SYNOPTIC DATABASE FOR 'SOUTHERN ROUTE' GLOBALIZATIONS ACROSS AFRICA, SOUTHWEST ASIA, SOUTH ASIA, SE ASIA, E ASIA

A selection of earliest known dated sites for a given period/technological mode or cultural facies
and comprehensive list of sites with evidence for symbolic behavior (turquoise highlight) including ochres or other red colarants (pink highlight)

AFRICA	SOUTHWEST ASIA	SOUTH ASIA	SOUTHEAST ASIA AUSTRALIA	CHINA, JAPAN, KOREA
Early Oldowan (~2.0-2.6 Ma): General technology: cores and flakes, bipolar reduction, utilized unmodified flakes, flakes not retouched, not yet standardized tool form *(SS1997)* but 'no need to posit a pre-Oldowan or Omo industry' *(KM1994)* or more precisely I suggest classifying *Australopithecus* tools and symbolic behavior as **'Pre-Oldowan'** and those of *Homo* as **'Early Oldowan'** *(JBH)*				
Bouri, Hata Member, Ethiopia (Ar/Ar, etc.) **2.45-2.50 Ma** *(HJ1999)*; 'Pre-Oldowan', cutmarks, bone breakage, no tools; *Australopithecus garhi (HJ1999)*				
Makapansgat, South Africa Member 4 (ESR, paleomag.) 2.9-3.2 *(KK1998)*; *Australopithecus africanus (DR1974)*; 'Pre-Oldowan'; natural manuported red jasperite cobble, 'figurine of many-faces' *(DR1974*; *BR1998; BR2003)*				
Ounda Gona, Ethiopia (Ar/Ar) **2.53±0.15-2.58 Ma**; Early Oldowan, pebble cores, flakes, ('technical blades'), flaked bone*(SS2003, SD2005)*	Yiron, northern rift, Israel (K/Ar on overlying basalt) **2.39 MYA** *(RA2006, 1991)*; [Not mentioned in regional reviews. Illustrated tools appear to be more like Developed Oldowan? – JBH]	Riwat, Upper Siwilak Formation, Pakistan (paleomag. and geostrat.) >1.9 or 2.0 – 2.1 MYA *(RH1989, MV2001)*; (revised paleomag.) **2.35 MYA** *(DR1998)* but dating is controversial *(KRP1998)*	no sites yet	Renzidong, Anhui, China (faunal) 2.0-2.5 MYA (Jin et al 2000) *(CR2000)*; (ESR) 'underestimate' at [ave. EU =1.2 MYA and ave. LU = 1.7 MYA] *(CQ2003)* but most assert not hominid tools *(CR personal com. 2006)*;
Pre-Oldowan and Early-Oldowan: evidence not yet convincing for dispersal out-of-Africa.				

'Classic' Oldowan (Lower or Early Paleolithic) (~1.4-2.0 Ma): General technology: bipolar and direct percussion, cores and flakes plus choppers, discoids, spheroids, and standardized small tools, including scrapers on flakes or fragments, rare burins and protobifaces, utilized unmodified flakes; rare worked bone				
Koobi For a and Karari, East Turkana, Kenya (K/Ar and paleomag. KBS Tuff to base Olduvai subchron) **1.88-1.95 Ma** *(IW2000, TI1988)*; associated with *Homo rudolfensis* and later occupations *Homo habilis (IW2000, TI1988) (TN1985)*; flaked pebble core with accidental 'inner rhomboid', curated *(HJ1992)*	Dmanisi, Kura River Basin, Georgia Level V-IV (fauna, tools, hominid remains palaeomag., K/Ar, Ar/Ar) **1.7-1.81 Ma** *(LH2005)*; closer to *H. rudolfensis* than *ergaster*, ergo *H. georgicus (LM2006, LH2005)* or 'close to stem of *H. erectus' (RG2006)*	Pabbi Hills, Upper Siwilak Formation, Pakistan (paleomag. and geostrat.) **>1.2-1.4 Ma** *(DR1998)*	no sites yet	Majuangou, Nihewan Basin, northern China (paleomag.) 4 artifact layers from (MJG-III) ~ **1.66 Ma** to highest (Banshan) at ~**1.32** Ma *(ZR2004)*
Olduvai Gorge, Tanzania Bed I (Ar/Ar) Naabi bedrock 2.029±.005 Ma Tuff IA **1.976±.015 Ma** Tuff IF **1.749±.007 Ma** *(WR1991)* FLK North 1: artificially pecked phonolite cobble, line of pits, vague shape of a 'baboon-head' *(LM1971, 1976; BR2003)* and 'pitted anvil', a conical block steeply flaked (high backed) all around its flat base, with deep 9 mm pecked depression *(LM1971, 1976)*; 'apparent cupule' *(BR2003)* or for nutcracking? // Gombore I, Melka-Kontouré*(GN2002)*	Erq-el-Ahmar, Israel (paleomag. Olduvai) **1.78-1.96** Ma (Verosub 1989; Ron & Levi 2001) *(PN2002, RH2003)*			

