NEW ZEALAND
ARCHAEOLOGICAL
ASSOCIATION

ARCHAEOLOGY IN NEW ZEALAND

THE SIGNIFICANCE OF CORTEX ON MAYOR ISLAND OBSIDIAN

PHIL MOORE
PENINSULA RESEARCH

Introduction

In a recent paper McCoy & Carpenter (2014) argued that Mayor Island obsidian found at late period archaeological sites in the Auckland and Whangarei areas (Mt Wellington and Bream Head) had been procured by long-distance formal trade or exchange, based on the lack of cortex, degree of use wear and large average size of artefacts. On the other hand they considered the obsidian originating from other sources was obtained either by direct access or informal (down-the-line) trade/exchange. However this hinges on the assumption that a high cortex percentage for obsidian from any specific source is indicative of procurement by direct access, whereas lack of cortex (in this case on all Mayor Island material) is not. Also the data used by McCoy & Carpenter (2014) are very limited. The total number of pieces of Mayor Island obsidian involved was only 30 (15 from Bream Head and 15 from Mt Wellington) and, in addition, the Bream Head assemblage is actually a combined one from three different sites in the area.

The ideas proposed by McCoy & Carpenter (2014) are certainly worthy of further consideration, but if we are going to use attributes like cortex to establish how obsidian was obtained by distant communities then there is a need to look at data from a wider range of sites and longer time span. Here I present some comments on the subject of cortex on Mayor Island obsidian based upon data from archaeological assemblages and observations on the island itself.

Obsidian cortex

Over the years I have made a note of the proportion of Mayor Island obsidian artefacts with cortex from various sites in the northern part of the North Island, and this information is presented in Table 1, along with some additional data gleaned from the literature. I have also included McCoy & Carpenter's (2014) figure for Mt Wellington for comparison, but excluded that for Bream Head because it is derived from a combined assemblage of unspecified age.

The type of cortex I am referring to is not rough and pitted but generally smooth and water-worn, and clearly associated with rounded cobbles and boulders (undoubtedly from beaches since there are no running streams on the island which would produce such rounding). This differs from the surfaces resulting from natural fractures in the obsidian, which are usually flat and unweathered. In certain cases it has also been possible to assess whether artefacts originate from a pebble, cobble or boulder based upon the degree of curvature of the cortical surface. For the most part the obsidian (with cortex) seems to have come from cobbles and boulders.

It is evident from Table 1 that the proportion of flakes, cores and fragments with remnants of cortex is very low, typically <5% and in many cases close to zero. The highest recorded figure is 15%, from the Kohika site in the eastern Bay of Plenty. But excluding Kohika, these figures are very different to those reported for obsidian from other sources, which commonly range between 15% and 50% (Moore 2012).

In Figure 1 I have plotted the cortex percentage in relation to the approximate age of sites (based on C14 dates, association with dated sites, or the type of artefacts) to see if there is any indication of change over time. With regards to the means of procurement, it seems reasonable to assume that for sites along the Bay of Plenty and eastern Coromandel coasts situated <80 km from Mayor Island, and thus probably within a day's sailing or paddling by canoe (in ideal conditions), that obsidian was largely obtained directly, particularly during the early period prior to inferred permanent occupation of the island circa 1500 AD (Empson *et al.* 2002). Notably many early sites within this region contain a small number of artefacts with water-worn cortex, indicating that it was not unusual for some obsidian to be obtained from beaches on the island. However either the quantity collected from beaches was very limited, or most of the cortex (which is of minimal thickness anyway) was removed prior to transportation, as suggested by Holdaway (2004). The latter, though, is a strategy that does not appear to have been implemented at other island sources (e.g. Fanal, Great Barrier), since the proportion of obsidian with cortex at Mt Wellington and Bream Head that was derived from such sources is about 30% (McCoy & Carpenter 2014).

