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THE ROLE OF ASTRONOMY IN DETERMINING THE LOCATIONS OF GEOGRAPHICAL FEATURES DURING THE ELEVENTH TO SEVENTEENTH CENTURIES: A CASE STUDY FROM THE THAI–MALAY PENINSULA

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Abstract: The Thai–Malay Peninsula is a multicultural region in Southeast Asia with a long history spanning at least 2,300 years. However, its sparse historical evidence makes its history discontinuous both in temporal and spatial regimes. This study utilized a multidisciplinary approach by combining astronomy, geography, and linguistics to geolocate maritime cities and geographical features in the Thai–Malay Peninsula from the eleventh to the seventeenth centuries CE. Astronomical computation results suggest that Arab sailors used two different systems to measure the angle of the Pole Star: one along the coastline of the Andaman Sea and Malacca Strait, and another for the Gulf of Thailand and the South China Sea. Etymological analysis results indicate that most native toponyms were transcribed into different languages. Some of them can be combined to reconstruct their continuation. This knowledge also solves some longstanding issues of the Thai–Malay Peninsula's history and anthropology.

Keywords: Thai–Malay Peninsula; maritime trade routes; geographical history; celestial navigation; etymological analysis

1 INTRODUCTION

Contemporary records are valuable for studying history and anthropology in every part of the world. These written documents can provide information relating to many aspects that cannot be interpreted from other types of historical evidence. In the case of the Thai–Malay Peninsula (i.e. Thailand and Peninsula Malaysia), there are fewer surviving written records compared to other regions in the world. Therefore, most of its history known in modern times was primarily reconstructed from historical documents written in foreign languages. Among them, only some contain content that can be used in the study of geographical history to geo-locate ancient cities and geographical features. Interpreting these records based on modern geographical knowledge can help narrow down possible locations of these ancient toponyms in the Thai–Malay Peninsula.

Correctly locating these maritime states and geographical features benefits Southeast Asian populations in the sense that it provides clues to the actual social dynamic of their homeland in ancient times without interference in their beliefs—which often distort the history. For example, the country of *Chìtǔ* (lit. red soil or utisol), which first appeared after a visit of two Chinese envoys during 607 to 609 CE, is believed by many scholars to be located in the Thai–Malay Peninsula or Sumatra (Indonesia). Many studies have been published in the last two centuries, attempting to locate this country based on the limited contemporary evidence (e.g. Hirth and Rockhill, 1911: 8; Le May, 1938: 55–56; Luce, 1925: 178; Wales, 1937: 28–29; Wheatley, 2017: 32–33).

The journey of two Chinese envoys to *Chìtǔ* as narrated in their original work in the early seventh century CE indicates that their route involved coastal sailing through the Gulf of Thailand. The content from Chinese records which leads modern scholars to believe that this country is located in the Thai–Malay Peninsula is that, after two envoys sailed pass the Tenasserim Mountains, the king sent 30 ocean-going junks to welcome them, and it took more than a month to reach the capital city of *Chìtǔ* (Wang, 1958: 68; Wheatley, 2017: 26–33).

At first glance, it seems logical to place the capital city of *Chìtǔ* somewhere in the Thai–Malay Peninsula since the content does not contain any detailed description after passing

the Tenasserim Mountains, indicating that the journey thereafter should be short. However, one can argue that if *Chìtǔ* is located in the Thai–Malay Peninsula, why did its king had to send a group of 'ocean-going junks' to accompany the envoys, and the sailing time of "… more than a month …" surpasses any distance along the coast or rivers of the Thai–Malay Peninsula. Moreover, another passage in the record of the two envoys also states that this country extends several thousand *lǐs* (i.e., more than 400 km in extent) which cannot be fitted into the long and narrow Thai–Malay Peninsula.

Fortunately, there are some subsequent Chinese records that give the direction of *Chìtǔ* as 'directly southward' from the Gulf of Tonkin and the island of Hainan in China (Wheatley, 2017: 30–31). By eliminating formerly proposed locations for *Chìtǔ* based on facts obtained from all associated Chinese records and modern geographical knowledge, *Chìtǔ* should be located in the northwestern part of Borneo (present-day Malaysia and Indonesia, along the longitude of 110° E). Placing *Chìtǔ* in Borneo not only solves many long-standing superposition paradoxes of having two different political entities in the same area and time, but suggests the possibility that Borneo also has a long history and is also an important place along the maritime trade route. This new proposition also benefits the people of Borneo in that their homeland was once an important state in the early history of Southeast Asia.

The Thai–Malay Peninsula is a multicultural region in Southeast Asia perfect for studying the social dynamic influenced by the influx of culture and technology exchanged through the popularity of the maritime trade route. However, this region has received less attention from historians and anthropologists since it was mostly under the control of *Śrīvijaya* from the eleventh to the seventeenth centuries CE. Most scholarly outputs therefore focus mainly on the history of the maritime trade route through the Malacca Strait and the geopolitics of Sumatra and Java. This study provides another part of the same picture by emphasizing the Thai–Malay Peninsula, filling the spatio-temporal gap in Southeast Asian history and anthropology. This study attempts to (1) estimate the geographical latitudes from some Arab records using modern astronomical methods; (2) associate these estimated locations with their respective toponyms from different languages using a comparative study in linguistics; and (3) study the continuation of some toponyms and their relations with modern-day places.

2 MATERIALS AND METHODS

2.1 Records from the Eleventh to the Seventeenth Centuries CE

Arab records from the eleventh to seventeenth centuries CE contain descriptions of *Zābaj* and *Srībūza* (Java and Śrīvijaya), which covered the Thai–Malay Peninsula and the Indo–Malay Archipelago (Wheatley, 2017: 233–243). Some of them also give a list of toponyms, their latitudes, and sailing directions between places along the maritime trade route around the coastline of continental Southeast Asia and the Thai–Malay Peninsula. These Arab records include:

- *Taḥqīq mā li-al-Hind min Maqūlah Maqbūlah fī al-ʿAql aw Mardhūlah* (تحقيق ما للهند من مقولة مقبولة في العقل أو مرذولة) from CE 1030 by Al-Bīrūnī (also called the *Tārīkh al-Hind*);
- *Nuzhat al-Mushtāq fī Ikhtirāq al-Āfāq* (نزهة المشتاق في اختراق الآفا ق) from CE 1154 by Al-Idrīsī (hereafter the *Nuzhat al-Mushtāq*);
- *Muʻjam al-Buldān* (معجم البلدا ن) from AD 1224 by Yāqūt al-Hamawī;
- *Ḥāwīyat al-Ikhtiṣār fīʻilm al-Baḥār* (حاوية الاختصار في أصول علم البحار) from CE 1462 by Aḥmad ibn Mājid (hereafter the *Ḥāwīyat*);
- *Al-ʻUmdat al-Mahrīyah fī Ḍabṭ al-ʻUlūm al-Baḥrīyah* (العمدة المهرية فى ضبط العلوم البحرية) by Sulaimān al-Mahrī, a student of Aḥmad ibn Mājid, dated within the first half of the sixteenth century CE (hereafter the *Al-ʻUmdat*); and
- *Al-Minhāj al-Fākhir fīʻilm al-Baḥr al-Zākhir* (المنهاج الفاخر فى علم البحر الزاخر) by Sulaimān al-Mahrī, but the version used in this study can be dated not earlier than CE 1605 (hereafter the *Al-Minhāj*).

These Arab records yield valuable evidence in locating toponyms, especially on the Thai–Malay Peninsula's western coast, but give little information on the eastern shore. Fortunately, passages and illustrations in Chinese records from the early thirteenth to early seventeenth centuries CE provide helpful evidence, especially about toponyms and their travel times between cities on the eastern coast of the Thai–Malay Peninsula, complementing information from the Arab records (Wheatley, 2017: 61–103). These Chinese records include:

- *Xīn Tángshū* (新唐書) from CE 1060 by Ōuyáng Xiū, Sòng Qí, and collaborators;
- *Zhū Fān Zhì* (諸蕃志) from CE 1225 by Zhào Rǔkuò (it gives a list of dependencies of *Sānfóqí*, a Chinese name of *Śrīvijaya*, together with their descriptions);
- *Dǎoyí Zhìlüè* (島夷誌略) from CE 1339 by Wāng Dàyuān (it contains descriptions of some cities in the Thai–Malay Peninsula);
- *Kūnyú Wànguó Quántú* (坤輿萬國全圖),

from CE 1602 by Matteo Ricci and collaborators;
- *Sāncái Túhuì* (三才圖會), an encyclopedia from CE 1609 by Wáng Qí and his son Wáng Sīyì; and
- *Zhèng Hé Hánghǎi Tú* (鄭和航海圖) from CE 1628 by Máo Yuányí (it depicts navigational landmarks along maritime trade routes, also called the Máo Kūn Map).

