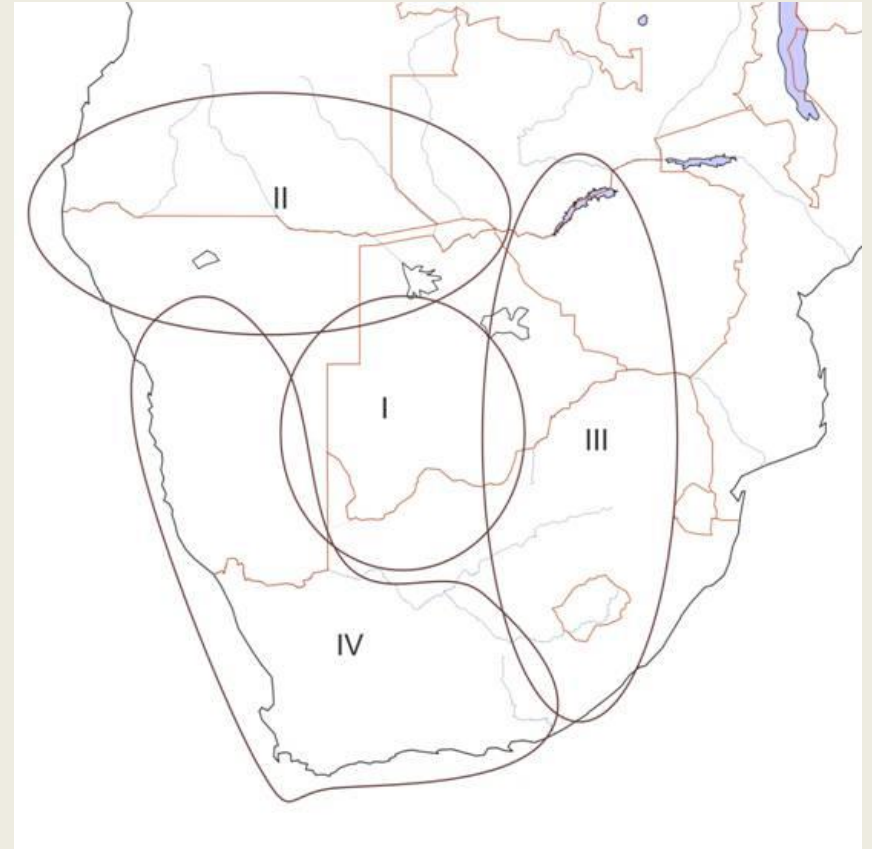


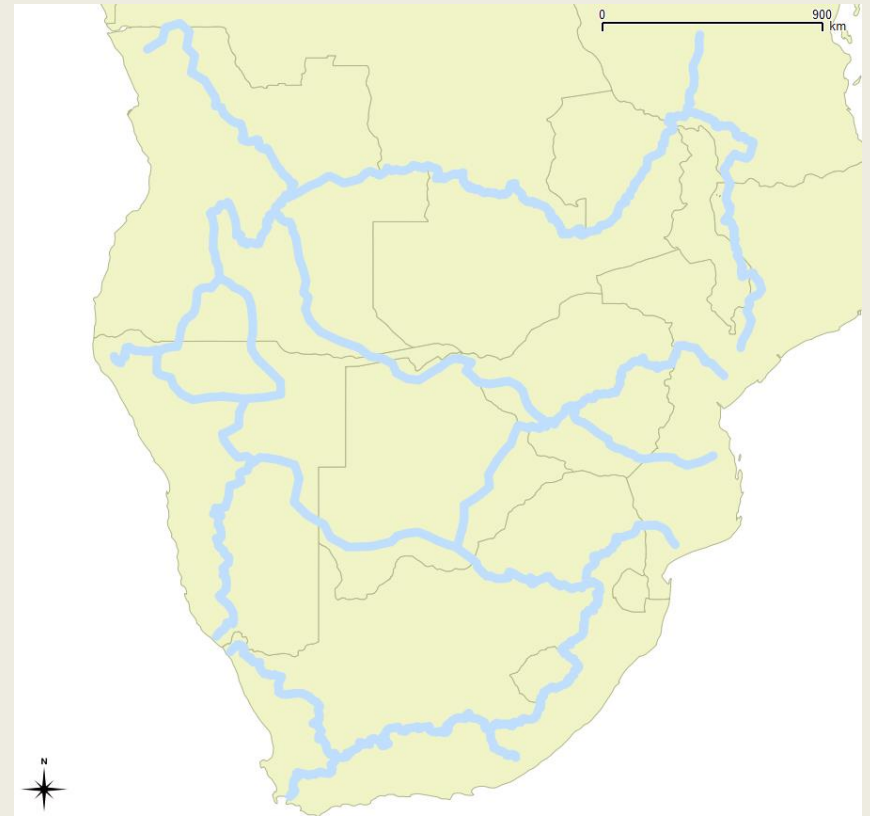
3rd Day (Saturday, May 16): Thematic panels according to chronology and questions

- (7) Kalahari Basin prehistory before the advent of food production
- 09:00-11:00: Panel (7)
- Archaeology: Sadr: Interior foraging



(7) Kalahari Basin aka Interior southern Africa

- Focus on Zambezi, Kalahari, Limpopo and Orange River Basins,
 - with a sideways glance at Namibian Coastal Basin
- Time Frame: ~12-2 kya
 - Holocene before the advent of food production



Blue lines indicate watersheds.