There is no obvious temporal change in the cortex percentage, regardless of whether obsidian was likely procured by direct access or some form of exchange, though more data are certainly required for late period sites. This means obsidian continued to be obtained in the same manner, from both outcrops (and/or associated colluvial deposits) and beaches, throughout the prehistoric period despite possible restrictions on access post 1500 AD due to

Mayor Island cortex										
LOCATION	**SITE**	**AGE**	**PERIOD**	**TOTAL N**	**CORTEX N**	**CORTEX %**	**SIZE**	**Procurement**	**REFERENCE**	**Dist to Mayor**
Aupouri	N02/879	1475	Early	19	1	5	cobble	exchange	pers obs	430
Aupouri	N03/584	1525	Late	72	1	1.4	cobble	exchange	pers obs	400
Urquharts Bay	Q07/571	1575	Late	12	1	8.3		exchange	pers obs	220
Matatuahu	Q11/344	1350	Early	481	3	0.6	boulder	exchange	pers obs	145
Matatuahu	Q11/344	1350	Early	450	2	0.4		exchange	Prickett 1987	145
Mt. Wellington	R11/12	1600	Late	15	0	0		exchange	McCoy & Carpenter 2014	135
Tamaki River	R11/1201	1550	Late	83	0	0		exchange	Foster & Sewell 1993	130
Ponui Island	R11/20	1450	Early	340	1	0.3		exchange	pers obs	105
Raupa	T13/13	1750	Late	1440	12	1		exchange	Prickett 1992	55
Skippers Ridge 2	T10/226	1800	Late	92	2	2.2	pebble/cobble	direct access	pers obs	75
Hot Water Beach	T11/115	1475	Early	454	26	5.7		direct access	Leahy 1974	60
Slipper Island	U12/5	1450	Early	174	2	1.2		direct access	pers obs	50
Whiritoa	T12/500	1350	Early	523	2	0.4		direct access	pers obs	30
Mt Maunganui	U14/363	1430	Early	313	2	0.6		direct access	pers obs	40
Waikite	U14/3611	1480	Early	110	2	1.8		direct access	Moore 2009	50
Maketu	V14/187	1350	Early	125	2	1.6	cobble/boulder	direct access	Moore 2008	55
Kohika	V15/80	1680	Late	1934	289	15		direct access	Holdaway 2004	80
Waikorea	R14/330	1400	Early	30	1	3.3	cobble/boulder	exchange	Ritchie et al. 2009	135

Table 1: Proportion of cortex on Mayor Island obsidian assemblages from archaeological sites in the northern North Island, and inferred means of procurement.

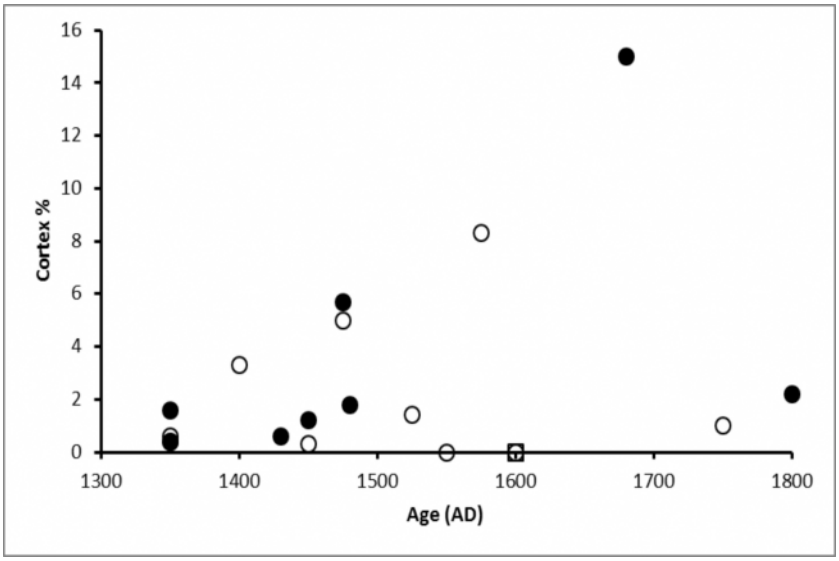

Figure 1: Proportion of cortex on Mayor Island obsidian inferred to have been obtained by direct access (solid dots) and some form of exchange (open circles). Mt Wellington represented by square.

permanent occupation of the island and/or warfare. Kohika is perhaps an unusual case, but Mt Wellington definitely is not.

