The rocky road: the selection and transport of Admiralties obsidian to Lapita communities

Glenn Summerhayes

Abstract
This paper builds upon the previous work of Ambrose, Kennedy and Fredericksen on the movement of Admiralty Island obsidian by focussing on the obsidian found in sites with Lapita pottery located outside the Admiralty group of islands in the Bismarck Archipelago, Papua New Guinea. The results offer a new perspective in modelling the mechanisms of obsidian exchange and the nature of the societies that extracted and moved the obsidian. The model proposed to explain the Lapita period distribution of Admiralties obsidian goes some way to filling the gaps identified by White in 1996.

Introduction
Over the last thirty years major advances have been made in our understanding of the nature of obsidian exchange within Papua New Guinea. J. Peter White has been a leading player in this field, from his excavation of obsidian at Batari and Kafiavana in the New Guinea Highlands (White 1972) to his involvement in sourcing obsidian at the Australian Nuclear Science and Technology Organisation (ANSTO), Lucas Heights. His 1996 article ‘Rocks in the head’ was a major contribution to this field, inviting us to rethink the explanatory models used to account for obsidian distribution in the region. It is hoped that this article will fill some of the gaps identified by White’s earlier work.

Background
Admiralty Islands’ obsidian has a long history of exploitation. The islands are part of Manus Province in the Bismarck Archipelago of Papua New Guinea. Its obsidian was first used on Manus in the terminal Pleistocene (Fredericksen 1997a, 1997b), but is first found outside the Admiralty region only in the late 2nd millennium BC in association with Lapita ceramics. To the west, it has now been identified on Borneo (Service 1996) and the north coast of New Guinea at Biak, Wom and Moen (Ambrose 1978:330). Within the Bismarck Archipelago, it occurs in Lapita contexts in New Britain and the Mussau Islands (Green 1987; Kirch et al. 1991; Summerhayes et al. 1993), and in various contexts on New Ireland at sites such as Lossu, Panakivuk, Balof and Muliamia (Ambrose 1978; Marshall and Allen 1991; White et al. 1991), as well as on the nearby islands of Tabar, Masahet (off Lihir), Tanga and Anir (Ambrose 1978). Further south, it is reported from North Solomons (Ambrose and Duerden 1982; Spriggs 1991; Wickler 2001), southeast Solomons (Green 1987), and Vanuatu (Ambrose 1976). Fredericksen (1997a) provides a more complete review.

Two important observations arose out of these early analyses. Firstly, in most assemblages there was a shift over time from mainly West New Britain obsidian to Admiralty obsidian, with Admiralty obsidian numerically dominant in the later assemblages of Anir, Eloaua, Lossu, Balof and Buka (Ambrose and Duerden 1982:84). Changes in the nature of Lapita obsidian exchange were recognised initially by Ambrose (1978:330), who identified an increase in Admiralty obsidian in the Eloaua Lapita material excavated by Egloff, from 68% in the earlier material to 85% in the later assemblage. Secondly, of the two Admiralty Island source areas (Fig. 1), obsidian from Lou Island was the dominant source represented outside the Admiralties; in contrast, obsidian from the small island of Pam Lin provided little and has been written off as ‘unimportant for external trade’ (Fredericksen 1997b:72). This was in contrast to local consumption in the Admiralties, where Pam Lin obsidian was used more commonly than Lou Island obsidian (Fredericksen 1997a, 1997b).

The sourcing of Admiralty obsidian in some sites, however, often did not go down to the level of specific sources or sub-sources (Fredericksen 1997a:180; Allen in press). This contrasts with New Britain, where extensive sampling of obsidian outcrops (Torrence et al. 1992; Fullagar et al. 1991), combined with advances in the analysis of obsidian using PIXE-PIGME (Summerhayes and Hotchkis 1992, Summerhayes et al. 1998), allowed the definition of five specific obsidian source areas within New Britain (Kutau/Bao, Gulu, Hamilton, Baki/Garala, Mopir). Over the last 12 years, over 1500 archaeological samples have been traced back to these sub-sources using PIXE-PIGME.

