The Southeast Asian Galleon Trade:
A process towards a re-assessment of human-environment interaction

Jennifer Craig and Carl Hughes
McGill University
Indian Ocean World Centre
Montreal, Canada H3A 0E6
Email: Jennifer.craig2@mail.mcgill.ca
Email: carl.hughes@mail.mcgill.ca

Abstract

In 1939, William Schurz published 'The Manila Galleon' that has been considered a seminal work in maritime history (in the English language). In it, he proposed the shipping route of the galleon trade in the Pacific Ocean during the 16th to 19th centuries. The directional flow of goods were purported to enter eastern Southeast Asia through the Philippine archipelago at the San Bernardino Strait. The same strait was also used as the exit point by the galleons that travelled northeast out of East Asia and east bound across the Pacific. This paper will reconsider Schurz's hypothesis with input from up to date analyses based on environmental data. Our results are displayed in layers on digital seascape in a Geographic Information Systems (GIS) format? These layers include detailed water-surface topography (small islands, atolls, reefs) as well as the dynamic atmospheric and oceanic environment. The data for these layers were gathered from accessible online datasets generated by the National Oceanic and Atmospheric Administration (NOAA). These datasets were then reconfigured into algorithms and models for use in a set of geovisualizations using GIS and Google Earth. This is overlaid with Schurz's hypothesized historic shipping route. The results are a comparison of human-environment interaction and a re-assessment of a 75 year old hypothesis.

Keywords: Chart, Digital, Geovisualizations, Manila Galleon, Maritime, Pacific Ocean

Introduction

This paper is a case study and part of a larger project that re-evaluates historians' works on shipping routes in Southeast Asia from the 14th to mid-18th centuries CE (Common Era) for maritime archaeology purposes. It discusses the methodology to produce dynamic charts that visually represent human-environment interaction. The

direct comparison of contemporary data on human activity and environment action was problematic because there is little information on maritime environment data prior to the mid-19th century. To overcome this issue, we incorporated recent atmospheric and oceanic data generated from readily available reputable sources. The results are an original figure of a chart created in 1939 and three charts created using GIS software. The first figure is William Schurz's interpretation based on the Spanish archives. Of the three figures created by this exercise, the first chart is a detailed shipping route through the Philippines for the eastward journey. Schurz did not repeat the details for the westward journey but he inferred similar directions that were followed through the Philippines to Manila. The second chart showed the breadth of the possible shipping routes eastward bound for the Americas. The third chart showed the breadth of possible shipping routes westward bound across the Pacific Ocean.

Schurz's hypothesis

William Schurz's (1939) 'The Manila Galleon' is considered a seminal work in maritime history (in the English language). Part of the reason why the book had such impact was because it contained *The Chart of the Pacific Ocean* (Fig. 1; henceforth known as Schurz's Chart). This is a visual representation of Schurz's hypothesis of past Spanish shipping activity through the Philippines, across the Pacific Ocean and along the western coast of the Americas. However, the choice to include the figure at the beginning of the book is confusing because the chart did not represent Schurz's whole discussion but only one of his subsections of a chapter. The subsection titled *The Route* (Schurz, 1939: 216-250) is summarized in Schurz's Chart. One can see from this figure that Schurz included the multiple possible routes the Spanish took to establish trade in Southeast Asia. Some of his directions may seem