Sterkfontein Cave, South Africa Member 5 Upper (faunal): 1.4-1.7 MA *(BL2001)* Stw53 *Homo habilis* (Hughes & Tobias 1977) // OH13, SK847 *(MJ2003; CD2006)* with stone tool cutmarks; indicates earliest evidence of 'post-mortem manipulation of hominid carcasses' *(PT2000)*				
Reconstructed Classic Oldowan Route: From East Africa (~1.9 Ma) through Southwest Asia (~1.8 Ma) through Pakistan (>1.4 Ma) across South Asia and into China (~1.6 Ma).				

'Developed' Oldowan (Lower or Early Paleolithic) (~1.2-1.7 Ma): General technology: Developed Oldowan A, similar to Oldowan but reduced % core-choppers, discoids, polyhedrons and heavy-duty scrapers; though steep-edged Karari core-scrapers; more refined light-duty scrapers, denticulates, burins, 1st appearance of awls, edge-trimmed flakes, and in later phases of Developed Oldowan a few crude bifaces (influence of Early Acheulian)				
Karari and Ileret, East Turkana, Kenya 'Karari industry' sites are generally in the Okote Member, and dated around **1.65±0.05 ka** *(IW2000; SN1993)* and associated with *Homo ergaster/Homo erectus* fossils *(BF1985; GP2006)*	Ubeidiya, Israel Earliest layers – Li-cycle: K19-20, III-4-20, II-2-20 **~1.60-1.65 Ma** *(BM2006)*	[see Pabbi Hills, Pakistan above – perhaps younger dates correspond to Developed Oldowan assemblages **1.2-1.4 Ma** and in older strata *(DR1998)]*	Perning, Solo River, Java (Ar/Ar) 1.81±0.04 MYA and (paleomag) normal = Olduvai = 1.78-1.96 MYA *(SC1994; DVJ1994)* but 20 m above this *(HO2006)* (Paleomag) = Jaramillo 1.1 MYA *(HM2002, HM1993)*	Xiaochangliang, Nihewan Basin, northern China **~1.36 Ma** *(ZR2001)*; flint, quartz, volcanic rock, quartz, 86% flake scrapers, including side scrapers, notches, a few end scrapers, burins, disc cores *(ZR2001)*
Olduvai Gorge, Tanzania Developed Oldowan A in Middle Bed II: **1.5-1.66 Ma** *(MR2005)*; FLK North Sandy yielded an artificially pecked 'anvil' with 5 mm deep pecked depression in its center *(LM1971);* 'apparent cupule' *(BR2003)* or nutcracker? *(GN2002);* Site BK (Developed Oldowan B) **~1.5 Ma**: 2 lumps red tuff, possibly colorant *(OK1981; BR2003))*; sites associated with *H. erectus (LM1971; (WJ1982)*			Sangiran, Solo River, Java Bapang Formation, (Ar/Ar) 1.51±0.08 to 1.02±0.06 MYA *(LR2001)* (Paleomag) = Jaramillo 1.1 MYA *(HM2002, 1993); Homo erectus*; shell tools *(KC2007);* small flake tools *(WH2006; SR2006)*	Xihoudu, Ruicheng, Shanxi, China **~1.27 Ma** *(ZR2003)*; 32 quartzite, gangue, lava implements, choppers, scrapers, points *(WQ2000)*
Melka-Kontouré, Ethiopia Gombore I: **1.6-1.7 Ma**, Oldowan, *Homo erectus*, 'pitted anvils' (*MJ2001; GN2002)*				
Reconstructed Developed Oldowan Route: From East Africa (~1.65 Ma) through Southwest Asia (~1.6 Ma) through Pakistan (~1.4 Ma) across South Asia (~1.1-1.5 Ma) and into China (~1.36 Ma). Whether this is a dispersal out-of-Africa or multi-regional innovation out of prior regionalized Classic Oldowan seems an open question.				