The results of this massive sourcing program, together with new archaeological excavations, have allowed insights into the socio-economic nature of obsidian exchange over a 20,000 year period (Summerhayes and Allen 1993; Torrence et al. 1996; Torrence and Summerhayes 1997; Summerhayes et al. 1998; Araho et al. 2002; Summerhayes in press a and b). This recent research has also refined the chronology of Lapita settlements, and has allowed closer attention to the changing proportions of obsidian from the New Britain and Admiralty sources (see Summerhayes in press a). This confirms the increasing importance of Admiralty Island obsidian in the eastern Bismarck Archipelago after the initial spread of the Lapita Cultural Complex.

It is now time to focus on the archaeological distribution of Admiralty obsidian outside the Admiralty Islands, particularly the distribution of obsidian from specific sources, in modelling the nature of interaction and exchange among the Lapita communities of the region. This paper first introduces the Admiralty obsidian source areas and the results of PIXE-PIGME analyses of archaeological finds outside the Admiralty Islands. This is followed by a review of various explanations to account for source
selection and what it tells about economic or social mechanisms for exchange.

Source areas

Obsidian naturally occurs at four major areas within the Admiralty Islands (Fig. 1). As it will be argued that access to sources provides the key to obsidian selection, some detail on each of the sources is provided.

1) Mt Hahie, Manus Island obsidian is not found outside the Southwest Bay area. (Kennedy et al. 1991; Kennedy 1997; cf. Bird et al. 1988).

2) Lou Island, located 25 km south of Manus Island, is about 12 km long and up to 6 km wide. It is of volcanic origin, with, five of its twelve volcanoes formed in the last 2000 years (Ambrose et al. 1981; Ambrose and Duerden 1982:85). Two major volcanic events at ~2100 and ~1650 BP affected human settlements and covered obsidian sources. Several obsidian sources have been located on Lou, including Umrei and Wekwok, where shafts to extract obsidian are found. At Umleang, Ambrose located 25 shafts, some up to 17 m deep (Ambrose et al. 1981:7). Use of these shafts was probably limited to the last 200 years (Ambrose et al. 1981:13; Fullagar and Torrence 1991). Permanent habitation was probably not possible on Lou prior to the introduction of agriculture.

3) Tuluman Island, lying just south of Lou, was formed in 1954 and its obsidian is not relevant here.

4) Pam Lin and Pam Mandian are two small islands located just over 6 km south of Lou Island. On Pam Lin, which is just 500 m wide, obsidian occurs 2 m above sea level and is thus easily accessible. Ambrose et al. (1981) noted that obsidian from Pam Mandian was of poor quality.

Through extensive sampling and chemical analysis using PIXE/PIGME, Ambrose and his colleagues (Ambrose et al. 1981; Ambrose and Duerden 1982) identified the chemical signatures of the Admiralty Islands’ sources. The late Roger Bird, who pioneered the sourcing program with Ambrose, provided the original source data, which were subsequently refined by improved machine conditions for the PIXE/PIGME analyses (Summerhayes et al. 1998). Obsidian from Umrei and Wekwok on Lou Island can be clearly separated from each other and from the nearby Pam Lin obsidian.

Apart from PIXE-PIGME, one other chemical technique using a JEOL scanning electron microscope with an EDAX attachment has been used for quantifiable analysis (Fredericksen 1997b). The chemical data thus generated allow the subdivision of the major source areas. Density analysis has also been used to separate and subdivide source areas, but with less success as overlaps between the major sources lead to problems in source attribution of archaeological specimens (Torrence and Victor 1995; White and Harris 1997; Allen in press).