Holocene Palaeo-climates

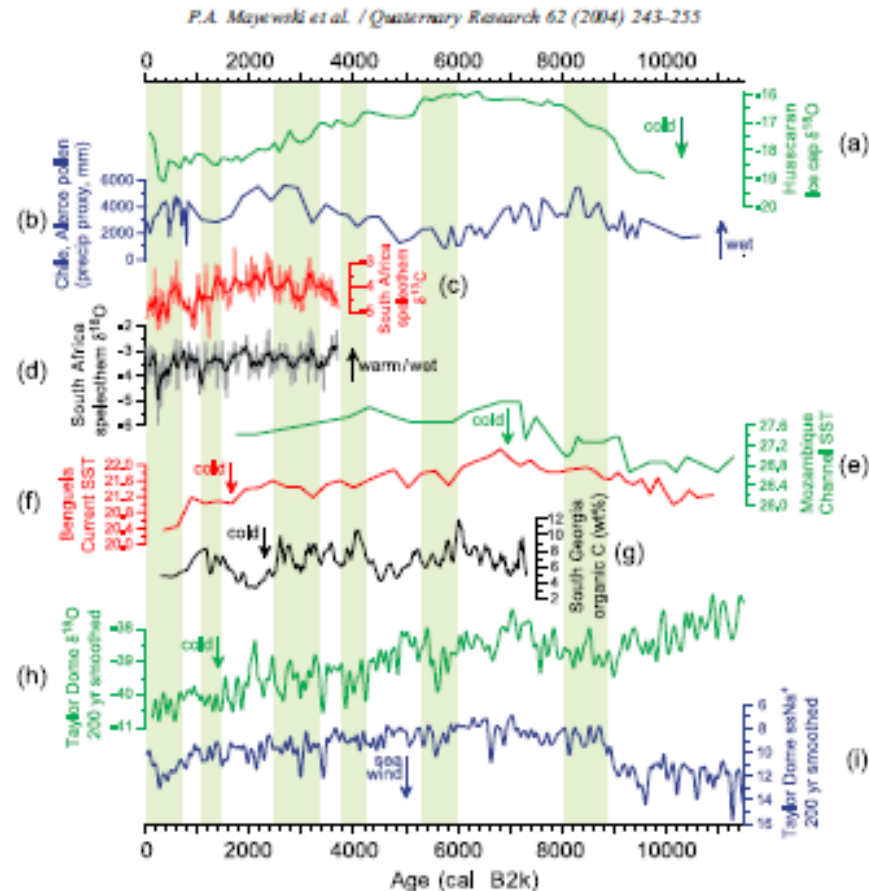
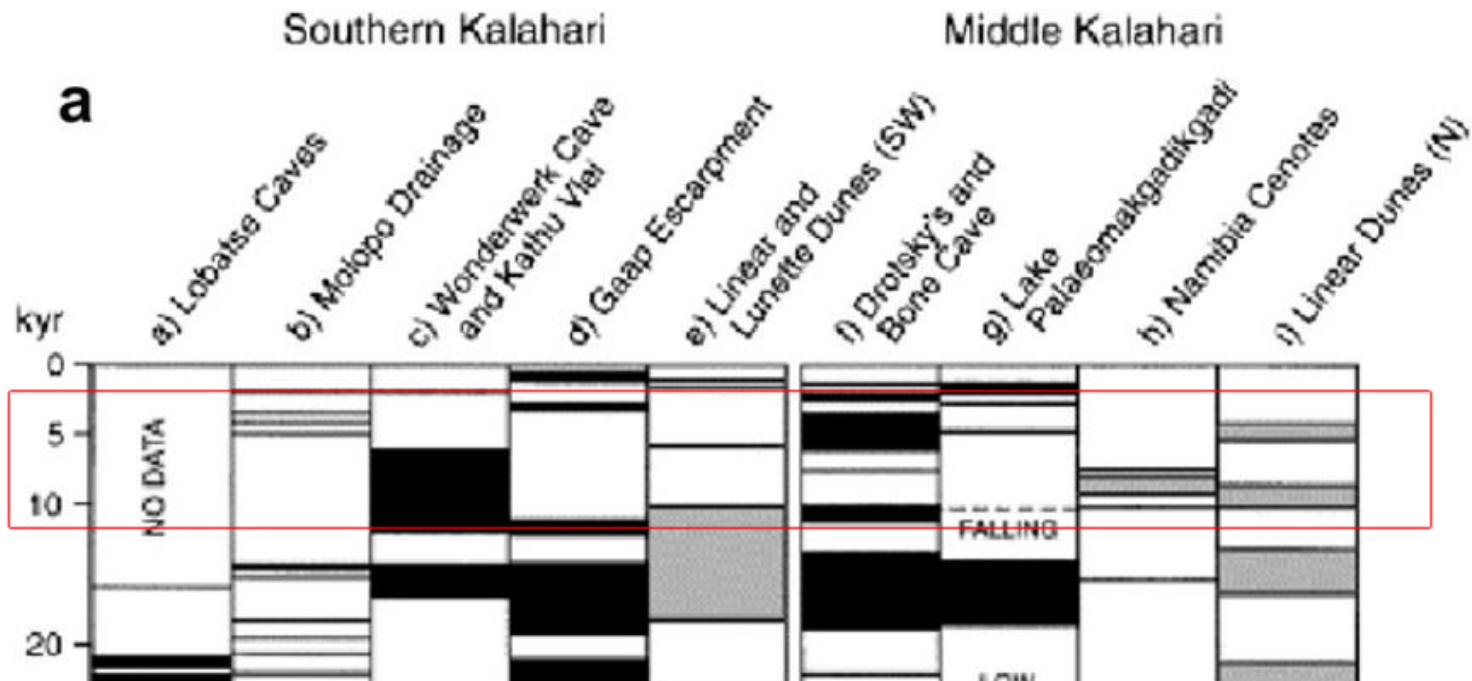


Figure 3. Southern Hemisphere paleoclimate series, arranged generally by latitude (north, top), with state of climate proxy noted. Green bands represent timing of RCC, tuned to high-resolution GISP2 record. (a) $\delta^{18}\text{O}$ record (‰) for Huacacarn ice-cap, Peru (Thompson et al., 1995). (b) Pollen-ratio based reconstruction of precipitation (mm) for Lake Alezco, Chile (Heusser and Stettler, 1980). (c) $\delta^{13}\text{C}$ record (‰) for speleothem in Cold Air Cave, South Africa (Lee-Thorp et al., 2001). (d) $\delta^{18}\text{O}$ record (‰) for speleothem in Cold Air Cave, S Africa (Lee-Thorp et al., 2001). (e) Alkenone-based SST record ($^{\circ}\text{C}$) for core from the Mozambique Channel (MD79257) (Bard et al., 1997). (f) Alkenone-based sea surface temperature record ($^{\circ}\text{C}$) for core from the Benguela Current (Kim et al., 2002). (g) Organic carbon (%) in a core from Block Lake South Georgia (Roqvist and Schubert, in press). (h) Gaussian smoothed (200 yr) $\delta^{18}\text{O}$ record (‰) for Taylor Dome, Antarctica (Steig et al., 2000). Taylor Dome Holocene time scale (Monnin et al., in press). (i) Gaussian smoothed (200 yr) sea-salt Na^+ (ppb) record for Taylor Dome, Antarctica (Mayewski et al., 1996). Taylor Dome Holocene time scale (Monnin et al., in press).

Kalahari Palaeo-climates

D.S.G. Thomas, S.L. Burrough / Quaternary International 253 (2012)