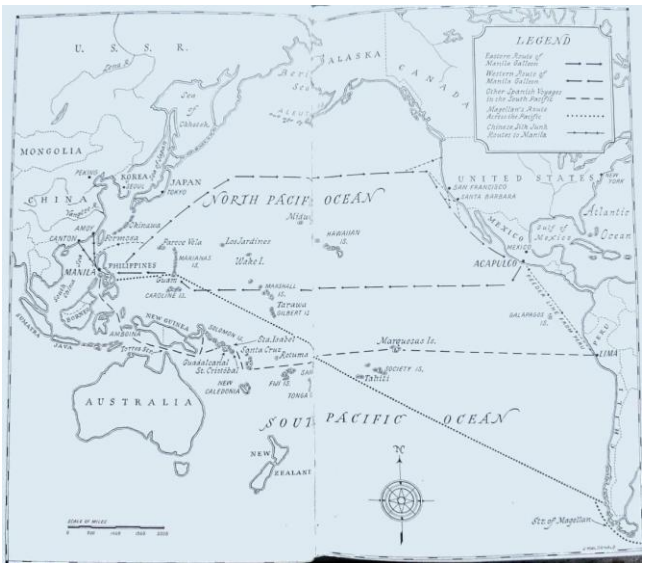

Fig. 1 The Chart of the Pacific Ocean. (Schurz, 1939: no number) Image enhancement by Rachid Hedjam with Synchromedia laboratory, Ecole de technologiesuperieure de Montreal, University of Quebec, Canada.

uncharacteristic of sailing; for example, when the ships heading eastbound suddenly switched direction from northeast to directly east. Other directions were unclear perhaps due to the scale of the chart, such as the route through the Philippines.

The environment these voyages took place was highly dynamic; with air and water movement being the major contributors to the decision-making of shipping activity timing and location but the figure did not include this information. In fact, the water and air look placid, and appears practically non-existent. Perhaps this is a restriction during the time of writing because his text provided details of a very dynamic environment. Schurz expects his readers to be familiar with major planetary environment. For example, he writes of prevailing winds. Understanding where these winds blow are central to appreciating the degrees of latitude ships sailed on the Pacific Ocean's east and west bound routes. Due to the Universal Laws of Gravity between the Earth, the Sun and the Moon, prevailing winds consistently blow across the Pacific Ocean eastward in the prevailing westerlies belt at latitudes 30° to 60° and westwards in the north-east trade winds belt between 5° to 30°(Thurman and Trujillo, 2001). Schurz's exclusion of major water currents is not surprising. At the time of this publication, humans knew next to nothing about the seabed. In 1940, the Woods Hole Institute had just gathered survey information on the Indian Ocean and it was not until 1967 that Mary Tharp had completed her drawings of the bathometric rift and published her results in *Mercador's World* (Tharp, 1967). Since then, oceanographers have discovered the planet's ocean water currents are caused by the prevailing winds and effects of temperature caused by the Earth's molten core seeping through the Earth's Crust at seabed rifts (Thurman and Trujillo, 2001). In the Pacific Ocean, the atmospheric and oceanic action is separated by the Equator into Northern and Southern Hemispheres (Thurman and Trujillo, 2001). In both hemispheres, Subtropical Gyres are formed by the circulatory movement of water currents caused by the California Rift and Mariana Trench, along with wind direction caused by prevailing winds. The currents that form the north Pacific Subtropical Gyre are the Kuroshio Current, at approximately 15º latitude off the east coast of the Philippines, flowing northeast out of the Philippine Sea; to the east flowing the North Pacific Current; to the south, flowing California Current and returns westward across the Pacific Ocean from latitude 10-15º with the North

Equatorial Current (Thurman and Trujillo, 2001). Although these are major systems of the Earth's planetary causes there are other seasonal environmental effects. One of the seasonal details that Schurz discussed is the monsoon.

Schurz pointed out the 'traditional route' took months to complete because of the monsoon winds. The longest stretch of the journey was going through the archipelago from Manila to the Embocadero and crossing the Pacific Ocean. For the purposes of this paper it will suffice to say that the sea, as displayed by Schurz, does not show the dynamism of his text. He expects the reader to be familiar with the local weather patterns and planetary functions known in the 1930s. When he mentions monsoon he does not explain the regularity of shipwreck caused by extreme weather but instead implies this by mentioning the need to be out of harm's way at the start of the season. This is certainly the case for the westbound journey timing to enter the Embocadero and the eastbound journey's timing for leaving Manila. In order to visualize a closer reality to the shipping activities of past sailors, the authors are currently developing a methodology to display dynamic charts with historians' hypotheses included as layers. This will provide a platform for comparisons of data, recognition of gaps in the literature and provide information for maritime archaeologists to recognize areas of potential high-risk for shipwreck of particular cultural groups during specific periods of time. This exercise identifies cultural-group-specific corridors of maritime activity. It identifies locations of Spanish galleons in the Philippines at certain periods of time; or when a shipwreck is located these charts narrow down the possibilities of date and ship-type. Alternatively, it notes if a shipwreck is in an unexpected area, leading to the hypothesis of bootlegging.

