nāgarakṛtāgama* 63.1-64.2, Prapañca describes the Buddhist *śrāddha* ceremony commemorating the twelfth year of the decease of Rājapatnī, King Hayam Wuruk's maternal grandmother. This took place at the auspicious moment of sunrise on the first day of the waxing fortnight in the month Bhādrapada in the Śaka year 1284 or Monday, 22 August 1362 (Robson 1995: 129-30). Here, the author gives a more detailed account of the royal pavilion:

⁴⁷ In the early 1830s, Domis (1834: 90) saw this area of the former elephant stables. In 1887, Verbeek (1890: 12, cf. Map) pointed out the existence of two elephant poles in this selfsame spot. The guard of the Pëndopo Agung complex declared that there were two elephant pillars (Figure 6, #13). During the construction of the Pëndopo Agung in 1966, they attempted to remove the eastern elephant pole, but the pillar snapped. The lower part was left buried *in situ*. The upper part of the elephant pole was moved together with ten stone dies to the south of the Pëndopo Agung. (Personal communications, Bp. Muntholip, 19 May 2006, 26 December 2006, and 4 April 2014) In 1973, Wibowo reported the existence of two elephant poles (1973: 29), but his 1980 reference to the existence of 'three' elephant pillars and his forceful speculation to the existence of a fourth 'south-western' one amounts to fiction (cf. Wibowo 1980: 6).

⁴⁸ *Nāgarakṛtāgama* 8.3a (O.J.): *alwāgimbar ikang wanguntur a[ñ]atur-ddiś i watangan...* (Stutterheim 1948: 30; Zoetmulder 1982, 1: 315).

⁴⁹ *Nāgarakṛtāgama* (O.J.): 8.3a *wanguntur... ika witāna ri tēngah*; 63.4b *sthāna singhēng wanguntur* (Pigeaud 1960, 1: 7, 48).

When the auspicious time arrived, the irreproachable durbar (*sabhā*) had already been put in good order. There, at the centre, the splendid open pavilion (*witāna*) was adorned like a lofty towering structure with stairs (*prisaḍi*). [Its] stone platform was unique, [furnished] with beautiful red-dyed pillars of stone and decorated with a roof. It was [a] majestic [scene] as the people took [their] places in front of the quite wonderful throne (*singhāsana*). (after Kern 1918, 8: 48; and Robson 1995: 70)⁵⁰

For the *śrāddha* ceremony, temporary structures were set up in the durbar. Prapañca (64.2) relates that an open pavilion (*maṇḍapa*) was erected for the princes to the west of the royal pavilion (Stutterheim 1948: 32 n. 83). On the southern side of the durbar, bamboo awnings (*taratag*) were set up for the servants. Prapañca (64.2b) also tells us that, on the northern side of the durbar, there were rows of bamboo awnings (*taratag*), “going along [the side] to the east and rising [like] terraces at the rear” (after Robson 1995: 70). In this case, we envisage bamboo stands floored and roofed with woven bamboo, like tribunals, along the northern and north-eastern perimeter of the durbar. In a similar scene in Vālmīki’s *Rāmāyaṇa*, Daśaratha sits on a throne in a *prāsāda*, which is a towering construction with stairs (De Cock 1899: 79-80). So Pigeaud (1960, 3: 73) rightly translates *prisaḍi* as a towering structure. In this case, we imagine a mounted throne as in 19th-century Bali (cf. Zoetmulder 1982, 1: 262, 2: 1424, 2314). We cannot concur with Stutterheim (1948: 32 n. 83), who states that King Hayam Wuruk sat on his throne in *witāna* (#4), oriented towards the west. Javanese kings always face north when they are seated in the northern *siti inggil*, just as in the illustration of the King of Tuban’s audience with the VOC merchants in 1599 (Figure 16). In our view, the Majapahit kings also faced north looking both towards those who were waiting for royal audience in the eponymous pavilion (*weśma panangkilan*, #5) and towards the stands on the durbar’s northern perimeter.

In Prapañca’s text (66.4), the queen dances in the Royal Pavilion (*witāna*, #4) in spatial reference to the *pasabhān*. In the durbar, poetry is read (94.1a-b). The Majapahit text on state protocol, *Nawanāṭya*, mentions that the “prime minister... has the privilege of entering the durbar mounted on a chariot” (Pigeaud 1960, 3: 120-121).⁵¹ Hence, we conclude that the spatial function and the court protocols relating to the 14th-century Majapahit durbar were inspired by the Sanskrit *Mahābhārata* and *Rāmāyaṇa* epics (cf. De Cock 1899: 101-107). Finally, we

⁵⁰ *Nāgarakṛtāgama* 64.1 (O.J.): *ndah prāptang śubha-k[ā]la sāmpun atitah tēkang sabhānindita/ ngkāne madhya witāna śobhita rinēngga lwir prisady āruhur/ tunggal tang mabatur śilā-saka rinaktārji[ā]wuwunghinyasan/sa-śryāpanpaḍa munggwisanmukha nikang singhāsanātyādbhutā//* (Kern 1919: 151-2; Pigeaud 1960, 1: 48).

