The Dinagat Corridor: Preliminary explorations on the archaeology of Samar and Siargao Islands

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Abstract

Sea level changes during the Quaternary period had drastic effects on the land/sea distribution of Island Southeast Asia. Such was the case for the eastern part of the Philippine archipelago where reconstructions show that the islands of Mindanao, Dinagat, Siargao, Leyte and Samar were previously connected since prior to the Last Glacial Maximum up to around 10,000 years ago. This swath of exposed land is named the "Dinagat Corridor" here, and models have shown the possibility that the peopling of the Philippines occurred via this land corridor. Review of previous works as well as new archaeological explorations in the islands of Samar and Siargao described in this article show that numerous archaeological sites belonging to different time periods, including the Palaeolithic, are present in the Dinagat Corridor. A total of 90 sites was recorded for this project, which demonstrates the potential of both islands for future archaeological research, particularly, in the study of the early peopling of the Philippine archipelago.

Keywords: island archaeology, palaeolithic Philippines, Dinagat Corridor

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Introduction

This article narrates the archaeological explorations that were undertaken in the islands of Samar and Siargao in eastern Philippines (Figure 1) from September 2017 to April 2018. The investigations involved an extensive review and digitization of the archaeological literature as well as preliminary reconnaissance in both islands. The results were digitized in a form of an archaeological site spatial database for Samar and Siargao. Here we present preliminary results of this research intending to review and assess the importance of the Dinagat Corridor in the study of Philippine archaeology.

Solar insolation throughout the Quaternary Period (the last 2 million years) resulted to changes in sea levels and yielded climatic changes at a global scale. The rising and lowering sea levels resulted in dramatic geographical changes in the land/sea distribution of Southeast Asia and the Philippines. During most of this period, the landmass of Sundaland was exposed, and islands such as Borneo, Sumatra and Java were connected to the Asian Mainland (see Sathiamurthy and Voris, 2006; Voris, 2000). The emergence of these land areas connecting the different islands played a crucial role in the migration of terrestrial fauna, and probably humans, to the different parts of the region.

Reconstructions of Philippine coastlines based on present-day bathymetric data show the drastic effect of changing sea levels to Philippine geography (Robles, 2013) (see Figure 2). During most of the Quaternary period, sea levels were lower than present to as much as -123m during the Last Glacial Maximum (LGM) 21,000 years ago (Hanebuth et al., 2009). During periods of lower sea level, large areas of land that are currently underwater were exposed. Many present-day Philippine islands were once connected by these landmasses; such was the case in the eastern part of the archipelago, particularly the islands of Samar, Leyte, Dinagat, Siargao and Mindanao. This connection is indicated in several biogeographic studies in the region (Heaney, 1986; Heaney et al., 2005). Furthermore, a study on prehistoric migrations in the Philippines showed that the route from Sunda to Luzon island, with the least sea crossing, passed through this area (Robles, 2013) (Figure 3). This led us to investigate what we collectively refer to as the Dinagat Corridor for its potential in providing key insights to further understand the patterns of migration during this period in Philippine prehistory.

This preliminary research will focus on the islands of Samar and Siargao,

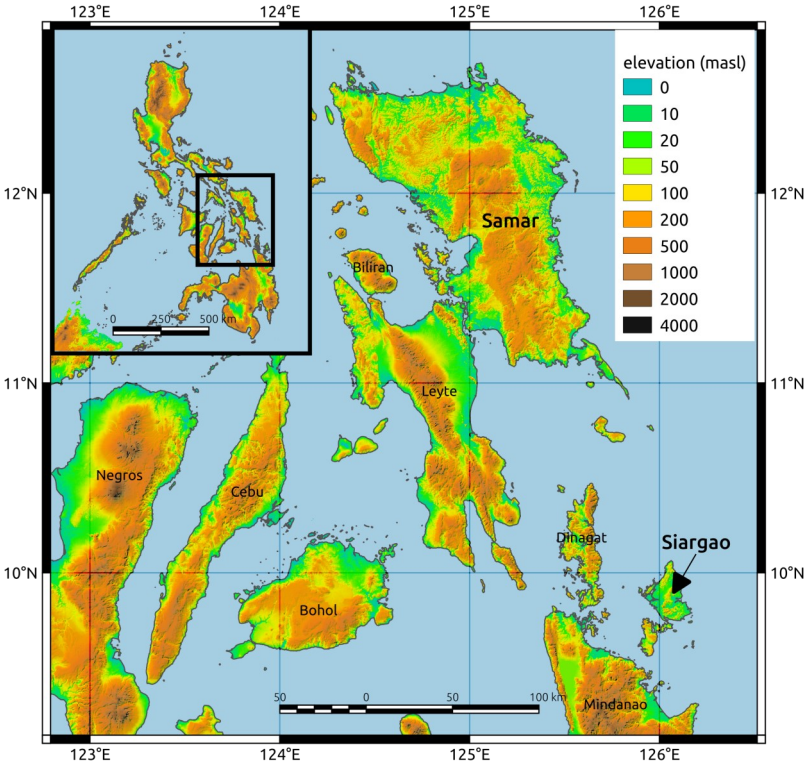

Figure 1. Elevation map showing the location of Samar and Siargao.

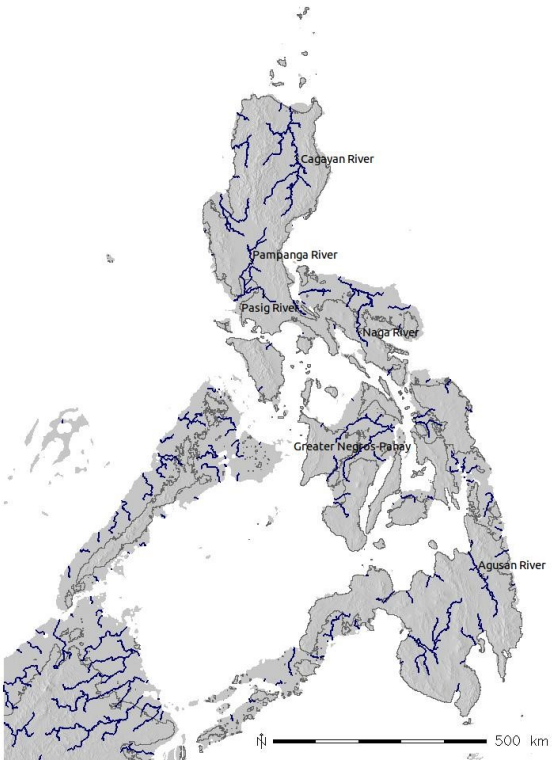

Figure 2. Relief map of the Philippines showing exposed land area during the Last Glacial Maximum and modelled major river systems (from Robles 2013).

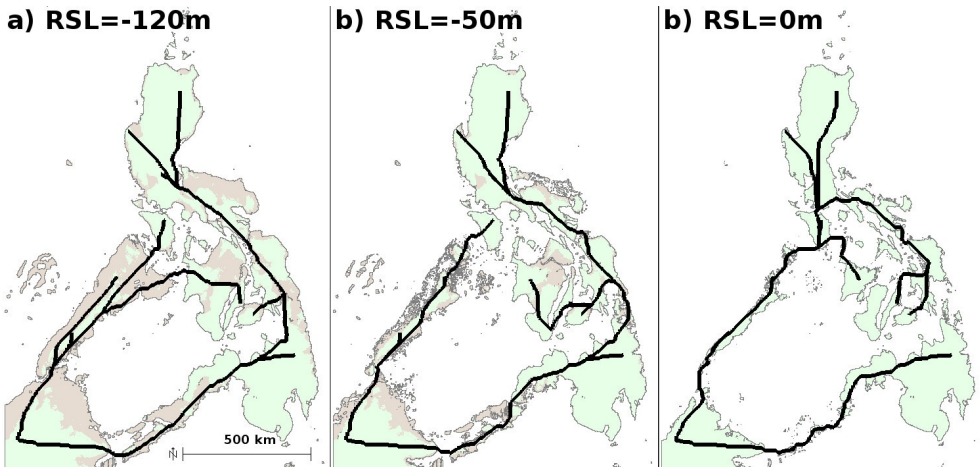

Figure 3. Models showing routes with the shortest water crossing from Sunda to the islands of the Philippines for 0, -50 and -120 meter sea level configuration (from Robles 2013). Note that route to Luzon passes through Samar and the Dinagat Corridor at -50 and -120 m levels during the Quaternary.

with relative guidance from previous exploratory works conducted on both islands (see Georeferencing the literature section below), which demonstrate its potential for further archaeological studies. Both islands have large karstic areas, wherein caves and rockshelters are found. Elsewhere, these formations have been demonstrated to host past and current human activities (Ronquillo, 1995).

