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► To cite this version:

Aude Favereau, Bérénice Bellina. Late prehistoric ports in the Thai-Malay Peninsula: mapping regional and long distance connections through pottery. Miksic, John. Archaeological Sites on the Maritime Silk Road, National University of Singapore, In press. hal-03060081

HAL Id: hal-03060081

<https://hal.science/hal-03060081>

Submitted on 13 Dec 2020

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Late prehistoric ports in the Thai-Malay Peninsula: mapping regional and long distance connections through pottery

Aude Favereau & Bérénice Bellina

Introduction

Common tasks for archaeologists and historians working on maritime exchange consist of mapping networks, determining the goods and communities involved and, for the latter, what was their potential involvement in the local socio-economic landscape. The intensity of these exchange varied: some regions and people built close ties with others, some interacted and developed more than others. Whilst ethnographic studies show that groups' social and economic organization have an influence on their interactions, archaeology often works to explain the mode of transmission enabling cultural evolutions. However, if archaeologists observe that certain social structures are more favorable than others to evolution processes, it appears necessary to refer to actualist data to explain why (Roux 2019: 164-165; Stark *et al.* 2008). Trading ports are notoriously favorable places for interactions and cultural change (Casson 1989; Miksic 2000; Wang 1958; Wisseman Christie 1995). However, examining which groups are more prompt to interact with others and adapt their behavior is less often considered, incomplete archaeological data often limiting this level of interpretation. These issues are especially crucial when dealing with regions that acted as crossroads engaging multiple social groups. This is typically the case of the Thai-Malay Peninsula and its port-settlements which received and redistributed material and cultural goods both from the east and the west. The Thai-Malay Peninsula is a thin piece of land stretching from southern Thailand and Myanmar through mainland Malaysia to Singapore. Surrounded by water, the Peninsula has long played a significant role in maritime contacts. Already, by the middle of the 1st millennium BCE, recent archaeological research has demonstrated that populations in the area were actively taking part to long distance trans-Asiatic networks facilitating connections between communities from the South China Sea and from the Indian Ocean (Bellina *et al.* 2018; Bellina & Silapanth 2006; Bellina 2017; Bellina & Glover 2004; Gupta 2005; Silapanth 2018). The area later remained crucial for maritime contacts, cultural exchanges and trade (Allen 1991; Jacq-Hergoualc'h 1997; Miksic 2006; Miksic & Goh 2017; Mills 1997; Noonsuk 2014; Srisuchat 2003). The article focuses on some of the late prehistoric sites located in the narrowest part of the Peninsula, also known as the Isthmus of Kra¹ (fig. 1), occupied during the second half of the 1st millennium BCE up to the 1st centuries CE.

1 . The Isthmus of Kra encompasses the Chumphon and Ranong Provinces of Thailand. However, one of the site

Several archaeological sites in the Isthmus of Kra are known for that period: caves/rockshelters, many of which were used for mortuary purposes on one hand, and early port-settlements/open air sites on the other hand (Bellina *et al.* 2019; Chalosantisakun, Chelao & Sitthirit 2015). This article focuses on port settlements investigated by the Thai-French archaeological mission²: Khao Sam Kaeo, Khao Sek, and Tha Chana on the eastern side of the Peninsula facing the Gulf of Thailand (Chumphon and Surat Thani Provinces), Phu Khao Thong and Bang Kluay Nok on the western side of the Isthmus of Kra (Ranong Province) facing the Andaman Sea (fig. 1). The sites were connected to the seas via fluvial systems and had advantageous geographical locations nearby transpeninsular routes potentially linking up the South China Sea communities and the Indian Ocean communities as early as the 5/4th century BCE (Bellina 2017; Bellina *et al.* 2019). On these ports, the study of pottery is the privilege means to map regional and long distance networks. Implementing the technological approach allows distinguishing local³, hybrid (using foreign-influenced technologies and/or foreign-influenced styles) and foreign groups. By doing so, we hope to start unravelling the different social groups' interactions and adaptations and tracing their sequence during a period spanning from the late centuries BCE and early centuries CE, corresponding to the initiation of the Maritime Silk Road.

Late prehistoric ports of the Isthmus of Kra during the second half of the 1st millennium BCE to the early centuries CE

Khao Sam Kaeo (KSK)

The site of Khao Sam Kaeo (Chumphon Province) was surveyed in the 1980s by the Fine Arts Department of Thailand and excavated from 2005 to 2009 by the Thai-French archaeological mission. Located near the current town of Chumphon, Khao Sam Kaeo is a port which main activity period can be dated between the 4th to 1st century BCE (Bellina & Silapanth 2006; Bellina 2017). Surface finds suggest it was still visited until the 1st centuries CE. It is connected to the Gulf of Thailand via the Tha Tapao River, and stretches over four main hills. One hundred and thirty-six test pits were open on an area covering 55 hectares, which allowed estimating that the site occupied at least 35 hectares. The site displayed monumental structures (walls, ramparts, water control

included in this chapter is located a little further south, in Surat Thani Province.

2 . The Thai-French archaeological mission is headed by Dr Bérénice Bellina (National Center for Scientific Research, France) in collaboration with the Faculty of Archaeology of Silpakorn University in Thailand (specifically Dr Praon Silapanth, Dr Rasmi Shoocongdej, and Dr Chawalit Khaokhiew) and the National Science Museum of Thailand (in particular Mr. Cholawit Thongcharoenchaikit). It was co-directed by Dr Praon Silapanth, Mr. Cholawit Thongcharoenchaikit and Dr Rasmi Shoocongdej successively.

3 ."Local" in this chapter is used in the broad sense of the word to refer to the area encompassing Chumphon and Ranong Provinces (i.e., the Isthmus of Kra), and the northernmost part of Surat Thani Province.

structures) and concentrated different socio-professional quarters (craftsmen, merchants, etc.) surrounded by walls. The rich and varied cultural materials recovered from the site highlighted its involvement in local, regional and trans-Asiatic exchange networks. Technological analysis revealed that to some extent, each industry implemented Indian complex techniques: this is particularly the case for stone, glass and copper-based industries and to a lesser proportion, for some of the ceramic groups too. Some used imported South Asian raw materials (stones, glass), others used local (tin, clay) or regionally-obtained (copper, some glass) raw materials to produce goods of South China Sea regional style. As for stone, glass and copper-based industries, it was suggested that Indian artisans present on the site produced those goods (Bellina 2007, 2017; Dussubieux & Bellina 2017; Pryce *et al.* 2017). Finally, the presence of Indian wares, local vessels displaying Indian-inspired morphologies, Sa Huynh- and/or Kalanay-related potteries, and Han-related ceramics attest to contacts with various populations from the east and west (Bouvet 2017; Favereau *et al.* 2017; Péronnet & Srikanlaya 2017).