Black=more humid; Grey=more arid

Kalahari Palaeo-lakes

1404

S.L. Burrough et al. / Quaternary Science Reviews 28 (2009) 1392–1411

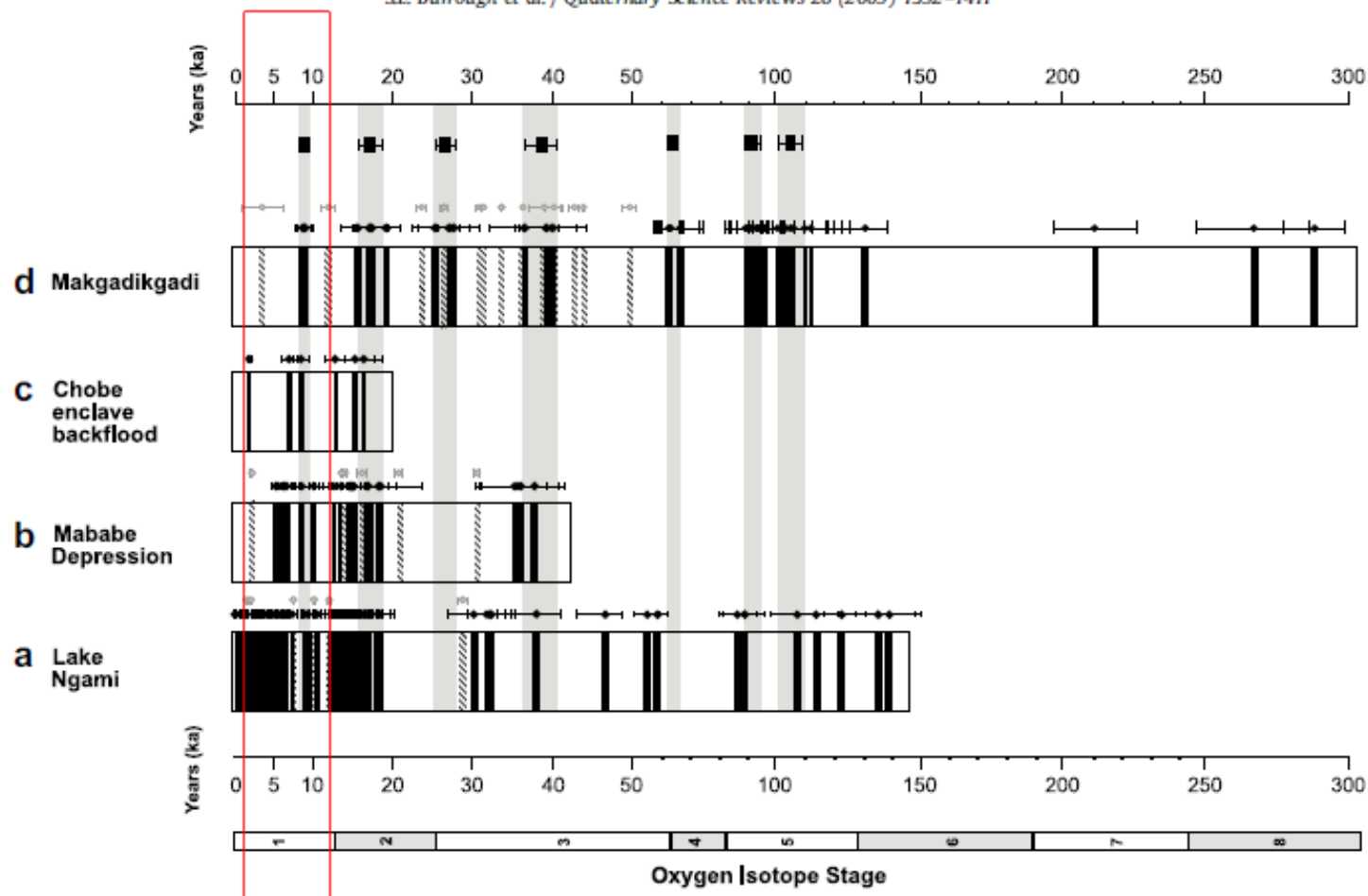


Fig. 6. Lake occupancy chronologies in the Palaeolake Makgadikgadi sub-basins. (Inferred palaeo-mega-lake phases shaded in grey – see Section 5.1 for details) Black bars within columns refer to dated shoreline ridge accumulation periods. Actual dates and their associated errors (given to 1 standard error) are plotted adjacent to these columns in black (also see Table 3). a) Lake Ngami high-stands (Burrough et al., 2007) b) Mababe Depression lake high-stands (Burrough and Thomas, 2008); c) Chobe Enclave backfloods (Burrough and Thomas, 2008). Hatched bars indicate dated periods of calcrete formation within the basins and shorelines (refer to Table 1), the ages and associated errors are shown adjacent to these columns in grey.

Distribution of southern African archaeological radiocarbon dates

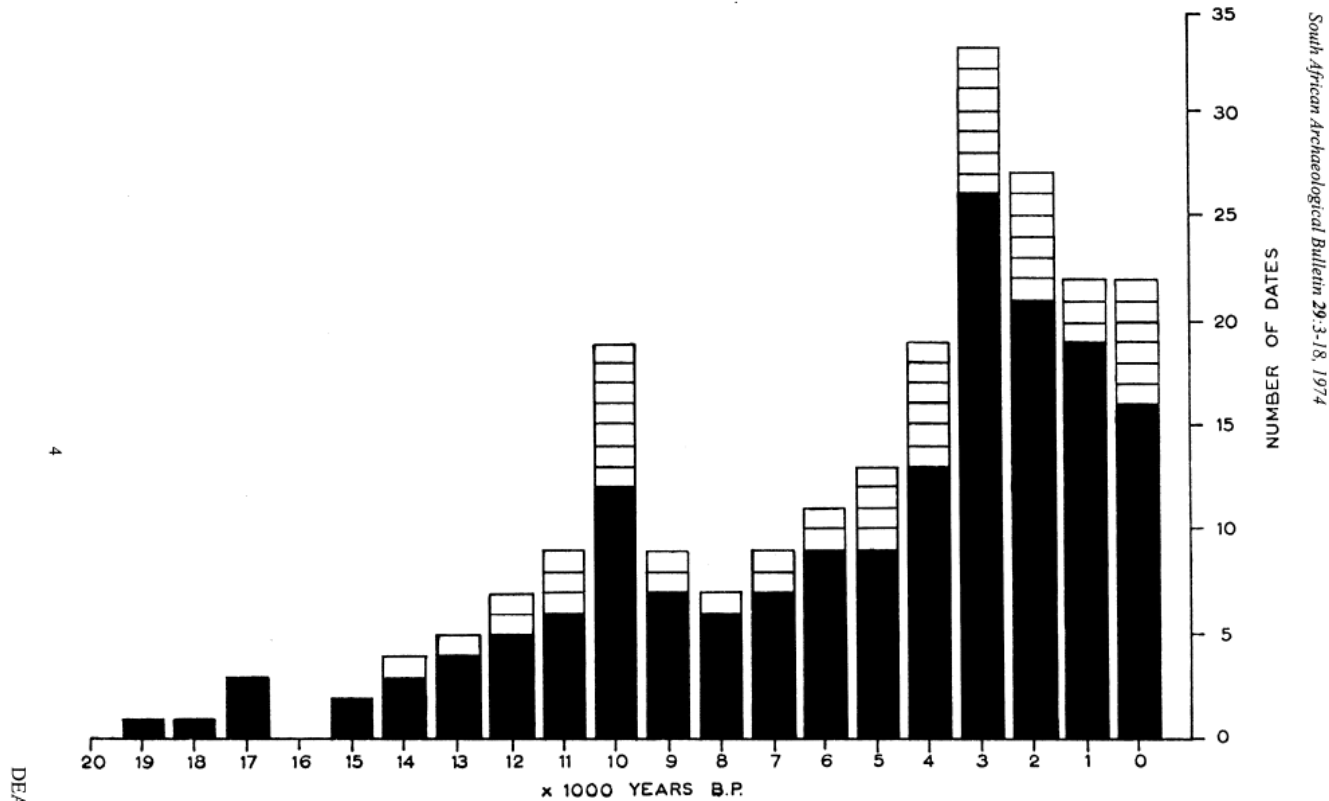


Fig. 1. Histogram of radiocarbon dates for the later Stone Age in southern Africa. Solid portions indicate single determinations for horizons from which more than one sample has been run. Names of sites and references are listed in figure 5 and accompanying table.