This study also referred to contents in Indian and Siamese sources to help in the etymological analysis of toponyms (Anonymous, 2017: 160, 181; Wyatt, 1975). They include:
- Tanjore inscription dated CE 1030 found at Tamil Nadu in India, which contains a list of states in Southeast Asia conquered by King Rajendra Chola I; and
- *Tamnan Phrathat Mueang Nakhon Si Thammarat* (ตำนานพระธาตุเมืองนครศรีธรรมราช, hereafter the *Tamnan Phrathat*) written in Thai from the third quarter of the seventeenth century CE, which gives a list of Nakshatra cities under the control of *Śrīdharmarāja* (where the Sanskrit word *Nakṣatra*, in this context, means the 12-year cycle of animals, not the Hindu lunar mansions).

2.2 Estimation of Geographical Latitudes

At present, the position of the North Celestial Pole (NCP) can be determined by looking for the Pole Star (α UMi or Polaris in Ursa Minor). However, the position of this star slowly changes over time due to the Earth's axial precession phenomenon, in which, around the beginning of CE 1500, it was about 3.5° from the NCP (Figure 1). Therefore, in Arab records (including the *Ḥāwīyat*, *Al-'Umdat*, and *Al-Minhāj*), the latitude of each place is recorded as the maximum altitude of the Pole Star or that of the Guardians (β UMi or Kochab and γ UMi or Pherkad) measured in *iṣba'* (lit. finger, or *asābi'* in the plural form) using angular measuring instruments such as a *kamāl* (Clark, 1993; Mills, 1970: XV). Near the equator, where the Pole Star is not clearly visible, the altitude of the Guardians is measured instead. (The altitude of the Pole Star below 1 *iṣba'* is equal to that of the Guardians minus 7 *iṣba'*.)

The Pole Star's angle associated with each Arabic toponym can be used to determine its modern-day location. First, angles of the Pole Star of some identified toponyms mentioned in the *Ḥāwīyat*, *Al-'Umdat*, and *Al-Minhāj* were used to create a transformation function using the linear least squares method. This function converts the Pole Star's angle in *iṣba'* to its corresponding geographical latitude in degrees. On the western coast of the Thai–Malay Peninsula, which includes the Andaman Sea and the Malacca Strait, these toponyms mostly have similar sounds compared to present-day towns and islands. The first version of this transformation function was then used to estimate the latitudes of the remaining toponyms and we attempted to identify them with locations on the modern-day map. All identified toponyms with Pole Star angles were used to refine the transformation function further. Moreover, sailing times, distances, and relative directions between some cities in Chinese records were also considered to support the estimated locations.

2.3 Etymological Analysis of Toponyms

The estimated geographical coordinates of all Arabic toponyms were etymologically considered together with their possibly associated names in different languages, including Tamil, Chinese, and Thai, through a comparative method in linguistics (Lyons, 1968). In the case of the Thai–Malay Peninsula, the preliminary analysis suggests that most toponyms in foreign languages are loanwords or calques, which were derived from their native names in the ancient Malay and Mon languages. The derivation processes of a toponym in different languages from its native name include the transcription (from a 'spoken' name), transliteration (from a 'written' name), and translation (from the 'meaning' of a name) (Bloomfield, 1984).

3 RESULTS AND DISCUSSION

3.1 Geographical Latitudes

The transformation function for the western coast of the Thai–Malay Peninsula is

$$\phi = 2.00541\ \theta^* + 3.74411, \quad (1)$$

where ϕ is the geographical latitude in degrees (°), θ^* is the Pole Star's angle in *iṣba'* of the western coast (hereafter denoted *), 2.00541°/* is the estimated slope, and 3.74411° is the estimated offset. Note that the slope of about 2°/* is steeper than the previously estimated value, which ranges from 1.61°/* to 1.72°/* (Clark, 1993; Mills, 1970: XV; Wheatley, 2017: 234). The offset value is also similar to 3.5°, which was the angular distance of the Pole Star from the NCP around the beginning of CE 1500. This function's Root Mean Square Error (RMSE) is 0.330°, and the maximum observation error is 0.371* or equivalent to 0.744° of latitude (Table 1 and Figure 2).

However, on the eastern coast, including the Gulf of Thailand and the South China Sea, the estimated parameters of the transformation

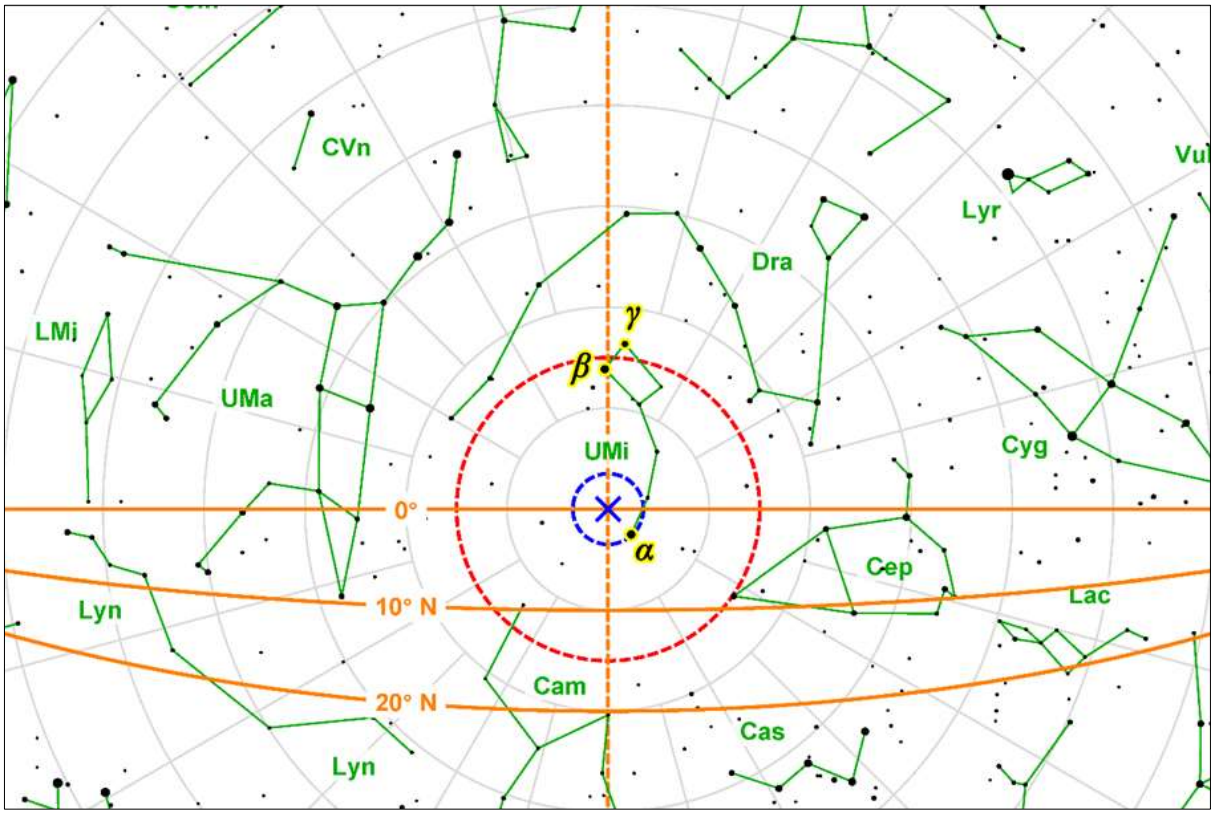

Figure 1: Star chart of the sky around the beginning of CE 1500 (looking north at the local sidereal time of 15 hours). Black dots are stars in which the size of each dot represent its apparent magnitude. Green texts are abbreviations of constellations (e.g. UMi stands for Ursa Minor) while green lines represent their figures. Revolution circles are centered at the NCP (blue cross) of the Pole Star (α Umi, 3.5° from NCP) and the Guardians (β Umi and γ UMi, about 15° from the NCP) are shown as blue and red dashed circles, respectively. The orange dashed line shows 0° azimuth, while the orange solid lines represent the horizon of an observer at various latitudes (star chart: Peeravit Koad and Thatdao Ratmak).