Khao Sek (KK)

Khao Sek (Chumphon Province) is located about 80km south of Khao Sam Kaeo. It is an open-air site occupying two hills and bordered by the Langsuan River, which connects to the Gulf of Thailand eight kilometers away. Three absolute dates indicate an occupation around the 3rd-2nd century BCE (Bellina 2018). These dates are supported by compositional analyses of glass samples, which confirm, because of the presence of potash glass and type m-Na-Al 3, that Khao Sek site was likely occupied during the 4th-2nd century BCE (Dussubieux & Bellina 2018). The site was prospected in 2012 and some parts excavated in 2013 and 2014 by the Thai-French archaeological mission. Forty-one test pits were excavated, and revealed that the site could reach ten hectares (Bellina 2018). The site yielded large quantities of carnelian, agate, garnet and glass ornaments (in the form of beads and bracelets) as well as fragments of metal (iron, bronze and gold) and pottery. Analysis conducted on the hard stone and glass ornaments show a similar craft system to that of Khao Sam Kaeo (Dussubieux & Bellina 2018; Bellina 2018). On the other hand, the compositional and isotopic analysis of fragments of a Dong Son bronze drum demonstrated that copper may have come from a source in central Laos (Xepon) and that it may be the result of a local or regional production (Pryce & Bellina 2018). Decorated bronze bowls were also analysed. Their composition, characteristic of other "Indian" bronze bowls, shows that they belong to the same networks as those found in Khao Sam Kaeo and Ban Don Ta Phet (Pryce & Bellina 2018).

Tha Chana (TCN)

Tha Chana (Surat Thani Province) is located about 45km south of Khao Sek. To date, no formal excavation was ever conducted there. However, a significant amount of cultural materials highly similar to those from Khao Sam Kaeo and Khao Sek was collected by villagers. These concern ceramics (Bouvet 2017; Favereau 2015; Péronnet & Srikanlaya 2017), hard stone ornaments (Bellina 2008) including nephrite ornaments (double headed ornaments & *lingling-o*), and glass beads (Lankton *et al.* 2008). Although no absolute dating is available, some Han-related ceramics attributed to the 1st century BCE were discovered (Péronnet & Srikanlaya 2017). In addition, Indian vessels comparable to those found at Khao Sam Kaeo in contexts dated 4th-2nd century BCE were also uncovered (Bouvet 2017). Based on the material culture, the chronological sequence of the site could extend from the last centuries BCE to the first half of the 1st millennium CE (Bellina *et al.* 2014).

Phu Khao Thong (PKT)

Phu Khao Thong (Ranong Province) is located on the western coast of the Peninsula. The Fine Art Department, under Captain Boonyarit supervision, conducted small scale excavations there in 2011. It was also surveyed by the Thai-French archaeological mission in 2006 and 2007, and mapping and archaeobotanical sampling was done in 2009 (Bellina *et al.* 2014). The archaeobotanical remains indicate similar agricultural regime as in Khao Sam Kaeo, i.e. based on dry rice and millet and with the consumption of Indian beans (Castillo 2017). Among the goods discovered, hard stone ornaments also comparable to Khao Sam Kaeo, glass ornaments, vessels from India, and fragments of mirrors dating from the eastern Han period (25-220 CE) have been identified (Bellina *et al.* 2014; Lankton *et al.* 2008). No absolute dating has been obtained, but material culture suggests an occupation from the end of the 1st millennium BCE to the 3rd-4th century CE (Bellina 2007). In addition, a Tamil-Brahmi inscription on a pottery sherd was estimated about the second century CE (The Hindu 2006).

Bang Kluay Nok (BKN)

The site of Bang Kluay Nok (Ranong Province) is located on a small hill, on the western coast of the Peninsula bordered by the Andaman Sea. Close to Phu Khao Thong, to which it could be related, the site has not been the subject of controlled excavations (Bellina *et al.* 2014). The material uncovered includes hard stone and glass ornaments, as well as Indian ceramics (Bellina 2009; Bouvet 2017).

Materials under study

In total, pottery from five port-settlements is considered (table 1). The material partially comes from the excavations conducted by the Thai-French archaeological mission. In addition, since all the sites experienced heavy looting, surface material was also taken into account. The latter has been studied in Chumphon National Museum, in the Fine Art Department offices (Phuket and Nakhon Si Thammarat), and within private collections (villagers' collections and Suthi Rattana foundation). For the latter ones, whenever possible, we enquired villagers about the context of their discovery (soil, depth, material associated) and also tried to cross information with material from our excavations.

Complete study of pottery assemblages conducted at Khao Sam Kaeo and Khao Sek allowed generating both qualitative and quantitative data. Tha Chana, Phu Khao Thong and Bang Kluay Nok surface collections were limited in quantity and diversity, the vessels mainly consisting in imports. Consequently, the proportion of imports compared to the local ware cannot be estimated as opposed to sites excavated by the mission. Only qualitative data can thus be considered for these latter sites.

| Sites | Number of pottery fragments analysed from archaeological contexts | Number of pottery fragments analysed without archaeological context | Sources |
|----------------|--|--|--|
| Khao Sam Kaeo | 17275 | 562 | Bouvet 2017; Péronnet & Srikanlaya 2017; Favereau 2015; Favereau <i>et al.</i> 2017; Favereau & Bellina, forthcoming; this chapter |
| Khao Sek | 5342 | 6293 | Favereau 2018, this chapter |
| Tha Chana | - | 66 (numerous fragments belonging to local productions and paddled&impressed pottery were examined but not counted, therefore are not included in this table) | Bouvet 2017; Favereau 2015; this chapter |
| Phu Khao Thong | 116 | - | Bouvet 2017 |
| Bang Kluay Nok | - | 10 | Bouvet 2017; Favereau 2015; this chapter |

Table 1: pottery corpuses from the Thai-Malay Peninsula under study.

Technological analysis of pottery

The analysis focused on the identification of techniques, gestures and tools used to make pottery. The methodological framework adopted was developed by V. Roux in collaboration with M.-A. Courty (Roux 2011, 2019). It is based on the concept of *chaîne opératoire* (or "production sequence" or "operational sequence"), and the idea that techniques and "ways of doing" are transmitted between individuals from the same social group (Roux 2011, 2019; Stark 1999; Stark *et al.* 2008). All the steps of the *chaîne opératoire* (from the selection and preparation of the raw materials to firing and post-firing treatments, right through shaping, finishing, surface treatments and decorations) were investigated through the careful examination of fabrics, traces and features on surfaces and sections of all pottery fragments⁴. Pottery was then classified into groups gathering vessels made using comparable paste "recipe", shaping and finishing techniques, surface treatments and firing atmosphere. Slight variations may occur within groups, but since shaping is attested through ethnoarchaeology to be the most stable step during the transmission process (Gosselain 1998, 2000; Manem 2020; Mayor 2010; Stark, Bishop & Miksa 2000), a particular attention was paid to the way of shaping which is always homogeneous within a group. Such an approach made it possible to examine pottery raw materials, technologies and styles in a dissociated manner, and to question their provenance separately.

To further characterize the raw materials used to prepare pottery pastes, evaluate their variability within *chaîne opératoire* groups and compare with others, nineteen thin sections were examined (Bouvet 2017). However, no provenance studies were conducted. The latter are planned, but in the current state of data, the abundance criterion (Bishop *et al.* 1982), according to which a large number of vessels suggests the use of resources available locally, was used to evaluate the origin of raw materials. However, the concept of "local" may have different meanings in terms of distance, time and accessibility (Arnold 1985, 2005; Druc 2013; Gosselain 2008) and to our knowledge, there is no specific quantity of vessels from which a local origin could most likely be inferred. We therefore decided, in this chapter: (1) to use the word "local" to refer to the broad area encompassing Chumphon and Ranong Provinces (i.e., the Isthmus of Kra), as well as the northernmost part of Surat Thani Province; (2) to consider that groups gathering more than 1000 vessels (in terms of Minimum Number of Individuals⁵) and weighing more than 100 kg, would more likely indicate that the production was made using local resources.