Periodization

- Phase 1: 12-8 kya
 - Southern Africa: Terminal Pleistocene/Early Holocene Non-Microlithic
 - Oakhursts, Albany, Kuruman, Lockshoek, Pomongwan...
 - North of Zambezi River: Nachikufan I and IIA
- Phase 2: 6-2 kya
 - Southern Africa: Holocene Microlithic
 - Early, Classic and Post-classic Wilton
 - North of Zambezi River: Nachikufan IIB and III

Phase 1: South Africa

- Oakhurst macrolithic, expedient tools
 - many scrapers

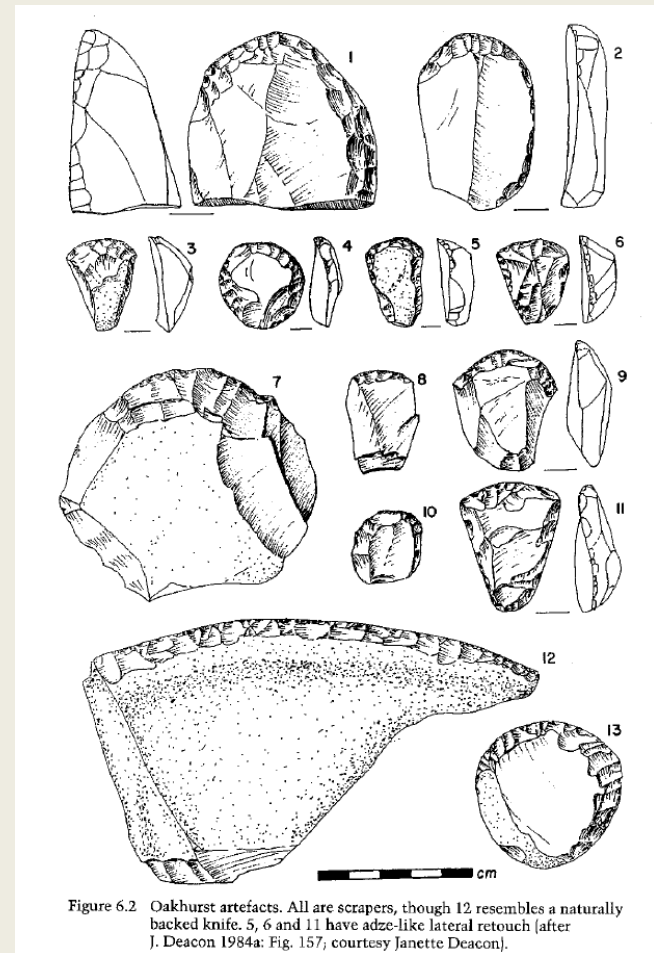


Figure 6.2 Oakhurst artefacts. All are scrapers, though 12 resembles a naturally backed knife. 5, 6 and 11 have adze-like lateral retouch [after J. Deacon 1984: Fig. 157; courtesy Janette Deacon].

Phases 1 & 2: North of the Zambezi

- Nachikufan I-III: formal tools include scrapers and backed tools
- Shifts in their relative frequencies define phases within the Nachikufan tradition.































Nachikufan Phases of Clark & Miller		N I	N I	N IIA N III	N IIA N III	N IIB N III
Sites		Nachikufu Cave Nsalu Hill	Nachikufu Shelter Leopard's Hill	Nach. Shelt. → X Leopard's H. → X	Mwela R → X Nsalu	Nach Cave → X Leopard's H. Nach. Shelt.
CLUSTER		I	II	III	IV	V
Rank order						
1						
2						
3						
4						
5						
6						

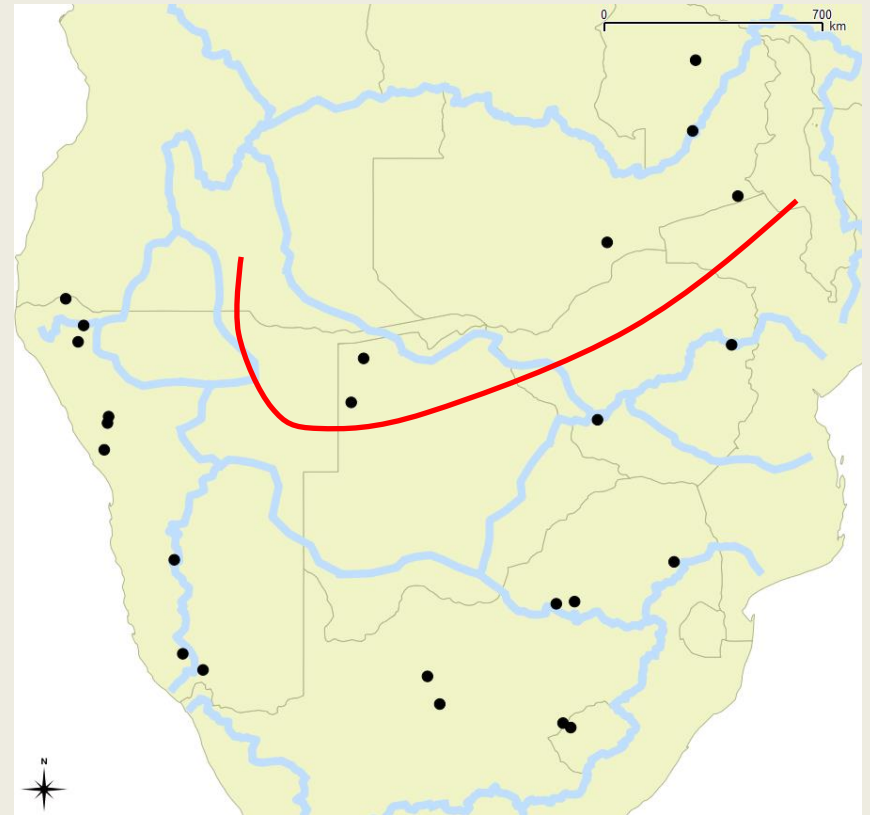
Fig. 4. The six most abundant tool-types of each of the five clusters ranked in order from most abundant (1) to sixth most abundant (6).