Methodology: The Digital Data

Geovisualizations bring the dynamisms of the environment to historians' hypothesized routes. The results of this exercise are displayed in layers on digital seascape in GIS format. These layers include detailed water-surface topography (small islands, atolls, reefs) and the dynamic atmospheric environment. The data for these layers are gathered from online accessible datasets generated by the National Oceanic and Atmospheric Administration (NOAA). These datasets are then reconfigured into algorithms and models for use in a set of geovisualizations using GIS and Google Earth.

This is overlaid with Schurz's hypothesized historic shipping route for comparison and discussion. First, one had to prepare the data for GIS. This required 'point creation' of the geographical locations described in the historian's text. With these points in place the authors followed Schurz's text, the case study, to connect the points and sailing routes. The reader is reminded that the authors were focused on the Southeast Asian portion of Schurz's data so the figures below do not include details about the route from the Pacific Ocean to the western coast of the Americas, nor along that coast. The westbound directions from Acapulco are assumed steady across the Pacific Ocean because, in comparison to the complicated course of the eastbound journey, the westbound journey is described as regular and straight across the Pacific to the Ladrones. For example, to describe the eastward route from Manila to the Embocadero Schurz (1939: 223-4) wrote 23.5 lines of text. From the Embocadero to the point where the galleon crossed the Pacific Ocean, Schurz (1939: 226-7) wrote 14 lines of text. The description for the westward route from Acapulco to Manila however, occupied only 8.5 lines of text (Schurz, 1939: 251-252).

Results: Geovisualizations

For the sake of clarity the 'traditional route' has been subdivided by the authors into six steps: 1) Manila to Embocadero; 2) Eastbound from Embocadero to Ladrones; 3) Eastbound from Ladrones to the Americas; 4) Southbound along the Americas; 5) Westbound from the Americas to Ladrones; 6) West-Northwest bound from Ladrones to Embocadero; 7) Embocadero to Manila. Steps 1, 2, 6 and 7 are displayed in full with only partial discussion of steps 3 and 5. Step 4 is not included in this paper**.** To discuss these locations and the consistent and seasonal environment the authors noted details of timing and direction. Our meaning of the term 'Direction' is specifically the geographical locations of the 'traditional route'. 'Timing' discusses the months chosen for sail which correspond to environment data of seasonal high and low activity. Steps 1 and 7 are displayed in (Fig. 2). The east bound journey was timed to start with the beginning of the southwest monsoon. At this time, the winds were strong and would push the sails of galleons through the archipelago from early May to late September, with preference for timing during mid-June to mid-July (Schurz, 1939: 251-252). The route's direction through the Philippines is provided in minute detail in the book's text

over two pages (Schurz, 1939: 221-222). However, Schurz's Chart (Fig. 1) only showed

Fig. 2 Schurz's hypothesized Spanish galleon 'traditional route' through the Philippines from 1565 to 1730. (Schurz, 1939: 216-283 and Chart created by Carl Hughes)

the exit/entry point of the Embocadero at the San Bernardino Strait. Figure 2 brings to the foreground the following interesting points. The passage for the shipping activity should be littered with shipwrecks. However, at this time the authors are unaware of any underwater archaeology activity from the Verde Passage eastward. Perhaps this has to do with the highly active environment. At this time, there is little data available on the surface currents and wind force of the Philippines. Although an *Oceanography* article discussed some of these details in the Sulu Sea region, the area is outside the route discussed by Schurz (Lermusiaux, et al., 2011). Interestingly, Schurz provided minute details when the route was directed around the entire coast of Capul Island. He included what was viewed at the portside and starboard along with, one of the few times it is mentioned, distance. This may have been the same case for San Bernardino Island