Abundance, combined with other data, was also used to assess the origin of technologies: when a group encompassed a significant number of vessels (NMI>1000), coming from various

4 . Pottery sherds were studied using the naked eye, a magnifying glass (10x) and a Dino-Lite digital microscope (20 to 220x).

5 . The Minimum Number of Individuals, or MNI, refers to the minimum number of vessels and is calculated based on the number of pottery rims and bases identified after refitting.

archaeological contexts, identified on at least two sites, and reflecting a wide range of restricted and unrestricted morphologies, local origin of technologies was hypothesized. Conversely, "foreign technologies" refers to technologies rare in the area and are expected to occur in low quantities (>100 vessels). As for groups comprising between 100 and 1000 vessels and whose weight does not exceed 100 kg, hypotheses are proposed on a case-by-case basis, taking into account archaeological context, spatial distribution and morphological range.

Finally, pottery shapes and decorative patterns were examined within each group. When a morphology and/or a decor was recognised as scarce in the Isthmus of Kra and strongly similar to another one found within the same chronological range on site(s) known to be involved in the South China Sea networks, it was hypothesized to be the results of foreign influence.

The analysis was first performed on each site independently, identifying the pottery groups from different sites and comparing them. This allowed defining various groups distributed throughout the area (table 2):

- (1) pottery produced using local paste and technologies (potters are local artisans using local raw materials. They may produce vessels displaying local or foreign-influenced forms and decorations);
- (2) pottery made using foreign technologies and style (the paste is local or of uncertain provenance. Potters are foreigners or locals trained by foreigners and mastering foreign technologies);
- (3) imported pottery (vessels are made using exogenous paste, technologies and style. Potters do not belong to local communities).

Pottery groups identified on the ports

In total, thirteen pottery groups were identified. Most of them are distributed on two or more sites (tables 2 & 3). All the groups can be found at Khao Sam Kaeo. Most of them are also present at Tha Chana, and less than half are identified at Khao Sek. Fewer groups were identified at Phu Khao Thong and Bang Kluay Nok, most likely because data for these sites are incomplete and only selected sherds were investigated. Detailed technological descriptions of the pottery groups have already been written for some of the sites (table 1) (Bouvet 2017; Favereau 2015, 2018; Favereau *et al.* 2017; Favereau & Bellina, forthcoming; Péronnet & Srikanlaya 2017). As mentioned above, among all these groups, some were interpreted as locally-produced by local communities (fig. 2 & 3), others as possibly produced locally using foreign technologies and styles (fig. 4), and others as imported (fig. 5) (table 2).

| | | Khao Sam Kaeo | Khao Sek | Tha Chana | Phu Khao Thong | Bang Kluay Nok | Known distribution of highly similar vessels outside of the Isthmus of Kra and Surat Thani Province |
|--|-----------------------------------|----------------------|-----------------|------------------|-----------------------|-----------------------|--|
| Local pottery | Thai-Local-1 pottery | x | x | x | N/A | N/A | - |
| | Thai-Local-2 pottery | x | x | x | N/A | N/A | - |
| Pottery made using foreign technologies and styles (the origin of raw materials is questioned) | Vegetal-tempered&moulded pottery | x | - | N/A | N/A | N/A | - |
| | Paddled&impressed pottery | x | x | x | N/A | N/A | - |
| | Black/Black-and-Red pottery | x | - | N/A | N/A | N/A | South Asia |
| | Wheel-made pottery | x | - | N/A | N/A | N/A | - |
| | Black-and-Red Jars | x | x | x | N/A | N/A | Central and southern Vietnam, Palawan, central Philippines |
| | Wheel-coiled pottery | x | x | x | N/A | N/A | South Asia |
| Imported pottery | Fine Grey pottery | x | - | x | x | x | South Asia, Indonesia, Vietnam |
| | Han-related pottery | x | - | x | N/A | x | Southern China, northern Vietnam, central Vietnam, Indonesia |
| | Fine Orange pottery | x | - | N/A | N/A | x | Central and southern Vietnam, Cambodia |
| | Exogenous Kalanay-related pottery | x | - | x | N/A | N/A | Philippines, central Vietnam |
| | Vegetal-tempered pedestal cups | x | - | x | N/A | N/A | Southern Vietnam, Cambodia |

Table 2: pottery groups identified on the five port-settlements under study in the Thai-Malay Peninsula. "Non Applicable" (N/A) is used to highlight groups that have not been reported in the current state of knowledge due to the lack of excavations but whose presence cannot be excluded.

LOCAL POTTERY

Thai-Local-1 pottery

Thai-Local-1 is the main group at Khao Sam Kaeo and Khao Sek. It was also identified at Tha Chana. Given the quantity (N. of sherds > 18,375; NMI > 2,107; weight > 167 kg) and ubiquity of fragments in all test pits of both sites excavated, as well as the wide range of restricted and unrestricted vessel forms, the group has been interpreted as produced locally by local potters (Bouvet 2017; Favereau 2015, 2018). Most sherds contain 15 to 30% of medium-sized grains (ϕ 0.5 to 2.5 mm), chiefly quartz. Vessels are manufactured using small coils (about 1-to-1.5-cm-high). The body walls are smoothed through discontinuous gestures, and the rims are smoothed using continuous rotation pressures. The inner surface is often scrapped, while the outer one may be burnished. Most of the vessels are plain. However, some additional surface treatments have been observed:

- The outer surface of unrestricted cups with high pedestal (N. of sherds > 564; NMI > 57) is likely covered with a red-slip.
- Few shallow bowls (N. of sherds: 122; NMI: 48) are impressed with a comb tool or using a cord.
- Some fragments display decorations showing similarities with Sa Huynh- and/or Kalanay designs identified in Vietnam and/or in the Philippines (N. of sherds: 273; NMI: 105). Many of them belong to pedestals or carinated vessels. Made using local paste and ways of doing, these ceramics attest to the existence of foreign stylistic influences (Bellina *et al.* 2012; Favereau & Bellina 2016; Favereau *et al.* 2017).
- Other incised, impressed or appliqué decorations are also noticed infrequently (Bouvet 2017: 240 & 250).

Finally, the vessels were fired in an oxidizing atmosphere.

Thai-Local-2 pottery

Thai-Local-2 potteries are identified at Khao Sam Kaeo, Khao Sek and Tha Chana. In terms of quantities, the group is the second largest in the Isthmus of Kra (N. of sherds > 4,946; NMI > 359; weight > 41.2 kg). Given the ubiquity and the significant number of potteries identified on two excavated settlement sites, their discovery in both habitation and mortuary contexts, and the various morphologies attributed to the group, the vessels were likely made locally by local potters (Bouvet 2017; Favereau 2015, 2018). They are tempered with organic materials (representing of volume of about 15 to 25% in the paste) chiefly consisting of elongated burnt plant remains. They are

manufactured using coils and slabs, then smoothed. Most of the sherds are plain. However, pink- and red-slipped surfaces are noted (N. of sherds: 245; NMI: 48) (Bouvet 2017: 258). In addition, very few vessels are decorated with Sa Huynh- and/or Kalanay-related decorations (N. of sherds: 8; NMI: 8) (Favereau & Bellina 2016, forthcoming). The vessels' surfaces are usually dark to dark grey, showing that the pots were fired in a reducing atmosphere.