Table 1: Arabic toponyms in the Thai–Malay Peninsula and their geographical information derived from Pole Star angles given in Arab records from the fifteenth to the seventeenth centuries CE.

Arabic Toponym	Pole Star Angle	Estimated Latitude	Proposed Position		Proposed Location	Latitude Difference
			Latitude	Longitude		
Andaman Sea						
Cape *Marṭabān*	6.00*	15° 47' N	16° 05' N	97° 33' E	Thanlyin River	−0.307°
Kāradiyū	5.75*	15° 17' N	15° 33' N	97° 39' E	Kalegauk Is.	−0.275°
Balang River	5.50*	14° 46' N	15° 11' N	97° 47' E	Ye River	−0.409°
Muk	5.25*	14° 16 N	14° 18' N	97° 47' E	Bok Ye-gan Is.	−0.028°
Tawāhī River	5.00*	13° 46' N	13° 43' N	98° 12' E	Dawei River	0.054°
Fālī (N)	5.00*	13° 46' N	13° 13' N	98° 15' E	Mali Is.	0.554°
Fālī (S)	4.75*	13° 16' N	12° 52' N	98° 19' E	Mali Nge Is.	0.403°
Fālī Kārā	4.50*	12° 46' N	12° 31' N	98° 15' E	Maingyi Is.	0.252°
Lāwamand	4.50*	12° 46' N	12° 29' N	98° 23' E	Kadan Is.	0.285°
Markhī River	4.50*	12° 46' N	12° 26' N	98° 35' E	Tanintharyi River	0.335°
Awzārmanda	4.25*	12° 16' N	12° 17' N	98° 10' E	Haycock Is.	−0.016°
Butom Bāshkalā	4.00*	11° 46' N	11° 43' N	98° 16' E	Paeker, Sabi, Money, and Letsok-aw Islands	0.049°
Malakī River	4.00*	11° 46' N	11° 40' N	98° 43' E	Lenya River	0.099°
Shayān	3.75*	11° 16' N	11° 41' N	98° 28' E	Kanmaw Is.	−0.419°
Lanbī	3.50*	10° 46' N	10° 51' N	98° 12' E	Lanbi Is.	−0.087°
Tanakūlam (N)	3.25*	10° 16' N	10° 12' N	98° 12' E	Zadetkalay Is.	0.062°
Tanakūlam (S)	3.00*	09° 46' N	09° 50' N	98° 08' E	Zadetkyi Is.	−0.073°
					Myanmar Thailand	
Qrā (*Tākwā* ?)	3.00*	09° 46' N	09° 58' N	98° 36' E	Kra Buri River	−0.206°
Lantā	2.75*	09° 16' N	09° 25' N	97° 53' E	Surin Is.	−0.158°
Urang Sālah (N)	2.75*	09° 16' N	09° 16' N	98° 18' E	Ra Is.	−0.008°
Kalārī	2.50*	08° 45' N	09° 04' N	97° 49' E	Tachai Is.	−0.309°
Sanbīlan Siam (N)	2.50*	08° 45' N	08° 41' N	97° 39' E	Ba-ngoo Is.	0.074°
Ayam	2.25*	08° 15' N	08° 50' N	97° 48' E	Bon Is.	−0.577°

Sanbīlan Siam (S)	2.00*	07° 45' N	08° 28' N	97° 39' E	Huyong Is.	−0.712°
Urang Sālah (S)	2.00*	07° 45' N	07° 46' N	98° 18' E	Cape Promthep	−0.012°
Malacca Strait						
Trang	2.00*	07° 45' N	07° 18' N	99° 30' E	Trang River	0.455°
Southern *Lanta*	1.75*	07° 15' N	07° 28' N	99° 06' E	Lanta Is.	−0.213°
Butang	1.50*	06° 45' N	06° 32' N	99° 10' E	Butong Is.	0.219°
					Thailand Malaysia	
Lakāwī	1.25*	06° 15' N	06° 22' N	99° 47' E	Langkawi Is.	−0.116°
Perak	1.00*	05° 45 'N	05° 41' N	98° 56' E	Perak Is.	0.066°
Kēdā	1.00*	05° 45' N	05° 41' N	100° 21' E	Merbok River	0.066°
Penang	0.75*	05° 15' N	05° 22' N	100° 15' E	Penang Is.	−0.119°
Dingding	0.50*	04° 45' N	04° 14 'N	100° 34' E	Pangkor Is.	0.513°
Bankūr Lau	0.50*	04° 45' N	04° 12' N	100° 32' E	Pangkor Laut Is.	0.547°
Sanbīlan Malacca	0.25*	04° 15' N	04° 02' N	100° 33' E	Sembilan Iss.	0.212°
Klang	0.00*	03° 45' N	03° 00' N	101° 23 'E	Klang River	0.744°
Jumar	−0.25*	03° 15' N	02° 53' N	100° 34' E	Jemur Is.	0.359°
Bāsalār	−0.50*	02° 44' N	02° 50' N	101° 25' E	Bukit Jugra	−0.092°
Sina Usang	−0.75*	02° 14' N	02° 42' N	101° 58' E	Negeri Sembilan	−0.460°
Malacca	−1.00*	01° 44' N	02° 12' N	102° 14' E	Malacca	−0.461°
					Malaysia Indonesia	
Karīmun	−1.25*	01° 14' N	01° 04' N	103° 22' E	Karimun Iss.	0.171°
Kālang	−1.75*	00° 14' N	00° 42' N	104° 16' E	Galang Iss.	−0.465°
Singapūr	−2.00*	00° 16' S	00° 18' S	104° 30' E	Singkep-Lingga Iss. ?	0.033°
Gulf of Thailand and South China Sea						
Shahr-i Naw	4.50*	12° 46' N	13° 06' N	99° 57' E	Petchaburi ?	−0.332°
Cape *Kanbūsā*	5.00**	08° 28' N	08° 30' N	104° 50' E	Cape Cà Mau (in Vietnam)	−0.029°
Gulf of *Kūl*	4.50**	08° 13' N	08° 27' N	100° 07' E	Pak Phanang Bay	−0.235°
Ṣūrā	4.25**	08° 05' N			Sathing Phra Pen. ?	0.587°
Banagh	4.00**	07° 58' N			Songkhla ?	0.726°
Singūr	3.00**	07° 27' N	07° 14' N	100° 34' E	Songkhla	0.214°
Langa Shukā	2.00**	06° 56' N	06° 54' N	101° 15' E	Pattani River	0.035°
					Thailand Malaysia	
Kalāndan	1.00**	06° 25' N	06° 13' N	102° 14' E	Kelantan River	0.206°
Lākanjī	−1.50**	05° 09' N	05° 20' N	103° 09' E	Terengganu River	−0.191°

function are different. The refined function for the eastern coast can be written as

$$\phi = 0.51204\ \theta^{**} + 5.91079, \qquad (2)$$

where θ^{**} is the Pole Star's angle in *iṣba'* of the eastern coast (hereafter denoted **), 0.51204°/** is the estimated slope, and 5.91079° is the estimated offset. This function gives an RMSE of 0.17404°, and the maximum observation error is −0.459** or equivalent to −0.235° of latitude (Table 1 and Figure 2).

Note that the slope value for the eastern coast is shallower than the previously estimated values between 1.61°/* to 1.72°/* and much shallower than that of the western coast as in Equation (1). The offset value is also nearly 1.6 times that of the western coast. This difference indicates that the Pole Star's angles along the eastern coast must have been measured by a different observer or method compared to the western coast.