Results

Table 1 lists PIXE-PIGME source data on Admiralty obsidian found outside the Admiralty region in stratified contexts in New Ireland, Mussau, East New Britain and north coast New Guinea (Fig. 2 gives the location of sites). The Table shows the percentage of obsidian by count allocated to the New Britain and Admiralty source regions, and then the percentage identified to individual sources in the Admiralties. The results come from several published and unpublished studies. The Lossu, Lasigi, Balof and Panakiwuk data are from various analyses by Ambrose and Bird in conjunction with the Lapita Homeland Project. The Duke of York Islands’ results come from White and Harris (1997). For Watom Island, J. Specht (pers. comm.) provided the SAD data, and the results for SAC and SDI are taken from Green and Anson (2000) and Anson (2000).
coast New Guinea data for Tumleo Island are taken from Terrell and Welsch (1997). The Tumleo material came from surface collections and excavations undertaken in 1996 as part of research directed by Terrell and myself. Finally, the Anir results for Kamgot, Balbalankin and Feni Mission are from my own work.

Four sets of assemblages show changes in the frequency of Admiralty obsidian over time: Anir, Duke of Yorks, Watom and Mussau. Quantitative data for the Mussau finds are not listed due to difficulty in clarifying the percentages of obsidian from different sources, as a consequence of problems correlating the results of density analysis with the PIXE-PIGME data (Allen in press). Data for Buka and Nissan in North Solomons also are not presented in as they derive from density analysis.

Regional patterns

Early Lapita: 3300 - 3000/2900 BP

Admiralty obsidian was never dominant in assemblages of this age. In sites close to the Willaumez Peninsula sources, Admiralty obsidian is very rarely found (Summerhayes in press a). In the Arawe assemblages, only one piece in Adwe (FOH) and another in Paligmete (FNY) were identified as being from Umrei. Although Umrei is the dominant obsidian moving out of the Admiralties, Pam Lin obsidian is also found in sites slightly further away from Willaumez Peninsula. One piece was identified in SEE layer II in the Duke of Yorks (White and Harris 1997:98). The Kamgot site (ERA) in the Anir group, which is equidistant to both sources, has 20% of obsidian from the Admiralties; of this, 67% came from Umrei and 25% from Pam Lin. Closer to the Admiralty sources, both Pam Lin and Umrei are represented at Talepakemalai (ECA) (Allen in press) where about half of the obsidian is attributed to Admiralty sources (Kirch et al. 1991).

Middle Lapita: 2900 - 2700/2600 BP

Like the previous period, Admiralty obsidian is rare in sites close to the west New Britain sources. Only one piece of Admiralty obsidian, from Umrei, was identified in the Apalo (FOJ) site, Arawe Islands. In assemblages located to the east and north of the New Britain source regions, Admiralty obsidian replaced Kutau/Bao as the major source. This probably corresponds to a shift from a ‘colonising phase’ when populations were more mobile, to one where they were more sedentary (Summerhayes in press b). The proportions of obsidian from New Britain and the Admiralties in these assemblages are best explained by proximity to the source areas. This can be seen in the Mussau Islands, on New Ireland’s offshore islands (e.g. Anir), and on Watom and the Duke of Yorks off the eastern tip of New Britain as well. In the Mussau assemblages, the change is more marked than elsewhere. In the earlier levels of Talepakemalai (ECA), there were roughly equal amounts