POTTERY MADE USING FOREIGN TECHNOLOGIES AND/OR STYLE

Organic tempered & Moulded pottery

Vegetal-tempered&Moulded vessels are identified at Khao Sam Kaeo (N. of sherds: 2,060; NMI > 324; weight: 14.2 kg). They are tempered with vegetal matters comparable to those used for the local *Thai-Local-2* potteries, which suggests that *Vegetal-tempered&Moulded* pots may also have been produced using local raw materials. The vessels are manufactured from different assembled elements and some parts are likely to be moulded (Bouvet 2017), as suggested by the regular curvature of the walls. Whether smoothed or burnished, these vessels are always carefully finished. Surfaces may be plain, orange-slipped or with grooves (Bouvet 2017: 263-266). A single sample, which could correspond to a lid, displays incised, impressed, and excised decorations covered by an orange slip (Favereau 2015: 241-244). Such decorations possibly relate to Sa Huynh- and/or Kalanay designs but no decorative element diagnostic of Sa Huynh and/or Kalanay vessels can be identified, and the morphology is different from Sa Huynh and/or Kalanay recurring shapes. Finally, the group encompass various kind of restricted and unrestricted vessels (Bouvet 2017: 267-270) and vessels are fired in oxidation atmosphere. Although the raw materials may come from local sources, the number of vessels remains limited and the group only occurs at Khao Sam Kaeo. There, the vessels are not ubiquitous: most of them were uncovered on Hills 3 and 4 (Bouvet 2017: 263), which corresponds to an area that was likely occupied by foreign communities (Bellina 2017: 650). Therefore, we believe that these potteries may be produced (locally or not) by foreign potters. The presence of foreign craftsmen has been formulated for the production of other artefacts at Khao Sam Kaeo (Bellina 2011 & 2017; Pryce *et al.* 2017). The possible origin of these potters remains unknown, since apart from one vessel displaying possible Sa Huynh and/or Kalanay influences, no similar potteries have been spotted outside the Isthmus of Kra so far.

Paddled & Impressed pottery

Paddled&Impressed vessels are found at Khao Sam Kaeo and Khao Sek (N. of sherds: 1,489; NMI: 181; weight: ~15.5 kg). They are also identified at Tha Chana. The variety of pottery pastes within the group suggest raw materials of multiple origins. Some vessels may have been produced locally,

others elsewhere. At Khao Sek, sherds are mineral-tempered (mainly quartz and feldspar) (Favereau 2018: 43). Some pastes contain grog (i.e., recycled broken sherds). At Khao Sam Kaeo, many fragments are tempered with crushed shell fragments (Bouvet 2017: 272), but mineral and vegetal tempers are also observed (Bouvet 2017: 275). Pots are formed using coils and then shaped with a paddle and an anvil. The rim is smoothed with a rotation gesture. The outer body walls are covered with overlapping patterns impressed with carved paddles or paddles around which a cord was wrapped. Impressed decorations create net patterns, straight lines, and corded lines. The latter are more frequent and usually overlap. The surfaces, usually reddish, indicate that the vessels were fired in oxidation. Morphologies identified are restricted, carinated or not, with rounded base. Whether some were locally-produced and others imported or whether all were imported, cannot be determined at this stage. In any case, the paddle-and-anvil technique was not popular among local potters, and no anvil was recovered from any of the sites under study⁶. Additionally, the decorations displayed on the vessels' surfaces are not shared with local groups, and vessels all consist of restricted spherical pots. Despite the significant number of *Paddled&Impressed* vessels at Khao Sam Kaeo (MNI: 175), they are likely distributed on Hills 3 and 4 visited by foreign communities (Bouvet 2017). Finally, their occurrence at Khao Sek is low (MNI: 6) and their distribution remains limited to two test pits (Favereau 2018: 43). We therefore suggest that these vessels may be attributed to foreign potters and served a specific function. Similar pots bearing cord-marked impressions on their body and base are documented across Southeast Asia and beyond for the time period ranging from the late 1st millennium BCE to the early centuries CE (Solheim 2003; Rao 2001; Stark 2003; Yamagata 2013). Further analyses are clearly needed to investigate the possible connections between similar vessels from different sites and better understand who produced and used them.

Black/Black-and-Red pottery

Black pottery and *Black-and-Red pottery* are only identified at Khao Sam Kaeo (N. of sherds: 531; NMI: 66; weight: 4.4 kg) (Bouvet 2017: 313-320). The fabric is tempered with vegetal materials (Bouvet 2017: 314). Vessels are carefully shaped using coils and slabs. The surfaces are slipped and vitrified, which is atypical at Khao Sam Kaeo and considered as a foreign input (Bouvet 2012: 327-329). Most vessels are also incised with horizontal lines. They are fired in reduction (resulting in *Black pottery*) or oxydo-reduction atmosphere (corresponding to *Black-and-Red pottery*) (Bouvet 2011: 61, fig. 3.9; 2017: 313). These pottery, which surfaces have areas in black and others in red,

⁶ . One possible fragment of anvil is mentioned at Khao Sam Kaeo (Bouvet 2012: 205), but the re-examination of this artefact leads us to believe that it would more likely correspond to a lid fragment.

may have been fired using a firing technique similar to the Black-and-Red firing technique used in Sri Lanka to fire pottery associated with archaeological contexts dated 3rd/2nd centuries BCE (Schenk 2014: 107). This technique is also documented in India (Pavan & Schenk 2012; Purshottam 1969). In addition, some morphologies (small bowls with rounded bases, shallow bowls with flatten bases, and unrestricted vessels) and decorations (horizontal incised bands) are comparable to South Asia types, specifically the so-called Northern Black Polished Wares and Black and Red Wares (Bouvet 2017: 328-333). This suggests that the foreign technologies and styles used to produce *Black/Black-and-Red pottery* might come from South Asia.

Wheel-made pottery

The group *Wheel-made pottery* is anecdotic (N. of sherds: 275; NMI: 47; weight: 1.6 kg) and was only identified at Khao Sam Kaeo (Bouvet 2017: 364-368). The origin of raw materials is unknown. Vessels' profiles are regular and surfaces bear traces suggesting the use of a wheel. Due to the low number of potteries and since the use of a wheel is not attested among local groups in the Isthmus of Kra, the *chaîne opératoire* is interpreted as exogenous. No stylistic similarity has been noticed with vessels from neighbouring areas. Although it is still unclear whether these potteries were produced locally or imported, they were likely manufactured by foreign artisans.