⁵¹ *Nawanāṭya* 3b-4b (O.J.) *mantri mūkyā... wēnang wahāna munggwing pangāstryan* (Pigeaud 1960, 1: 81-82).

noticed during our field walks in December 2008 that the soils in the southern area of the durbar had been removed to depths of four metres and a medieval brick-walled well in the south-western corner had vanished. Anticipating future archaeological excavations of the Majapahit durbar, we suggest that only the soils of its northern part might reveal structures and artefacts.

The temple complex (*brahmasthāna*)

Prapañca (8.4) continues his description with an account of a separate external courtyard (*natar*) housing the temple complex situated adjacent to the east of the durbar. In opposition to Krom's schematic plan (cf. Kern 1919: 254), Stutterheim (1948: 48, 124-5, Map III no. 14) erroneously sites it some 700 metres to the north-east of the durbar. In the entire corpus of Old Javanese literature, only the *Kidung Harṣawijaya* provides us with another spatial reference to this important religious space:

According to the prescribed rites, the king's consecration ceremony is held to the east of the durbar (*pangastryan*) at the shrine(s) (*pangasthūlan*).⁵²

Prapañca (8.5) describes three shrines (*pahoman*, literally 'offering places') standing in a row (*jajar*) from south to north. The southern shrine belongs to the Brahmins (*wipra*, #7), who probably performed the coronation rituals of the Majapahit kings, as found elsewhere in Southeast Asia (Witzel 1976: 4). The central shrine is Śivaite (#8), the state religion of the Majapahit kings, while the northern shrine with its three-tiered roof (*susun tiga*) is Buddhist (#9), the faith to which several of the Majapahit queens adhered. On the western side of the temple complex, the author describes a raised stone platform for offerings (*batur patawuran*, #10) which the princes attend during ceremonies. All these four religious constructions were located in an external courtyard (*natar*), probably demarcated by a surrounding hedge or low brick wall (Figure 6, #7-#10). In accordance with Prapañca's description (83.6), these are the places where the fire oblations (*homa*) and the Vedic offerings (*brahmayajña*) probably take place. In the early 12th-century Old Javanese poem *Sumanasāntaka* 111.7a and 111.11c, Monagaṇa's references to the offering place (*patawuran*) and the shrine(s) (*dewagrha*) probably correspond to the Majapahit stone offering platform (*batur patawuran*) and the three shrines (*pahoman*) respectively (cf. Worsely *et al.* 2013: 292). We know of no archaeological evidence of the siting of these shrines, but

⁵² *Kidung Harṣawijaya* 6.85b (O.J.): ... *sawidi-widhāna krama ning homa ambiṣeka prabhu ri pūrwa ning pangastryan tang pangasthūlan* (Berg 1931: 173). The Old Javanese *pangasthulan* literally translates 'the place where the deity descends and is worshipped' (Zoetmulder 1982, 2: 1825).

their position with respect to the durbar leads us to a spot near the north-eastern corner of the royal palace. Such shrines still exist in Bali where they are situated at the north-eastern corner of the outer walls of a residential compound (see Tjahjono 1998: 37 top; Davison *et al.* 2003: 13 bottom; Wijaya 2002: 30 Fig. 2.2B no. 2). The 13th-century East Javanese monument Caṇḍi Jawi shows two shrines with three-tiered roofs (Galestin 1936, 34, Plate I nos. 14-15). We include here a photograph of a shrine of the Pura Ulun temple on Lake Bratan in Bali, which has a three-tiered roof (Figure 17). Prapañca also gives another reference to this temple complex.