Phase 1: Late Pleistocene/Early Holocene

	Orange River Basin	Kalahari Basin	Limpopo River Basin	Zambezi River Basin	Nambia	Comment
Sites	Dikbosch 1a; Wonderwek; Rose Cottage; Sehonghong	Depression; White Painting?; Gwihabe	Cave of Bees; Pomongwe; Nswatugi; Jubilee; Mphekwane; Bushman	Diana's Vow; Kalembe; Leopard's Hill; Nachikufu Cave; Mwela Rocks	Apollo 11; Zebrarivier; Austerlitz, Messum; 95/1, 99/1, 98/6	Wider variety of sites than pre-12kya: aggregation/dispersal?
Dates	8.1-13.7 kya	10.9-18.9 kya	9.2-15.2 kya	8.6-15.0 kya	9.4-15.0 kya	
Lithics	Scraper dominated macrolithic industry, but bladelet industry of previous phase continues at RC and SH into this phase.	Few backed microlithic and segments in bladelet rich Tsodilo sites; some unretouched macro flakes and bladelets in Gwihabe	Microlithic in earlier Maleme industry. Macrolithic Pomongwan industry in later dates; macrolithic Oakhurst industry in upper basin	Nachikufan with bck>>scr, mostly microlithic but also some heavy duty tools, some polished axes, bored stones. Earliest wilton at DV 10.6 kya	Informal macrolithic industry, hangover from Middle Stone Age?	
Fauna	Equus capensis, Megalotragus, small antelopes; increase in trapping and snaring ground game	Tortoise to buffalo, fish.	Hunting, trapping, snaring small antelope. Increased exploitation of smaller species such as dassies and rodents.	Large variety large to small, hyrax, zebra, warthog.	Equus capensis, klipspringer mostly, some larger ungulates.	In interior, smaller range of large gregarious game than in previous phase.
Flora	Geophytes at RC	Mongongo nuts.	Marula systematically exploited, hypoxis corms in cooler times; sour plum.	Vegetable ivory palm, marula nuts, mongongo nuts.	Nara melon seeds.	Remains rarely preserved.
Other	Decorated ostrich eggshell (oes).	No clear evidence of bone harpoons and fishing in this phase, although harpoons were present in Tsodilo sites in previous and next phase.	Bone tools, including flaked bone artefacts; bored stones; deliberate burials.		Decorated oes probably present.	Bone points and beads more common than before 12kya: hxaro? Invention of bow technology?
climate	Grassland in N Cape; Caledon valley by 11kya less rainfall but more wooded, cool and dry 8.8-8.1 kya	In nw Botswana drier already 11.5 kya; central high lake levels till 11kya; drier by 10kya; wetter than today by 7kya.	Increased rainfall c. 10kya; drier early holocene conditions with bushveld rplcing graslands by 8.5 kya.		Drier by 10kya; wetter than today by 7kya	Younger Dryas, produced more arid conditions in many parts, relatively cool until 10kya.
comments	Kuruman industry in N Cape; Lockshoek in karoo, many open air sites near spring eyes.	Microlithic bladelet industry with few formal tools	Pomongwan industry in Zimbabwe.	Strong continuity in microlithic Nachikufan industry in last 40k years. Wilton at DV from 10.6 kya	MSA hangover? Not Oakhurst.	An increase in density of sites suggested by increase in number of dates. Shift to exploitation of smaller terrrial game may be a result of increased population.

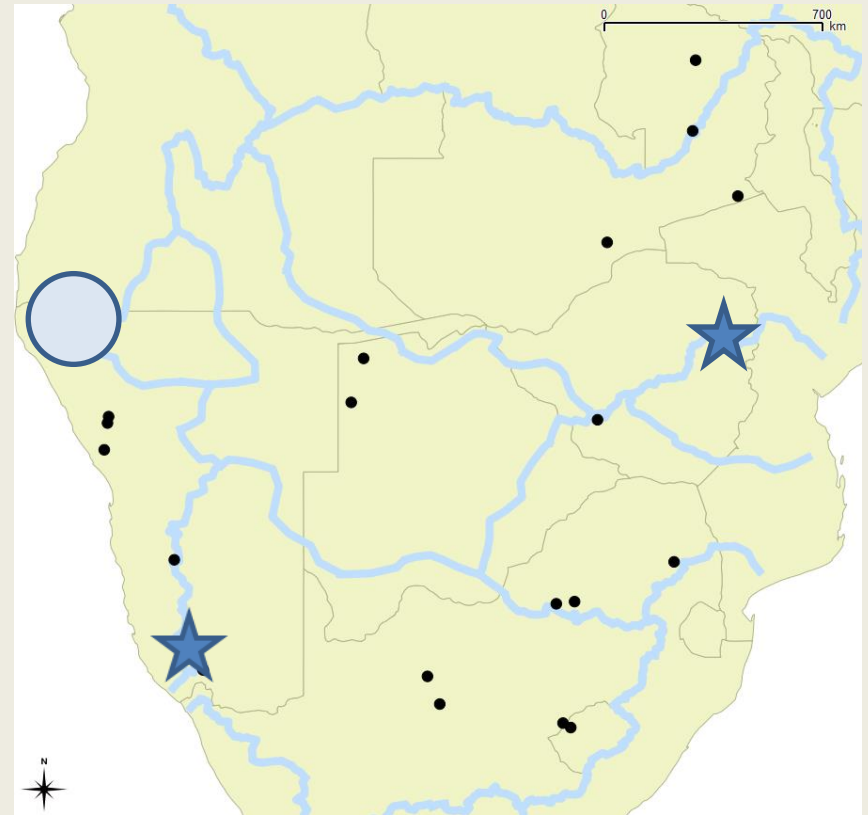
Phase 1: Interior Southern Africa 12-8 kya

- North of red line
 - Microlithic industries
 - Many backed tools
- South of red line
 - Oakhurst macrolithic
 - Many scrapers
- Namibia
 - Informal macrolithic since MSA
 - Few retouched tools



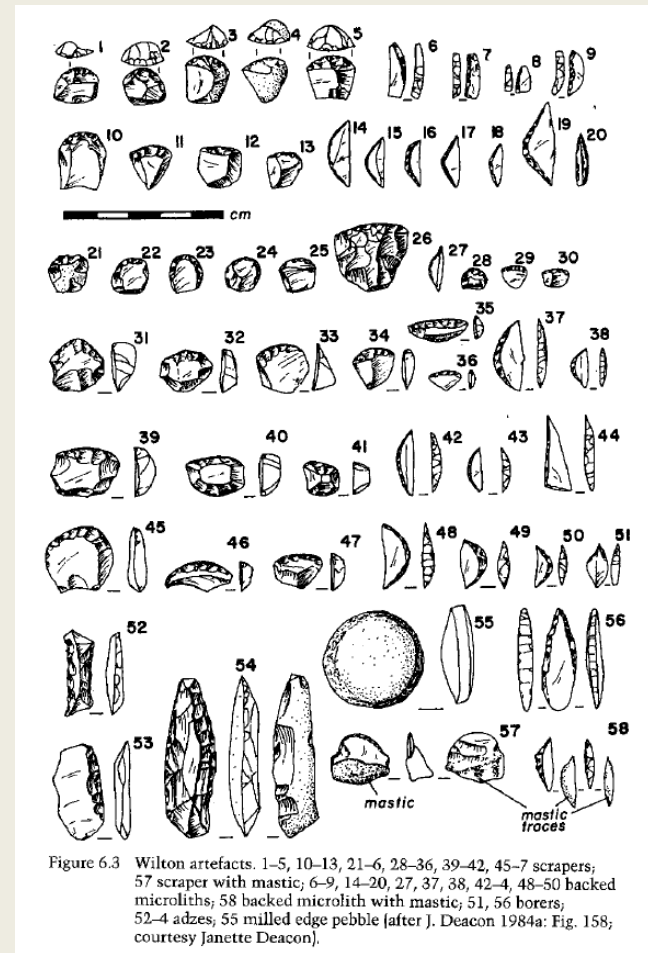
Late Phase 1: Interior Southern Africa 10-8 kya