Black-and-Red jars

Black-and-Red Jars are found at Khao Sam Kaeo, Khao Sek and Tha Chana. The group encompasses few large spherical potteries (N. of sherds: 335; NMI: 38; weight: ~8.2 kg), which may have been used for burial purposes: indeed, artefacts that may be interpreted as offerings were found inside one of the jars at Khao Sek (Bellina 2018: 7), and the same jars are also found in some of the nearby coastal caves used for mortuary practices. However, no human remains were recovered. The fabric is tempered with plant materials similar to those used for *Thai-Local-2* potteries and *Vegetal-tempered&Moulded* potteries. A convex mold was used to manufacture the lower part of the jars, while the upper part was shaped using large coils or slabs. The base and body were then padded. The presence of a vitrified slip is reported on several outer surfaces (Bouvet 2017: 324). Decorations always occur and are impressed, sometimes incised with a comb. The jars were fired in reduction or slightly oxidized, hence the "Black-and-Red" (or rather "black and reddish-to-white") color of most surfaces. The raw materials may have been collected locally, but the jars were manufactured using technologies rarely or not seen for that period on other pottery groups in the Isthmus of Kra. In the current state of research, these vessels are interpreted as produced (locally or not) by foreign potters using foreign technologies and style. Highly similar jars

associated with mortuary contexts are reported from the end of the 1st millennium BCE in Vietnam (Go Ma Voi, Giong Ca Vo, Giong Phet, and Hoa Diem sites) (Bouvet 2017; Yamagata 2013: 125, fig. 52) and later in the Philippines (Masbate -including the site of Kalanay-, Samar and Palawan islands) (Favereau 2015, after Bay-Petersen 1982).

Wheel-coiled pottery

Wheel-coiled vessels are found at Khao Sam Kaeo, Khao Sek and Tha Chana (N. of sherds: 138; NMI > 76; weight: ~4.6 kg). The comparative analysis of ceramic thin sections revealed that the clay source used for these vessels at Khao Sam Kaeo is the same as the one used for the main local group *Thai-Local-1 pottery* (Bouvet 2017: 349), suggesting these vessels are locally produced. However, these potteries are rare and were finished using a wheel⁷ (Bouvet 2017: 352-353; Favereau 2018: 44), a technique which is not attested in last centuries BCE among local pottery productions in the Isthmus of Kra and is thus interpreted as a foreign technique. The group encompasses two types of sherds: rim fragments on one hand, and base fragments on the other hand. Rim shapes show similarities with some reported in India (Bouvet 2017: 352-353; Favereau 2018: 44). Indeed, lips with two rounded bulges toward the exterior are known in India on vessels with flat bases like those identified among *Wheel-coiled* pottery. This not only suggests that the shape may have been introduced from India, but also that the technology might come from there since the use of a wheel is reported in India within the same chronological range⁸ (Begley 1983: 469 and 1988: 429; Jahan 2010: 6).

IMPORTED POTTERY

Fine Grey pottery

Fine Grey pottery (including Rouletted Ware) are found at Khao Sam Kaeo, Tha Chana, Phu Khao Thong and Bang Kluay Nok (N. of sherds: 777; MNI: 179). They are also reported on a few other settlements inland, and along the western coast of the Thai-Malay Peninsula, including Maliwan and Aw Gyi (Bellina *et al.* 2018). Interestingly, only Khao Sek did not yield any evidence of their presence despite their presence at Ban Na Hyan, a relay station along the River Langsuan that leads to Khao Sek (Bellina *et al.* 2019). The fabric is always fine. Bouvet, who extensively described and analysed the *Fine Grey pottery* in the Isthmus of Kra (Bouvet 2011, 2017: 281-307), distinguish between vessels providing evidence for the use of a wheel and covered with a vitrified shiny slip

7 . Vessels were first coiled and then finished with the help of a wheel.

8 . The use of a wheel is reported for the manufacture of the "Rouletted Ware" in India (Begley 1983: 469 and 1988: 429; Jahan 2010: 6).

and other ceramics (plain or impressed) without slip (Bouvet 2017: 286). Ceramics are fired in reduction, oxidation and oxido-reduction atmosphere, resulting in different surface colours (Bouvet 2017). Such vessels were produced in South Asia (Das *et al.* 2017; Ford *et al.* 2005; Gogte 1997; Magee 2010). Some, and specifically Rouletted Ware, circulated across the Indian Ocean and the South China Sea between the 4th/3rd century BCE and the 4th century CE (Ardika & Bellwood 1991; Begley 1988, 1996; Bouvet 2017; Chaisuwan 2011; Eka Asih Putrina Taim 2006; Glover *et al.* 2014; Manguin and Agustinjanto 2006; Ray 2006; Reddy 2015; Schenk 2014; Jahan 2010; Tomber 2010; Walker & Santoso 1976). They have been interpreted as prestigious goods/gifts by some (Magee 2010; Schenk 2001: 128) and items used by Indian merchants or sailors by others (Tomber 2008: 74).

Han-related pottery

Han(China)-related pottery is found at Khao Sam Kaeo, Tha Chana and Bang Kluay Nok (N. of sherds: 195). The fabric is fine, with the exception of a few coarser sherds at Khao Sam Kaeo (Péronnet & Srikanlaya 2017: 397). The vessels are shaped using large coils (about 1.5-to-2.5-cm-high), then paddled and smoothed. The most common decorative techniques are impression and incision. The impressions cover the upper two-thirds of the outer surface. A seal may be impressed over them. Incisions are less frequent and form one or several horizontal lines. Some surfaces may be slipped and/or glazed. Inner surfaces, in particular, are frequently covered with a slip. The latter may have been applied to reduce permeability of the pottery walls (Cotkin *et al.* 1999; Schiffer *et al.* 1994; Shepard 1985). The firing atmosphere is oxidized or reduced. A single morphology has been identified: barrel-shaped restricted potteries with flat bases. Although dimensions vary, most of the pots are rather small (less than 20 cm tall). Such shape, associated the recurring presence of an inner slip and the lack of traces indicative of cooking activities, suggest that these vessels may have been used for storage. The fabric, techniques and styles used to produce these ceramics are all totally different from what is identified for other vessels in the area. In addition, fragments are rare and a single morphological type is identified. Finally, at Khao Sam Kaeo, many of them were recovered from areas visited by foreign communities (Péronnet & Srikanlaya 2017: 412). Therefore, these vessels are interpreted as imports. Based on stylistic comparisons, most are likely to come from southern China and northern Vietnam, and a few others from eastern China (Péronnet & Srikanlaya 2017: 393). Elsewhere in Southeast Asia, Han ceramics were also uncovered in central Vietnam (Crick 2006; Glover *et al.* 1996; Janse 1941; Pham 2000; Prior & Glover 2003; Southworth 2004) and some are reported in Indonesia (Bellwood 2007; Nasruddin 1996/97, after Anggraeni & Sunarningsih 2008).