GIS and Spatial Database for Samar and Siargao Archaeology

Geographic Information Systems (GIS) has a myriad of applications in archaeology. Archaeological data is both temporal and spatial, and GIS as a platform for storing, managing, visualizing, and analyzing data has multiple advantages compared to the traditional methods of recording on paper. Quantum GIS (QGIS)(Quantum GIS Development Team, 2017, https://qgis.org/) and Geographic Resources Analysis Support System (GRASS) (GRASS Development Team, 2016; Neteler et al., 2012, https://grass.osgeo.org/) were utilized as the data management, visualization, and analysis platform. Both software packages are open source GIS packages which can be downloaded, utilized and modified freely, and were used to manage, analyze and visualize data gathered from the literature and field recordings. These open source GIS tools also allowed the production of digital maps with relevant archaeological and geographical data as reference for the fieldwork. Likewise, the direct digital recording of tracks, points and sites using an Android powered

smartphone with GPS capabilities, which reduces human errors in recording and data management. The resulting spatial database was cleaned, managed, and analyzed for this study. The methods utilized here are based on and are described in Robles (2015; Unpublished Report).

Modelling the Dinagat Corridor palaeogeography with sea-level changes

To understand the effects of sea-level changes in the geography of the Dinagat Corridor, we modelled land/sea changes for the past 21,000 thousand years, since the LGM lowstand, following the methods described in Robles (2013). Using the General Bathymetric Chart of the Oceans (GEBCO; https://www.gebco.net/), the method extracts exposed land, calculates land areas, and determines land connections for different sea level configurations (see Robles 2013 for more details).

Digital Field Recording

Digital methods for field recording, data management, and data visualization were applied during field explorations. GPS and GIS field recordings were conducted using a smartphone and Locus Pro (https://play.google.com/store/apps/details?id=menion.android.locus._pro&hl=en) and Locus GIS (https://play.google.com/store/apps/details?id=menion.android.locus.gis) mapping applications. Maps were prepared using QGIS and were used in Locus Map and Locus GIS for field reference. Data fields were also developed for data entry in Locus GIS for direct management of the archaeological site spatial database.

Georeferencing the literature

The relatively scant literature on the archaeology of Samar and Siargao is enough to tell an interesting story. Beyer (1947) described Samar as one of the best areas for future archaeological work, which is evident when looking at the karstic geography of the area, and based on previous archaeological explorations on the island (see list below). The main purpose of reviewing previous work for this project is to digitally record archaeological sites and areas, and manage them using an Archaeological Site Spatial Database. This recording technique allowed us to have a preliminary archaeological map of Samar, which was helpful during the

subsequent fieldwork. The following published articles and unpublished manuscripts were utilised:

- Fedor Jagor's Samar expedition based on his published book *"Travels in the Philippines"* (1875).
- Carl Guthe's (1922–1925; 1927) work in Samar based on his notes and catalogue.
- H. Otley Beyer's review of Samar archaeology based on the *"Outline Review of Philippine Archaeology"* (1947) .
- Fr. Cantius Kobak's works based on notes and catalogues and other documents from the Samar Archaeological Museum of Christ the King College in Calbayog City.
- Studies done by Hutterer and others from 1968 to 1971 based on published articles (Scheans et al., 1970; Townsend, 1972; Tuggle and Hutterer, 1972; Hutterer, 1971; Hutterer, 1969).
- Research and surveys done by The National Museum of the Philippines in Samar and Siargao based reports and manuscripts (Galpo, 1982; Salcedo, 1983; Peralta, 1968; Santiago and Barbosa, 1977; Intoh and Dizon, 1995).

Field Explorations

Field explorations were undertaken to check the present status of previously recorded archaeological sites and to survey possible new sites in both Samar and Siargao. Fieldwork was carried out twice in Samar. The first, from 21 September to 02 October 2017, in which prospective areas were determined for potential explorations and coordination with local government units and guides. The second was accomplished on 14 February to 2 March 2018, wherein extensive explorations and recording of sites were conducted. Furthermore, museum visits and preliminary reporting on the findings were shared with the local communities. On the other hand, Siargao was explored from 22 January to 3 February 2018. This exploration focused on the municipality of Del Carmen, where numerous archaeological sites were previously recorded by the NMP. Subsequent sections below describe and discuss the investigated sites.

Samar Explorations

Extensive explorations were undertaken on Samar island. Different areas were visited and recorded to verify and inspect previously recorded

archaeological sites, as well as record newly identified sites. Figure 4 shows a map that includes exploration tracks and places visited in Samar. The areas are described further below.

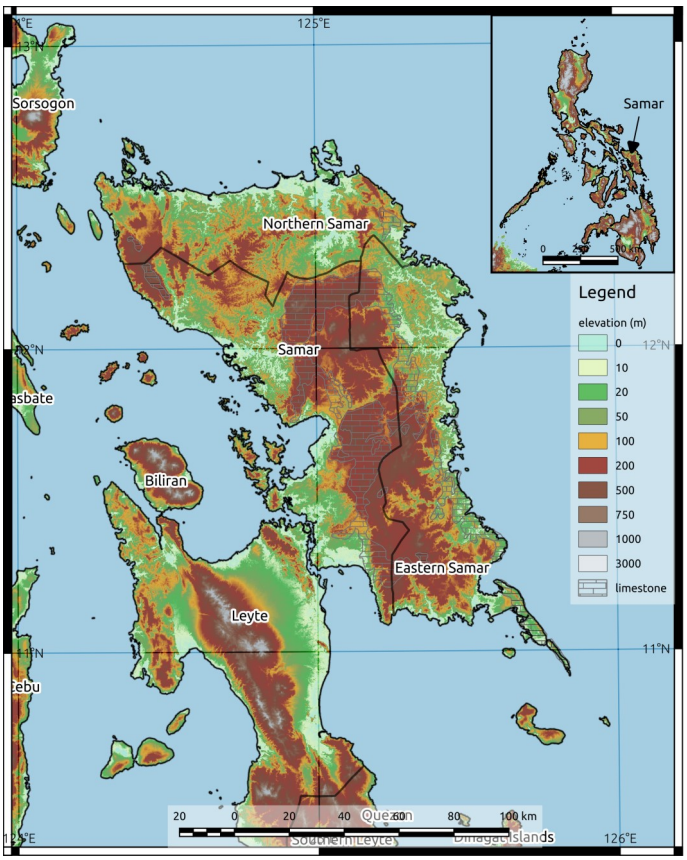

Figure 4. Elevation map of Samar showing tracks and locations recorded during field explorations -120 m levels during the Quaternary.

Basey and the Sohoton Natural Bridge National Park (SNBNP)

The Sohoton Natural Bridge National Park (SNBNP) is one of the more famous tourist spots in Samar. The area features numerous caves and a river dissecting the karst area. It is also the most studied area in Samar in terms of archaeology, due to the explorations and excavations undertaken between 1969 and 1971 (Hutterer, 1971; Townsend, 1972). Results of this project show that the area is rich in archaeological finds dating from the Palaeolithic up to more recent periods.

SNBNP was visited from 25 to 26 of September 2017 for preliminary reconnaissance, and again on 20 to 22 February 2018 for a more extensive survey and mapping of the sites. During the first visit a boat was hired to survey the park and assess the possibility for a more extensive study of the area.

On the second visit, the team coordinated with the Department of Environment and Natural Resources (DENR) through its Regional, Provincial and Central Office in Sta. Rita, Samar. The central office in Sta. Rita is headed by Mr. Crisostomo Badeo who also allowed us to stay in the DENR Station in the SNBNP. Mr. Joseph Cabigayan and Mr. Lito Banola also joined us in our field activities. Survey tracks and waypoints for this trip are seen in Figure 5.

Upon our explanation to the local guides of our target activities, Mr. Lito Banola told us about a cave located just across the river from the DENR field station that contained human bones. This cave is called Irongkahurao, which was recorded but not excavated during the 1971 expedition (Macdonald, 1972b). We decided to visit and record the cave. Our observation of the surface remains suggests the potential of some areas to yield intact archaeological deposits (Figure 6). However, some disturbance of the archaeological materials is also evident. Numerous human bones were piled and scattered on the ground a few meters from

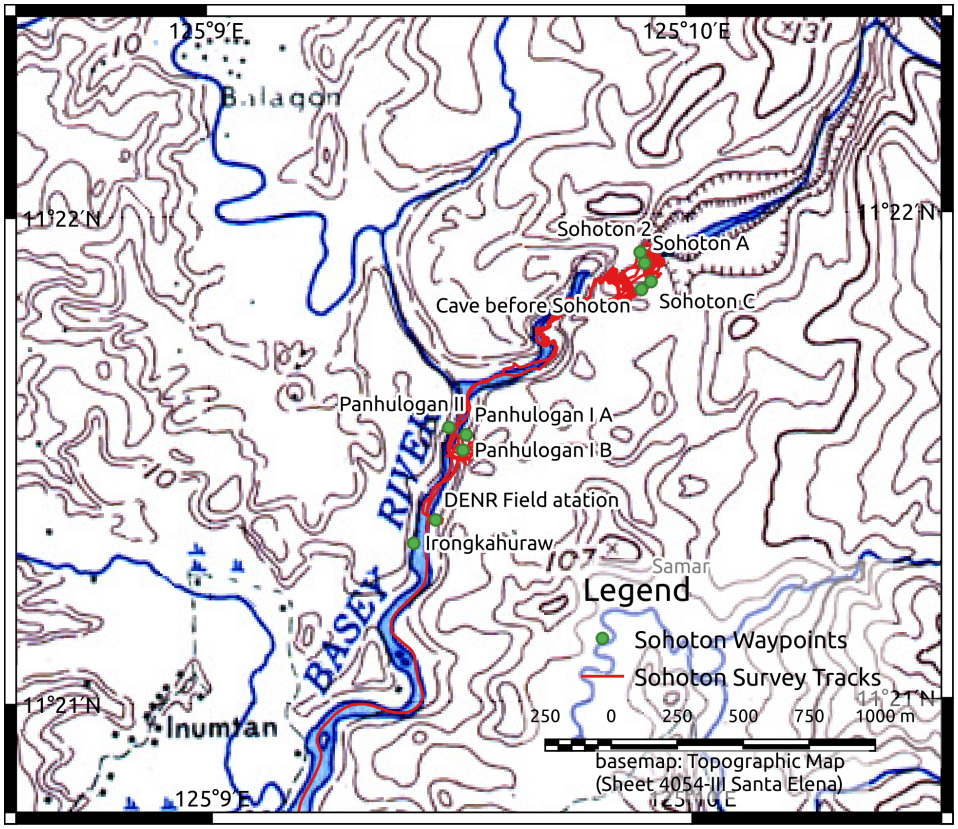

Figure 5. Topographic Map showing Sohoton survey tracks and waypoints recorded.