3.2 Toponyms on the Andaman Sea

Around the Gulf of Martaban in Myanmar, *Marṭabān* is the first checkpoint after crossing the Gulf eastward from Cape Negrais (Table 1 and Figure 2). It is said in the *Ḥāwīyat* that *Marṭabān* is the cape of Siam (Wheatley, 2017: 241). This toponym can be located at Kyaik-khami at the mouth of the Thanlyin River, which leads to Mottama (formerly called Martaban, hence the name of this cape). Southward are *Kāradiyū* (Kalegauk Island), *Balang* (the Ye River), and *Muk* (the Bok Ye-gan Island), which appeared only in the *Al-Minhāj* without any description except their Pole Star angles. The Arabic name *Kāradiyū* may be the transcription of the name Kalegauk (as well as the name *Muk* and the syllable 'Bok'.) *Balang* might also be transcribed from its old name in the ancient Mon language. The next toponym is *Tawāhī*, although the *Ḥāwīyat* refers to it as an island (*pulau*), it is undoubtedly located at the mouth of the Tavoy River that leads to the city of Dawei in Myanmar (hence the Arabic name *Tawāhī* and also the Chinese name *Dǎwāi*, Cantonese[1] *Daa*^{2}*waai*^{1}, in the Máo Kūn Map) (Mills, 1970: 287).

After *Tawāhī* are islands off the Siamese coast collectively called *Tākwā* in the *Al-'Umdat* and *Al-Minhāj.* Their northernmost point is at *Fālī,* which is, in fact, the two islands of *Mali* and *Mali Nge (Fālī* can be transcribed from the syllable *'Mali'* in their names). To the south is

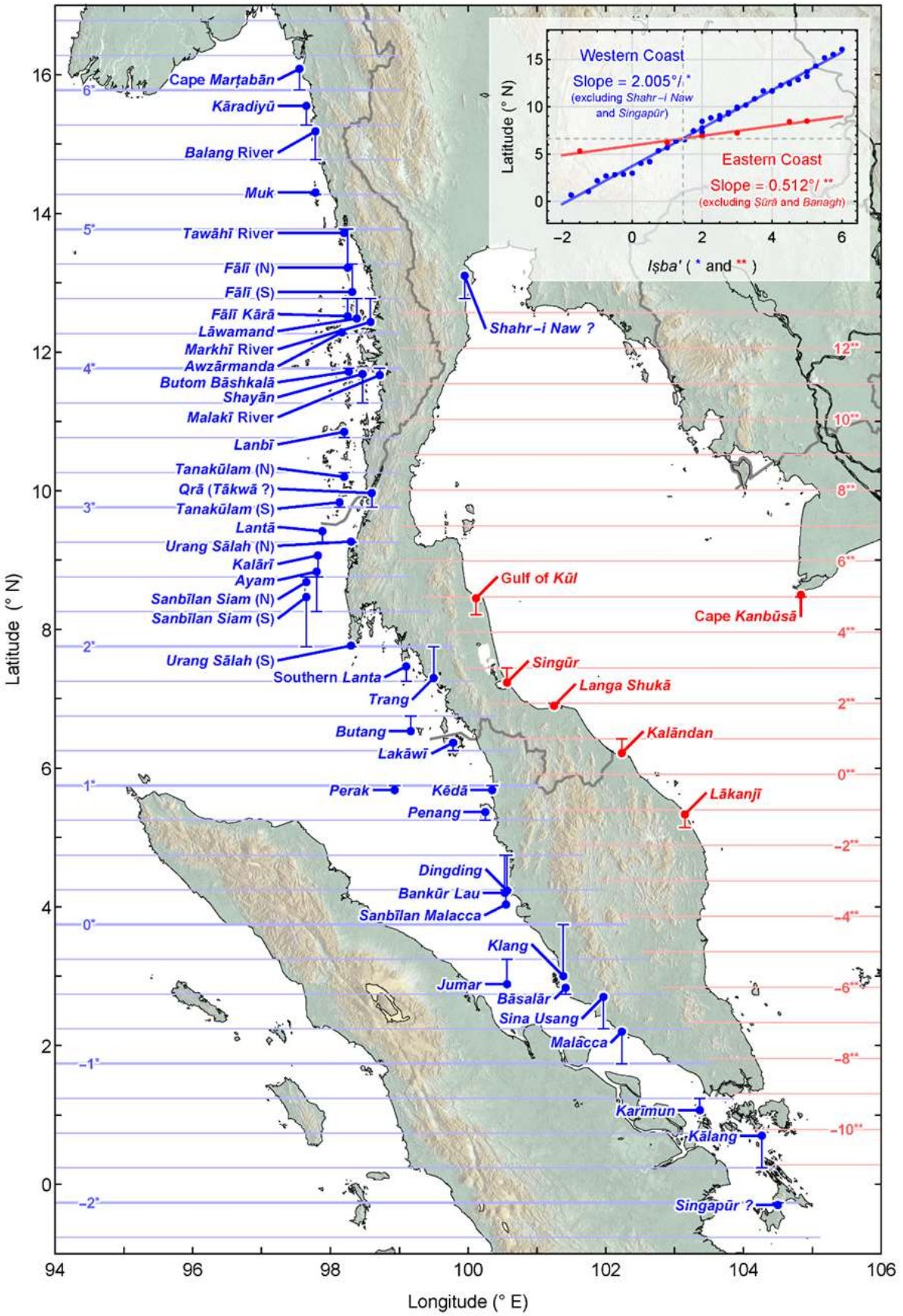

Figure 2: Proposed locations of Arabic toponyms in the Thai–Malay Peninsula from the fifteenth to seventeenth centuries CE. Toponyms and their related information on the western coast (the Andaman Sea and the Malacca Strait) are shown in blue, while that of the eastern coast (the Gulf of Thailand and the South China Sea) are shown in red. The overlaid graph shows those transformation functions which convert the Pole Star's angle into the geographical latitude (map: Peeravit Koad and Thatdao Ratmak).

Fālī Kārā (also *Fālī Kabar* in a passage of the *Al-Minhāj*) or the Maingyi Island, which is located to the west of *Lāwamand* (likely Kadan Island, in which the origin of this Arabic name is unknown) and the mouth of the *Markhī* River (the Tanintharyi River near the city of Myeik), respectively. It is also remarked in the *Al-Minhāj* that *Markhī* and *Malakī* (possibly the Lenya River) are two harbors of the inland city of Tenessarim (Chinese *Dānàsīlǐ*, Cantonese *Daap*^{3}*naa*^{6}*si*^{1}*lei*^{5}, in the Máo Kūn Map) (Mills, 1970: 287). *Markhī* and *Malakī* likely have connections with Mergui, the old name of Myeik and nearby islands. Between them is *Awzārmanda* (Haycock Island), which is said in the *Al-'Umdat* to have the appearance of a large sail (triangular shape when viewed from sea level).

After these are a chain of four islands called *Butom Bāshkalā* (the Paeker, Sabi, Money, and Letsok-aw Islands), then *Shayān* (Kanmaw Island), and *Lanbī* (Lanbi Island). *Butom Bāshkalā* is separately called *Buttom* and *Bataqālah* in the *Ḥāwīyat*, while *Lanbī* was also called *Līnī* in the *Al-'Umdat* and *Kayni* in the *Al-Minhāj*. The possible origin of the Arabic name *Butom Bāshkalā* is a native name in the ancient Mon language. The name *Shayān* was transcribed from the indigenous people's old name of Kanmaw Island (Wheatley, 2017: 235). The Arabic name *Lanbī* also indicates that the name of the Lanbi Island has remained unchanged for many centuries.

The toponym *Tākwā* as the name of a strait located at 3* from the Pole Star appeared in the *Ḥāwīyat*. Note that this 3* is the same as *Qrā* in the *Al-Minhāj* that points to the latitude around Kawthaung in southern Myanmar as well as Ranong and the northern part of Phang Nga in southern Thailand (Table 1 and Figure 2). The toponym *Qrā* can be associated with the name of the city that was contemporary with *Singūr*, a port city on the Gulf of Thailand. If *Singūr* was established in CE 1605 and was mentioned in the *Al-Minhāj* of the seventeenth century CE in the same passage as *Qrā*, then it is also possible that the city of *Qrā* was established not later than the seventeenth century CE. It is undoubtedly transcribed into *Kra* (the City of the Pig in the *Tamnan Phrathat*) that still exists today as the name of the Kra Buri River as well as the Kra Isthmus (Table 2 and Figure 3) (Anonymous, 2017: 160, 181; Wyatt, 1975).