- Stars: Earliest Wilton microlithic: 10.6 kya in Zimbabwe; 9.4 kya in southern Namibia.
- Circle: Latest Informal macrolithic: until 6 kya.



Phase 2: South of the Zambezi

- Wilton microlithic, diversity of formal tools include scrapers and backed tools.
- Shifts in scraper morphology and the relative frequencies of different kinds of backed microliths define phases and facies within the Wilton tradition.



Relative Proportions of Scrapers, Segments, and Backed Tools Through Time

Scrapers & segments

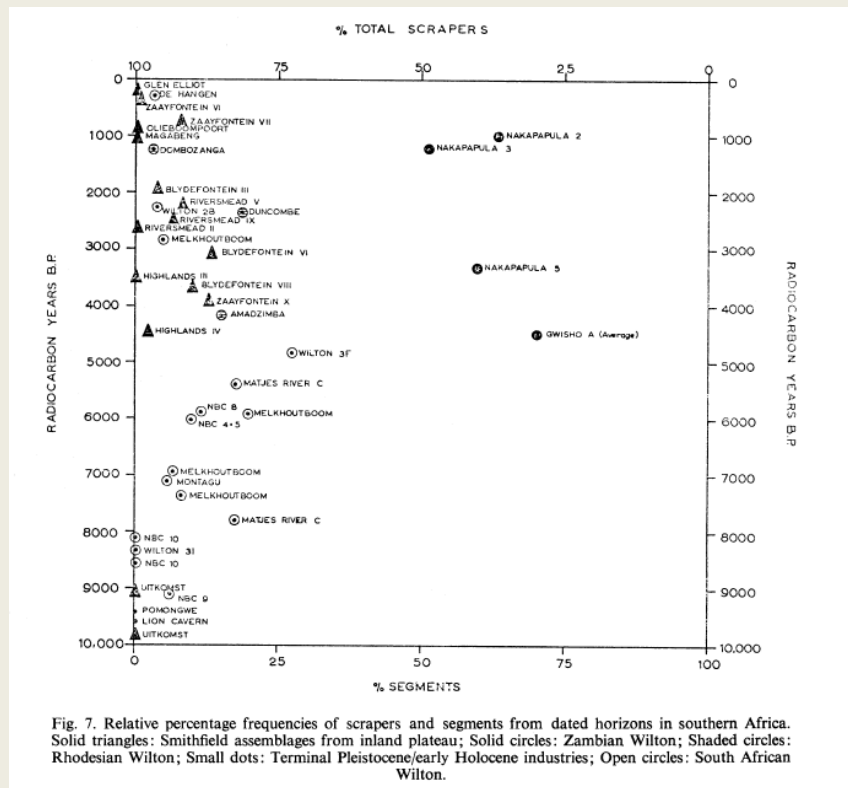


Fig. 7. Relative percentage frequencies of scrapers and segments from dated horizons in southern Africa. Solid triangles: Smithfield assemblages from inland plateau; Solid circles: Zambia Wilton; Shaded circles: Rhodesian Wilton; Small dots: Terminal Pleistocene/early Holocene industries; Open circles: South African Wilton.

Scrapers & backed tools

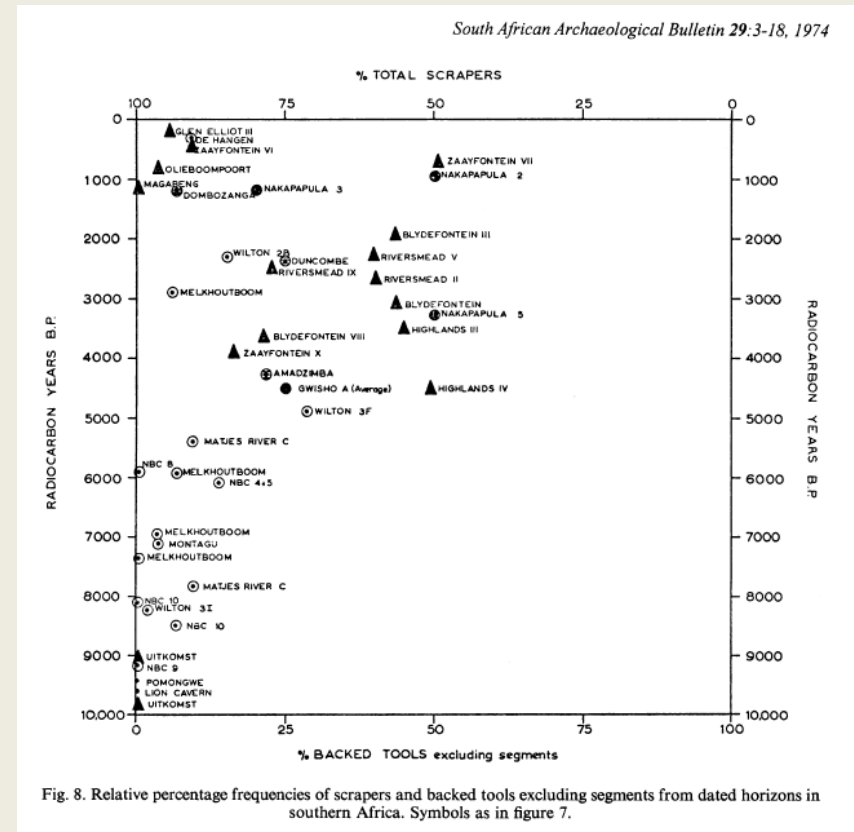


Fig. 8. Relative percentage frequencies of scrapers and backed tools excluding segments from dated horizons in southern Africa. Symbols as in figure 7.