Fine Orange pottery

A limited number of *Fine Orange* pottery has been found (N. of sherds: 128; MNI: 20) at Khao Sam Kaeo in contexts dated of the 4th-1st centuries BCE (Bouvet 2017: 372, table II). One vessel was also identified at Bang Kluay Nok. The paste is always fine, and vessels are made possibly using coils and a wheel (Bouvet 2017: 357-358). Some fragments are impressed with a paddle, others are slipped, and some are both impressed and slipped. Vessels are fired in oxidation atmosphere, and typically exhibit a light reddish, orange or buff surface. Morphologies available include possible lamps or lids⁹ and spherical vessels, including one spouted with ringfoot (*kendi*), impressed on its lower part, incised on the shoulder, and slipped (fig. 5: 6). Their fine fabric, the techniques used and the morphologies are highly comparable to some of the vessels from Oc Eo (Bouvet 2017: 359-361, after Manguin 2000; Guillaume Epinal, pers. comm., July 2015). During the chronological range running from late 1st millennium BCE to early 1st millennium CE, similar spherical pots without spout are spotted in Hoa Diem (Yamagata 2013: 120, fig. 47) and Prohear (Reinecke *et al.* 2009: 75, fig. 61), and others with spout are seen at Angkor Borei/Vat Komnouv (Fehrenbach 2009; Stark & Fehrenbach 2019: 122, fig. 9 & 123, fig. 10). Similar lamps/lids are reported at Arikamedu (India) as early as 1st century AD (Begley 1996, 2002), and also in Gujarat and Maharashtra states (Reedy 2015: 258). Spouted vessel forms, which are considered to be of South Asian origin, are found across the Indian subcontinent in contexts dated from the late 1st millennium BCE (Bellina & Glover 2004; Bouvet 2017: 362; Manguin 2002: 63-64; Stark 2003). Finally, similar lamps/lids are also documented up to the Arabian Peninsula and along the coasts of the Red Sea in contexts of the early 1st millennium CE (Reddy 2015: 258; Tomber 2000: 628).

Exogenous Kalanay-related pottery

The group *Exogenous Kalanay-related pottery* is found at Khao Sam Kaeo, Khao Sek and Tha Chana (N. of sherds: 395¹⁰; MNI: 35). The fabric includes minerals mixed with possible grog, rock fragments or shell fragments depending on vessels. The use of coils is attested for the upper part of the potteries. Under the carination, the containers are shaped using percussions. The distinctive decorative technique is incision, which was performed with a two-pointed tool (Favereau & Bellina 2016; Favereau & Bellina, forthcoming). In addition, scallop decorations may be found on carinations. Most decorative patterns are strictly identical to those found on vessels from Kalanay and Kalanay-related sites (Solheim 1964) in the Philippines. Vessels are chiefly restricted spherical-

⁹. see Reedy 2015: 258-262 for a discussion of the possible function of these vessels.

¹⁰ . The number of sherds appears relatively high due to the high rate of fragmentation of these vessels at Khao Sek.

shaped and have surfaces unevenly oxidized. The paste "recipes" sharing no similarities with others in the area, the scarcity of ways of doing (such as beating and decorating with a comb), the Kalanay-related decorations displayed on surfaces, and the limited range of shapes and number of pots suggest that this group is exogenous. Techno-stylistic comparisons with vessels uncovered in the Visayas allowed highlighting perfect matches, which indicate that these pots are likely to come from the Philippines (Favereau 2015; Favereau & Bellina, forthcoming). Highly similar vessels are also documented in Hoa Diem (Yamagata 2013).

Vegetal-tempered pedestal cups

Vegetal-tempered pedestal cups are tempered with plants, made using a rotary device, and fired in reduction atmosphere. Very rare (N. of sherds: 15; MNI: 11), these potteries, which systematically consist of cups with high pedestal, were recovered at Khao Sam Kaeo (Bouvet 2017: 332) and Tha Chana. Strong techno—stylistic similarities with vessels of the late 1st millennium BCE at Giong Ca Vo have been highlighted by Bouvet (2017: 334-335), who suggested they may have been imported from the Mekong River Delta area. In addition, similar morphologies are observed in southern Vietnam and Cambodia on sites such as Go O Chua (Bouvet 2017: 332) and Prohear (Reinecke *et al.* 2009: 44, fig. 45-1; Reinecke *et al.* 2012: 274, fig. 21.6, n°49), and from surface contexts at Angkor Borei (Miriam Stark, pers. comm., May 2020). The latter are part of the “Burnished earthenware” ceramic group, dated around the 4th to 1st centuries BCE (Stark 2000: 73; Stark 2003: 216-217).

Discussion

Connections and sites' relationship within the Isthmus of Kra and Surat Thani Province

Two dominant pottery groups are interpreted as locals (*Thai-local-1* and *Thai-local-2*) and identified on the port-settlements located on the eastern coast (Khao Sam Kaeo, Khao Sek and Tha Chana). This evidences that local potters from the same community were settled along the coast and supplied different ports, which further suggests close links between the local populations occupying these sites. Local pottery at Phu Khao Thong and Bang Kluay Nok was not investigated, therefore the connections between groups from the western and eastern coasts of the Peninsula cannot be evaluated on similar grounds. However, we suspect strong links, since the two main local pottery groups under study (*Thai-local-1* and *Thai-local-2*) share notable techno-stylistic similarities with those identified on sites further north in Myanmar (Tanintharyi Region) (Bellina *et al.* 2018). Evidence of pottery groups made using foreign technologies and styles are found at Khao Sam

Kaeo, Khao Sek and Tha Chana. The lack of study of the complete assemblages at Phu Khao Thong and Bang Kluay Nok did not allow to identify any of these groups yet. However, some are reported on sites in Myanmar's Tanintharyi Region (Bellina *et al.* 2018). These groups always occur in limited quantities. Whether pots were produced locally or not and, in case they were produced locally, whether they originated from a single or few centers welcoming foreign potters, are questions we intend to further investigate in the future.

The same imported pottery groups are found on all ports under study, except Khao Sek. This suggests that, apart from Khao Sek, sites were involved in networks within which ceramics circulated over long distances. Sites from the eastern and western coasts were likely connected through transpeninsular routes, since some pottery groups such as *Fine Grey pottery* can be found inland on a settlement site, Ban Na Hyan, that acted as a relay station (Bellina 2018). Perhaps Khao Sek was not or seldom frequented by foreigners. The hypothesis of a hierarchical confederation including specialized and complementary sites such as Khao Sam Kaeo and Khao Sek was formulated to explain the relationships between both sites (Bellina 2018). Further work is needed to examine whether Tha Chana, Phu Khao Thong and Bang Kluay Nok were also part of this alliance, as well as other centers on the west coast such as Maliwan and Aw Gyi (Bellina *et al.* 2018).

Long distance connections and foreign influences in the Isthmus of Kra and Surat Thani Province

All the pottery groups identified in the Isthmus of Kra and its environs bear evidence of direct or indirect contacts with distant areas. Indeed, local groups both adopted a foreign Sa Huynh and/or Kalanay-related style to decorate a limited number of vessels. The other pottery groups all attest to the use of foreign technologies. If in-depth large scale comparative studies are clearly needed before drawing any conclusion, hypotheses on the social groups involved may be proposed.