The older name *Tākwā*, also called *Dúguà* (Cantonese *Duk*^{6}*gwaa*^{3}) under *Dúguà Tóu Shān* (where *Tóu* means head and *Shān* means mountain in Chinese) in the Máo Kūn Map, were likely derived from the ancient port city which possibly has its variants in many languages (Mills, 1970: 285). These include *Takkola* in Pali (in the *Mahāniddesa* written not later than the third century BCE and the *Milindapañhā* from the third to fourth centuries CE) (Beaujard, 2019: 479; Bennett, 2018; Sarkar, 1981), *Dōulú* in pre-Han Chinese (pronounced as *Dou*^{1}*lou*^{4} in Cantonese, from the *Hànshū* dated CE 111) (Pachow, 1960; Sarkar, 1981; Wang, 1958: 19, 22; Xiong and Lin, 2018), *Dōukūn* in post-Han Chinese (*Dou*^{1}*gwan*^{4} in Cantonese, from various records starting from the mid-third century CE) (Wang, 1958: 38), *Takōla* in Greek (in Ptolemy's *Geōgraphikē Hyphēgēsis* from the second century CE) (Berggren and Jones, 2000; McCrindle, 1927: 197–198; Renou, 1925: 45–46; Russo, 2013), and *Talaittakkolam* (where *Talai* means head in Tamil) as appearing in the Tanjore inscription dated CE 1030 found in Tamil Nadu, India (Table 2) (Majumdar, 1937: 203, 206; Skilling, 1997). The name *Tanakūlam* in the *Al-'Umdat* and *Batakūlam* in the *Al-Minhāj* (the Zadetkalay and Zadetkyi Islands in southern Myanmar) may be transcriptions of their Tamil names in the Malay language. *Tākwā* has also been transcribed into *Takua*, which means lead (a chemical element) in Thai and still exists today as the name Takua Pa and Takua Thung (districts of Phang Nga in southern Thailand).

The next group of islands, from north to south, are *Lantā*, *Kalārī*, *Ayam*, and *Sanbīlan Siam* (the Similan Islands, from the Ba-ngoo Island southward to the Huyong Island). However, as the configuration of islands in this area is not complicated compared to southern Myanmar, all toponyms in this area can be identified with great certainty. Therefore, it is clear that *Lantā* is not a single island but the Surin Islands, *Kalārī* (also called *Kahādī* in the *Al-Minhāj*) is now Tachai Island, *Ayam* (lit. chicken in Malay) becomes Bon Island, and *Sanbīlan Siam* (from *sembilan*, means nine in Malay) is still called the Similan Islands.

The last island in the Andaman Sea was described in the *Al-'Umdat* as a large and long island called *Urang Sālah* where its northernmost point is a cape facing *Lantā*, and the southern-most cape faces the southern limit of *Sanbīlan Siam*. However, there is no island as described but the coastline of Phang Nga and Phuket in southern Thailand. The northernmost cape of *Urang Sālah* is probably located at Ra Island in Phang Nga, and its southernmost cape is undoubtedly Cape Promthep in Phuket (Table 1 and Figure 2). The Malay name *Ujong Salang* (lit. Tip *Salang*) was transcribed into *Urang Sālah* by the Arabs. It was likely transcribed into *Xìlán* (Cantonese *Sai*^{3}*laan*^{4}) by the Chinese, which appeared in the *Zhū Fān Zhì* as

Table 2: Selected toponyms in the Thai–Malay Peninsula in Tamil (from the Tanjore inscription dated CE 1030), Chinese from the thirteenth to fourteenth centuries CE and the seventeenth century CE, Arabic from the fifteenth to seventeenth centuries CE, and Thai (the *Tamnan Phrathat* from the seventeenth century CE). Chinese names from the seventeenth century CE are marked with asterisks. Nakshatras (animals) associated with Thai names are given within parentheses.

Tamil (Tenth Century CE)	Chinese (Thirteenth to Fourteenth and Seventeenth Centuries CE)	Arabic (Fifteenth to Seventeenth Centuries CE)	Thai (Seventeenth Century CE)	Proposed Location
Western Coast (Andaman Sea and Malacca Strait)				
Talaittakkolam	*Dúguà**	*Tanakūlam, Tākwā, Qrā*	*Kra* (Pig), *"Takua" Thalang* (Dog)	Kawthaung, Ranong, Phang Nga
Talaittakkolam	*Xìlán*	*Urang Sālah*	*Takua "Thalang"* (Dog)	Phang Nga, Phuket
—	—	*Trang*	*Trang* (Horse)	Trang
Kaḍāram	*Jiāluóxī, Jídá**	*Kēdā*	*Sai* (Naga)	Kedah
—	*Mǎnlájiā**	*Malacca*	—	Malacca
Eastern Coast (Gulf of Thailand and South China Sea)				
—	—	—	*Chumphon* (Goat)	Chumphon
—	*Qiánmài Bádá**	—	*Bantaysamo* (Monkey)	Surat Thani (Chaiya)
—	—	—	*Sa Ulao* (Rooster)	Surat Thani (Kanchanadit)
Mādāmaliṅgam	*Dānmǎlíng*	*Kūl*	*Śrīdharmarāja*	Nakhon Si Thammarat
Māyiruḍiṅgam	*Rìluótíng*	*Ṣūrā ?*	—	Songkhla (Sathing Phra Peninsula)
—	*Fóluōān, Shālǐ Fóláiān**	—	*Phatthalung* (Snake)	Phatthalung
—	*Péngfēng, Péngkēng, Pénghēng**, *Sūngūnà**	*Banagh ?, Singūr*	*Pahang* (Rabbit)	Songkhla (Mueang Songkhla)
Ilaṅgāśokam	*Língyásījiā, Dànǐ**, *Lángxījiā**	*Langa Shukā*	*Tani* (Bull)	Pattani (Mueang Pattani)
—	*Xī**	—	*Say* (Rat)	Pattani (Saiburi)
—	*Jílándān, Gūlándān**	*Kalāndan*	*Kalantan* (Tiger)	Kelantan
—	*Dēngyánóng, Dīngjiàlù**	*Lākanjī*	—	Terengganu
—	*Péngháng**	—	—	Pahang