Figure 6. Human remains and pottery sherds in Irongkahurao Cave.

the mouth of the cave. The site probably dates back to the Metal Period like the other burial caves in the area that were also described by Macdonald (1972b).

Sohoton Cave, excavated by Macdonald in 1971 (1972b), was also visited. The cave is currently closed to tourists because of the hazardous trail leading up to it. It is located on the southern side of the Sohoton Natural Bridge, and one of its entrances opens to the river below. The cave is large, well-lit, and dry, potentially suitable for habitation (see Figure 7). Pottery sherds and stone tools are still observed on the cave's surface. This site is one of the most promising in terms of finding remains of early humans in the region. The team recorded and took photographs of the cave for future reference. Digital survey and mapping were also conducted for Sohoton Cave (Figure 8).

Previous investigations (see Townsend, 1972), mentioned two other localities in the Sohoton Cave area where shell middens were found (Labeled Sohoton 2 and C in Figure 5) but were not yet excavated. Both sites were located and recorded since they show promise for future

Figure 7. (Left) Sohoton Cave interior and (Right) main entrance as viewed from the Basey river below.

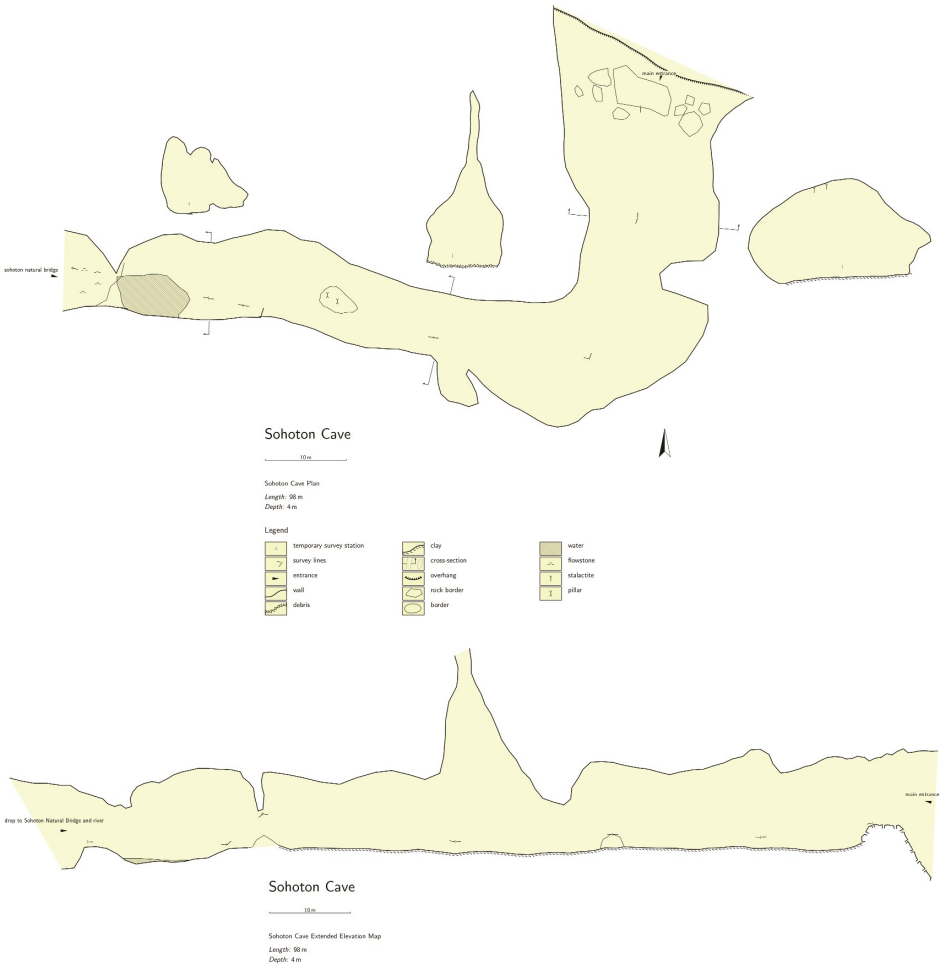

Figure 8. Sohoton Cave Plan and Extended Elevation Map. Surveyed using Topodroid and processed using Therion.

archaeological excavations. One of the sites is located on an elevated area while the other near the bank of the river which is continually being eroded by rising waters (Figure 9).

Finally, the team conducted a digital mapping of Panhulogan Cave which is one of the caves excavated in 1968 and 1971 (Hutterer, 1969; Moore, 1972). Morphologically, Panhulogan Cave is dry, very suitable for habitation. The excavations reached six meters in depth but did not reach the cave floor, and only a few stone tools were found compared to the thousands in Sohoton. This was apparently due to the frequent flooding of the river, which deposited sediments in the cave (Moore, 1972). Nevertheless, Hutterer (1969) reports that they found a flowstone formation with marine shells and stone tools embedded on the deeper part of the excavations, which warrants more investigations. Mr. Lito

Figure 9. Shell midden in Sohoton C site.

Figure 10. Photo of (left) interior of Panhulogan Cave and (right) fossil embedded in the limestone.

Banola (local forest ranger) also reported possible fossils embedded on the limestone formation inside Panhulogan Cave. Upon closer examination, a particular rock layer in the formation which contains what looks like fossil remains of some vertebrate fauna was observed (Figure 10). If this is correct, then the fossil remains would be the same age as the limestone formation, which is dated to the Miocene Period (Moore, 1972; Travaglia et al., 1978). This still needs to be verified by a palaeontologist.

The team also visited and recorded Panhulogan B. This is a long rockshelter across the river from the main Panhulogan Cave. This site was also investigated in 1971 by Tuggle and Hutterer (1972), and remains of numerous burials were excavated. During the visit, a few pottery sherds can still be seen on the surface of the rockshelter, but the site was extensively excavated in 1971 so future research for the site may be limited.

Marabut (Nipa-nipa)

In Fedor Jagor's (1875) travelogue, there is a particular mention of an island that he sketched (see Figure 11) while travelling from Guiuan to Tacloban. The island, he claims, is located in Nipa-nipa, and when

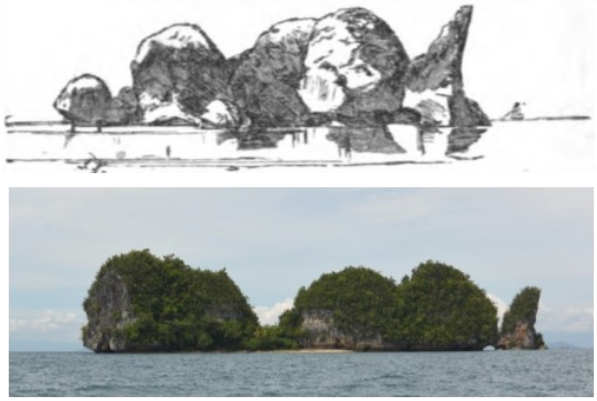

Figure 11. Comparison between Fedor Jagor's sketch (above) and the photo taken (below) of the island claimed to have been sacred burial grounds in Marabut, Samar.

passing through the island, the sailors slowed down their boat and gave their respects. They claimed that the island is where the spirits of the ancestors live, and that these were also ancient burial grounds. Jagor also tells of a story of a young parish priest 30 years before his visit in 1860, who organized a group of people to cleanse the island. They destroyed artefacts in the burial caves and threw them into the sea. When in Basey, the mayor of the town organized a trip wherein they recovered a wooden coffin, which they sold to Mr. Jagor.

