ARCHAEOLOGY OF ATAFU, TOKELAU: SOME INITIAL RESULTS FROM 2008

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ABSTRACT

Surface survey, shovel testing, and stratigraphic excavations were done on Atafu Atoll in Tokelau during August 2008. Initial results suggest that Fale Islet has the most potential for further archaeological research. Dense cultural deposits on this islet are >1 m (39 in.) deep. Cultural material recovered includes food bone, fire-affected volcanic rock, tool-grade basalt flakes and tool fragments, *Tridacna* shell adzes, and pearl-shell fishhook fragments. Dog bone occurs from the earliest deposits through to the late prehistoric, while pig bone is found only in historic contexts. Fish bone is common throughout, and, with the exception of *Tridacna*, there are few edible mollusk remains. Initial EDXRF (Energy Dispersive X-Ray Fluorescence) analyses have found the basalt to be consistent with documented sources on Tutuila, Samoa. Basal radiocarbon dates from two excavation units are 660-540 *cal.* BP and 500-310 *cal.* BP (at 2σ).

TOKELAU AND PREVIOUS ARCHAEOLOGY

Tokelau is a group of three atolls, Fakaofo, Nukunonu, and Atafu, located ~500-600 km (311-373 mi.) north of Samoa in the equatorial Pacific. Global climate change and rising sea level will have a disproportionate effect on these atolls because of their tiny landmass (~10 km^2 [3.9 $mi.^2$], most of which is < 2 m (6.6 ft.) above sea level. The current human population is ~1,400 persons, and this is probably near the prehistoric maximum (Huntsman & Hooper 1996). Like other atolls, Tokelau has a severely limited resource base — a situation that necessitated the development of strong cultural mechanisms for resource management and resiliency. The sole prior archaeological project in Tokelau aimed to establish the presence of archaeological deposits on each atoll, obtain initial estimates of their age, and a general idea of their contents (Best 1988:104).

Best excavated at the modern village location on each atoll. He found deposits at each containing: well-preserved faunal material (McAlister 2002); bone, shell and stone tools; *in situ* features; and exogenous material such as ceramics and basalt. Best's (1988) radiocarbon dates on the lowest cultural strata are in the ~1,100-600 *cal.* BP range (as re-calibrated by Addison & Kalolo 2009), a critical time for understanding the settlement of East Polynesia and the Polynesian outliers as well as understanding the interaction network that distributed Samoan basalt over a large portion of the Southwest Pacific (Addison, in prep.).

Although long seen as marginal to the main processes in Polynesia, the northern atoll arc (Tuvalu, Tokelau, Phoenix Islands, Line Islands, and Northern Cook Islands) may have played a critical role in post-Lapita Polynesian dispersals and subsequent interactions (Addison 2007). Typical early East Polynesian artefacts are found in the Line, Phoenix, and Northern Cook Islands (Anderson, *et al.* 2002; Anderson, *et al.* 2000; Bellwood 1978; Chikamori, *et al.* 991; Pearthree & Di Piazza 2003), while West Polynesian basalt tools are found in Tokelau, the Phoenix, and Northern Cook Islands (Best, *et al.*-1992; Di Piazza & Pearthree 2001).