Table 1

<table>
<thead>
<tr>
<th>% of source areas</th>
<th>% of Admiralty sources</th>
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<tbody>
<tr>
<td></td>
<td>WNB</td>
</tr>
<tr>
<td>Early Lapita</td>
<td></td>
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<tr>
<td>ERA – Kamgot (Anir)</td>
<td>80</td>
</tr>
<tr>
<td>SEE Layer 2 - Duke of Yorks</td>
<td>99</td>
</tr>
<tr>
<td>Middle Lapita</td>
<td></td>
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<tr>
<td>ERC – Balbalankin (Anir)</td>
<td>33</td>
</tr>
<tr>
<td>EAQ – Malekolon (Anir)</td>
<td>36</td>
</tr>
<tr>
<td>SDP layer II - Duke of Yorks</td>
<td>11</td>
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<tr>
<td>SDI C4 - Watom</td>
<td>100</td>
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<tr>
<td>Late Lapita</td>
<td></td>
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<tr>
<td>ERG – Feni Mission (Anir)</td>
<td>56</td>
</tr>
<tr>
<td>SDP II - Duke of Yorks</td>
<td>69</td>
</tr>
<tr>
<td>SAC C2 – Watom</td>
<td>53</td>
</tr>
<tr>
<td>SDI C3 – Watom</td>
<td>50</td>
</tr>
<tr>
<td>SAD – Watom</td>
<td>44</td>
</tr>
<tr>
<td>Post Lapita to 1300 BP</td>
<td></td>
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<tr>
<td>SDP layer I - Duke of Yorks</td>
<td>80</td>
</tr>
<tr>
<td>SDI C2 – Watom</td>
<td>84</td>
</tr>
<tr>
<td>SDI C1 – Watom</td>
<td>95</td>
</tr>
<tr>
<td>SAC C1 – Watom</td>
<td>93</td>
</tr>
<tr>
<td>EAA – Lossu</td>
<td>15</td>
</tr>
<tr>
<td>EAT - Lasigi Mission</td>
<td>1</td>
</tr>
<tr>
<td>ELS - Leigei Dorf site</td>
<td>6</td>
</tr>
<tr>
<td>EAB - Bulof</td>
<td>32</td>
</tr>
<tr>
<td>NGRP46 - Tumleo</td>
<td>100</td>
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Table 1 Distribution (%) of obsidian by sources and periods as indicated by PIXE-PIGME. The total for the major source regions in Watom SAD does not add up to 100% as some pieces could not be allocated.
of Willaumez Peninsula and Admiralty obsidian, but in the later levels Admiralty sources dominate. Again, both Pam Lin and Umrei obsidian occur, but the proportions are difficult to discern, though Allen (in press) hints that Pam Lin obsidian may have increased. Further south at Balbalankin and Malekolon, Admiralty obsidian, particularly Umrei, also dramatically increased compared to the earlier assemblage at Kamgot (ERA). A similar trend is seen in the Duke of York assemblages. Unfortunately, from the sole Watom site of this period, SDI zone C4, only two pieces of obsidian were found: one from Mopir, the other from Umrei (Anson 2000:108). On Buka, obsidian from the Lapita site of DJQ (Kessa Plantation) is mostly from Admiralty sources (Wickler 2001:178). The increase in Admiralty obsidian in New Ireland and the eastern tip of New Britain represents an increase in the movement of Umrei obsidian, while Pam Lin is a secondary source. This contrasts with the Mussau islands, where Pam Lin is the dominant source represented (Allen in press).

**Late Lapita: ca 2600 - ca 2200 BP**

During this period, West New Britain obsidian increased in the assemblages on Anir (Feni Mission ERG), Duke of Yorks (SDP layer II), and Watom (SAC C2, SDI C3, SAD). The Admiralty obsidian present in these assemblages shows variations between the sub-sources. At ERG, Pam Lin increases to 45% of the Admiralty obsidian. Umrei, on the other hand, still makes up the majority of Admiralty obsidian in SDP layer II and on Watom. In SDP layer II, Umrei makes up 83% of the Admiralty obsidian while Pam Lin represents only 17% (White and Harris 1997). In SAC C2, Umrei makes up 65% of the Admiralty obsidian, Wekwok reaches a high of 27%, and only 3% is attributed to Pam Lin (Green and Anson 2000:67). In SDI C3, only five pieces of obsidian were recovered, two of which are from Admiralty sources, one each from Umrei and Pam Lin (Anson 2000:108). In SAD, Umrei makes up 96% of the Admiralty obsidian, with 4% identified to Wekwok and none to Pam Lin. The proportions at SAD are similar to those of other levels from this phase, supporting Specht’s (2002:41) belief that this assemblage ‘probably represents a Lapita expression contemporary with that of zone C2 at SAC and the lower levels of SDI.’ In the North Solomons, the one site allocated to this period, the DAF surface site on Sohano Island, has mostly Lou Island obsidian (Wickler 2001:179).