This story piqued our curiosity, and we tried to look for this island. Based on Jagor's description, the island is located on the southwestern part of Samar. In our preliminary visit to Basey, none of the people we asked knew of a place called Nipa-nipa, and upon observing the islands visible from the coast of Basey none of them resembles the sketch of Jagor. Investigating present-day maps show that there are some islands in the municipality of Marabut the town next to Basey. Guthe (1922–1925) also recorded a few archaeological caves in the area so we decided to visit. For our visit, we hired a boat to examine the coastline and the islands of Marabut. We were able to locate the island mentioned by Jagor although the folklore and stories he mentioned have been lost in local folklore, or at least to the locals that we were able to interview. The group of islands is collectively called Kapuruan by the locals. A comparison of the photo and the sketch clearly shows that this was the island that Jagor was referring to (Figure 11). The difference between the sketch and the photograph is most probably because Fedor Jagor was sketching the island while the boat was moving. Thus, this likely yielded a slightly different appearance of the island.

Figure 12. Cemetery in the coast of Marabut located beside limestone cliff with large rockshelter.

Some of the locals also mentioned ancient burial caves in the Marabut mainland, with human remains and pottery sherds. Carl Guthe (1922–1925) also collected specimen from two cave sites in Marabut, which he designated as C21 and C22. In these sites, he found remains of burials associated with trade goods. Additionally, Guthe also visited the local cemetery, which is located near the coastline beside a limestone rock formation with a rockshelter of around 10 meters above the surface (Figure 12). The rockshelter was not accessed by the team as this would entail some ropework, but photographs were taken.

Iguid Site

Iguid Site was one of the major sites visited and excavated by Carl E. Guthe (1922–1925) and was also mentioned by Beyer (1947). It is a jar burial site in the beach of Barangay Iguid, Catbalogan City. Guthe was able to recover several specimens based on the inventory. The finds in this site are composed of large jar burials with stone covers. Based on the finds the site was probably used during the Metal Period around 2000 years ago the same as the site in Catanauan, Bondoc Peninsula in Luzon Island (see Paz et al. 2008).

This site was visited to check whether further archaeological investigations can be done. Our visit revealed that it has been heavily looted and almost destroyed. Brgy. Chairman Claudio de Lune del Monte was interviewed, and he recounts that several jar burials were dug up by locals and treasure hunters until the 1990s. The beach was also quarried for sand, which exposed jar burials during the process. It was also

revealed during the interview that before the beach was quarried, the coastline was still farther off compared to its current location. The walking survey on the beach showed some earthenware sherds. Aurora Dominado, an older resident of the area, also claims to have seen many burial jars being dug up in the area.

Tinago Church Ruins

The Tinago Church Ruins, located in Brgy. Dapdap in Tarangnan Municipality, is a famous place to visit in Samar. It is one of the earliest Spanish developed settlements , and where the first Jesuit missionaries planted faith in 1596. The ruins are situated in a strategic location along a big river, surrounded by mangrove forests, making it easy to navigate the river since the ruins are located on top of a promontory. The mangrove forest hides the site behind the bend from the open sea, hence the name Tinago, which means "hidden." The façade is still intact, while the interior of the church was converted to a park for visitors and is well-maintained and clean. The location of the site was recorded, and photographs were also taken for 3D modelling. The church was said to have been abandoned because of its location. Although in terms of defence, the area is a very good place to establish a community. It is confined in terms of land area, and there is no direct access to the rest of the Samar mainland, except by boat.

Zumarraga (Buad) Island

Zumarraga (formerly Buad) island is the location of archaeological excavations in 1969 (Scheans et al., 1970; Cherry, 1978). The interest of the archaeological excavations stemmed from a collection of lithic blades presented by an Attorney Rumualdo Mendiola from Daram Island to Scheans et al. (1970). Their survey of the islands in Maqueada Bay yielded thousands of stone tools, which led to the archaeological excavations in Buad island (see Figure 19, Site H01). The results of the excavations showed two intact distinct stratigraphic layers. The top layer consists of ceramics, marine shells and stone tools, while the lower layer is composed of mainly stone tools and with the absence of ceramics. The production of the stone tools is referred to as the Buadian Industry. A radiocarbon date of the sediment layer between the top and bottom layer yielded a very recent date of 800 AD (Cherry, 1978). However, based on the descriptions

Figure 13. (Left) Boat ride to Zumarraga Island showing Archie Tiauzon and Mr. Crispolo Bagacay; (Right) Possible location of 1969 excavation area in Brgy. Ibarra.

of the recovered stone tools from the lower layer, it is possible that the date of this layer is much older. This begs further investigations and dating.

Brgy. Ibarra was visited based on the location map of the excavations (see Figure 13). The owner and captain of the boat we hired, Mr. Crispolo Bagacay, happens to be a *Kagawad* (councilor) of Sugod (the adjacent barangay) and was able to act as our guide, helping us go around the island and interview the locals. On our visit, we discovered that despite the number of blades and other artefacts that were recovered in 1969, they have become a rare occurrence in the island. We talked to some residents in Brgy. Ibarra and Sugod, wherein some of the older residents still remember the explorations of foreigners in the 1960s. There are also a few who claim to have found some earthenware sherds and stone tools while ploughing their fields. It may be possible to recover more stone tools within the sediment layer described by the archaeologists that previously studied the area.

After visiting Brgy. Sugod, we decided to visit the Arteche fortifications in the main town of Zumarraga. The *baluarte* (fort) was built on a promontory just above the church. Ruins from numerous structures are still left in the area and these were photographed and recorded. This site could be a very good area to do historical archaeology and historical architecture studies.

Explorations in Lavezares

The team also visited Lavezares, an old town in Northern Samar based on verbal reports by locals of recovered tradeware ceramics. The site is located in the elementary school, and during the construction of a new

school building from 2018, human remains and grave goods in the form of tradeware vessels were recovered by construction workers. We met with Mr. Rodel Cuyco of the municipal office, and he showed us three complete tradeware vessels. The vessels were recovered from Brgy. Bani. The team then visited Spanish period cannons displayed in the town plaza as well as remains of the old church, which can be seen behind the present church.

The team hired a boat to explore Brgy. Bani and the nearby islands. In Bani, we visited the site wherein the tradeware jars were reportedly recovered (Figure 14). It was reported to the mayor of Lavezares and he took some of the finds to exhibit in the local municipal office. Earthenware sherds were also found in the surface of the school grounds.

Figure 14. (Left) Photo of school building constructed when the burial was discovered. (Right) Some earthenware sherds on the surface of the school grounds.

Siargao Explorations

Archaeological explorations were also undertaken in Siargao Islands. Our explorations focused on the municipality of Del Carmen, while a rapid assessment of other parts of the island was also done. This is because Del Carmen provides a suitable place for the study of the relationship between sea levels and archaeology. The coastal part of the municipality is composed of karstic formations surrounded by extensive mangrove forests. Our reconstructions show that this only developed during the mid -Holocene period and before that all of this area was inland. It is imperative to look at changes in the archaeological record concerning these extensive changes in coastal environments. Before the explorations were done, maps and reconstructions were developed to aid in determining areas for explorations. Our explorations in Del Carmen were undertaken as part of a project funded by the National Geographic Society, and was conducted in coordination with the local government

unit through Mayor Alfred Coro II and the tourism officer, Ms. Lanie Lipio. Locals were also interviewed and the reported sites were visited and documented. Figures 15, Table 1 show survey tracks and recorded tracks for Siargao. A total of 34 sites were recorded, with 15 sites identified to have archaeological significance.

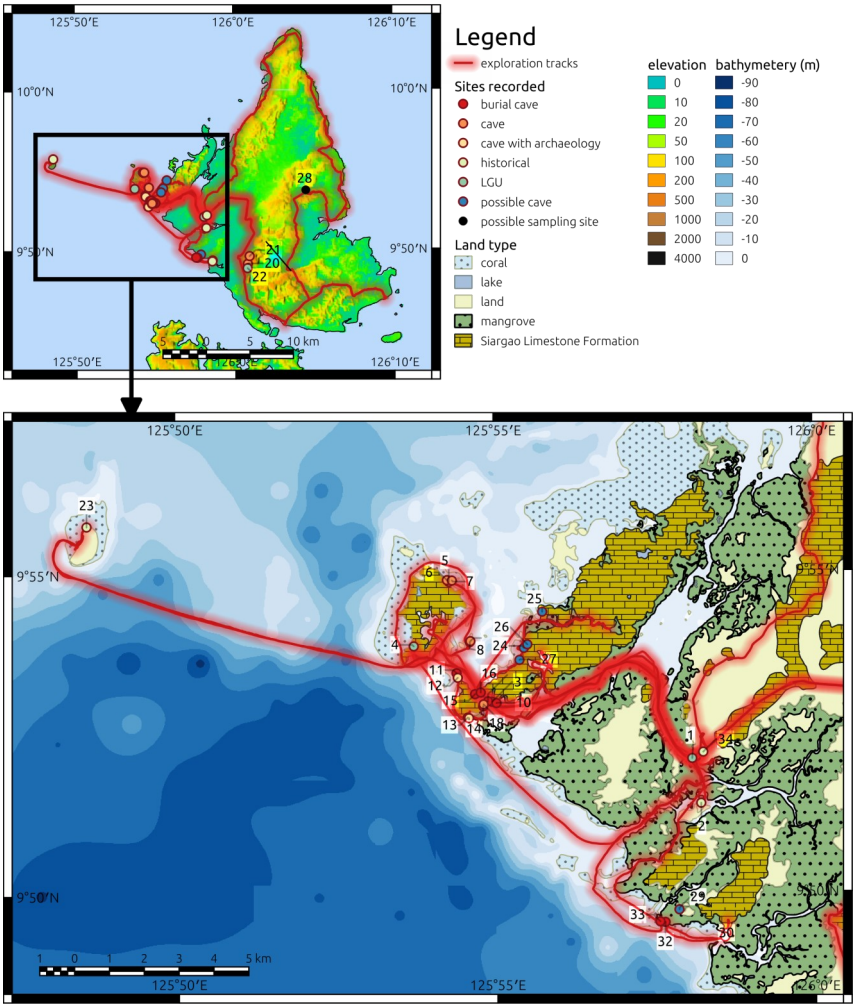

Figure 15. Map showing survey tracks and recorded sites in Siargao

Caves and Rockshelters in Del Carmen

During the interviews, it became apparent that there are numerous caves and rockshelter in Del Carmen. The locals also know of certain caves containing human bones. These sites were explored and recorded by the team.