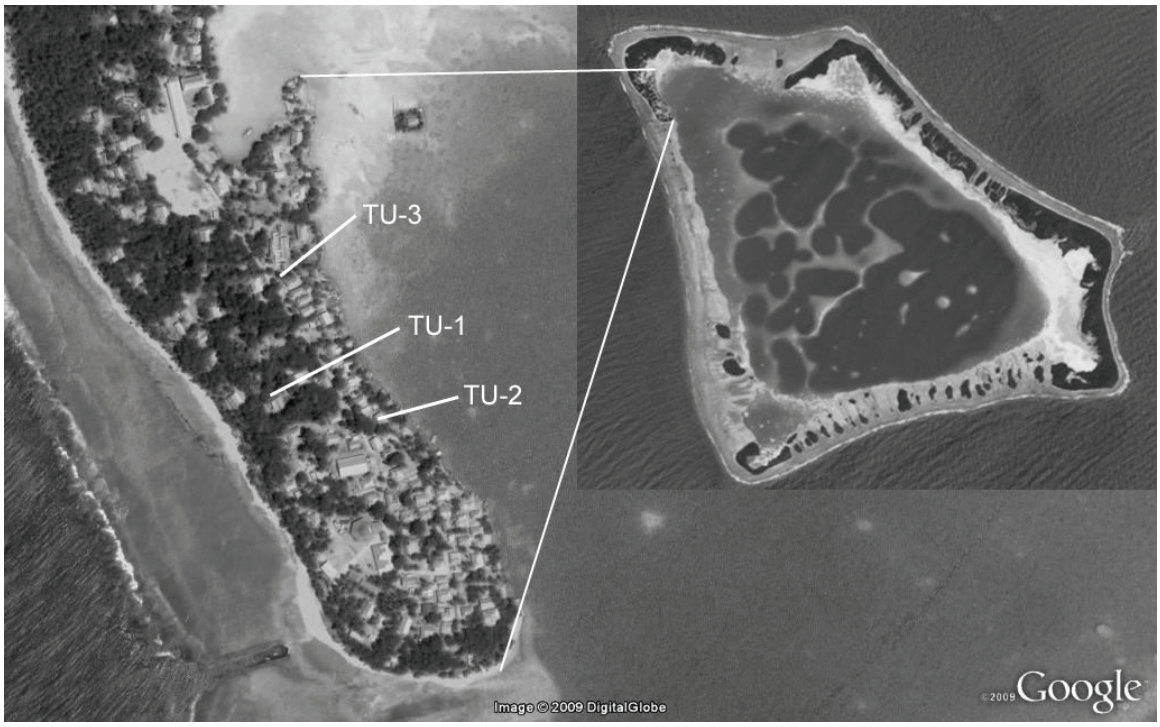

Figure 1. Fale Islet and test unit locations; inset, Atafu Atoll.

Prevailing easterly winds do not favor a direct route from West Polynesia to the nearest East Polynesian high islands (the Southern Cook Islands). Computer modeling of voyaging routes has indicated this as a formidable barrier to the settlement of East Polynesia (Di Piazza, *et al.* 2007; Irwin 1992). However, analysis of daily wind patterns (as opposed to averaged wind-rose data) indicates that short jumps between Samoa and various atolls in the northern atoll arc in a "stepping-stone" pattern provide a reliable and relatively easy route into high-island East Polynesia (Addison, in prep.). A route through the northern atoll arc also provides a downwind safety net, a factor that has been put forth as an important aspect of Polynesian voyaging strategies (Irwin 1992). If such a strategy was used, Tokelau would have been a nexus because of its geographic position.

The Tokelau Department of Education, the American Samoa Community College and international collaborators have launched a multi-disciplinary program of research that will include all atolls in Tokelau (see description at *www.tokelauscience.com*). Below we report initial result of a preliminary exploration of Atafu Atoll's archaeology conducted in August, 2008.

Surface Survey

Surface survey by line-abreast transects found no traditional surface features or artefacts outside Fale Islet, the location of the atoll's only village (Figure 1). Five shovel tests on three islets at the east side of the atoll found no cultural deposits. Screening of the shovel tests found only a few small fish bones at one location. Together, these results suggest two possibilities: 1) that permanent habitation on Atafu has always been on Fale Islet; or 2) that the other islets are so affected by storms that archaeological remains there have been severely impacted. The exception to this pattern is the *Cyrtosperma chamissonis* cultivation pits on islets at the southeast corner of the atoll, which remain in cultivation.

Excavations

Three 1×1 m (3.3×3.3 ft.) test units were excavated on Fale Islet within the current village area (locations on Figure 1). Each test unit was placed at the edge of a septic-tank pit in progress. Each had cultural deposits and the stratigraphy in each was different. The stratigraphy and cultural materials broadly parallel results from Best's 1986 excavations.

Test Unit 1

At Test Unit 1 (TU-1) Layers I-VII represent ~150 cm (59 in.) of dense cultural deposits (Figure 2). These rest on what appears to be an unmodified beach deposit. The cultural-deposit sediments are mostly coral gravel with variations between strata in color and particle size. Fish bone, bird bone, rat bone, fire-affected volcanic rocks, and basalt tool fragments or flakes were recovered from Layers I-VII. Pig bone was only recovered from Layer I. Dog bone was recovered from Layers III-VII (supporting Best's dog chronology for Tokelau). Turtle bone was recovered from Layer VII. There was a notable dearth of edible mollusks.