Sites equidistant to both source regions have an increase in West New Britain obsidian. In contrast the proportions of the individual Admiralty sources remain the same, with Umrei dominating, except at ERG where Pam Lin and Umrei are found in equal quantities. Wekwok obsidian appears at SAC and Watom, and Allen notes that one Wekwok piece was found in ECB in the Mussau group (Allen in press).

**Post Lapita: ca 2200 - 1300 BP**

New Britain obsidian still dominates the East New Britain (Watom SDI C2 and C1) and Duke of York (SDP layer I) assemblages. The small amount of Admiralty obsidian is mostly from Umrei. Admiralty obsidian, however, dominates the assemblages at Lossu (EAA), Lasigi (ELS and ELT) and Balof (EAB) in central and northern New Ireland, where Umrei is the main Admiralty source represented (Table 1). On the north coast of New Guinea, only Admiralty obsidian was used during the Sumalo Period (ca.1300 BP) on Tumleo Island (Terrell and Welsch 1997:561). Here, Pam Lin (42%) is almost as common as Umrei (50%), while only a small amount of Wekwok (8%) is present.

During this period, Umrei is still the dominant Admiralty source to the east, with Pam Lin either absent or rare. To the west, Pam Lin obsidian is found in much higher proportions than Umrei. The proportion from Wekwok increases in both eastern and western assemblages.

**Admiralty Islands’ use of obsidian**

By comparing these regional distributions with the local distribution of obsidian within the Admiralty Islands, contrasting patterns emerge that are important for modelling exchange patterns. There are, however, several problems in identifying obsidian consumption patterns within the Admiralties. Firstly, there are only six relevant
excavated sites: Ahus, Pamwak (GOD), Father’s Water (GAC), Mouk (GLT), Kohin (GDN), and Paemasa (GFR).
The last three have dentate-stamped Lapita pottery (Kennedy 1981, 1982, 1983; McEldowney and Ballard 1991). Secondly, the lack of fine chronological resolution for the last 3500 years inhibits the placement of sites into discrete time periods (Fredericksen 1997a:382).

Despite these limitations, two major points can be made.
Firstly, Pam Lin was more commonly used within the Admiralties than further east and south (Fredericksen 1997a). At Mouk, Kohin and Pamwak, Pam Lin obsidian makes up 50%, 39% and 38.5% respectively (Fredericksen 1997a:382). In Father’s Water, on the other hand, it is only 7%, and only 8% in the Ahus site which dates to the last 2000 years. Fredericksen (1997a:382) suggests a scenario where several intra-regional distribution routes were operating, with the Lou sources utilised by communities in the eastern part of Manus Island, and the Pam Lin source by communities in the western part.

Secondly, this pattern of source use has a long history. In the terminal Pleistocene, obsidian from an unknown Lou Island source (’source X’) was used at Pamwak, with Pam Lin obsidian appearing in the early Holocene. By the middle Holocene, Pam Lin replaced source X as the main supplier to Pamwak, and Welkwo obsidian first appeared there (Fredericksen 1997b:72). Two dates for this transition are 6280 ± 250 (ANU 7122) and 7940 ± 90 BP (ANU 8239) (Fredericksen 1997b:72). This transition underlies a midden layer with a dense concentration of obsidian that suggests a change in economic strategies, with much greater use of obsidian from Pam Lin (Fredericksen 1997b:71). Lou Island obsidian occasionally occurs in early Holocene contexts, but the first significant amounts appear only in the top levels. These levels, unfortunately, cannot be dated accurately, though Fredericksen (1997b:71) narrows the time of the increase in Lou only to the period after the introduction of Pam Lin and before the use of a post-2000 BP style of pottery (Fredericksen 1997:72).

Pam Lin was also the dominant source represented at the other unequivocally pre-Lapita site, Peiti Louson. Here, obsidian was found in mid-Holocene contexts (Kennedy 1983), with the majority sourced to Pam Lin and the rest to Lou (Fredericksen 1997a:379). Thus, the exploitation of Pam Lin obsidian in the mid-Holocene is a continuation of the selection and use of this obsidian in the early Holocene.