Figure 2 shows the frequency of cortex relative to the straight line distance from Mayor Island for both early and late period sites, and clearly there is no overall decline in the cortex % with distance which might be attributable to down-the line-exchange, at least for sites within about 150 km from source. In general then, the proportion of cortex was not being progressively reduced as a result of successive transfer of material.

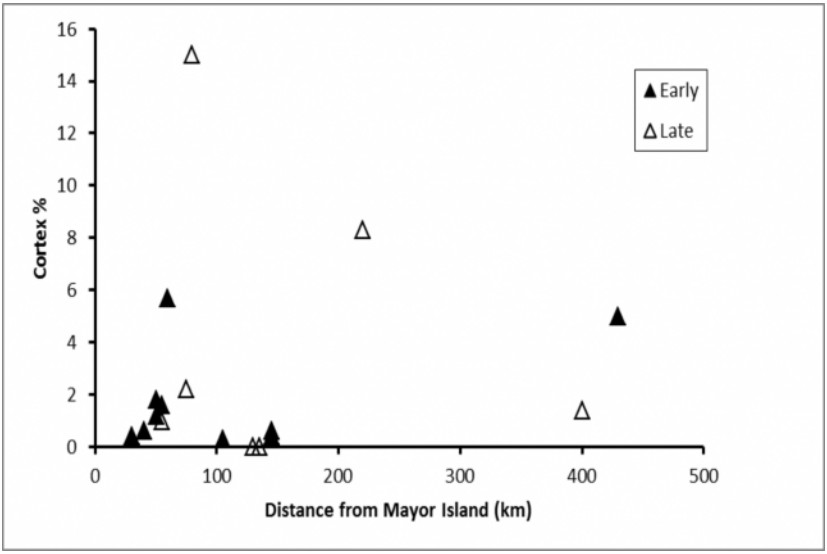

Figure 2: Proportion of cortex on Mayor Island obsidian assemblages from early and late sites relative to the distance from source.

The obsidian resource

As previously noted by various authors the obsidian resource on Mayor Island is vast. It also differs from all other sources in that seams of obsidian are exposed around much of the coastline, making it particularly easy to access *in situ* material. It has therefore generally been assumed that almost all of the obsidian was obtained by quarrying of outcrops. Yet, surprisingly, only three supposed quarries have been recorded (Seelenfreund-Hirsh 1985). The best known (N54/5; U13/124) is located at the Devil's Staircase on the narrow crater rim above Taratimi Bay, approximately 50 m above sea level. It simply consists

of a hole in the cliff face, which unfortunately is situated adjacent to the main walking track and has been considerably modified by visitors in the past 40-50 years. Anyway, since obsidian makes up only about 30% of the outcrop here (*pers obs*.) in my view there is some doubt it was actually a pre-European quarry (see also Sheppard 2004). Another recorded quarry (U13/147) is located near the shoreline in Taratimi Bay, which is a more logical position and thus more likely to be a pre-European feature. The third (U12/33) is near Taumou pā and apparently consists of an outcrop with some evidence of working, but no tunneling. Both of the Taratimi quarries are very small, and based on Seelenfreund-Hirsh's (1985) rough measurements and my own observations at U13/124, it seems unlikely they could have yielded more than about 1.5 tonne of obsidian between them. Whether this could account for most of the Mayor Island obsidian found on archaeological sites in New Zealand (which to my knowledge no-one has calculated) is an interesting question. How much obsidian was actually quarried by the island's permanent residents for their own use also needs to be considered.