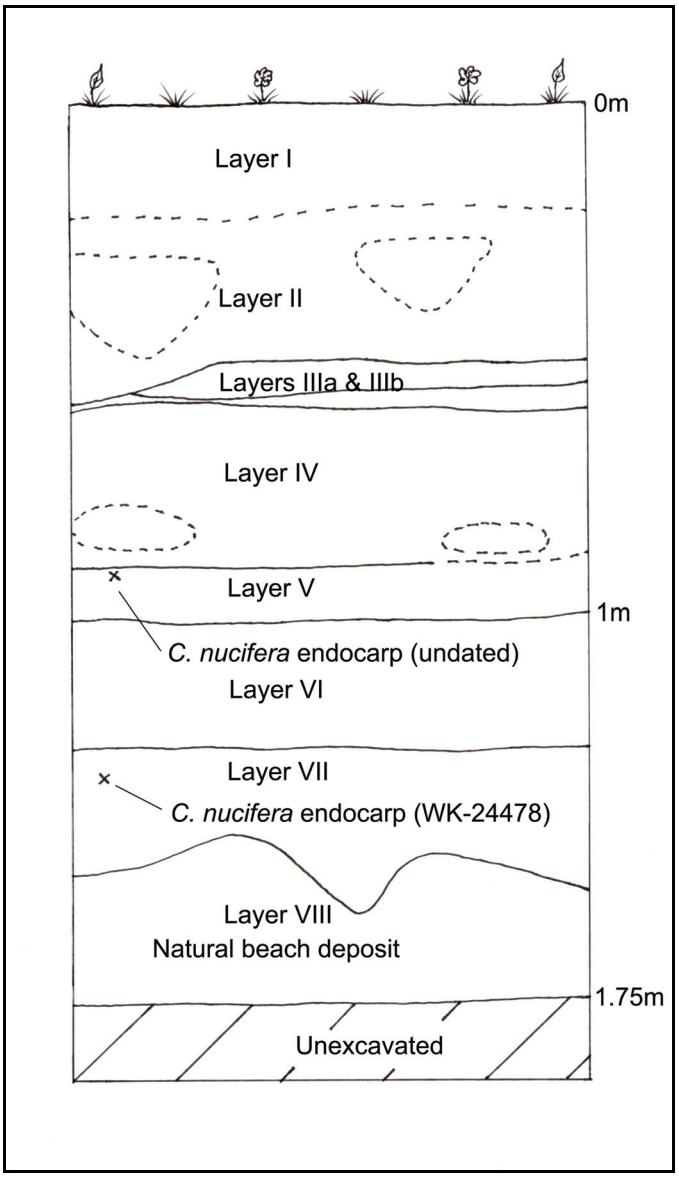

Figure 2. TU-1 profile; drafting by Tuipuavai Tago.

A single dating sample has been processed from TU-1. WK-24478 is an AMS date on a sole piece of *Cocos nucifera* endocarp. Calibration with OxCal v3.10 (Bronk Ramsey 2005) using the Northern Hemisphere curve (Reimer, *et al.* 2004) gives a calendar date of 660-540 *cal.* BP at 2σ (see Addison & Asaua 2006; Petchey & Addison 2008 on reasons for using the NH curve).

Initial results of land-snail analysis from TU-1 indicate only marine species in the lowest stratum. Anthrophilic snail species (including Polynesian introductions) are present throughout the rest of the column. Probable historic introductions are present in the uppermost stratum.

TEST UNIT 2

TU-2 was placed ~30 m (98 ft.) from the lagoon edge. Below Layers I and II, which are recent paving material, Layer III is ~100 cm (39 in.) of very darkly stained cultural deposit in a coral gravel matrix (Figure 3). Cultural materials recovered from Layer III were similar to those from Layers III-VII in TU-1.

At the bottom of Layer III and placed on a non-cultural beach deposit is what appears to be the edge of a house foundation. This consists of an alignment of upright coral slabs surrounded by coral rubble. A piece of *Cocos nucifera* endocarp (WK-24479) from just above this pavement was AMS dated. The same calibration protocol as for WK-24478 gives a calendar date of 500-310 *cal.* BP at 2σ. Although no stratigraphic distinctions were recognized in Layer III, we assume that this deposit slowly accumulated over a period of time — likely from the initial occupation of this location (500-310 *cal.* BP) until the proto-historic period.