In the late Holocene, there was no major change in behaviour associated with extracting obsidian for consumption within the Admiralties, though admittedly the archaeological evidence currently available is slight. Outside the Admiralty Islands, Umrei obsidian was selected for distribution eastwards in the Early Lapita period at 3300 BP, and by 1300 BP obsidian from Umrei and Pam Lin was being selected and transported westwards to northern New Guinea in equal proportions.

Obsidian will probably be recovered from older contexts on the north coast of New Guinea, where Lapita pottery, albeit only two sherds, is reported (Swadling 1990; Terrell and Welsch 1997). To the east of the Admiralties, the distribution of Lapita pottery is closely associated with obsidian movement, and the same can be expected to the west. Interestingly, the proportion of Admiralties and New Britain obsidian from surface scatter on Ali Island off the north coast of New Guinea, where one dentate stamped sherd was found, is identical to that from the Middle Lapita phase on Anir.

Evidence for earlier contact between north coast New Guinea and Manus comes from the introduction into Manus of cuscus (Spilocuscus kraemeri), bandicoot (Echymipera kalulu), and Canarium indicum nuts at ca 13,000 BP (Kennedy 2002:20; Specht in press). These introductions occurred about the same time that obsidian was extracted and distributed to mainland Manus. Earlier use of obsidian from Mt Hahie in southwest Manus is also a possibility, although evidence from stratigraphic contexts is currently lacking.

In summary, while the selection and distribution of obsidian within the Admiralties continued unchanged after 3300 BP, the selection and distribution of obsidian for places to the east beyond the Admiralties was different. In modelling these patterns of obsidian selection and dispersal, three aspects will be discussed below: volcanic events, social/economic models, and the role of Lapita communities in obsidian distribution.

Factors affecting the selection and distribution of resources

Volcanic events?

The nature of volcanic events in the archaeological record, in particular their effect on the extraction and distribution of obsidian, have been well documented for West New Britain (Torrence et al. 2000; Torrence 2002). In the Admiralties, volcanic disruptions seem to have had less impact on the extraction and distribution of obsidian in the late fourth and third millennium BP. As Ambrose and Duerden (1982:85) noted, the ‘chronology of volcanic events will therefore be important in any attempt to define prehistoric exploitation of this resource.’ A major eruption on Lou Island ~2100 BP buried the Sasi (GDY) site under 5 m of ash, and the other at ~1650 BP covered the Emsin Site (GEB) with 3 m of ash (Ambrose et al. 1981; Ambrose and Duerden 1982:85; Ambrose 1991). With such depths of ash, it is understandable why shafts were needed to extract obsidian from the Lou sources. Despite these disruptions, however, the Umrei source apparently did not go out of production, and there are no hiccups in its temporal distribution. Umrei obsidian is present in archaeological assemblages of the Early to Late Lapita periods, and in those of the post-Lapita period.

Volcanic activity might have influenced which obsidian reached Pamwak before 3500 BP, when Pam Lin obsidian was preferred over that from the closer Lou Island sources. Why was Lou Island obsidian not chosen? Inaccessibility? Was it available? It is certain from the amount of volcanism evident that Lou Island would have looked very different in the past (Ambrose 2002:68). Pam Lin, on the other hand, has obsidian flows at beach level that could have been more accessible and easier to work than those on Lou.

Social or economic models

Studies of obsidian extraction and distribution from the West New Britain sources suggest that social factors played a role in the regulation of obsidian leaving that area (Torrence et al. 1996; Torrence and Summerhayes 1997; Araho et al. 2002). One source area, Kutau/Bao, was strongly preferred over Baki and Gulu, even though the latter were of equal quality and accessibility. This was not the case in the Admiralties, where both Pam Lin and Umrei were selected and distributed, albeit in unequal quantities.
The proportion of different Admiralty sources reaching archaeological sites outside the source region is important here. The selection of Umrei as the primary source and Pam Lin as the secondary one in the movement of obsidian fits a pattern of closeness to the source in being a determining factor in the selection of obsidian. It is similar to the distribution of obsidian from West New Britain in the Pleistocene, when mostly Mopir obsidian, and only a small amount from Willaumez Peninsula, was distributed to New Ireland in the east (Summerhayes and Allen 1993).