During our explorations, we observe that caves in Del Carmen were utilized as burial grounds in the past. Most of the caves were looted and

Table 1 (1/3). Table showing recorded sites for Siargao.

Label	Name	Type	Description	Archaeology
1	Del Carmen Tourism	LGU	Tourism office of Del Carmen	
2	Del Carmen	historical	Viewdeck previously used for monitoring mangroves	
3	Liaunon 1 Cave	burial cave	Cave with human remains, earthenware sherds and fragment of shell bracelet.	Yes
4	Caub	LGU	Brgy. Caub	
5	Waing 1	cave	Cave with lots of cave pearls	
6	Waing 2	cave	Cave facing the shoreline. Conducive for habitation but no evidence of archaeology	
7	Waing 3	cave	Rockshelter	
8	Magkaduha	cave	Cave with modern hearths. Still	
9	Makaduha 2 Cave	cave	Small cave near Makaduha 1. Fossil tridacna allegedly used for cooking	
10	Liaunan 2 Cave	burial cave	Cave near Liaunon 1. Lots of human remains. Disturbed by treasure hunting activities	Yes
11	Kanlikid Cave	burial cave	Cave near coastline with 4 entrances. Human remains, earthenware sherds and shells are found on the cave surface.	Yes
12	Kanlikid 2 Cave	cave with archaeology	A rockshelter opening to the sea. Lots of shells and evidence of habitation until recent times	Yes
13	Punta Linog Cave	cave with archaeology	Small cave opening to the sea. Lots of shells in the surface	Yes
14	Punta Linog 2	burial cave	Larger cave near Punta Linog 1. Earthenware, stoneware sherds, Animal bones found on the surface	Yes

Table (2/3 continued). Table showing recorded sites for Siargao.

Label	Name	Type	Description	Archaeology
15	Looc Cave	burial cave	Cave near Sitio Liaunan. Locals say cave used to be full of human bones	Yes
16	Liaunan 3	burial cave	Cave across Sitio Liaunan. Human remains and	Yes
17	Masuyog Cave	burial cave	Small rockshelter. Human bones found on the surface. Guide says there were complete remains of 3 individuals including a child	Yes
18	Luzo	burial cave	Rockshelter with a large	Yes
19	Luzo 2	cave	Small rockshelter used by	
20	Antipolo 1 Cave	cave	Narrow cave. No surface archaeology	
21	Pangi Cave	cave	Long cave with lots of cave	
22	Antipolo	LGU	Barangay Hall of Brgy Anti	
23	Halian	historical	Lighthouse in the island of	
24	PC1	possible	Possible cave. Viewed from the	
25	PC2	possible	Possible cave. Viewed from the	
26	PC3	possible cave	Possible cave. Viewed from the boat	
27	PC4	possible cave	Possible cave. Viewed from the boat	
28	Marshland	possible sampling site	Marshland in San Isidro. Suitable for palaeo-environmental and coastal evolution studies	
29	PCS	possible cave	Possible cave. Viewed from the boat	
30	San Fernando Baluarte	historical	Old Spanish period watchtower ruins. Has been treasure hunted also.	Yes

Table 1 (3/3 continued). Table showing recorded sites for Siargao.

Label	Name	Type	Description	Archaeology
31	San Fernando Jetty	historical	Jetty. Locals claim it is very old and remains of old posts are also visible.	Yes
32	Pamaybayan 1 Shelter	burial cave	Rockshelter with human remains	Yes
33	Pamaybayan 2	burial cave	Rockshelter with some human remains	Yes
34	Del Carmen Church	historical	Old structures beside present church	Yes

disturbed by treasure hunters, but archaeological materials such as human bones and pottery sherds can still be seen on the cave floors. A total of 21 caves were recorded and 9 of these were found to contain evidence of ancient burials. The better-known sites are the Liaunan Caves located in the sitio with the same name. The Liaunan caves contain remains of many individuals (see Figure 16). The local folklore suggests that the human remains in these caves were either those of Japanese soldiers (a common lore this part of the Philippines), or from victims of a cholera outbreak. Based on associated materials, these were probably the remains of people much earlier than what the folklore suggests. In Liaunan 1 Cave, earthenware ceramics and shell bracelet fragment were recorded (see Figure 16), and these have been observed in other Metal Period burial sites in the Philippines.

Figure 16. Human skull (top left), bones (top right), earthenware sherds (bottom left) and fragments of shell bracelet (bottom right) found in Liunan 1 Cave in Del Carmen, Siargao.

Historical Sites in Del Carmen

Interviews with the locals also pointed out historical sites around Del Carmen. Next to the present-day church of Del Carmen, the ruins of old Spanish period structures can be observed. We then visited Brgy. San Fernando, which is known to the locals as the first established Spanish period settlement of Del Carmen. The remains of the old watchtower can still be seen, although locals claim treasure hunters have also dug up some parts of it. Locals also talk about the many areas in the surrounding limestone formations where human remains have been found. We visited two of these sites in Pamaybayan island and recorded the presence of a few human remains, although these sites have been eroded and disturbed by natural coastal processes.

Results and Discussions

On the palaeogeography of the Dinagat Corridor

Our models show that there have been drastic changes in the Dinagat Corridor throughout its history (Figure 17). During a large part of the Quaternary Period, Samar was connected to Leyte and Mindanao when large expanses of land were exposed. According to our estimations, these exposed areas were at its maximum extant at 21,000 years ago (Table 2). Samar, Siargao and Mindanao were connected to Luzon Island before 17,000 years ago. The separation of Samar from Siargao and Mindanao Island only occurred approximately 11,000 years ago, while Siargao separated from Mindanao around 9,000 years ago. The history of this land connection should have significant implications in the study of Palaeolithic archaeology in the area.

On the archaeology of Samar and Siargao

The collection of archaeological data from previous works and our recent explorations show the importance of Dinagat Corridor in Philippine archaeology. A total of 90 archaeological sites (60 from Samar and 30 from Siargao) have been recorded and digitized in this project. Locations of these sites are seen in Figures 18 and 19 while descriptions and other sample data from the spatial database are seen in Table 3. The relative dates of these sites cover the Palaeolithic through the Historical Period (see Figure 20, 21, 22).