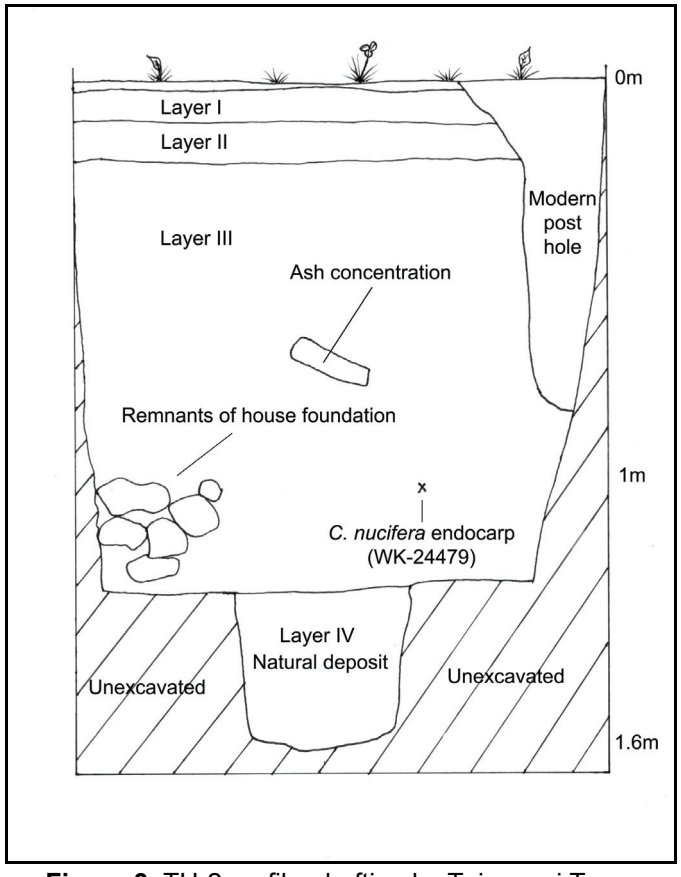

Figure 3. TU-2 profile; drafting by Tuipuavai Tago.

TEST UNIT 3

The main cultural stratum of TU-3 (Layer III, Figure 4) is ~100 cm (39 in.) of light-colored coral gravel containing a much more restricted range of cultural materials. These consist of a few fish bones, minimal amounts of fire-affected volcanic rock, a basalt adze blade fragment, and a *Tridacna* valve adze blade fragment. The lower portion of Layer III is a dense deposit of *Tridacna* sp. valves.

An *in situ* combustion feature is indicated by a lens of monocot charcoal (perhaps *Cocos nucifera* petiole) capped by a light-colored powdery material (probably burnt coral). It is unclear if this feature was used for making coral lime (traditionally mixed with coconut oil for use as canoe caulking), or if the light-colored material is the result of repeated fires with coral gravel in one spot (as is common today for Atafu cooking fires). The relatively restricted range of cultural materials and the two adze blade fragments found in TU-3 could suggest an area used for canoe making, hence favoring the lime-making interpretation of the combustion feature's function.