Modelling the social nature of obsidian distribution using the New Britain sources was based on technological analyses of assemblages found at the sources (Torrence 1992) and away from them (Sheppard 1992, 1993; Halsey 1995), as well as an argument that obsidian was a prestige good (Summerhayes in press a for discussion). Torrence et al (1996:220) argued that acquisition of obsidian from the West New Britain sources was a result of embedded procurement, where ‘materials were collected in the course of carrying out other activities.’ Such ‘other’ activities do not apply on Lou or Pam Lin. If people travelled to these two islands, it would have been to collect obsidian or to obtain it from inhabitants from Lou, Pam Lin being too small for long-term occupation. Thus, in contrast to the New Britain sources, the consumption of obsidian from Lou would be expected to reflect distance from the raw material source (Torrence et al. 1996:220).

Unfortunately, no obsidian production sites of Lapita age are known in the Admiralty source areas. The first available workshop evidence is from the post-Lapita Sasi site, which has produced hundreds of blades and flakes. The later Emsin workshop, on Lou Island, produced triangular points that were exported to other parts of Manus (Antcliff 1988; Kennedy 1997; Fredericksen 2000), and further afield to New Ireland (Lossu) and North Solomons. The obsidian of all exported points is sourced to Umrei.

Information on obsidian technology from archaeological contexts in the Admiralties is also limited. The available descriptions suggest that pre-Lapita production was of a non-economising form, while in later periods production was directed more towards provision of single flakes that equate with an economising technology. Pamwak yielded over 23,000 pieces of obsidian from 7.5 m3 of deposit (Fredericksen 1997b:69). Formal tools made ‘from a flake [of pitchstone] that is secondarily flaked on only one surface to produce a discoid without any cortex’ are found only in the early Holocene levels (Ambrose 2002:69). The later obsidian found with pottery is described as ‘simple obsidian flakes’ (Ambrose 2002:69). At Peli Louson, the obsidian from the lower, pre-pottery levels was described as ‘including large flakes and nodules,’ whereas the pottery levels contained a ‘few small flakes of obsidian’ (Kennedy 1983:116). At Father’s Water, obsidian was ‘abundant in the upper two layers’, with only eight flakes in layer 3 (Kennedy 1983:116, 118).

Technological information from outside Manus is a little more useful. Where Admiralty Island obsidian is found, the indications are that it was heavily reduced. For Mussau, Allen (in press) notes that artefacts were ‘for the most part small, simple flakes with little purposeful retouch but occasional use wear.’ At the Anir sites, there is little difference in technology from Early to Late Lapita, with the obsidian from all sources being very small flakes (Swete-Kelly 2001; Summerhayes in press b).

In the Duke of Yorks, White and Harris (1997:104) noted that obsidian pieces from the dominating source are usually heavier than those from the lesser used source, and suggested that ‘material from a currently important source is more lavishly used – or less re-used.’ For Admiralty obsidian, this refers to the Middle Lapita assemblage of SDP layer III and the Late Lapita assemblage of SDP Layer II. Despite this, White and Harris (1997:104) report that the technology was unremarkable, made up of flakes and chips of less than 2 g. Hanslip (2001) also noted this trend in other sites such as SAD at Watom, Balof (EAB2), Lasigi (ELT) and at some sites on Buka and Nissan. Such comparisons are, as Hanslip (2001:74) noted, limited and not conclusive. The bottom line is that, unlike the West New Britain Kutau/Bao obsidian found in the colonising phase in both the Reef/Santa Cruz and Arawes assemblages, the Admiralty obsidian and later Kutau/Bao obsidian is minute in size and indicative of an economising behaviour. At excavated sites where Admiralty obsidian dominates, the mean weights of pieces (<0.6 g) are very small (Specht 2002: Tables 2 and 4).