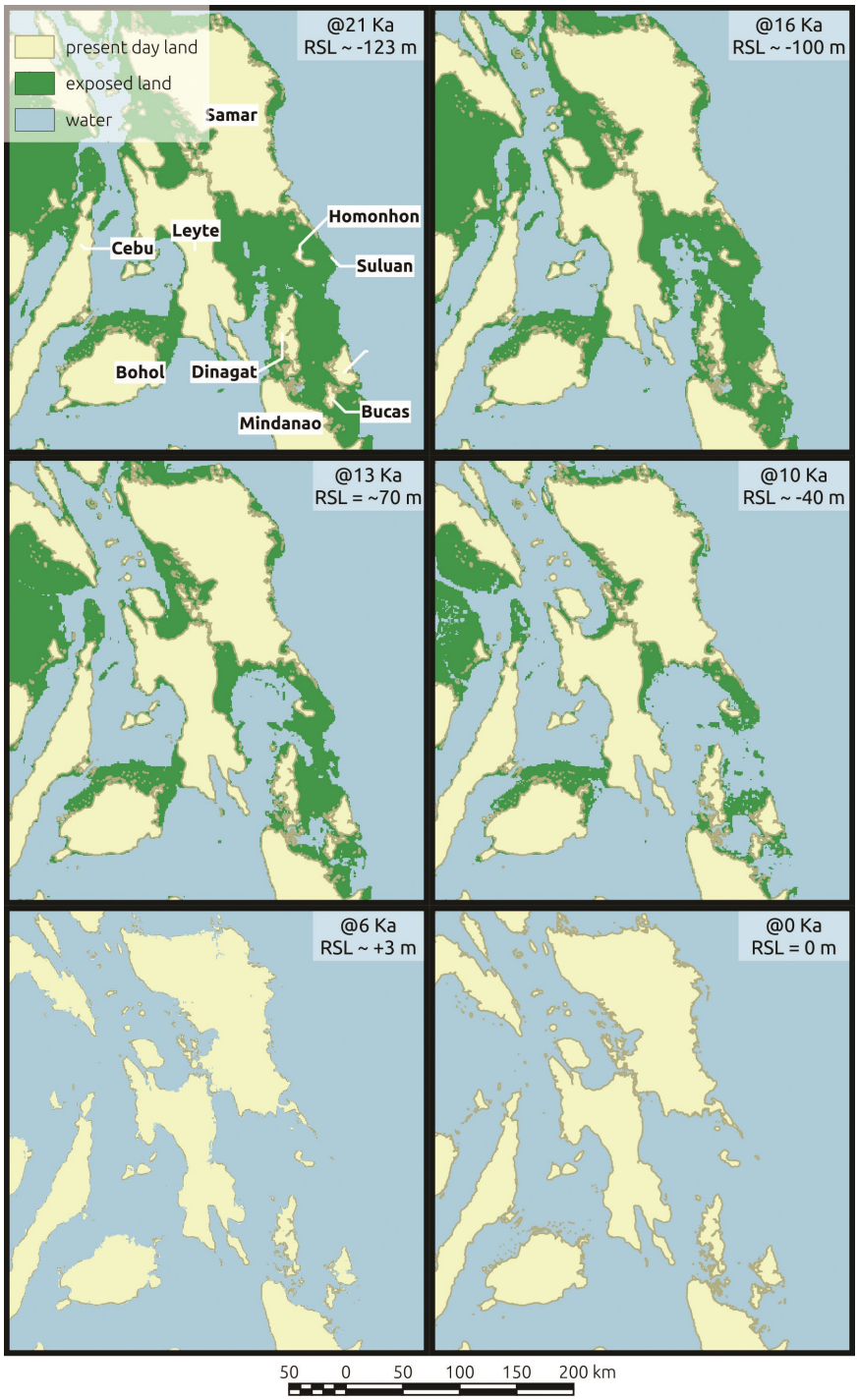

Figure 17. Coastline reconstructions for Dinagat Corridor for the last twenty-one thousand years.

Table 2. Table showing land area calculations (in km2 for different islands at different sea levels for the Dinagat corridor. Merged cells indicate the connection between the islands at the particular sea-level period.

Name	0m	-10m	-20m	-30m	-40m	-50m	-60m	-70m	-80m	-90m	-100m	-110m	-120m
Last Occurrence	6-0 Ka	7.5 Ka	9 Ka	10 Ka	10.5 Ka	11 Ka	12.5 Ka	13.5 Ka	14.4 Ka	14.3 Ka	15.5 Ka	17 Ka	20 Ka
Panaon Island	208	22530	29014	30611	32686	34688	144124	157751	160823	163794	166069	317540	319903
Biliran Island	508												
Leyte Island	7060												
Samar Island	12490												
Siargao Island	431	884	1018	101877	103873	105817							
Dinagat Island	789	98177	99447										
Mindanao Island	94201												
Luzon Island	105196	110889	113925	116683	119632	122194	132837	138467	143573	146394	148189		

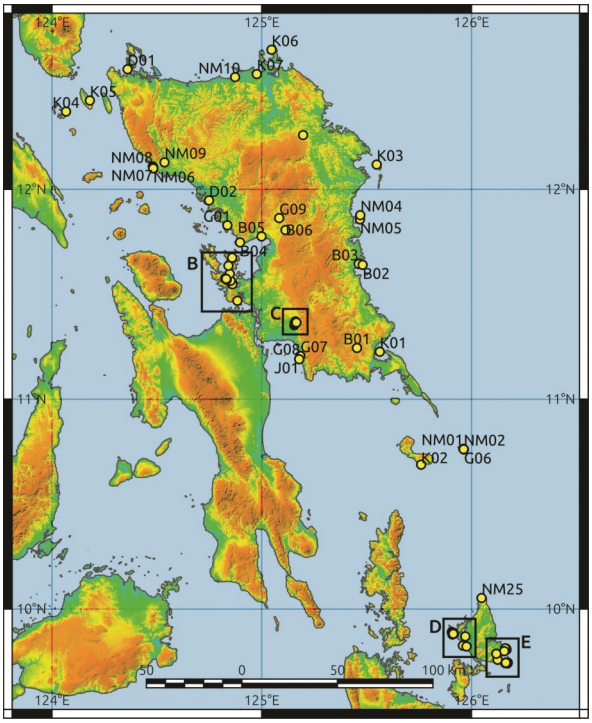

Figure 18. Archaeological sites in Samar and Siargao. See Figure 19 for box inset.

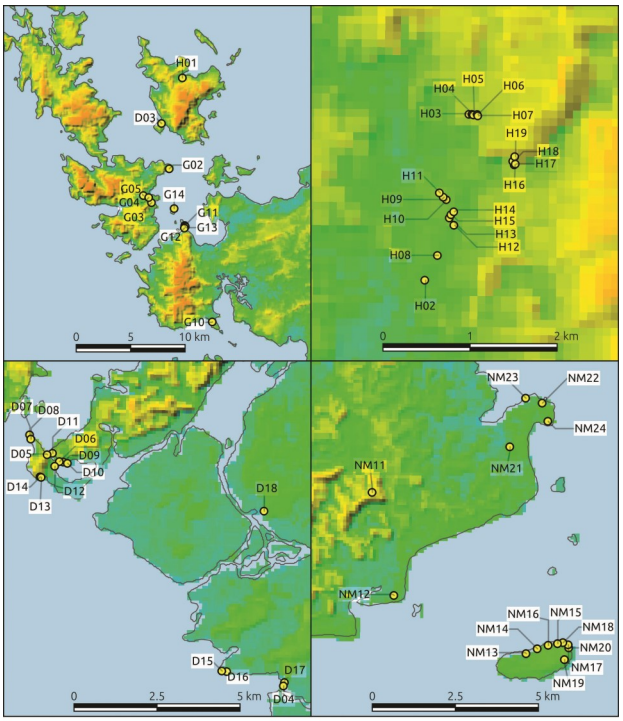

Figure 19. Archaeological sites in Zumarraga (top left) and Sohoton (top right), Samar and Del Carmen (bottom left) and General Luna (bottom right) in Siargao.

Table 3 (1/5). Table showing sample data for the archaeological sites in Siargao. Prov=Province; Ca=Caves; Ro=Rockshelter; Op=Open sites; P=Palaeolithic; N=Neolithic; M=Metal Period; C=Contact Period; H=Historical; Bu=Burial; Ja=Jar Burial. Co=Plot confidence score (1=recorded using GPS. 3=based on specific description, 5=plot based on a very vague description.

Label	Name	Prov	Ca	Ro	Op	P	N	M	C	H	Bu	Ja	Co	Literature
B01	Frasche-Russell Site	Eastern Samar	1		1				1		1		5	Beyer 1947
B02	Isla de Ando	Eastern Samar	1						1		1		3	Beyer 1947
B03	Tominobo Cave	Eastern Samar	1						1		1		4	Beyer 1947
K01	Minalu-ngon	Eastern Samar	1						1		1		3	Samar Archaeo-logical Museum
K02	Magellan's Cross	Eastern Samar			1					1			3	Samar Archaeo-logical Museum
K03	Tubawbaw	Eastern Samar		1					1		1		3	Samar Archaeo-logical Museum
NM01	Paglilihiyan Cave	Eastern Samar	1	1				1	1		1		3	Santiago and Barbosa 1977
NM02	Guinsipitan Cave	Eastern Samar	1				1				1		3	Santiago and Barbosa 1977
NM03	Cave in Jipapad	Eastern Samar	1										4	Peralta 1968
NM04	Makati Island	Eastern Samar			1								2	Intoh and Dizon 1995
NM05	San Vicente Island	Eastern Samar			1				1				2	Intoh and Dizon 1995
D01	Bani Elementary School	Northern Samar			1				1		1		1	This project
K04	Mungul-bungol	Northern Samar		1					1		1		4	Samar Archaeo-logical Museum
K05	Capul	Northern Samar	1						1				4	Samar Archaeo-logical Museum
K06	Kabadi-angan	Northern Samar			1				1		1		4	Samar Archaeo-logical Museum
K07	Burabod	Northern Samar			1			1			1	1	3	Samar Archaeo-logical Museum
NM06	Cave 2	Northern Samar	1						1		1		3	Peralta 1968
NM07	Cave 1	Northern Samar	1						1				4	Peralta 1968
NM08	Lo-ok	Northern Samar			1								4	Peralta 1968
NM09	Oquendo	Northern Samar			1				1				3	Peralta 1968
NM10	San Roque	Northern Samar			1			1			1	1	3	Peralta 1968
B04	Bey001	Samar	1						1		1		4	Beyer 1947
B05	Motiong	Samar			1			1			1	1	3	Beyer 1947

Table 3 (2/5 continued). Table showing sample data for the archaeological sites in Siargao. Prov=Province; Ca=Caves; Ro=Rockshelter; Op=Open sites; P=Palaeolithic; N=Neolithic; M=Metal Period; C=Contact Period; H=Historical; Bu=Burial; Ja=Jar Burial. Co=Plot confidence score (1=recorded using GPS. 3=based on specific description, 5=plot based on a very vague description.