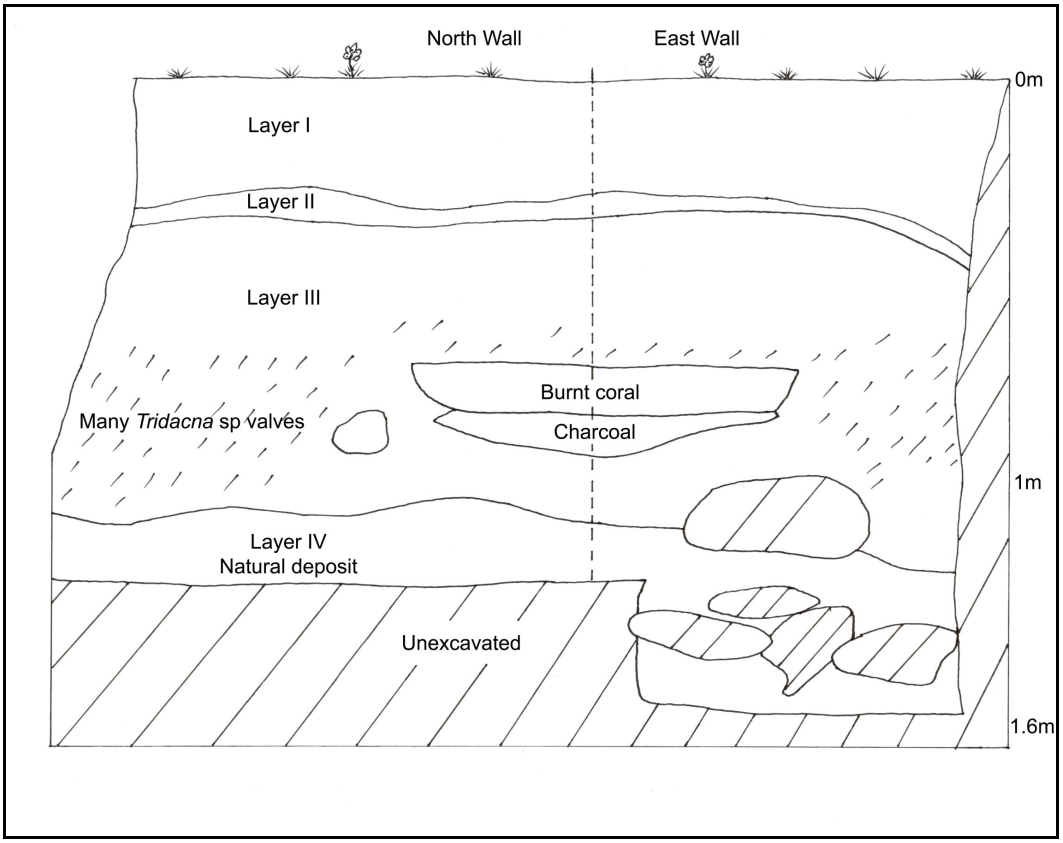

Figure 4. TU-3 profile, hash marks indicate a dense deposit of *Tridacna* valves; drafting by Tuipuavai Tago.

FUTURE WORK

The near-ubiquitous presence of exogenous volcanic rock (either tool-grade basalt or cooking stones) in the initial Fale Islet excavations suggests that Atafu had external interaction over the period of human occupation of the atoll. Initial analyses of eight pieces of tool-grade basalt from the three test units have found some to be consistent with documented sources on Tutuila Island in Samoa. Further geochemical analyses are underway at the University of Hawai'i, Hilo. Additional excavation should provide more information on the continuity of Tokelau's interaction with other islands and on the exact sources of exogenous materials. If East Polynesian lithic material exists in Tokelau, a larger sample size will increase the probability of identifying it, both geochemically and by tool morphology.

The presence of pearl shell artefact fragments — so rare in West Polynesia and yet such an important element in East Polynesian assemblages — also indicates the potential of Tokelau archaeological materials to assess the idea of the northern atoll arc as an important pathway into East Polynesia. More excavation and larger samples are needed.

The initial results from the work in August of 2008 suggest that further archaeological research in Tokelau has potential for addressing local and regional questions. Excavations planned for 2009-2011 should provide a much better understanding of the internal processes on each Tokelau atoll as well as the role the archipelago played in regional prehistory.

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We thank Simon Best for having the initiative and enthusiasm to undertake the initial archaeological exploration of all three atolls — we build on the work he did and his results have been important in formulating our research strategy. We also appreciate his open and collegial attitude in freely sharing his field notes and other materials with us.

REFERENCES

Addison, D.J. in prep. Daily Wind Patterns and Sailing Routes Between Samoa and East Polynesia: Why the Northern Atoll Arc Was Crucial.

Addison, D.J. in press. The Tutuila Basalt Export Industry and the 5600 km Distribution of Samoan Adzes at ~700-600 BP **in** *The Gotland Papers: Proceedings of the VII International Conference on Easter Island and the Pacific* (S. McLaughlin, ed.). Los Osos: Easter Island Foundation.

Addison, D.J. & T.S. Asaua. 2006. 100 New Dates from Tutuila and Manu'a: Additional Data Addressing Chronological Issues in Samoan Prehistory. *Journal of Samoan Studies* 2:95-117.