Brahmasthāna, literally ‘Brahma’s place’, is a fundamental concept in Indian architecture and town planning. In the *Mayamata* text, *brahmasthāna* refers to the centre of a temple, where a foundation deposit is ritually placed, or the centre of a settlement, where a pavilion for public assembly or an altar dedicated to Brahma is erected (cf. Dagens 1994, 1: lxxxvi Fig. 34, lxxxviii Fig. 35, 50, 64, 246; 2: 596, 952). In the Sanskrit text *Mānasāra* 12.142, *brahmasthāna* is described as ‘the central part of a village or town, where a public hall is built for the assemblage of the inhabitants’ (Acharya 1946, 7: 376). Citing Acharya (1946, 7: 438) on *Mānasāra* 40.156-157, ‘the *brahma-pīṭha* or royal chapel is installed in the *brahmasthāna* or central part’. Since Monier-Williams’ Sanskrit dictionary (1899: 740) lists *brahmasthāna* as ‘the mulberry tree’, Stutterheim (1948: 12, 17) and all other scholars of Old Javanese studies have interpreted *brahmasthāna* in Prapañca’s description (8.1c) as a tree. However, Robson (1995: 101) keenly observes that “there is no clear indication that it is a tree here”. In Prapañca’s description (8.1c), the Sanskrit *brahmasthāna* appears in conjunction with the Old Javanese *patani* denoting “a small building, often a mushroom-shaped pavilion for sheltering under” (Robson 1995: 101; Zoetmulder 1982, 2: 1319). The art historian Theodoor P. Galestin (1907-80) devotes an elaborate discussion to such mushroom-shaped pavilions, concluding that they represent shrines dedicated to gods or spirits (cf. Galestin 1936: 7-35, Plate I). The only other Old Javanese text, where the Sanskrit-derived word *brahmasthāna* appears, is the poem *Kṛṣṇakālāntaka*, indisputably alluding to a shrine: “a *brahmasthāna* in the shape of a *paryangan*”.⁵³ The Old Javanese word *paryangan* denotes a shrine or a sanctuary dedicated to a god or the spirits (cf. Zoetmulder 1982, 1: 659). Hence, in Prapañca’s description, the appearance of *brahmasthāna* in combination with *patani* unambiguously refers to a spiritual or religious edifice. Since these *brahmasthāna* shrines stand with the *buddhi* tree (#2) in a row (*jajar*), like the three Brahmin (#7), Śivaite (#8), and Buddhist (#9) *pahoman* shrines, and are also situated near the conceptual centre of the Majapahit court town – that is the *catuspatha* or central crossroads (#1) – we conclude that Prapañca employs *brahmasthāna* (8.1c) as a synonym of

⁵³ *Kṛṣṇakālāntaka* 31.1 (O.J.): *brahmasthāna winimba paryangan ika* (Zoetmulder 1982, 1: 257).

pahoman ('offering place, shrine'). Finally, we consulted the online version of the Critical Edition of the Sanskrit epics and found that the word *brahmasthāna* does not appear as an architectural term for temple or shrine in either the *Mahābhārata* or Vālmīki's *Rāmāyaṇa* (cf. Tokunaga 1996). Hence, we conclude that Prapañca's use of the technical term *brahmasthāna* points to the influence of Sanskrit texts such as the *Mānasāra* and the *Mayamata* on urban architecture and town planning.

Conclusion

Prapañca's account of the five courtyards (Figure 6, #14, #17, #19, #21 and #26) accords with the layout of the inner palace walls marked on Vistarini's 1931 plan and Maclaine Pont's 1926 map. Four toponyms – Panggung, Kēḍaton, Siti Inggil and Wringin Puṭul – accord with Prapañca and Tantular's descriptions. Five topographic features – the dirt road or trail (#15) in the north-eastern courtyard (#14), the terracing in two other courtyards (#19, #21), the levelness of Abode Beyond Compare's courtyard (#26), the central crossroads (#1), and the hedge marking the area of the durbar (#3) – also accord with the author's narrative. The three extant archaeological remains of Batu Umpak-Umpak, Siti Inggil/Canḍi Kēḍaton and the two elephant-chaining pillars near the Panggung Islamic shrine are identified with the Amazing Pavilion (#29), the north-eastern pavilion in the Abode Beyond Compare (#30), and the two elephant stables (#13) respectively. The appearance of the tank in the north-western corner of the *antahpura* is in line with descriptions of the streams and pleasure gardens inside royal palaces in a number of Old Javanese texts. The excavated Chinese coins and ceramics predominantly date to the 14th and 15th centuries. Hence, Prapañca's spatially related description matches precisely the site of the 14th-century Majapahit royal palace at Kēḍaton. Since the Buddhist author's description only covers some forty per cent of our reconstruction of the total area of the royal palace, we can surmise that the other sixty per cent must have been reserved for members of the Majapahit royal family and the ruler's secondary wives and his close female retainers. In comparison with Stutterheim's plan (1948: 124-5, Map III; Gomperts, Haag and Carey 2008b: 415, Fig. 2), our reconstruction reduces the total area of the royal palace by some forty per cent. In our mapping, the outer palace walls enclose an area of just 0.41 square kilometres, providing a living space for some 400-700 inhabitants.

Three remarkable individuals played decisive roles in the identification of Prapañca's description of the Majapahit royal palace site, namely the initiator Van Stein Callenfels, the excavator Vistarini and the exegetist Stutterheim. It was Van Stein Callenfels who, inspired by Krom's schematic mapping (Kern 1919: 254; Krom 1920, 2: 111) and taking advantage of Bosch's fortuitous furlough absence (May 1928-August 1929), pushed for Vistarini's excavations in the face of Maclaine Pont's pseudo-archaeological views. And it was Stutterheim

(1948) who added spatial and architectural context to Prapañca's description. Without his contribution, the Buddhist author's description would have remained an uncorrelated string of Old Javanese words in Dutch and English translation.



Figure 18. A 1947 photograph of the Austrian architectural engineer and gentleman archaeologist, Bruno A.G. Nobile de Vistarini (1891-1971), taken after his post-war return to his native Austria. Copyright and courtesy of the Inneres Landesarchiv, Graz.