Label	Name	Prov	Ca	Ro	Op	P	N	M	C	H	Bu	Ja	Co	Literature
B06	Shauger Sites	Samar			1				1		1		4	Beyer 1947
D02	Dapdap Church Ruins	Samar			1					1			1	This project
D03	Arteche	Samar			1					1			1	This project
G01	B010	Samar			1			1	1	1	1	1	1	Guthe 1922; this project
G02	C012	Samar	1						1				3	Guthe 1922
G03	Ilihan Cave	Samar	1					1	1		1		3	Guthe 1922
G04	Tigauan Cave	Samar	1	1					1		1	1	2	Guthe 1922
G05	C018	Samar		1					1		1		3	Guthe 1922
G06	C023	Samar	1						1		1	1	3	Guthe 1922
G07	Celadon Cave	Samar	1						1		1		3	Guthe 1922
G08	C022	Samar	1					1	1			1	3	Guthe 1922
G09	B011	Samar			1				1		1		3	Guthe 1922
G10	C016	Samar	1					1	1		1		3	Guthe 1922
G11	Chapel Cave	Samar	1						1		1	1	3	Guthe 1922
G12	Cathedral Cave	Samar	1						1				3	Guthe 1922
G13	Gold Tooth Cave	Samar	1						1		1		3	Guthe 1922
G14	C007	Samar	1						1			1	3	Guthe 1922
H01	44-A	Samar			1	1		1					1	Scheans et al 1970; Cherry 1978; this project
H02	Asgad	Samar	1										2	Hutterer 1969; Tuggle and Hutterer 1972
H03	Bugasan I	Samar	1					1	1		1		2	Tuggle and Hutterer 1972 Tuggle and Hutterer 1972
H04	Bugasan II	Samar	1					1	1		1		2	Hutterer 1969; Tuggle and Hutterer 1972
H05	Bugasan Ill	Samar	1					1	1		1		2	Hutterer 1969; Tuggle and Hutterer 1972

Table 3 (3/5 continued). Table showing sample data for the archaeological sites in Siargao. Prov=Province; Ca=Caves; Ro=Rockshelter; Op=Open sites; P=Palaeolithic; N=Neolithic; M=Metal Period; C=Contact Period; H=Historical; Bu=Burial; Ja=Jar Burial. Co=Plot confidence score (1=recorded using GPS. 3=based on specific description, 5=plot based on a very vague description.

Label	Name	Prov	Ca	Ro	Op	P	N	M	C	H	Bu	Ja	Co	Literature
H06	Bugasan IV	Samar						1	1		1		3	Tuggle and Hutterer 1972
H07	Bugasan V	Samar									1		3	Tuggle and Hutterer 1972
H08	Irongka-hurao	Samar	1					1			1		2	Hutterer 1969; Tuggle and Hutterer 1972; this project
H09	Kapigtan I	Samar	1					1	1		1		2	Hutterer 1969; Tuggle and Hutterer 1972
H10	Kapigtan II	Samar	1					1			1		2	Tuggle and Hutterer 1972; this project
H11	Kapigtan Ill	Samar	1					1			1		3	Tuggle and Hutterer 1972
H12	Panhologan I	Samar	1			1							1	Hutterer 1968; Hutterer 1969; Tuggle and Hutterer 1972; this project
H13	Panhologan II	Samar		1		1		1	1		1		1	Hutterer 1968; Hutterer 1969; Tuggle and Hutterer 1972; this project
H14	Panhologan IV	Samar	1					1			1		3	Tuggle and Hutterer 1972
H15	Panhologan Ill	Samar	1					1			1		3	Tuggle and Hutterer 1972
H16	Sohoton A	Samar	1	1		1		1					1	Hutterer 1968; Hutterer 1969; this project
H17	Sohoton B	Samar		1				1					2	Tuggle and Hutterer 1972; this project
H18	Sohoton C	Samar		1				1					1	Tuggle and Hutterer 1972; this project
H19	Sohoton D	Samar		**1**				1			**1**		3	Tuggle and Hutterer 1972
J01	Nipa-nipa	Samar	**1**						**1**		**1**		2	Jagor 1875; this project

Table 3 (4/5 continued). Table showing sample data for the archaeological sites in Siargao. Prov=Province; Ca=Caves; Ro=Rockshelter; Op=Open sites; P=Palaeolithic; N=Neolithic; M=Metal Period; C=Contact Period; H=Historical; Bu=Burial; Ja=Jar Burial. Co=Plot confidence score (1=recorded using GPS. 3=based on specific description, 5=plot based on a very vague description.

Label	Name	Prov	Ca	Ro	Op	P	N	M	C	H	Bu	Ja	Co	Literature
D04	San Fernando Jetty	Surigao del Norte			1					1			1	This project
D05	Looc Rockshelter	Surigao del Norte		1							1		1	This project
D07	Kanlikid **1** Cave	Surigao del Norte	1					1	1		1		1	This project
D08	Kanlikid 2 Cave	Surigao del Norte	1										1	This project
D09	Liaunan 1 Cave	Surigao del Norte	1	1				1			1		1	This project
D10	Liaunan 2 Cave	Surigao del Norte	1					1			1		1	This project
D11	Liaunan 3 Cave	Surigao del Norte	1					1			1		1	This project
D12	Luzo Liaunan	Surigao del Norte		1							1		1	This project
D13	Punta Linog 2 Cave	Surigao del Norte	1										1	This project
D14	Punta Linog 1 Cave	Surigao del Norte	1										1	This project
D15	Pamay-bayan 2	Surigao del Norte		1									1	This project
D16	Pamay-bayan 1 Shelter	Surigao del Norte		1									1	This project
D17	San Fernando Baluarte	Surigao del Norte			1					1			1	This project
D18	Del Carmen Church	Surigao del Norte			1					1			1	This project
NM11	Vito Cave	Surigao del Norte	1										3	Salcedo 1983
NM12	Hanyuoy Rockshelter	Surigao del Norte	1										3	Salcedo 1983
NM13	Dako Cave	Surigao del Norte	1					1			1		3	Salcedo 1983
NM14	Berdejo Cave	Surigao del Norte	1										3	Salcedo 1983
NM15	R. lllut Rockshelter	Surigao del Norte	1										3	Salcedo 1983
NM16	W. Durero Rockshelter	Surigao del Norte	1										3	Salcedo 1983
NM17	Dalucanog	Surigao del	1										3	Salcedo 1983

Table 3 (5/5 continued). Table showing sample data for the archaeological sites in Siargao. Prov=Province; Ca=Caves; Ro=Rockshelter; Op=Open sites; P=Palaeolithic; N=Neolithic; M=Metal Period; C=Contact Period; H=Historical; Bu=Burial; Ja=Jar Burial. Co=Plot confidence score (1=recorded using GPS. 3=based on specific description, 5=plot based on a very vague description.

Label	Name	Prov	Ca	Ro	Op	P	N	M	C	H	Bu	Ja	Co	Literature
NM18	Antonio Adapon	Surigao del Norte	1										3	Salcedo 1983
NM19	Cambarijas Cave	Surigao del Norte	1										3	Salcedo 1983
NM20	Arellano Rockshelter	Surigao del Norte	1										3	Salcedo 1983
NM21	Poyanggi Rockshelter	Surigao del Norte	1										3	Salcedo 1983
NM22	J. Noguerra Rockshelter	Surigao del Norte	1					1			1		3	Salcedo 1983
NM23	Solloso Rockshelter	Surigao del Norte		1									3	Salcedo 1983
NM24	F. Ducero Rockshelter	Surigao del Norte		1				1			1		3	Salcedo 1983
NM25	Dansug Cave	Surigao del Norte	1					1	1		1		4	Galpo 1982

Palaeolithic Archaeology of Dinagat Corridor

The archaeology of the Palaeolithic period at the Dinagat Corridor needs to be assessed in these studies because, as mentioned earlier, large geographical changes occurred before 7000 BP So far there are only a handful of possible Palaeolithic sites in the Philippines, and these are often found in caves and rockshelters. We were not able to find any site in Siargao that contains evidence of Palaeolithic occupation, but we have only surveyed a small part of the limestone formation. In Samar, sites that are attributed to the Palaeolithic by this project include site 44-A in Buad (Zumarraga) island, and Sohoton and Panhologan areas in the SNBNP. Hundreds of blades and other types of stone tools have been recovered from Buad (Zumarraga) and nearby islands most from the surface with no context (Scheans et al., 1970). The explorations and excavations in site 44-A yielded numerous stone tools (see Figure 23) in situ— with upper the archaeological levels containing a mix of pottery and stone tools, while the lower levels contain only of stone tools (Cherry, 1978; Scheans et al., 1970). This seems to indicate that the lower levels may date back to the Palaeolithic and a later date for the upper levels. But the interface between the two layers gave a date of 880 ± 100 (GaK-2871) (Scheans et al., 1970), which needs further investigations.