situated near the entrance of the San Bernardino Strait. The directions on how a ship was to sail through this point are confusing, hence the hashed triangle over the island of San Bernardino and out towards Catanduanes, “northeast with Sorsogon coast to port and San Bernardino to starboard; northeast by east seven leagues to the Embocadero with San Bernardino now to port and the island of Biri to starboard” (Schurz, 1939: 222). Step 2 and half of step 3 are displayed in (Fig. 3). Mid-July was recorded as the best time to use the wind power of the monsoon in order to reach and sail across the North Pacific. The Spanish galleons were recorded to regularly leave Manila from mid-June and reach the Embocadero in mid-July; and then head from the 2nd Midpoint to the Americas in September through November. Throughout most of the year, the winds and currents run east from the 2nd Midpoint to the Americas. In (Fig. 3), October is labelled because it is the middle of that period. In order to get to the Ladrones, they would need to rely on the July winds to push them out of the Embocadero, up to the latitude where the current flows eastward and along a narrow band of latitude running parallel to the arrows on Figure 3. Our data shows that north of the July currents, the wind direction is straight north then curves west. If this were the case, then ships may not have only stopped into the Ladrones but also ported the islands south of China and/or Japan. Schurz (1939: 230) did remark that ships reached Japan, “a galleon occasionally passed close enough to make out the mountains of Hondo to the west”. On the chart where the lines are solid, very definitive directions are provided. Where the hashed triangles are is the potential extent of where the ships may have sailed. Schurz does mention the full breadth of the route extended from the Shichi-to Islands to Guam but he is clear that the main area the ships sailed were between the Volcanes and Uracas (Schurz, 1939: 230-231). The ships again follow a very strict route to *Midpoint 1* at 31º latitude and longitude east of Manila 28.5º”, then east northeast on to *Midpoint 2* at between 36º and 37º in longitude 40º. Within the area represented in the key as the Extent of the Route, Schurz indulged in Spanish lore of the islands Rica de Oro and Rica de Plata (‘Rich in Gold’ and ‘Rich in Silver’). He spent some time discussing the importance of these islands and stipulated the reason the ‘traditional route’ remained on course for the length of time it did was because of these islands. Rica de Oro and Rica de Plata had multiple locations over hundreds of years. They were often likened to

Ptolemy's Argyre and Chryse. Henry Yule (1882) placed a start point from Orissa, West Coast India and sailed east across the Bay of Bengal to Argyre (in Arakan, Burma) in parallel to the Ganges. From there one went south to Chryse within Indo-China (i.e. Pegu and Irrawady Delta of Myanmar/Thailand). In 1885, William Muir in his publication on the Annual Report of the Royal Asiatic Society cited Yule but went on to place Ptolemy's Argyre in Arakan, Burma and Chryse as a misnomer (Muir, 1885). This is interesting timing as the British were attempting to colonize this part of the planet. Later, when the Americans displayed strong presence in the Pacific Ocean, Japan was thought to be Chryse / Rica de Plata (Chassigneux 1933; Moriarity and Roberts 1975). Considering these comments, the authors believe this is still an area open for debate and one that seems to move geography according to political maneuvers in colonization.