Although we may have been able to improve on the chief archaeologist's reconstructive mapping of the 14th-century Majapahit royal palace by projecting Vistarini's 1931 excavation plan onto satellite imagery, we still consider Stutterheim's interpretation of Prapañca's account a masterpiece of text-based archaeology. Of this remarkable trio, however, Bruno Nobile de Vistarini must take pride of place. His excavation plan is the most professional archaeological mapping of the Majapahit-Trowulan site surviving from the pre-1942 colonial period (Figure 6). This modest, and hitherto unknown, Austrian architectural engineer will go down in history as the gentleman archaeologist who excavated the Majapahit palace walls (Figure 18).

After a century of *Nāgarakṛtāgama* studies, we found that Prapañca's text still contains a few surprises. The language of the architectural layout of the Majapahit royal palace is strongly reminiscent of the Sanskrit *Mahābhārata* and *Rāmāyaṇa* epics. The influence of the Sanskrit texts on Majapahit court architecture goes much further than the idea of an imported subcontinental blueprint for a royal palace. Prapañca's account of the Majapahit *pura* testifies to a Javanese elite living in the court architecture of the *Mahābhārata* and *Rāmāyaṇa*.

Selected cartographic sources

J.W.B. Wardenaar's 1815 *Plan of Majapahit*, scale 1: 10,800. Drake Collection, British Museum, London, registration number: 1939, 0311, 0.5.36. Viewable online at the website of the British Museum.

1879 Ordnance maps of the Surabaya regency (*Kaart van de Residentie Soerabaja*), surveyed in the Bonne projection in 1871-2, scale 1: 20,000, sheets F.XIII and F.XIV. Batavia: Topographisch Bureau van den Generalen Staf. Amsterdam University Library.

R.D.M. Verbeek's 1890 *Map of the Majapahit Antiquities in the Mojokerto and Jombang Regencies* (Dutch, *Gedeelte der afdeelingen Madjakerta en Djom-*

- bang, residentie Soerabaja, waar zich de oudheden van Madjapahit bevinden*), scale 100,000. Published in Verbeek (1890).
- 1892 Ordnance maps (second edition of the 1879 ordnance maps). Collection Perpustakaan Nasional Republik Indonesia, Jakarta.
- 1918 TDNI topographic map *Java, Res[identie] Soerabaja*, no. LVIII D, Mercator projection, scale 1: 50,000. Batavia: Topographische Inrichting. Collection KIT, Leiden University Library.
- N.J. Krom's 1919 reconstructive schematic plan. Published in Kern (1919: 254).
- Maclaine Pont and Kromodjojo Adinēgoro's 1924 *Map of the Majapahit Terrain* (Dutch, *Emplacement van Majapahit*), scale 1: 25,000. Published in Maclaine Pont (1924: 6; 1925).
- 1925 TDNI topographic map *Java, Res[identie] Soerabaja*, no. XLI-53 D, Mercator projection, scale 1: 50,000. Weltevreden: Topografische Dienst. Collection KIT, Leiden University Library.
- H. Maclaine Pont's 1926 *Map of Majapahit Archaeological Remains* (Dutch, *Majapahitsche restantenkaart*), scale of approx. 1: 50,000. Published in Maclaine Pont (1926).
- B. Vistarini's 1931 excavation plan of the northern and central part of the site of the vanished royal palace, scale of approx. 1: 6,000. Published in Vistarini (1931: 31).
- 1941 TDNI topographic map *Modjoangoeng*, no. 53/XLI-D, Mercator projection, scale 1: 50,000. Batavia: Topografische Dienst in Nederlandsch-Indië (TDNI). Collection KIT, Leiden University Library.
- W.F. Stutterheim's July 1941 reconstructive mapping of Majapahit. Published in Stutterheim (1948: 124-5, Map III).
- Bakosurtanal 1983 plan, *Trowulan: A Reconstruction of the Capital of the Majapahit Kingdom* (Bahasa Indonesia, *Trowulan: Rekonstruksi Ibukota Kerajaan Majapahit*), consisting of an archaeological mapping projected onto a 1973 KLM Aerocarto aerial image (scale 1: 25,000) published by the Indonesian National Survey as a special map edition. Cibinong: Bakosurtanal.

References

- Acharya, Diwakar. 2009. *The Little Clay Cart by Śūdraka*. The Clay Sanskrit Library. New York University and JJC Foundation.
- Acharya, Prasanna Kumar. 1927-46. *Mānasāra Series*. Vol. 1: *A Dictionary of Hindu Architecture* (1927). Vol. 2: *Indian Architecture according to Mānasāra Śilpāśāstra* (1927). Vol. 3: *Mānasāra, Sanskrit Text with Critical Notes* (1934). Vol. 4: *Architecture of Mānasāra, Translation in English* (1934). Vol. 5:

- Architecture of Mānasāra, Plates* (1934). Vol. 6: *Hindu Architecture in India and Abroad* (1946). Vol. 7: *An Encyclopaedia of Hindu Architecture* (1946). London: Oxford University Press.
- Arifin, Karina, and R. Cecep Eka Permana (eds.). [2011]. *Laporan Penelitian Arkeologi Terpadu Indonesia I (PATI-I 2008)*. Depok: Fakultas Ilmu Pengetahuan Budaya, Universitas Indonesia/Orchid Media Creasindo.
- Baker, Chris. 2013 'The Grand Palace in the Description of Ayutthaya: Translation and Commentary', *Journal of the Siam Society* 101: 69-112.
- Berg, C.C. 1929. *Kidung Pamañcangah: de geschiedenis van het rijk van Gelgel*. Kirtya Lieferinck-van der Tuuk, Javaansch Balische Historische Geschriften 1. Santpoort: Mees.
- _____. 1931. 'Een nieuwe redactie van den roman van Raden Wijaya/Kidung Harṣa-Wijaya: Middel-Javaansche historische roman', *Bijdragen tot de Taal-, Land- en Volkenkunde* 88: 1-238.
- Bernet Kempers, A.J. 1949. [Summary of Willems' excavations of the Siti Inggil earthwork/Canḍi Kēḍaton in 1941], *Oudheidkundig Verslag* 1941-1947.
- _____. 1978. *Herstel in eigen waarde: Monumentenzorg in Indonesië*. Zutphen: Walburg Pers.
- [Borghart, M.]. 1929. Newspaper article 'Modjokerto', *Soerabajasch Handelsblad*, 13 May 1929, p. 13, cols. 5-6, http://resources3.kb.nl/011105000/pdf/DDD_011107969.pdf
- Bosch, F.D.K. 1930. 'Onderzoek Majapahit en verzameling te Trawoelan', *Oudheidkundig Verslag* 1929, 3-4: 133-4.
- _____. 1931/32. 'De Oudheidkundige Dienst', *Indisch verslag 1931: I. Tekst van het verslag van bestuur en staat van Nederlandsch-Indië over het jaar 1930*, pp.317-9. 's-Gravenhage: Algemeene Landsdrukkerij.
- Buddingh, S.A. 1859-1861. *Neêrlands-Oost-Indië: Reizen over Java... gedurende het tijdvak van 1852-1857*. 3 vols.. Rotterdam: Wijt.
- Carey, Peter B.R. 2007. *The Power of Prophecy: Prince Dipanagara and the End of an Old Order in Java, 1755-1855*. Verhandelingen van het Koninklijk Instituut voor Taal-, Land- en Volkenkunde 249. 1st ed. Leiden: KITLV Press.
- Cock, Jan K. de. 1899. *Eene Oudindische stad volgens het Epos*. Groningen: Noordhoff.
- Crowder, David A. 2007. *Google Earth for Dummies*. Hoboken, NJ: Wiley.
- Dagens, Bruno. 1994. *Mayamatam: Treatise of Housing, Architecture and Iconography*. 2nd ed., 2 vols. Kalāmūlaśāstra series 14 & 15. 2007 reprint. New Delhi: Indira Gandhi National Centre for the Arts & Motilal Banarsidass.
- Darmoyuwono, Kardono et al. 1981. *Penerapan Teknik Penginderaan Jauh untuk Inventarisasi dan Pemetaan Peninggalan Purbakala Daerah Trowulan Kabu-*

- paten Mojokerta, Jawa Timur*. In collaboration with Badan Koordinasi Survey dan Pemetaan Nasional (Bakosurtanal), Direktorat Sejarah dan Purbakala, Direktorat Jenderal Kebudayaan Departemen Pendidikan dan Kebudayaan, Universitas Gadjah Mada (UGM), Institut Teknologi Bandung (ITB) and Lembaga Penerbangan dan Antariksa Nasional (LAPAN). Cibinong: Bakosurtanal.
- Davison, Julian, Bruce Granquist, Mubinas Hanafi, Nengah Enu, and Luca Invernizzi Tettoni. 2003. *Introduction to Balinese Architecture*. Singapore: Periplus.
- Domis, H.J. 1834. 'Bijzonderheden betreffende Sourabaya en Madura', *De Oost-erling (Tijdschrift bij uitsluiting toegewijd aan de verbreiding der kennis van Oost-Indië)* 2: 88-126. Kampen: Van Hulst.
- Eastmead, Stephen. 2012. *Landscape Surveying using Handheld GPS Receivers*. Swaledale and Arkengarthdale Archaeology Group.
- Fagan, Garrett G. 2006. 'Diagnosing Pseudoarchaeology', in *Archaeological Fantasies: How Pseudoarchaeology Misrepresents the Past and Misleads the Public*. Edited by Garrett G. Fagan, pp. 23-46. Abingdon/New York: Routledge.
- Flemming, N.C. 2006. 'The Attraction of Non-Rational Archaeological Hypotheses', in *Archaeological Fantasies: How Pseudoarchaeology Misrepresents the Past and Misleads the Public*. Edited by Garrett G. Fagan, pp. 47-70. Abingdon/New York: Routledge.
- Galestin, Theodoor Paul. 1936. *Houtbouw op Oost-Javaansche tempelreliëfs*. Doctorate thesis, University of Leiden. 's-Gravenhage: privately published.
- Gent, Lambertus F. van. 1916. 'Aardrijkskundige benamingen in Midden- en Oost-Java', *Jaarverslag van den Topographischen Dienst in Nederlandsch-Indië* 1915, 11: 176-212.
- Glowacki, Julius. 1909. *Jahresbericht des k.k. Staats-Gymnasiums in Marburg a.D. veröffentlicht von der Direktion am Schlusse des Studienjahres 1909*. Marburg a.D.: Mostböck. Available at www.archive.org.
- Gomperts, Amrit. 2011. 'More on the Archaeological Mapping of the Fourteenth-century Royal City of Majapahit based on a Balinese description in the Kidung Pamañcangah', in: ManjuShree (ed.), *From Beyond the Eastern Horizon: Essays in Honour of Professor Lokesh Chandra*, pp. 63-73. Śata-piṭaka Series 638. New Delhi: Aditya Prakasahan.
- Gomperts, Amrit, Arnoud Haag, and Peter Carey. 2008a. 'De veertiende-eeuwse Javaanse hofstad Majapahit alsnog op de kaart gezet', *Caert-Thresoor* 27, 3: 71-8.
- _____. 2008b. 'Stutterheim's Enigma: The Mystery of His Mapping of the Majapahit Kraton at Trowulan in 1941', *Bijdragen tot de Taal-, Land- en Volkenkunde* 164, 4: 411-30.
- _____. 2010. 'Rediscovering the Royal Capital of Majapahit', *Newsletter of the International Institute for Asian Studies (IIAS)* 53: 12-13.