Addison, D.J. 2007. *The East-West Polynesia Boundary: An Archaeologically Useful Concept?* Paper presented at the VII International Conference on Easter Island and the Pacific Islands: Migration, Identity, and Cultural Heritage - Gotland, Sweden (August 20-25).

Addison, D.J. 2008. The Northern Atoll Arc and Sailing Strategies between West and East Polynesia. Paper presented at the 19th Annual Maritime Archaeology and History of the Pacific Symposium - Honolulu, Hawai'i (February 16-18).

Addison, D.J. & J. Kalolo. 2009. *Tokelau Science Education and Research Program: Atafu Fieldwork August 2008*. Pago Pago and Atafu: Samoan Studies Institute and Tokelau Department of Education.

Anderson, A.J., H. Martinsson-Wallin, & P. Wallin. 2002. *The Prehistory of Kiritimati (Christmas) Island, Republic of Kiribati : Excavations and Analyses*. Oslo, Norway: Kon-Tiki Museum.

Anderson, A.J., P. Wallin, H. Martinsson-Wallin, B. Fankhauser, & G. Hope. 2000. Towards a First Prehistory of Kiritimati (Christmas) Island, Republic of Kiribati. *Journal of the Polynesian Society* 109:273-293.

Bellwood, P.S. 1978. *Archaeological Research in the Cook islands*. Honolulu: Department of Anthropology, Bernice Pauahi Bishop Museum.

Best, S.B. 1988. Tokelau Archaeology: A Preliminary Report of an Initial Survey and Excavations. *Bulletin of the Indo-Pacific Prehistory Association* 8:104-118.

Best, S.B., P.J. Sheppard, R.C. Green, & R.J. Parker. 1992. Necromancing the Stone: Archaeologists and Adzes in Samoa. *Journal of the Polynesian Society* 101(1):45-85.

Bronk Ramsey, C. 2005. OxCal Program v3.10: Oxford Radiocarbon Accelerator Unit, Oxford (U.K.) <http://c14.arch.ox.ac.uk/>.

Chikamori, M., S. Yoshida, T. Okajima, & T. Yamaguchi. 1991. Te Mata, Looking at the Past: Archaeology of the Northern Cook Islands: Unpublished report, Department of Archaeology and Ethnology, Keio University, Tokyo, Japan.

Di Piazza, A., P. Di Piazza, & E. Pearthree. 2007. Sailing Virtual Canoes Across Oceania: Revisiting Island Accessibility. *Journal of Archaeological Science* 34(8):1219-1225.

Di Piazza, A. & E. Pearthree. 2001. Voyaging and Basalt Exchange in the Phoenix and Line Archipelagoes: The Viewpoint From Three Mystery Islands. *Archaeology in Oceania* 36(3):146.

Huntsman, J. & A. Hooper. 1996. *Tokelau: A Historical Ethnography*. Auckland: Auckland University Press.

Irwin, G. 1992. *The Prehistoric Exploration and Colonization of the Pacific*. Cambridge: Cambridge University Press.

McAlister, A.J. 2002. *Prehistoric Fishing at Fakaofo, Tokelau: a Case for Resource Depression on a Small Atoll* (MA thesis), Department of Anthropology, University of Auckland.

Pearthree, E. & A. Di Piazza. 2003. An Archaic East Polynesian Assemblage from the Phoenix and Line Archipelagos **in** *Pacific Archaeology: Assessments and Prospects, Proceedings of the New Caledonia 2002 Conference* (C. Sand, ed.); pp.327-336. Nouméa: Service des Musées et du Patrimoine de Nouvelle-Calédonie.

Petchey, F.J. & D.J. Addison. 2008. Radiocarbon Dating Marine Shell in Samoa: A New Delta-R from Known-Age Specimens **in** *Recent Advances in the Archaeology of the Fiji/West-Polynesia Region* (D.J. Addison & C. Sand, eds.); pp.79-86. Dunedin: University of Otago Studies in Prehistoric Anthropology, No. 21.

Reimer, P.J., M.G.L. Baillie, E. Bard, A. Bayliss, J.W. Beck, J.C.H. Bertrand, *et al.* 2004. IntCal04 Terrestrial Radiocarbon Age Calibration, 26–0 cal kyr BP. *Radiocarbon* 46(3):1087-1092.