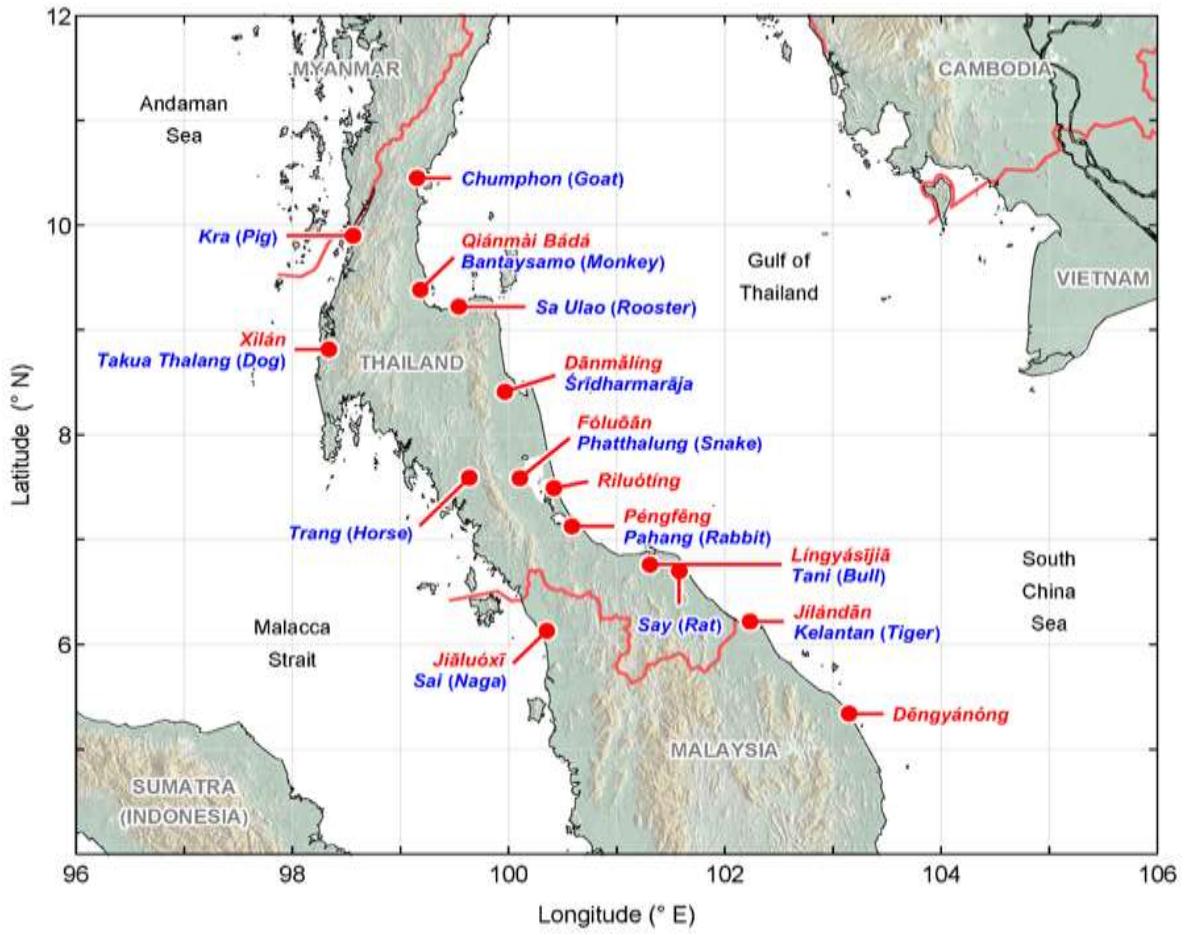

Figure 3: Proposed locations of some dependencies of Śrīvijaya in the Thai–Malay Peninsula mentioned in the *Zhū Fān Zhì* from CE 1225 (red text) compared to Śrīdharmarāja (the capital city) and surrounding Nakshatra cities which appeared in the Tamnan Phrathat compiled not earlier than the third quarter of the seventeenth century CE (blue text) (map: Peeravit Koad and Thatdao Ratmak).

a dependency of *Śrīvijaya*, *Junk Ceylon*, and *Jonselon* by the Europeans in their seventeenth century CE maps, and *Thalang* by the Siamese. *Takua* and *Thalang* in Thai were mentioned together as the name of a single city *Takua Thalang*, the City of the Dog in the *Tamnan Phrathat* (Table 2 and Figure 3) (Anonymous, 2017: 160, 181; Wyatt, 1975). *Thalang* also becomes the modern-day name of a district in Phuket.

Note that the Malay name *Ujong Salang* or "Tip" *Salang* is also connected by meaning to a place referred to as the 'Promontory' beyond *Takōla* in Ptolemy's *Geōgraphikē Hyphēgēsis*, *Talaittakkolam* or 'Head' *Takkolam* in the Tanjore inscription, and *Dúguà Tóu Shān* (the obvious translation, meaning the mountain of 'Head' *Dúguà*) in the Máo Kūn Map. The words promontory, tip, and head all signify a cape or headland, which is undoubtedly located in present-day Phuket in Thailand. However, the pronunciation of names of this cape or headland in various languages indicates that they all originated from the name *Takkola* in Pali, which first appeared not later than the third century BC. It also suggests that the territory of *Takkola* once reached the southernmost point of Phuket.

3.3 Toponyms on the Malacca Strait

Along the coast of the Malacca Strait in Thailand, there are *Trang*, Southern *Lanta*, and *Butang*. *Trang*, undoubtedly the modern-day Trang River, appeared only in the *Al-Minhāj* in the same passage as *Qrā* and *Singūr*. *Trang* was also mentioned as the City of the Horse in the *Tamnan Phrathat* (Anonymous, 2017: 160, 181; Wyatt, 1975). Southern *Lanta* (to distinguish it from *Lantā* or the Surin Islands described earlier) is still called Lanta Island, off the coast of Krabi. *Butang* is likely Butong Island, a small island and a part of the Adang-Rawi Islands. It was also called *Gǔlìyóu Bu-dòng* (Cantonese *Gu*^{2}*lik*^{6}*jau*^{4} *Bat*^{1}*dung*^{6}, from *Pulau Butong*) in the Máo Kūn Map (Mills, 1970: 285). The *Al-Minhāj* also explains that it marks the southern limit of the *Tākwā* Islands (where its northern limit is at Mali Island in Myanmar).

In Malaysia, all Arabic toponyms can be easily identified with modern-day locations since their names in Malay are mostly unchanged (Table 1 and Figure 2). These include *Lakāwī* (Langkawi Island), *Perak* (lit. silver in Malay, the Perak Island), *Kēdā* (Merbok River in Kedah), *Penang* (lit. betel palm in Malay, Penang Island), *Bankūr Lau* (Pangkor Laut Island), *Sanbīlan Malacca* (the Sembilan Islands), *Klang* (Klang River), *Jumar* (Jemur Island), and *Malacca* (Malacca). Some Arabic toponyms were transcribed from old names, including *Dingding* (Pangkor Island), *Bāsalār* (Bukit Jugra, also known as *Parcelar* in European maps), and *Sina Usang* (Negeri Sembilan, formerly *Sungai Ujong*) (Wheatley, 2017: 234). Similarly, in the Máo Kūn Map, *Lóngyájiāoyǐ* (Cantonese *Lung*^{4}*ngaa*^{4}*gaau*^{1}*ji*^{1}) can be equated with *Lakāwī*, *Jídá* (*Gat*^{1}*daat*^{6}) with *Kēdā*, *Bīnláng* (*Ban*^{1}*long*^{4}, also means betel palm in Chinese) with *Penang*, *Chén Gong Yǔ* (*Can*^{4}*gung*^{1}*jyu*^{4}, lit. old grandfather islet, probably a corrupted transcription of Pangkor) with *Dingding* and *Bankūr Lau*, *Jiǔ Zhōu* (lit. the nine island) with *Sanbīlan Malacca*, *Jílìng* (*Gat*^{1}*ling*^{6}) with *Klang*, *Jī Gǔ Yǔ* (lit. chicken bone islet) with *Jumar*, *Miánhuā Yǔ* (lit. cotton island) with *Bāsalār*, and *Mǎnlájiā* (*Mun*^{5}*laat*^{6} *gaa*^{1}) with *Malacca* (Mills, 1970: 285).

The name Kedah of a present-day Malaysian state has its origin in the name *Kaṭāha*, which was mentioned in many Indian texts from the seventh to eleventh centuries CE (Bennett, 2018; Sarkar, 1981; Suarez, 1999: 45). The Tanjore inscription dated CE 1030 also gave its Tamil variant as *Kaḍāram* (Table 2). In the seventh century CE, it was called *Jiéchá* by a Chinese Buddhist monk who visited this city in CE 672 (Pachow, 1960). But from the eighth to twelfth centuries CE, the Chinese began to call it *Gēluó* (as in the *Xīn Tángshū*) around the same time when the Arabs called it *Kalāh* (as in the *Tārīkh al-Hind*, *Nuzhat al-Mushtāq*, and *Mu'jam al-Buldān*) (Sarkar, 1986; Sastri ,1949: 62–65; Suarez, 1999: 52–53; Wang, 1958: 105; Zakharov, 2012). These Arab records also described a tin mine in this city and called this chemical element *Kalahī*, *Qala'ī*, or *Qal'ī* (Wheatley, 2017: 216–220). These Arabic words were transcribed into Chinese as *Jiāluóxī* (Cantonese *Gaa*^{1}*lo*^{4}*hei*^{1}) as appeared in the *Zhū Fān Zhì* (Table 2) (Sastri, 1949: 90), and also the name *Grahi* inscribed on the pedestal of a large bronze image of the Buddha sheltered by the seven-headed Naga dated CE 1183 found at Surat Thani in southern Thailand (de Casparis 1967; Sastri 1949: 91–92, 133). However, the Siamese in the seventeenth century CE called this city *Sai* (lit. fig in Thai), the City of the Naga in the *Tamnan Phrathat* (Table 2 and Figure 3) (Anonymous, 2017: 160, 181; Wyatt, 1975).