- _____. 2011. 'Maclaine Pont and the Discovery of Bharada's Hermitage', *Newsletter of the International Institute for Asian Studies (IIAS)* 58: 4-5.
- _____. 2012a. 'Mapping Majapahit: Wardenaar's Archaeological Survey at Trowulan in 1815', *Indonesia* 93: 177-196.
- _____. 2012b. 'The Sage who Divided Java in 1052: Maclaine Pont's Excavation of Mpu Bharada's Hermitage-Cemetery at Lĕmah Tulis in 1925', *Bijdragen tot de Taal-, Land- en Volkenkunde* 168, 1: 1-25.
- Hoëvell, W.R. van. 1849-1854. *Reis over Java, Madura en Bali in het midden van 1847*. 3 vols.. Amsterdam: Van Kampen.
- Hoskins, W.G. 1985. *The Making of the English Landscape*. Reprint of 1955 edition. London: Penguin.
- Kern, H. 1917-8. 'De Nāgarakṛtāgama: Oudjavaansch lofdicht op Koning Hayam Wuruk van Majapahit', in *Verspreide Geschriften* 1917, 7: 227-320; 1918, 8: 1-132. 's-Gravenhage: Nijhoff.
- _____. 1919. *Het Oud-Javaansche Lofdicht Nāgarakṛtāgama van Prapañca (1365 A.D.): Tekst, vertaling en bespreking*. With explanatory notes by N.J. Krom. Koninklijk Instituut voor Taal-, Land- en Volkenkunde. 's-Gravenhage: Nijhoff.
- Keuning, J. 1942. *De Tweede Schipvaart der Nederlanders naar Oost-Indië onder Jacob Cornelisz. van Neck en Wybrant Warwijck 1598-1600*. De Linschoten-Vereeniging, no. 46, vol. 3. The Hague: Nijhoff.
- Knaap, G.J., J.R. van Diessen, W. Leijnse, and M.P.B. Ziellemans. 2007. *Grote Atlas van de Verenigde Oost-Indische Compagnie/Comprehensive Atlas of the Dutch United East India Company, Volume II: Java en Madoera/Java and Madura*. Voorburg: Asia Maior.
- Knebel, J. 1909. *Rapporten van de Commissie in Nederlandsch-Indië voor Oudheidkundig Onderzoek op Java en Madoera, 1907*. Bataviaasch Genootschap van Kunsten en Wetenschappen. Batavia/The Hague: Albrecht/Nijhoff.
- Kosso, Peter. 2006. 'Introduction: The Epistemology of Archaeology', in *Archaeological Fantasies: How Pseudoarchaeology Misrepresents the Past and Misleads the Public*. Edited by Garrett G. Fagan, pp. 3-22. Abingdon/New York: Routledge.
- Krom, N.J. 1920, 1923. *Inleiding tot de Hindoe-Javaansche kunst*. 1st ed., 2 vols. Koninklijk Instituut voor Taal-, Land- en Volkenkunde. 's-Gravenhage: Nijhoff.
- _____. 1931. *Hindoe-Javaansche geschiedenis*. 2nd. ed. Koninklijk Instituut voor Taal-, Land- en Volkenkunde. 's-Gravenhage: Nijhoff.
- Maclaine Pont, Henri. 1924. *(Overzicht van de overwegingen welke geleid hebben tot de oprichting van de) Oudheidkundige Vereeniging "Majapahit" te Modjo-kerto*. Weltevreden: Albrecht.