Phase 2: Interior Southern Africa 8-2 kya

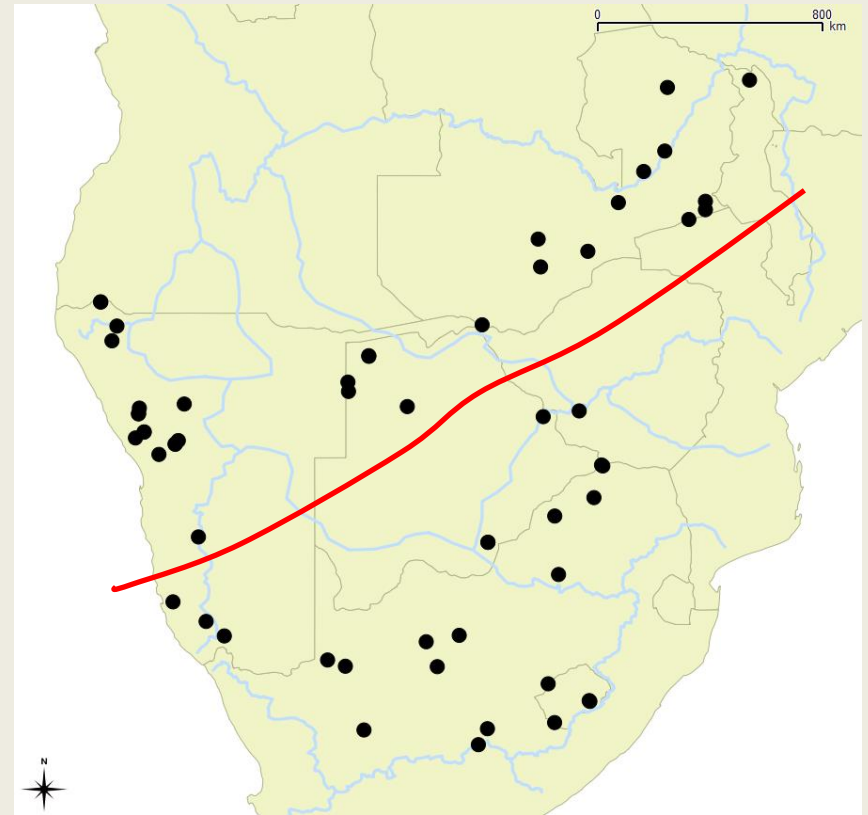
	Orange River Basin	Kalahari Basin	Limpopo River Basin	Zambezi River Basin	Namibia	comment
sites	Biesje Poort; Dikbosh; Witkrans; Wonderwerk; Zoovoorbij; Jagt Pan; Blydefontein; Riversmead; Likoaeng; Masitise; Rose Cottage; Sehonghong;	Depression; Lotshitshi; Mahopa; Rhino; Toteng; White Painting; Xaixai	Radiepolong; Thamaga; Jubilee; Kruger; Tshisiku; Mphekwane; Bambata; Olieboomspoor; Balerno;	Makwe; Kalemba; Chaminade; Leopard's Hill; Nachikufu Cave;	Apollo11; Pockenbank; Zebrarivier; Haalenberg; Brandberg; Geduld; Zebrarivier; Etemba; Striped Giraffe; Big Elephant; Phillips Cave; Affenfelsen; Hasenbild; Austerlitz; Messum; Geistershoehle; Mirabib; Oruwanje; 95/4; 96/1; 99/1; 98/6;	Few sites in interior to 4.5 kya. Marked increase in deliberate burials, regionally diverse burial customs. Skeletal measurements from southern coast and north of Zambezi suggest same population.
dates	1.9-8.1 kya	2.1-7.1 kya	2.1-7.0 kya	3.4-7.9 kya	2.0-8.2 kya	Earliest Wilton at Diana's Vow in Zambezi Basin 10.6 kya and in southern Namibia at Apollo 11 at 9.4 kya.
Lithics	High proportion of formal tools (ft), with variable proportions of types: some sites scr>bck, other sites bck>scr	ft hi; bck>>scr;	ft hi; bck=scr	ft hi, bck>scr	southern Namibia scr>bck; central and northern Namibia bck>scr;	Wilton microlithic wider range of formal stone tools on finer grained rocks, more regional facies.
Fauna	Large medium grazers, ground game, smaller bovids.	Fish, various antelopes.	Mostly small game, fish in some sites, many oes in some sites; mopane worms.	Large variety, all sizes plus fish. Zambian Wilton sites have few small animals.	Mainly small bovid, ground game.	Modern varieties; more smaller packages especially south of Zambezi, lower mean body weight than in previous phase. This may reflect smaller human territories.
Flora		Mongongo nuts.	Marula seeds and nuts common in some sites.	Vegetable ivory palm, marula nuts, mongongo nuts.	Cyperus fulgens, nara melons.	
Other	Decorated ostrich eggshell (oes).	Bone harpoons, pit traps.		Mlithics mostly on quartz.	Decorated ostrich eggshell (oes).	Bows and arrows, nets, fire sticks, leather clothing, digging sticks.
comment	In karoo Wilton sites away from spring eyes, dominant views.			Much continuity in Nachikufan microlithic industry in last 40k years.	Apollo 11 early Wilton from 9.4 kya; northern Namibia informal macrolithic until 6 kya.	Wilton tradition may have come from north of the Zambezi, or local adaptation to changing environment.

Phase 2: Interior Southern Africa 8-2 kya

- North of the red line
 - Backed tools > scrapers
- South of the red line
 - Scrapers > backed tools

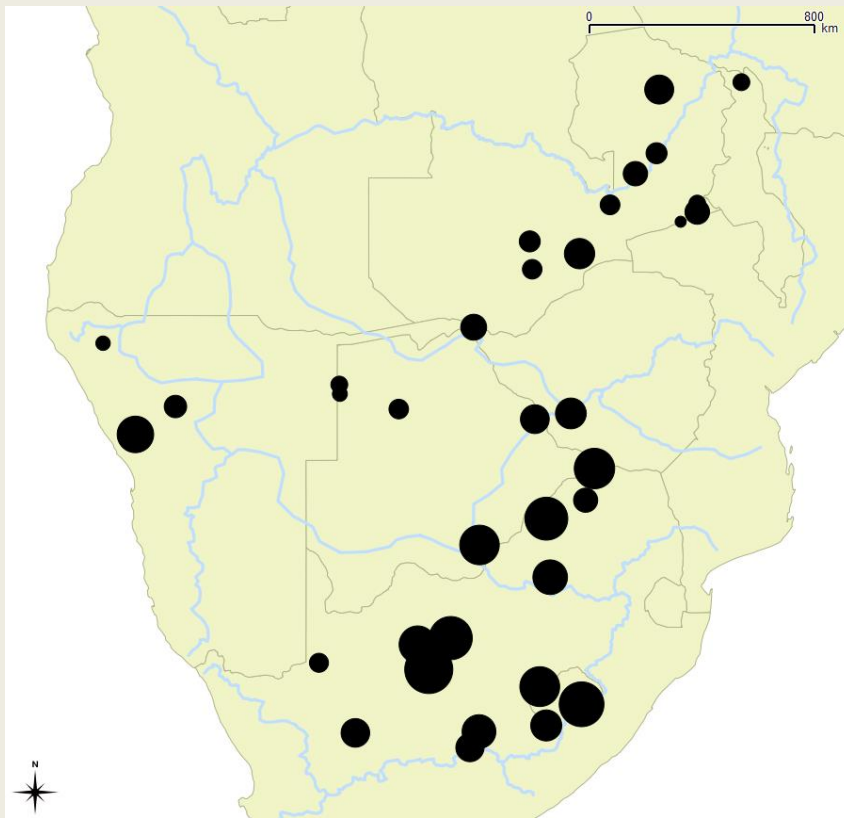
“Formal tool components in southern Zimbabwe, southern Namibia and throughout South Africa and the adjoining countries are all dominated by scrapers, with backed microliths seldom accounting for more than 30% of the total formal tools. In northern Zimbabwe and at some sites in central and northern Namibia, on the other hand, backed microliths are more numerous and the relative frequency is more similar to that in Zambian sites (Deacon, H.J. 1972; Deacon, J. 1974; Phillipson 1976, 1977; Jacobson 1978; Wadley 1979).”