In Indonesia near Sumatra, there are *Karīmun*, *Kālang*, and *Singapūr*. *Karīmun* and *Kālang*, which are undoubtedly the Karimun Islands and the Galang Islands, respectively. *Karīmun* can also be equated with *Jílìmén* (Cantonese *Gat*^{1} *lei*^{6}*mun*^{4}), a transcription in the Máo Kūn Map (Mills, 1970: 280). For *Singapūr*, it was mentioned in the *Ḥāwīyat* with

the Guardians' angle of 6* (equivalent to a Pole Star angle of −1*) while in the *Al-'Umdat* and the *Al-Minhāj* it is 5.00* from the Guardians or −2.00* of the Pole Star. Angle values in the *Ḥāwīyat* may have been recorded using the lower accuracy of 1*, while that in the *Al-'Umdat* and the *Al-Minhāj* is ¼*. Therefore, the angle of *Singapūr* in the *Ḥāwīyat* is probably inaccurate. If this assumption is correct, then the Pole Star angle of −2.00* points to the possible location of *Singapūr* among the present-day Singkep–Lingga Islands (Table 1 and Figure 2). (Note the similarity between the name *Singapūr* and Singkep.) This location raises a question: is the island of *Singapura*, where Prince Paramesvara reigned during the late fourteenth century CE, the Singkep–Lingga Islands and not the present-day island of Singapore? The Máo Kūn Map called the latter *Dànmǎxī* (Cantonese *Daan*^{1}*maa*^{5}*sek*^{3}), a transcription of *Tumasik* or *Temasek*, the old name of Singapore itself (Mills, 1970: 279). Moreover, it was stated in both the *Al-'Umdat* and the *Al-Minhāj* that *Singapūr* is the southernmost part of Siam (Wheatley, 2017: 234, 240).

3.4 Toponyms on the Gulf of Thailand and the South China Sea

Shahr-i Naw on the Gulf of Thailand, with its Pole Star angle of 4.50* as given in the *Al-'Umdat*, can be located at present-day Phetchaburi (a port city in the Kingdom of Ayutthaya) in the upper part of the Thai–Malay Peninsula (Table 1 and Figure 2). However, it was later used to refer to the Kingdom of Ayutthaya itself. This name is derived from a Persian name *Shar-i Naw*, which also has other variants in European maps from the fifteenth to eighteenth centuries CE (Wheatley, 2017: 235, 237, 240).

The location of *Qiánmài Bádá* (Cantonese *Cim*^{4}*maai*^{6} *Bat*^{6}*daap*^{6}), which it was incorrectly read separately as *Qiánmài* and *Bádá*, cannot be reasonably located by modern scholars (Wheatley, 2017: 71–72). However, suppose this name is rearranged as *Bádá Qiánmài*, it seems to be transcribed from the name *Bantaysamo*, the City of the Monkey in the *Tamnan Phrathat*, which can be located in the present-day Chaiya District in Surat Thani (Table 2 and Figure 3) (Anonymous, 2017: 160, 181; Wyatt, 1975). From Chaiya, across the Bandon Bay for about 40 km in the southwest direction is the mouth of the Tha Thong River in present-day Kanchanadit District in Surat Thani. The name of this river (lit. the golden port) is identified with *Sa Ulao*, the City of the Rooster in the *Tamnan Phrathat* (Anonymous, 2017: 160, 181; Wyatt, 1975). Note that *Qiánmài Bádá* or *Bantaysamo* (as well as nearby *Sa Ulao*) in Surat Thani were not mentioned in Arab records used in this study, possibly because it was found later, or the Bandon Bay was not a popular stop for the Arabs (this will be addressed later).

The Gulf of *Kūl*, which most scholars have located at Kuiburi District in Prachuap Khiri Khan, is the name of a gulf that lies to the south of *Shahr-i Naw* at a similar latitude to Cape *Kanbūsā* (Cape Cà Mau in Vietnam). The latter has the Pole Star angle of 5.00** and is located southeast of *Shahr-i Naw*. Therefore, it is clear that the Gulf of *Kūl* refers to the Pak Phanang Bay (also called the Ligor Bay) in Nakhon Si Thammarat (Table 1 and Figure 2). *Kūl* is probably the shortened transcription of a syllable 'khon' in *Lakhon*, one of the old names of Nakhon Si Thammarat.

Banagh, which has a Pole Star angle of 4.00**, frequently appeared as a checkpoint for Arab sailors from the fifteenth to seventeenth centuries CE. Another contemporary port city named *Ṣūrā* at 4.25**, is located to the north-northwest of *Banagh*. Neither *Ṣūrā* nor *Banagh* can be identified with certainty. However, they should be located somewhere along the coastline from the southern part of Nakhon Si Thammarat to the Sathing Phra Peninsula in Songkhla. It is also *Singūr* with the Pole Star angle of 3.00**, which appeared only once in the *Al-Minhāj*. It is undoubtedly the transcribed name of the Sultanate of *Singora* in present-day Singhanakhon District in Songkhla (Table 1 and Figure 2). In the Máo Kūn Map, it was also transcribed as *Sūngūnà* (Cantonese *Syun*^{1}*gu*^{1}*naa*^{6}) (Mills, 1970: 277).

Among the dependencies of *Śrīvijaya* in the early thirteenth century CE, as listed in the *Zhū Fān Zhì*, *Dānmǎlíng* (Cantonese *Daan*^{1}*maa*^{5} *ling*^{6}), and *Língyásījiā* (*Ling*^{4}*ngaa*^{4}*si*^{1}*gaa*^{1}, also *Langa Shukā* in the *Al-Minhāj*), or *Mādāmaliṅgam* and *Ilaṅgāśokam* in Tamil, are undoubtedly transcribed from the old names *Tāmbraliṅga* and *Laṅkāsuka* in modern-day Nakhon Si Thammarat and Pattani in Thailand, respectively (Table 2 and Figure 3). The *Zhū Fān Zhì* also described how from *Dānmǎlíng* one could sail to *Língyásījiā* within six days, and from *Língyásījiā* one can sail to *Fóluōān* within four days (Suarez, 1999: 46; Wheatley, 2017: 67–69). All of them are also connected through the land route. If *Dānmǎlíng* is located in Nakhon Si Thammarat and *Língyásījiā* is in Pattani (about 260 km apart), then *Fóluōān* can be located either north or south of *Língyásījiā*. For the former case, it implies that one can sail from *Dānmǎlíng* in a southerly direction to *Fóluōān* within two days, which points to its possible location in Phatthalung, and one can also sail further south for four days (about 170 km) to

Língyásījiā. For the latter case, four days' sail in a southerly direction from *Língyásījiā* points to a location which is too close to the proposed location of *Jílándān* in Kelantan. The *Dǎoyí Zhìlüè* also stated that *Dānmălíng* bordered *Shālǐ Fóláiān* (*Saa*^{1}*lei*^{5} *Fat*^{6}*lai*^{4}*ngon*^{1}, another variant of *Fóluōān*) (Wheatley, 2017: 77). Therefore, the most probable location of *Fóluōān* is in present-day Phatthalung to the west of Thale Luang in southern Thailand (Figure 3). The Cantonese pronunciation of *Fóluōān* as *Fat*^{6}*lo*^{1} *ngon*^{1} also suggests that it is a transcription of the name *Phatthalung*. *Phatthalung* was also mentioned in the *Tamnan Phrathat* as the City of the Snake (Table 2) (Anonymous, 2017: 160, 181; Wyatt, 1975).