- _____. 1925. 'Madjapahit, Posing tot Reconstructie van het Stadsplan, nagezocht op het terrein aan de hand van den Middeleeuwschen dichter: Prapanca', *Oudheidkundig Verslag* 1924, 1-2: 36-75 Appendix D, 3-4: 157-99 Appendix Q.
- _____. 1926. 'De historische rol van Majapahit: Een hypothese', *Djåwå* 6: 294-317.
- _____. 1927a. 'Eenige oudheidkundige gegevens omtrent den Middeleeuwschen bevoeiingstoestand van de zoogenaamde "woeste gronden van de lieden van Trik" voor zoover zij wellicht van belang zullen kunnen zijn voor eene herziening van den tegenwoordigen toestand', *Oudheidkundig Verslag* 1926, 1-2: 100-29 App. G.
- _____. 1927b. 'Inleiding tot het bezoek aan het emplacement en aan de bouwvallen van Majapahit', *Djåwå* 7: 171-174.
- _____. 1968-70. *De geschiedenis van Madjapahit: Deel II: Oudheidkundige verkenningen*. Unpublished typescript kept in the archives of the Nederlands Architectuurinstituut in Rotterdam (catalogue number MACL 76).
- _____. 1968-9. *De geschiedenis van Madjapahit: Deel III: Dewi Sri, twistappel der goden*. Unpublished typescript kept in the library of the Koninklijk Instituut voor Taal-, Land- en Volkenkunde in Leiden (catalogue number: M 2007 B 1384).
- Maclaine Pont, Henri, and Bruno Nobile de Vistarini. 1930. 'Oudheidkundige Vereeniging Majapahit', *Oudheidkundig Verslag* 1929: 144-55.
- Miksic, John. 2009. 'The King and the Ascetic in Indonesia', in *Lost Times and Untold Tales from the Malay World*, edited by Jan van der Putten and Mary Kilcline Cody, pp. 22-32. Singapore: NUS Press.
- Mills, J.V.G. 1970. *Ying-yai Sheng-lan. The Overall Survey of the Ocean Shores 1433 [by] Ma Huan*. 1997 reprint. Bangkok: White Lotus.
- Monier-Williams, Monier. 1899. *A Sanskrit-English Dictionary*. Oxford: Clarendon Press.
- Mulyana, Slamet. 1979. *Tafsir Sejarah Nagara Kretagama*. Jakarta: Bhratara Karya Aksara. (2nd edition, 2006, Yogyakarta: LKiS Pelangi Aksara).
- Noorduyn, J., and A. Teeuw. 2006. *Three Old Sundanese Poems*. Koninklijk Instituut voor Taal-, Land- en Volkenkunde, Bibliotheca Indonesica 29. Leiden: KITLV Press.
- Olivelle, Patrick. 2009. *Life of the Buddha by Āśvaghoṣa*. The Clay Sanskrit Library. New York University and JJC Foundation.
- Parcak, Sarah H. 2009. *Satellite Remote Sensing for Archaeology*. London and New York: Routledge.
- Pigeaud, Theodore G.Th. 1960-1963. *Java in the 14th Century: A Study in Cultural History. The Nāgara-kērtāgama by Rakawi Prapañca of Majapahit, 1365 A.D.*. 3rd ed. Illustrated with drawings by Professor Th. P. Galestin. Koninklijk Instituut voor Taal-, Land- en Volkenkunde, Translation Series 4, 1-5. The Hague: Martinus Nijhoff.