Deacon, J. 1984: 248

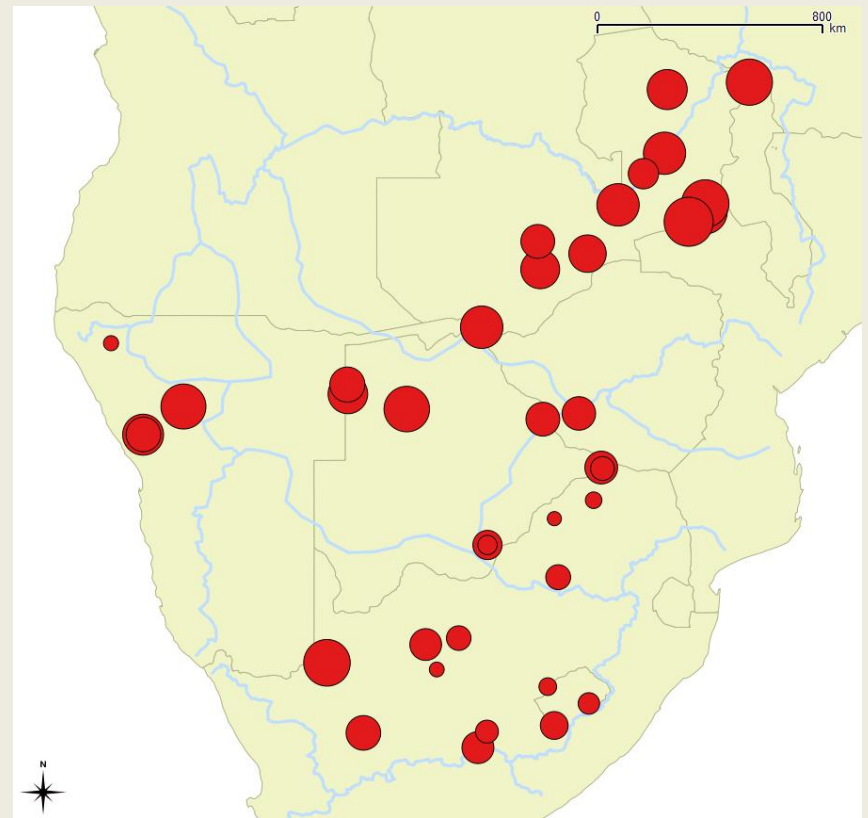


Phase 2: scrapers versus backed tools

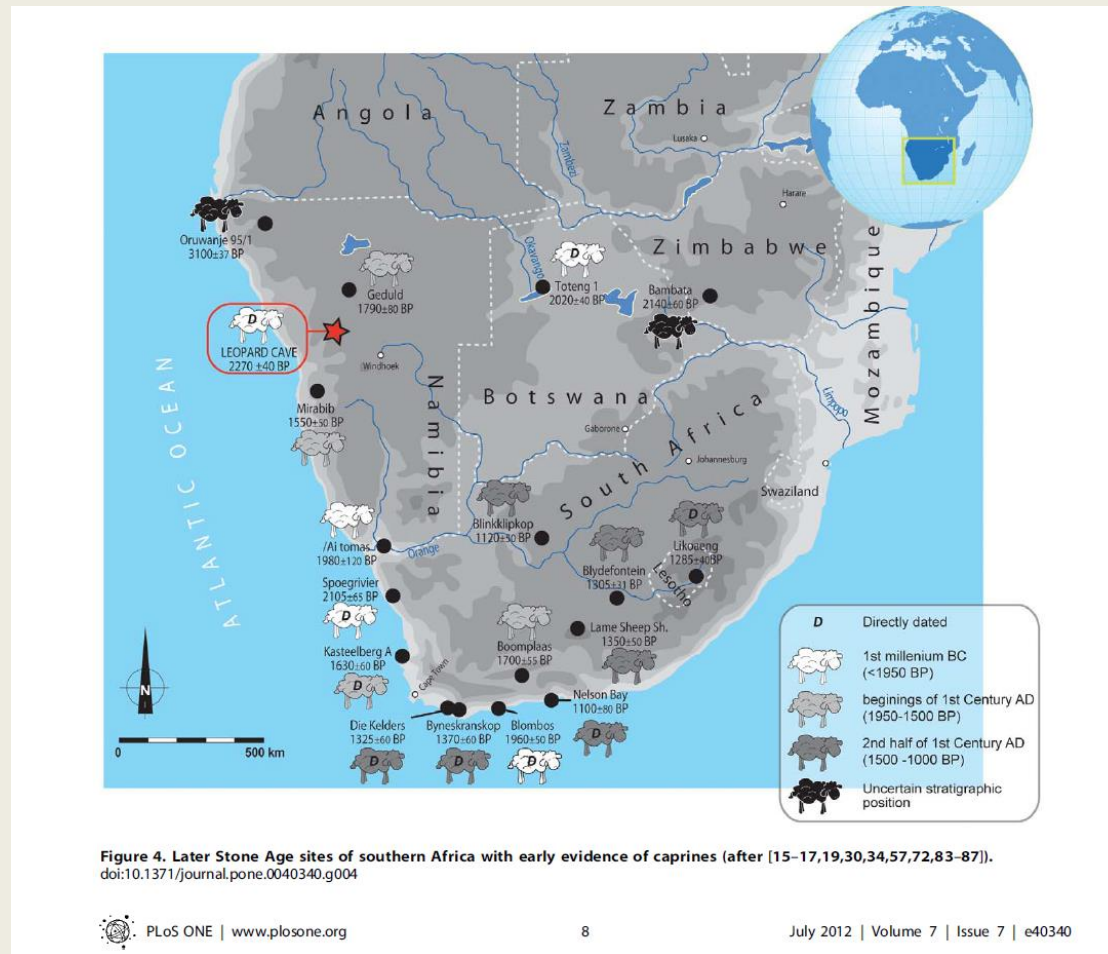
Scraper %



Backed %



Sheep arrive at end of Phase 2



Select Bibliography

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