One alternative, which seems to have been almost completely ignored (but see Sheppard 2004), is that a significant proportion of the obsidian was obtained from colluvial deposits along the base of cliffs. These consist of loose, suitably-sized blocks and pieces that probably generally lack cortex. Seelenfreund-Hirsh (1985) tentatively interpreted one such deposit on the inside

Figure 3: Obsidian boulder (c. 1.4 m diameter) at Otiora Bay, Mayor Island.

of the crater wall near Lake Te Paritu as a working floor, but provided no information on the distribution or nature of colluvial material on the island.

My observations on Mayor Island, along with those by Sheppard (2004: 153), indicate that obsidian was also readily available from most beaches around the coast in the form of semi-rounded cobbles and boulders up to about 1.5 m in diameter (Figure 3), some of which contain flat fracture surfaces showing only minor abrasion, a feature not normally associated with detrital material. Certainly it would have been far easier (and less hazardous) to simply load large cobbles/small boulders into a canoe during suitable weather conditions than to remove "massively large pieces" from outcrops, as inferred by McCoy & Carpenter (2014: 9). Yet the small number of artefacts with water-worn cortex would suggest that very little obsidian was obtained in this manner.

Discussion

So where does this leave us in terms of using the proportion of cortex on Mayor Island obsidian assemblages as an indicator of the means of procurement by distant communities? What I can say is that the collection strategy remained essentially the same throughout the prehistoric period – most was obtained from outcrops and/or colluvial deposits, and therefore lacks cortex, while only small quantities came from water-worn beach cobbles and boulders. Data from sites close to Mayor Island, where it is more likely the obsidian was procured by direct access, suggest this was the norm. There is no evidence that cortex was largely removed from cobbles and boulders prior to transportation by canoe, and in any case it simply doesn't make sense. The thickness of cortex is negligible, and it would be easier to transport a semi-rounded boulder than an extremely sharp angular core. Also, the prior removal of cortex does not seem to have been a factor in the exploitation of other obsidian sources. In addition it is worth noting that some of the Mayor Island obsidian found at distant sites is of very poor quality (e.g. vesicular). If it was considered necessary to remove any cortex to reduce weight or improve appearance, then it would have been just as important to discard other waste material at source.

In my opinion then, the absence or presence of cortex on Mayor Island obsidian assemblages relates more to *where* the material was obtained from than how it was procured by distant communities. Clearly not all of the obsidian was obtained by quarrying, but we have yet to establish why so few of the abundant and readily accessible beach cobbles and boulders were apparently utilized when detrital material from other sources was considered quite acceptable.

References

Empson, L., Flenley, J. and P. Sheppard 2002. A dated pollen record of vegetation change on Mayor Island (Tuhua) throughout the last 3000 years. *Global & Planetary Change* 33: 329-337.

Holdaway, S.J. 2004. The Kohika obsidian artefacts: technology and distribution. In G. Irwin (ed.) *Kohika. The Archaeology of a Late Māori Lake Village in the Ngāti Awa Rohe, Bay of Plenty, New Zealand*: 177-197. Auckland University Press.

McCoy, M.D. and J. Carpenter 2014. Strategies for obtaining obsidian in pre-European contact era New Zealand. *PLOS One* 9 (1): 1-13.

Moore, P.R. 2012. Procurement and cultural distribution of obsidian in northern New Zealand. *Journal of Pacific Archaeology* 3 (2): 17-32.

Seelenfreund-Hirsh, A.C. 1985. The exploitation of Mayor Island obsidian in prehistoric New Zealand. Unpublished PhD thesis, University of Otago.

Sheppard, P.J. 2004. Moving stones: comments on the archaeology of spatial interaction in New Zealand. In L. Furey and S. Holdaway (eds.) *Change Through Time. 50 Years of New Zealand Archaeology*: 147-168. NZ Archaeological Association monograph 26.