Connections with South Asia

Wheel-coiled pottery, *Black/Black-and-Red pottery* and *Fine Grey pottery* suggest connections with South Asia. *Wheel-coiled pottery* is the only group attested which was made with local raw materials, using foreign techniques and style. A single morphological type has been identified, suggesting its specific use. Technologies and morphologies point to South Asia, signifying potters likely came from there or were trained by South Asian potters. The hypothesis of the presence of South Asian potters in the Isthmus of Kra was first formulated by Bouvet (2011, 2017) based on her analysis of ceramics from Khao Sam Kaeo. The dataset from five port-settlements in the Isthmus of Kra and Surat Thani Province bring further support to her interpretation. So, we can clearly imagine

the circulation of potters besides other South Asian artisans. They may have travelled from one center to another, a hypothesis formulated in the case of the hard stone ornament production to explain the utterly similar craft system of the two ports of Khao Sam Kaeo and Khao Sek interpreted as part of the same confederation (Bellina 2018). Additionally, the analysis of hard stone and other complex industries also led to propose the presence of Indian artisans at Khao Sam Kaeo and Tha Chana (Bellina 2017; Pryce *et al.* 2017; Dussubieux & Bellina 2017). The limited number of *Wheel-coiled* vessels suggests that only a few potters were involved in the production. They may have been settled in one or few centers distributing in the whole area, or were travelling in the area and producing upon request for a few exclusive persons. Compositional analyses are planned to clarify this questioning. The spatial distribution of the vessels at Khao Sam Kaeo (mostly Hills 1 and 2), suggests that customers were likely to be locals. Conversely, other South Asian-related pottery groups (*Black/Black-and-Red pottery* and *Fine Grey pottery*) chiefly occur in areas visited by foreigners. These pottery groups further attest the connections with South Asian groups present in the Peninsula. Different morphological types are identified among each of the latter groups but unrestricted shapes are more numerous, which may be due to the function these ceramics were playing. Overall, none of the South Asia-related groups seem to have impacted local productions: local pottery on the eastern coast of the Peninsula did not adopt Indian technologies nor morphologies during the time period under study. To conclude, these vessels may all have been produced by foreigners to serve for exclusive purpose that need to be specified in the future.

Connections with the Philippines and south-central to southern Vietnam

Several groups show connections with the Philippines (Bicol Region, Visayas and Palawan) and Vietnam (south-central and southern Vietnam): *Thai-Local-1* and *Thai-Local-2* vessels displaying Sa Huynh- and/or Kalanay-related decorations, *Black-and-Red Jars*, and *Exogenous Kalanay-related pottery*. The two main and local groups identified on the eastern coast of the Peninsula (*Thai-Local-1* and *Thai-Local-2*) produced a small quantity of ceramics bearing incised patterns filled with other incisions, impressions and/or painting comparable to those found on vessels from Sa Huynh- and/or Kalanay-related sites across Southeast Asia. In the Peninsula, the Sa Huynh- and/or Kalanay-related style was not broadly adopted by locals as shown by the limited number of vessels decorated. At Khao Sam Kaeo, most of the fragments were found associated with valuable goods (Favereau *et al.* 2017), suggesting vessels may have belonged to “elites” who remain to be characterised. The latter might have control the production and access to Sa Huynh and/or Kalanay-related ceramics, hence the low quantities of vessels with such decorations. *Black-and-Red Jars* may have been produced locally, but the technology and style are exogenous. They are rare and

always in the form of large jars. At Khao Sam Kaeo, these potteries are mostly found in areas occupied by foreign communities. Jars belonging to the same pottery tradition were uncovered in some of the nearby coastal caves which were likely used for mortuary purposes (Favereau 2015). Additionally, highly similar burial jars are found on sites along the South China Sea. In total, these jars may have been produced by and for foreigners to serve as burial containers. These foreigners likely originated from the Philippines or Vietnam. Finally, *Exogenous Kalanay-related* potteries were imported, likely from the Philippines since perfect techno-morpho-stylistic parallels have been established (Favereau 2015; Favereau & Bellina forthcoming).

Connections with southern Vietnam and Cambodia

Fine Orange pottery and *Vegetal-tempered pedestal cups* are both imported groups. Strong techno-stylistic parallels highlighted by Bouvet (2017) evidence they are likely to come from the Mekong Delta area. Unlike many groups using foreign techniques, their spatial distribution (especially for the *Fine Orange pottery*) at Khao Sam Kaeo is not limited to hills occupied by foreign populations but also extends to areas occupied by local communities (Bouvet 2017: 354, map 2). They do not seem to have impacted local productions, since local pottery do not share any technology, nor decorative pattern attributed to them. However, one vessel shape (shallow cup with high pedestal) produced by local potters of group *Thai-Local-1* resembles the *Vegetal-tempered pedestal cups* (fig. 2: bottom, left to right). The archaeological context, their rarity and the fact that each group includes only one or two distinctive morphological types (*kendi* vessels and lamps/lids on one hand, cups with pedestal on the other hand), suggest that these imports were used by few people, both from local and foreign communities, and had specific functions.

Connections with China and northern Vietnam

A single group, *Han-related pottery*, demonstrates connections with China and northern Vietnam. Vessels were imported and no technological nor stylistic transfers have been observed to local productions. Since a limited number of vessels were recovered, and since many fragments are covered with an inner slip and display a single recurring morphology, they might have been dedicated to a special use, such as the transport of particular commodities. Some vessels are likely to come from southern China, while others from northern Vietnam (Péronnet & Srikanlaya 2017), suggesting the involvement of people from these areas in the networks. Perhaps intermediaries from northern Vietnam were making the liaison between areas, and given the presence of two seals with Chinese inscriptions at Khao Sam Kaeo (Borell 2017), we can also imagine that few Han merchants were involved in the exchanges.

Conclusion

To summarize, in the current state of research, the pottery data from late prehistoric port-settlements in the Isthmus of Kra and the immediate neighboring region (Surat Thani Province) suggests the following:

- Two pottery groups are attributed to local communities settled on the eastern coast of the Peninsula (*Thai-Local-1* and *Thai-Local-2*). Their presence to the west remains to be investigated. Potters from these communities produced a various range of vessels, including a few displaying Sa Huynh- and/or Kalanay-related decorations that perhaps were used by local elites sharing cultural references with communities settled in the Philippines and Vietnam.
- Two groups encompass a significant number of vessels but are still poorly understood (*Vegetal-tempered&Moulded pottery* and *Paddled&Impressed pottery*). No clear comparison is established so far with vessels from other areas.
- Other groups are interpreted as imported or made implementing foreign technologies while possibly locally made. If the exact origin of raw materials is not formally known for most groups, at least thin section analysis (Bouvet 2017) of wheel-coiled vessels demonstrates that the fabric is comparable to that of the *Thai-Local-1* group, showing that wheel-coiled pottery was produced locally. This group is seen as indicative of the presence of few Indian potters in the area. Other groups evidence connections with South Asia (*Wheel-made pottery*, *Black/Black-and-Red pottery*, *Fine Grey pottery*), but also Philippines and south-central to southern Vietnam (*Black-and-Red Jars* and *Exogenous Kalanay-related vessels*), the Mekong River Delta area (*Vegetal-tempered pedestal cups* and *Fine Orange pottery*) and Han-China (*Han-related pottery*). Overall, all groups encompass a limited range of pottery forms, which suggests the vessels met specific needs or were produced upon order, perhaps for foreigners settled on port-settlements and, in some cases, for local customers. Based on their spatial distribution at Khao Sam Kaeo, *Wheel-made pottery*, *Wheel-coiled pottery*, *Vegetal-tempered pedestal cups* and *Fine Orange pottery* were likely used by both locals and foreigners. *Fine Grey pottery*, *Black/Black-and-Red pottery* and *Han-related pottery* concentrate in areas occupied by foreign communities. *Black-and-Red Jars* are associated with foreign communities, but also occur in nearby caves, which is rarely the case of other productions.