- Rees, W.G. 2005. *Physical Principles of Remote Sensing*. 2nd ed. Cambridge: Cambridge University Press.
- Renfrew, Colin. 2006. 'Foreword' to *Archaeological Fantasies: How Pseudo-archaeology Misrepresents the Past and Misleads the Public*. Edited by Garrett G. Fagan, pp. xii-xvi. Abingdon/New York: Routledge.
- Robson, Stuart O. 1995. *Deśawarnana (Nāgarakṛtāgama) by Mpu Prapañca*. Verhandelingen van het Koninklijk Instituut voor Taal-, Land- en Volkenkunde 169. Leiden: KITLV Press.
- _____. 2003. *The Kraton: Selected Essays on Javanese Courts*. Edited by Stuart Robson and translated by Rosemary Robson-McKillop. Koninklijk Instituut voor Taal-, Land- en Volkenkunde, Translation Series 28. Leiden: KITLV Press.
- Santoso, Soewito. 1975. *Sutasoma: A study in Javanese Wajrayana*. Śāta-piṭaka Series 213. New Delhi: International Academy of Indian Culture.
- Sartono, S., and Bandono. 1995. 'The Destruction of Majapahit from the Perspective of Geology', in John N. Miksic and Endang Sri Hardiati (eds.), *The Legacy of Majapahit*, pp. 43-53. Singapore: National Heritage Board.
- Stutterheim, W.F. 1927. 'Bericht over enkele oudheden in Oost-Java bij Wallace'. *Oudheidkundig Verslag* 1926: 195-7, Appendix L.
- _____. 1932. 'Oudheidkundige Aanteekeningen XVII-XX', *Bijdragen tot de Taal-, Land- en Volkenkunde* 89, 1: 97-116.
- _____. 1948. *De kraton van Majapahit*. Verhandelingen van het Koninklijk Instituut voor de Taal-, Land- en Volkenkunde van Nederlandsch-Indië 7. 's-Gravenhage: Nijhoff.
- Subagio, Habib and Aris Poniman. 2010. 'Pemanfaatan GIS untuk Rekonstruksi Kawasan Strategis Nasional Trowulan', *Globē Majalah Ilmiah* 12, 2, December 2010: 101-113.
- Supomo, Suryo. 1977. *Arjunawijaya: A Kakawin of Mpu Tantular*. Koninklijk Instituut voor Taal-, Land- en Volkenkunde, Bibliotheca Indonesia 14. 2 vols.. The Hague: Martinus Nijhoff.
- Teeuw, A., and S.O. Robson. 2005. *Bhomāntaka: The Death of Bhoma*. Koninklijk Instituut voor Taal-, Land-, en Volkenkunde, Bibliotheca Indonesica 32. Leiden: KITLV Press.
- Tjahjono, Gunawan (ed.). 1998. *Indonesian Heritage. Volume 6: Architecture*. Singapore: Archipelago Press.
- Tokunaga, Muneo. 1996. E-text versions of the Poona Critical Edition of the Sanskrit *Mahābhārata* and Vālmīki's *Rāmāyaṇa*. <http://www.cc.kyoto-su.ac.jp/~yanom/sanskrit/>
- Verbeek, Rogier D.M. 1890. 'De oudheden van Madjapahit in 1815 en in 1887',

- Tijdschrift voor Indische Taal-, Land- en Volkenkunde* 33: 1-15.
- _____. 1891 *Oudheden van Java: lijst der voornaamste overblijfselen uit den Hindoetijd op Java met eene oudheidkundige kaart*. Verhandelingen van het Bataviaasch Genootschap van Kunsten en Wetenschappen 46. Batavia/'s[-Graven]hage: Landsdrukkerij/Nijhoff.
- Veth, P.J. 1878. *Java: Geographisch, Ethnologisch, Historisch*. 1st ed., vol. 2. Haarlem: Bohn.
- _____. 1896. *Java: Geographisch, Ethnologisch, Historisch*. 2nd ed., vol. 1. Haarlem: Bohn.
- Vistarini, Bruno Nobile de. 1931. 'Oudheidkundige Vereeniging Majapahit', *Oudheidkundig Verslag van de Oudheidkundige Dienst in Nederlandsch-Indië* 1930: 29-34.
- Wallace, Alfred Russel. 1869. *The Malay Archipelago: The Land of the Orang-Utan, and the Bird of Paradise. A Narrative of Travel, with Sketches of Man and Nature*. New York: Harper.
- Wayman, Alex. 1983. 'Eschatology in Buddhism', *Studia Missionalia* 32: 71-94.
- Wibowo, Abu Sidik. 1973. *Petunjuk Singkat Peninggalan² Purbakala di Daerah Trowulan*. Modjokerto: Damai.
- _____. 1980. 'Kubur Panggung: Situs yang Memerlukan Penelitian Khusus', *Majalah Arkeologi* 3, 1-2 (Sep.-Nov. 1980): 2-34.
- Wijaya, Made. 2002. *Architecture of Bali: A Source Book of Traditional and Modern Forms*. Honolulu: University of Hawai'i Press.
- Witzel, Michael. 1976. 'On the History and the Present State of Vedic Tradition in Nepal', *Vasudha* 15, 12: 17-24, 35-39. <http://www.people.fas.harvard.edu/~witzel/Veda.in.Nepal.pdf>
- Worsley, Peter, S. Supomo, Thomas Hunter, and Margaret Fletcher. 2013. *Mpu Monaguna's Sumanasāntaka: An Old Javanese Epic Poem, its Indian Source and Balinese Illustrations*. Koninklijk Instituut voor Taal-, Land en Volkenkunde, Bibliotheca Indonesica 36. Leiden/Boston: Brill.
- Yule, Henry, and A.C. Burnell. 1903. *Hobson-Jobson: A Glossary of Colloquial Anglo-Indian Words and Phrases, and of Kindred Terms, Etymological, Historical, Geographical and Discursive*. Edited by William Crooke. London: Murray.
- Zoetmulder, P.J. 1982. *Old Javanese-English Dictionary*. With the collaboration of S. O. Robson. KITLV. The Hague: Nijhoff.
- _____. 1983. *De taal van het Adiparwa: Een grammaticale studie van het Oudjavaans*. 2nd ed. Koninklijk Instituut voor Taal-, Land- en Volkenkunde, Indonesische Herdrukken. Dordrecht: Foris Publications Holland/U.S.A.