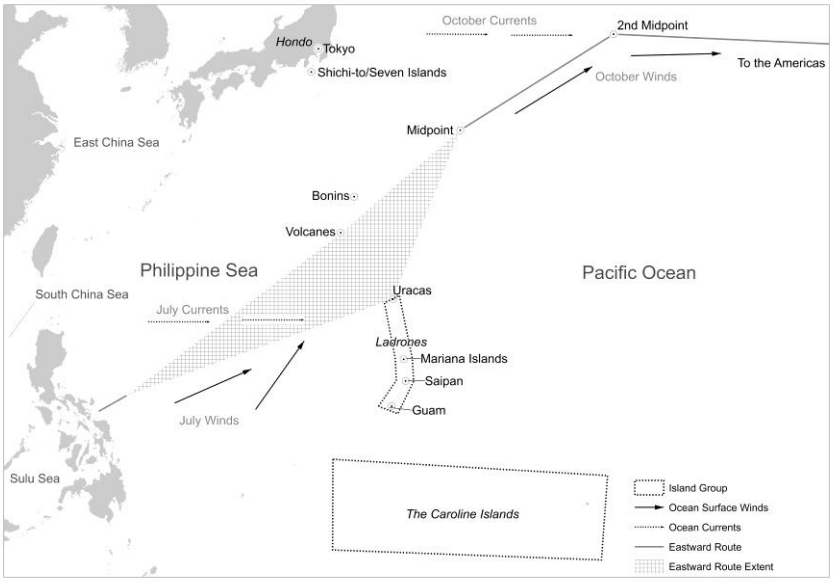

Fig. 3 Schurz's 'traditional route' eastward from the Embocadero to mid-way across the Pacific Ocean. (Schurz, 1939: 216-283 and Chart created by Carl Hughes)

Half of step 5 and all of step 6 are displayed in (Fig. 4). The westbound voyage was timed based on the Philippines' northeast monsoon. It was recorded as best timing to have the galleons in Manila by mid-April. This journey was only a matter of weeks so the suggested date for leaving Acapulco was during the month of February through to the end of March (Schurz, 1939: 225). Spanish galleons sailed westbound from the Americas to Ladrones, then west bound from Ladrones to Embocadero. The westbound journey, like the eastbound, also had a wide zone of possible sail route. Within which any of the islands from the Marianas to Guam were potentially ported. A Royal Decree in 1668 declared Guam as a regular stop point for all Manila Galleons. In 1681, Guam

was fortified and a royal governor and friars were sent to administer and convert the local populace in the name of the Spanish crown. When timing is considered, Schurz referred to Humbolt on the 'serenity of the sky', and did not mention a specific month in which the galleons had favorable conditions; except that it was best to enter the Embocadero prior to the start of the northeast monsoon that runs from late April to early October. This corresponds with Schurz's (1939: 225, 252) comments that galleons were not expected to reach Manila again until mid-April.

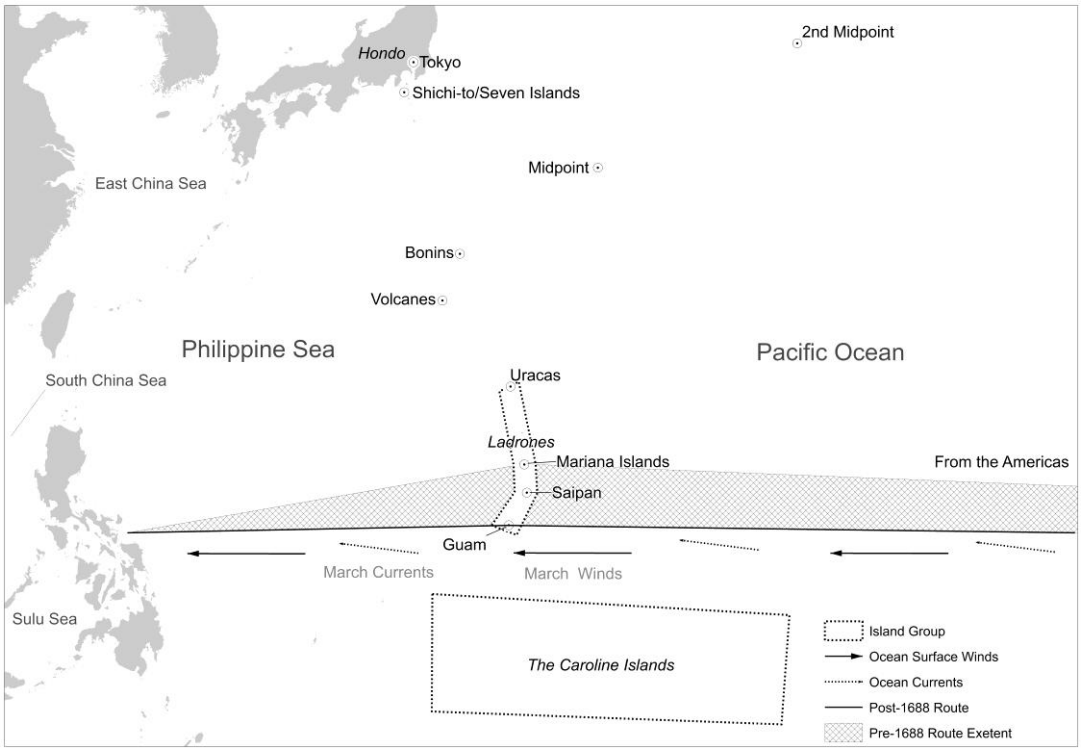

Fig. 4 Schurz's 'traditional route' westward from the mid-Pacific Ocean, through the Ladrones to the Embocadero. (Schurz, 1939: 216-283 and Chart created by Carl Hughes)