Ultimately, the data suggests different levels of interactions with various foreign communities in the Thai-Malay Peninsula and evidences various "spheres of ceramic exchanges" (Miksic & Goh 2017) overlapping through space. Some vessels may have been used for consumption (*Wheel-made pottery*, *Wheel-coiled pottery*), others to carry goods for imports-exports (*Han-related pottery*), and others as gifts and/or to signal a status (local vessels with Sa Huynh- and/or Kalanay-inspired decorations, *Fine Grey pottery*). The *Black-and-Red Jars* and possibly other groups highlighting connections with the Philippines and south-central to southern Vietnam may reflect specific usages and ways of interacting: those of very mobile groups perhaps acting as intermediaries (Bellina *et al.* 2019) but who nonetheless maintained their funerary practices. They may have found best to make their burial jars themselves or travel with them. Overall, further analyses are needed to clearly estimate the function of most vessels.

Most groups were probably going back and forth. That groups travel with pots is no surprise. More intriguing are potteries that may have been locally made (and in the case of *Wheeled-coiled vessels*, it was demonstrated to be locally made) and for which Indian techniques were likely used. Very few South Asian potters may have settled down more durably or permanently. The hypothesis of the presence of South Asian artisans in the Isthmus of Kra has been suggested for other industries: hard stone and glass ornaments, as well as high-tin bronze (Bellina 2014; Dussubieux & Bellina 2017; Pryce *et al.* 2017). These latter industries are interpreted as “prestigious goods” made for city-ports elites as a currency within its polities and its hinterland or between peer polities (Bellina 2018). With the ceramics, the implication may be of a different order. Despite the fact that they too are restricted in number and morphologies like beads and high-tin bronzes cited above, we argue that the coming of potter(s) producing vessels associated with specific functions and shapes may signal the desire for these migrating groups to maintain specific socio-religious practices and the material needed for those. More research is needed to test which of the potteries involving foreign techniques are actually locally-made in order to clarify for each group whether potters or pots were circulating. It is specifically important, since these productions signal social and economic practices and help understanding how the various groups lived, what were their trading practices (mobile intermediaries or settled groups), how they interacted and to what extent they adapted their behavior in the early maritime Silk Roads ports.

Acknowledgements

The authors would like to express their sincere gratitude to the Fine Art Department of Thailand, the National Research Council of Thailand, the National Museum of Chumphon and the University of

Silpakorn for giving permission to study pottery assemblages from Thailand. We are deeply thankful to Dr. Rasmi Shoocongdej, Dr. Chawalit Khaokhiew, Dr. Praon Silapanth (Silpakorn University) and Mr. Cholawit Thongcharoenchaikit (National Science Museum, Thailand) in particular, for allowing this research. We also wish to thank Dr. Bunchar Pongpanich, the Suthi Rattana Foundation and Mr. Sanae Peawkrasin in Chumphon for providing opportunities to examine ceramics from Thailand. We are deeply grateful to Dr. Valentine Roux who read an earlier version of this work and provided crucial advice. We are also very grateful to Dr. Miriam Stark for valuable discussion and comments, and to Dr. Emily Miyama for making it possible to examine pottery from Hoa Diem at the Museum of Archaeology in Nha Trang, Vietnam, thanks to a Resona Foundation Grant for research on Asian and Oceanic countries and regions by young researchers at home and abroad (Research study grants). We extend our thanks to the Thai-French archaeological mission team members and collaborators for continuous support. Many thanks also to our colleagues from the laboratory of Prehistory and Technology (CNRS-UMR7055) and the Institute of Archaeology of the National Cheng Kung University (NCKU) for their encouragement. The Thai-French Archaeological Mission was founded by the “Sous-Commission des Fouilles” of the French Ministry of Europe and Foreign Affairs and the National Center for Scientific Research (CNRS), France. This research was also supported in part by the Ministry of Science and Technology (research project number 109WFA0910048), Taiwan, ROC, as well as the Headquarters of University Advancement at the National Cheng Kung University, which is sponsored by the Ministry of Education, Taiwan, ROC. Part of the results in this paper were presented at the international conference “Singapura before Raffles: Archaeology of the Seas, 400 BCE-1600 CE”, organised by Dr. John Miksic, Department of Southeast Asian Studies, National University of Singapore, and we are deeply grateful to Dr. Miksic for inviting us to participate and for giving us to opportunity to write this article.

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Table 3: details on the pottery corpuses analysed on five port-settlements of the Thai-Malay Peninsula.

| Groups' name | KSK | | | KK | | | TCN | | PKT | BKN | Groups' name in other publications |
|-------------------------------------|--------------|-------------|------|--------------|-------------|------|--------------|-----|--------------|--------------|---|
| | N. of sherds | Weight (kg) | NMI | N. of sherds | Weight (kg) | NMI | N. of sherds | NMI | N. of sherds | N. of sherds | |
| Thai-Local-1 | 8782 | ~83 | 1078 | 9593 | 84.2 | 1029 | x | x | | | KSK-T.I KK-MineralTempered&Coiled Decorated sub-group: Thai-SHK-Local-1 |
| Thai-Local-2 | 3848 | ~31.3 | 324 | 1098 | 10.1 | 35 | x | x | | | KSK-T.II KK-PlantTempered&Coiled Decorated sub-group: Thai-SHK-Local-2 |
| Vegetal-tempered&Moulded pottery | 2060 | ~14.2 | 326 | | | | | | | | KSK-T.III |
| Paddled&Impressed pottery | 1206 | 13.9 | 175 | 283 | 1.6 | 6 | x | x | | | KSK-T.IV KK-Paddled&Impressed |
| Black Wares and Black-and-Red Wares | 335 | 4.4 | 66 | | | | | | | | KSK-BW KSK-BRW |
| Wheel-made pottery | 275 | 1.6 | 47 | | | | | | | | KSK-RKE3 |
| Black-and-Red jars | 242 | 6.9 | 31 | 285 | 1.3 | 3 | 4 | 4 | | | KSK-BRJ KK-PlantTempered,Slab&BRJStyle |
| Wheel-coiled pottery | 122 | 3.7 | 60 | 6 | 0.9 | 6 | 9 | 9 | | | KSK-RKE1 KK-WheelThrown&Indian-Style |
| Fine Grey pottery | 654 | 29.7 | 179 | | | | 6 | - | 116 | 6 | KSK-FW1, 1, 1/2 and 3 KSK-BW KSK-BRW PKT-FW1, 2, 1/2 and 3 BKN-FW1, 2 |
| Han-related pottery | 148 | - | - | | | | 44 | - | | 3 | KSK-Han-related |
| Fine Orange pottery | 128 | 0.8 | 20 | | | | | | | 1 | KSK-RKE2 |
| Exogenous Kalanay-related pottery | 23 | - | 23 | 370 | 1.7 | 10 | 2 | 2 | | | KSK-SHK-Exogenous KK-Paddled&SHK-Style |
| Vegetal-tempered pedestal cups | 14 | 0.5 | 10 | | | | 1 | 1 | | | KSK-RKE-BW KSK-RKE-BRW |
| TOTAL | 17837 | 190 | 2339 | 11635 | 99.8 | 1089 | >66 | >16 | 116 | 10 | TOTAL N. of sherds > 29664 |