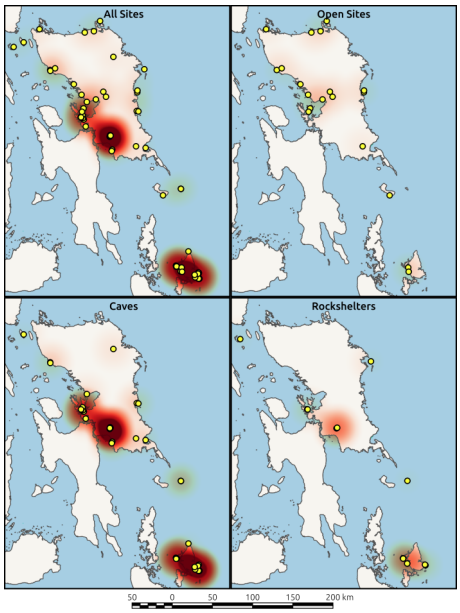

Figure 20. Distribution of Samar and Siargao archaeological sites by type.

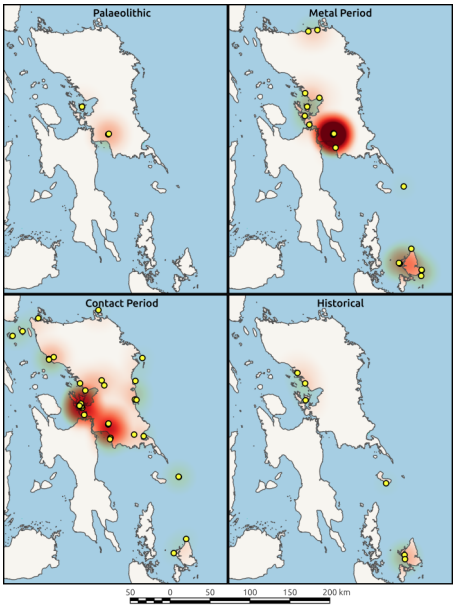

Figure 21. Distribution of Samar and Siargao archaeological sites by period.

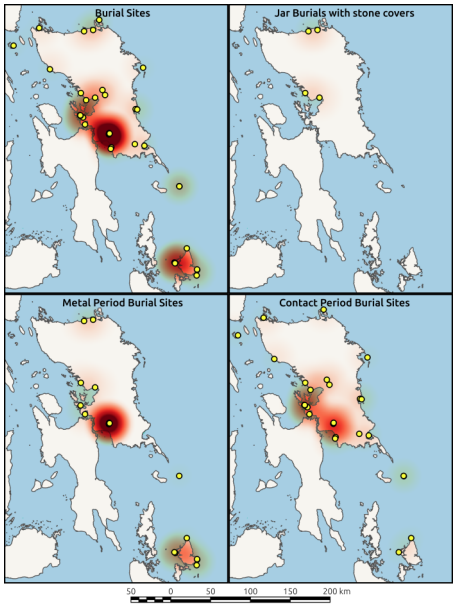

Figure 22. Distribution of Samar and Siargao archaeological burial sites.

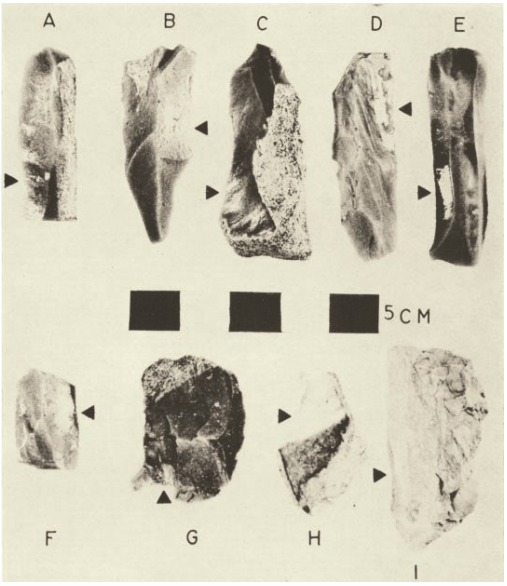

Figure 23. Blade tools recovered from Buad island (from Scheans et al. 1970).

Investigations in Panhologan area in SNBNP show that it has potential for future palaeolithic archaeology studies. From previous studies, a pebble tool along with flake tools and two blades were recovered during the exploration phases in Panhulogan II but the excavations from the same research yielded only remains of a metal period jar burial culture (Tuggle and Hutterer, 1972; Hutterer, 1971; Hutterer, 1969). The excavations by the same team in Panhologan I, on the other hand, revealed a stalagmitic floor with charcoal, flake tool, marine shells and animal bones. The problem was that a 2.5 metre thick sterile overburden overlies this layer, and it was not feasible during that time to expand the excavation. The excavations reached 6m in some areas but bedrock was not reached. Panhologan I cave would be a good site to do more archaeological investigations and excavations. The presence of marine shells 2.5 metres below the surface (see Moore, 1972) seem to indicate that this layer dates to the middle Holocene when sea levels were higher than present levels and the coastline closer to the site. This would be ideal for the study of the relationship between sea-level changes and past human occupations in the area.

So far, most of the Palaeolithic material excavated come from Sohoton Cave (Townsend, 1972). Thousands of lithic materials were recovered during the excavations. The stone tools were found throughout the archaeological sequence where it is mixed with pottery on the top layers, while no ceramics were recorded on the lower layers. The lower guano layer that was the lowest excavated layer was dated to 10,000 ± 120 BP (Tuggle and Hutterer, 1972). This layer was described as sterile but it might be possible that archaeological layers can be found under this sterile layer. Sohoton Cave is a very large, dry, well-lit cave very suitable for habitation, and thus much more can still be done for the study of the archaeology of the cave.

Sohoton B and C sites also have great potential. These sites contain shell middens and stone tools. One of these sites was mentioned by Jagor (1875) in the late 19th century and he has pointed out its significance in terms of geological history of the place. These sites were also recorded in 1968-1971 but they were not excavated (Tuggle and Hutterer, 1972; Hutterer, 1969). These would be very good areas for future archaeological research especially with comparing archaeology with sea level changes.

Ancient Burials

Most of the recorded archaeological sites for Samar and Siargao are burial sites (see Figure 22). These have been recorded all around the main islands including the small islands at the periphery. Based on associated artefacts these burials seem to date to the Metal Period (around 2000 years ago) up to the Contact Period.

Of particular interest are the jar burials with worked stone covers. In Samar, these have been recorded in Brgy. Iguid in Catbalogan (Guthe, 1922–1925) and Motiong (Beyer, 1947) in Samar Province and San Roque and Lauang in Northern Samar. This particular type of jar burial tradition is dated to the Metal Period and seems to be the case for the sites in Samar as no tradeware ceramics were found associated with these burials. Such burial traditions have also been recorded in Quezon (Paz et al., 2008) and Bicol Provinces (Dizon, 1979), and so far, have not been found in other parts of the Philippines.

Many of the other burials were found in caves and rockshelters, mainly in the caves recorded by Guthe (1922–1925), the Sohoton Area (Macdonald, 1972a; Macdonald, 1972b) and those recorded in Del Carmen, Siargao. Fr. Cantius Kobak also collected numerous specimens from burial sites all around Samar. His collections are now housed at the Samar Archaeological Museum in Christ the King College in Calbayog.

In Del Carmen, the associated artefacts like earthenware sherds and the shell bracelet from Liaunan 1 seem to date to the Metal Period, also much like many of the burial sites in Samar.

Caves that have been used as burial places during the Metal Period up to recent times are quite common in the Philippines and indeed, there seems to have been a shift in the use of caves from habitation spaces during the Palaeolithic Period to burial and ritual use from the Neolithic up to the Contact Period (Ronquillo, 1995). This is also observable in the Dinagat Corridor archaeological record.

Historical Archaeology in Samar and Siargao

Although recording historical sites were not the main objective for this project, we did record a few historical sites because of its importance to the local communities. The ruins of Tinago and Zumarraga are used as local tourist attractions and show the importance of Samar in Philippine

history. The Arteche ruins in Zumarraga still contain numerous structures that can still be observed on top of the promontory where there is very good visibility of the sea and coast. This will be a good site for the study of historical structures and fortresses. In Del Carmen, the old town located in Barangay San Fernando also has remains of an old watchtower. This is said to be one of the oldest Spanish settlements in Siargao. The presence of burials on the caves and rockshelters around the town itself may indicate that the site was probably established even before the arrival of the Spanish. This burial tradition might have also continued even after the arrival of the Spanish.

Future Directions

The results of our investigations show that the Dinagat Corridor is very promising for future archaeological research. There is still a lot to be done in terms of reconstructing the prehistory of the region. The authors plan on continuing this study focusing on a more extensive archaeological survey and archaeological excavations in some areas in Samar and Siargao as well as surveys of other islands in the corridor. Although Sohoton and Panhologan Caves have been excavated in the 1969 and 1971, these sites appear to be the most promising in terms of future archaeological excavations. For one, the cultural layers need to be dated systematically using modern absolute dating techniques. Other areas such as the jar burial sites in the coasts and the blade tools of Zumarraga and nearby islands also need more comprehensive archaeological research. A more extensive survey of the limestone areas in Siargao would help find an ideal site for archaeological excavations in the future. In our opinion, our preliminary explorations in both Samar and Siargao islands have only scratched the surface of the archaeological richness of the Dinagat Corridor.

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