Discussion and Conclusion

The authors provided a methodology to create geovisualizations that displayed the complex seascape of exchange with details on shipping activity directions and timing. There are many and varied details to consider if one were to reassess the whole of Schurz's chart so the authors narrowed their focus to only Southeast Asia and the western Pacific Ocean portion of Schurz's 'traditional route', namely the Philippines and the Ladrones. The Philippines is an archipelago of over 7,000 islands that topographically intercepts the force of the Pacific Ocean in the Philippine Sea as it

moves over/through the archipelago to continue to flow into the South China Sea, Sulu Sea and the Indonesian Throughflow. The Ladrones are the Marianas Islands (Schurz, 1939: 247), an archipelago to the east of the Philippine Sea and at the western boundary of the Pacific Ocean. The directional flow of goods were purported to enter westward into east Southeast Asia through the Philippine archipelago at the San Bernardino Strait. The same strait was also the exit point; then northwards close to Japan with the eastbound route out of East Asia and across the north Pacific. The locations mentioned in the text were all located and pinpointed on digital charts, along with lines drawn or hashed-marks used to display breadth of route. The geovisualizations provided more complete and dynamic figures to accompany the details of Schurz's text. It also pointed out the locations of unexpected activities on the route, such as sailing around the entire island of Capul in the Philippine archipelago. With these more detailed figures, we can begin to surmise the possibility of bootlegging having occurred in the Ladrones. This area was visited by both the eastbound and westbound journeys. The long stay and the false ship manifests are other indicators that this area was a potential hotspot for illicit activity.

The outcome of this exercise pointed out the inconsistencies between the text and figures. Schurz's original chart (Fig. 1) showed an overlap of multiple documents. The key associated to the Schurz's Chart entailed five routes, however in his text he discussed more. Schurz suggested that the galleon trade occurred within the period from 16th to 19th centuries, specifically from 1565 to 1815. The 'traditional route' existed from 1565 to 1762 without much argument but from 1762 to 1814 various other options were suggested, legislated, decreed and ultimately ignored. The Spanish consulado, "which embodied the commercial interests at Manila" (Schurz 1939: 226) nearly consistently argued to re-route different directions but these never took place (specifically in years 1777, 1782, 1786, 1791, 1794) (Schurz, 1939: 226). An example that Schurz does include in his chart but does not explain in the key is the Cape Bojeador option. It was never favored, nor followed by the Spanish (Fry, 1985: 17-18). It was endorsed by Philip Thompson, a British pilot of the royal navy who stated, "up the west side of Luzon [a sail ship] could climb to the twentieth parallel in two and a half or three DAYS" (Schurz, 1939: 224); whereas the 'traditional route' took nearly two

MONTHS. Thompson's route shortened the average time to Acapulco from five or six months to three months. If this is the case then why follow the southern Embocadero route? It was also interesting to note that modern day environment data was compatible for displaying the past seasonal environment information. The seasons Schurz discussed were from the archival records of the 16th, 17th and 18th centuries and these matched the seasonality of the data collected by NOAA over an 18 year period, from 1992 to 2010.

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Biography

Jennifer Craig *is an underwater archaeologist. She attained two Archaeology degrees from Memorial University in Newfoundland and University of Bristol. She continues to thank all the people whose projects she was/is invited to join. Jennifer started her Doctoral degree at the University of Oxford and continues at McGill University.*

Carl Hughes *is a GIScientist. He attained a degree in Geography from McGill. He continues to work on novel web based mapping methods in his Masters degree at McGill University. He would like to thank the support and resources provided to himfrom within the Indian Ocean World Centre.*