The point is that prior to the distribution of Emsin points from Lou Island, the obsidian distributed beyond the Admiralties is dominated by small flakes, with no cores or lumps of obsidian known in these archaeological contexts. This may seem to fit a ‘down the line’ economising model for distribution from a source. But ‘down the line’ from where, and to where? There is no evidence of a distance-decay pattern working here, where, as obsidian moves away from the source, it is reduced in size as the commodity gets rarer. The assemblages from Father’s Water, the Mussau sites and Kamgot all consist of small flakes.

Role of Lapita

Obsidian artefacts from the closest major Lapita sites, in the Mussau group, suggest that users did not obtain it by direct access as the material reaching these sites consists of small, heavily reduced flakes. It is possible that there is a yet-to-be-found Lapita site in the eastern islands of the Admiralties which obtained obsidian and subsequently distributed it further east, although there is currently no evidence for this. Another possibility is that the distribution of obsidian to Lapita communities outside the Admiralty Islands was undertaken and regulated by Admiralty Islanders themselves. This option has appeal for three reasons.

Firstly, there is very little evidence of Lapita presence in the Admiralties. Three handfuls of dentate pottery stand in contrast to the tens of thousands of sherds found in the major Lapita assemblages of Mussau, Kamgot and the Arawes. Also, if Manus Island fits the same pattern as the main islands of New Britain and New Ireland, then it will not have major early Lapita settlements as these are generally found on offshore islands. Ambrose (1991:103) made this point a decade ago, suggesting that the poor representation of Lapita is ‘probably related to the general observation that major Lapita sites occur as newly established outposts, away from areas of pre-existing settlement, and usually on small islands acquiring some defensive quality from their isolation.’ The few dentate stamped sherds on the main island of Manus are more likely due to exchange than settlement.

Secondly, Kennedy’s (2002) innovative paper using Blust’s linguistic work is important here. There is evidence
to suggest that Manus was not part of the speech community that spread with Lapita across the Pacific, suggesting ‘strong local tradition.’ Kennedy raises the possibility that settlements which made and used Lapita pottery within a Lapita social context might not occur on Manus, and the Lapita pottery found there might have been imported as trade goods.

Lastly, Fredericksen’s (1997a:382) suggestion that intra-regional distribution routes were operating, with perhaps the Lou source in the eastern part of Manus Island and Pam Lin more towards the west, has appeal in that local Manus groups were obtaining obsidian and then exchanging flakes to the Lapita communities to the east. In this scenario, Lapita communities in the Mussau group tapped into an existing obsidian network operating from the eastern Admiralties, where the amount of obsidian from Lou or Pam Lin was based on distance to the source. The expanded distribution of Admiralty obsidian eastwards to Lapita communities on Mussau by 3300 BP would have been fuelled by Lapita demand. Any subsequent increase in obsidian, such as the increase in Umrei obsidian in the Middle Lapita period, could thus be explained as an increase in consumer demand (Summerhayes in press b).

Conclusions
The dearth of data on human occupation for the mid to late Holocene in the Admiralty Islands should not stop archaeologists from modelling the nature of exchange and the social or economic processes working within and between communities that inhabited the region in prehistory. By focussing on the consumption of obsidian in archaeological contexts outside the Admiralty area, and then comparing the results with the distribution of obsidian within the region, it is possible to set out possible scenarios to account for the distribution of obsidian as well as the limitations of the data. Identifying the selection of obsidian primarily from Umrei, and to a lesser degree from Pam Lin, and its export as small flakes to Lapita settlements in the east, allows us to make comparisons and identify differences from the selection, extraction and distribution of New Britain obsidian to Lapita communities, and to develop models to account for these differences. The social models used successfully to account for the distribution of New Britain obsidians cannot explain the selection and distribution of obsidian from the Admiralties to Lapita communities. The model put forward here is that Lapita occupation was minimal in the Admiralty region, and that obsidian from pre-existing exchange networks were used to supply the demands of Lapita communities further east.

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