The later *Sāncái Túhuì* from CE 1609 located *Fóluōān* in Phatthalung at a sailing duration of four days from *Sānfóqí* or *Śrīvijaya* (not from *Língyásījiā* as in the *Zhū Fān Zhì*) and also connected by the land route (Wheatley, 2017: 69). Obviously, one cannot reach *Śrīvijaya* which had its capital city in Sumatra from Phatthalung within a sailing time of four days or even using the land route (since one has to cross the Malacca Strait). *Sānfóqí* in the *Sān-cái Túhuì* was not located in Sumatra but in the Thai–Malay Peninsula. If *Sānfóqí* was situated to the north of *Fóluōān*, then their sailing distance of about 200 km is supported by the sailing time of four days which is also similar from *Fóluōān* southward to *Língyásījiā* as described earlier. This evidence confirms that *Fóluōān* is located in Phatthalung, and *Sānfóqí*, in the view of the Chinese during the Ming Dynasty, is located in Surat Thani (Figure 3). It also suggests that, although *Śrīvijaya* in Sumatra had come to its end in the late fourteenth century CE, *Śrīvijaya* in southern Thailand at the Bandon Bay still flourished at least till the early seventeenth century CE. The latter served as an active entrepot for the Chinese then (but not for the Arabs as its name cannot be found in their records).

To the east of Phatthalung, across the Thale Luang, is a long and narrow land called the Sathing Phra Peninsula (a part of Songkhla) (Figure 3). The modern-day name Sathing and the Chinese name *Rìluótíng* (*Jat*^{6}*lo*^{4}*ting*^{4}) are believed by scholars to be transcribed from the old name of the Peninsula itself, which appeared as early as the eleventh century CE as *Māyiruḍiṅgam* in Tamil (Table 2).

It is also said in the *Zhū Fān Zhì* that *Fóluōān* adjoins *Péngfēng* (*Pung*^{4}*fung*^{1}). If *Fóluōān* is located in Phatthalung and to its north is *Dānmălíng*, then *Péngfēng* must be located to the south in modern-day Songkhla (Figure 3). Recall that one can sail from *Fóluōān* to *Língyásījiā* within four days. This statement means that *Péngfēng* is located halfway between *Fóluōān* and *Língyásījiā*. About a century later, the *Dǎoyí Zhìlüè* described that *Péngkēng* (Cantonese *Paang*^{4}*haang*^{1}, a variant of *Péngfēng*) is surrounded by rugged and steep mountains which look like "… a level rampart …" from afar (Wheatley, 2017: 78–79, 90). This description fits well with the geography of Khao Daeng at Songkhla in southern Thailand (the mouth of the Pahang River in Malaysia has no nearby mountain). The *Kūnyú Wànguó Quántú* also placed *Pénghēng* (Cantonese *Paang*^{4}*hang*^{1}, another variant of *Péngfēng*) to the north of *Dàní* (*Daai*^{6}*nei*^{6}, undoubtedly from *Tani*, the City of the Bull in the *Tamnan Phrathat*) (Anonymous, 2017: 160, 181; Wyatt, 1975).

Some scholars believe that *Banagh* is a transcription of the Malay name *Pahang*. If *Péngfēng*, *Péngkēng* and *Pénghēng* are also transcriptions of *Pahang*, then it implies that *Banagh* is the Arab name of the same port city in Songkhla. It also suggests that the actual Pole Star angle at *Banagh* might be 3.00**, similar to that of *Singūr* in present-day Songkhla (instead of 4.00** as given in both the *Al-'Umdat* and the *Al-Minhāj*). This information supports the possible location of the old *Pahang* in Songkhla (Figure 3). This *Pahang* was also mentioned in the *Tamnan Phrathat* as the City of the Rabbit (Table 2) (Anonymous, 2017: 160, 181; Wyatt, 1975).

Shortly after the establishment of *Singora* in CE 1605, a state named *Péngháng* (Cantonese *Paang*^{4}*hong*^{4}) appeared in the Máo Kūn Map from CE 1628 at modern-day Pahang in Malaysia (Mills, 1970: 277). It is possible that the Arabic name *Singūr* in the *Al-Minhāj* was added later (not earlier than the establishment of *Singora*) without realizing that it was the successor to *Banagh*. (This is why the *Al-Minhāj* used in this study should be dated not earlier than CE 1605.) Moreover, using the same reasoning, it can be deduced that present-day Pattani was still called *Laṅkāsuka* in the early seventeenth century CE as the Máo Kūn Map also mentions the name *Lángxījiā* (Cantonese *Long*^{4}*sai*^{1}*gaa*^{1}, another variant of *Língyásījiā*) after it was changed to *Tani* before that time since the slightly earlier *Kūnyú Wànguó Quántú* already called it *Dàní* (Mills, 1970: 277).

In the *Zhū Fān Zhì*, *Jílándān* (*Gat*^{1}*laan*^{4} *daan*^{1}, also called *Kalāndan* in the *Al-Minhāj*) and *Dēngyánóng* (*Dang*^{1}*ngaa*^{4}*nung*^{4}) can be indeed identified with Kelantan and Terengganu in Malaysia, respectively (Table 2 and Figure 3). The Arabic name *Lākanjī* was pos-

sibly derived from *Kenyir*, the name of a lake in Terengganu. In the Máo Kūn Map, Kelantan and Terengganu were also called *Gǔlándān* (*Gu*^{2}*laan*^{4}*daan*^{1}) and *Dīngjiàlù* (*Ding*^{1}*gaa*^{1}*lou*^{4}), respectively. Also, in this map, the modern-day Saiburi District in Pattani was called *Xī* (Cantonese *Sai*^{1}) and located to the north of *Gǔlándān* (Mills, 1970: 277). *Xī* is undoubtedly the transcription of the name *Say*, the City of the Rat in the *Tamnan Phrathat* (to its south is *Kalantan*, the City of the Tiger) (Table 2) (Anonymous, 2017: 160, 181; Wyatt, 1975).

Terengganu was not counted among the Nakshatra cities in the *Tamnan Phrathat*. If *Pahang* in this record was located in present-day Pahang in Malaysia, then it means that the list of Nakshatra cities curiously omitted Songkhla and Terengganu (Figure 3). Therefore, it is more likely that *Pahang*, the city of the Rabbit, is located in Songkhla. In this case, the *Tamnan Phrathat* from the seventeenth century CE might have used the name *Pahang* from older sources without realizing that it is the old name of *Singora*.

4 SUMMARY AND CONCLUSIONS

Performing a linear least squares approach with the angle of the Pole Star in Arab records shows two different systems for measuring it. Accurately estimating their conversion factors helps in precise geolocation, especially for toponyms along the Gulf of Thailand and the South China Sea. Using these different angular factors also proposes a new way of interpreting some confusing Islamic astronomy issues that typically use a single conversion factor, and confirms the content from contemporary evidence (recorded from their authors' direct experiences.) For example, *Singapūr* in Arab records can be located in the present-day Singkep–Lingga Islands in Indonesia (not Singapore), and *Fóluōān* in the Chinese records from the thirteenth to fourteenth centuries CE can be located in Phatthalung in southern Thailand (not in Sumatra). Moreover, the Chinese' *Sānfóqí* or *Śrīvijaya* in the seventeenth century CE, can be located in Surat Thani in southern Thailand, which explains why the present-day people in Surat Thani believed that their homeland was once the seat of *Śrīvijaya*.

Etymological analysis of toponyms in different languages also provides clues to their actual locations and solves contradictions in Thai–Malay Peninsula history. For example, the oldest continuation of a toponym in this region is *Takkola* which has been in use since the third century BCE or about 2,300 years ago. This toponym can be associated with the Andaman Sea coastline from Ranong to Phuket in modern-day southern Thailand. Moreover, the Chinese *Xìlán* can be located in Phang Nga and Phuket in southern Thailand (not Sri Lanka). *Jiāluóxī* in the Chinese records is the same as the Arabic name *Kalahī* and *Grahi*, which can be located at Kedah in Malaysia (not Surat Thani in southern Thailand). The Chinese *Péngfēng* before the seventeenth century CE can also be located at Songkhla in southern Thailand (not in present-day Pahang in Malaysia).

The results from this study, which present a multidisciplinary approach combining astronomy, geography, and linguistics, shed new light on studying Thai–Malay Peninsula history. This knowledge of geographical history can also help provide a complete history and anthropology of Southeast Asia before modern times in both spatial and temporal regimes.

5 NOTES

1. Chinese names that appear in this paper follow the Hanyu Pinyin (汉语拼音) romanization system for Standard Mandarin Chinese. Chinese characters associated with them are traditional characters. The Cantonese pronunciations of some Chinese toponyms follow the Jyutping (粵拼) romanization system with tone numbers given in superscript.

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