Early Acheulian (~1.0-1.7 Ma): General technology: flake blanks used as cores, in turn used as tools, including crude handaxes with sinuous edges and large flake scars, trihedral picks, rare cleavers; large component of flakes; chopper, polyhedron, spheroid, heavy-duty scrapers; hard hammer; absence of Levallois or other prepared core techniques				
Olduvai Gorge, Tanzania Site EF-HR; probably CK; Elephant K; MLK Middle Bed II: **1.5-1.66** *(MR2005)*	Ubeidiya, Jordan River Basin, Israel – Fi-cycle sites **1.2-1.6 Ma** *(BM2006)*; some assemblages assigned to Developed Oldowan B, others to Early Acheulian *(BO1995; AB1994)*; dental fossils possibly *Homo ergaster (BM2002)*	Isampur, Hunsgi Valley, Karnataka (ESR on bone, mean age LU) 1.27±0.17 Ma and (EU minimum age) 730±100 ka *(PK2002)*; [average: **1.0 Ma** – JBH]	(See above, Perning and Sangiran within this time period but with apparent Oldowan technology)	Gongwangling, Lantian, China (paleomag.) **1.2 Ma** (Hyodo et al 2002); cores, flakes, scrapers, '1 early Acheulian biface'; *Homo erectus (LJ1998; BP2006)* Donggutuo, Nihewan Basin, northern China (paleomag.) **1.1 Ma**; tools lack diagnostic bifaces *(WH2005)*
Peninj, West Lake Natron, Tanzania Type Section **1.4-1.7 Ma** *(DM2001)*				
Konso-Gardula, Ethiopia **1.39±0.02** *(IW2000);* associated with *H. erectus*				
Gadeb, Ethiopia Site 8E >0.7 to ~1.5 Ma *(WM1979)*; 4 ovate obsidian handaxes (source ~100 km away), 11 round cobbles with pits like Olduvai pitted anvils; several pieces red basalt, but no evidence rubbing for pigment *(CJ1979; OK1981)*				
Reconstructed EA Route: There is an apparent diffusion of Early Acheulian technology from Africa (~1.5-1.7 Ma) through Southwest Asia (~1.2-1.6 Ma) to India (~1.0 Ma) but no clearly diagnostic Early Acheulian industries east of India. Sparse sites in this time period in SE Asia and China suggest continuation of Developed Oldowan.				

<table>
<tr><td colspan="5">Middle Acheulian (~500 ka to 1 Ma): General technology: standardization of blank shape and reduction techniques (e.g., Kombewa, Victoria West in Africa); more regularized handaxe shapes (cordiform, amydaloid, lanceolate, oval), cleavers with bits made from single flat surface scars, trihedral picks, and flake tools (mostly denticulates, notches, scrapers); some assemblages only core-choppers and flakes</td></tr>
<tr><td>Olorgesailie, Kenya
Member 1 (Ar/Ar) 992±39 ka
Member 12 601±3 ka
(DA1990); Homo erectus (PR2004)</td><td>Bizat Ruhama, no. Negev, Israel
(multi-method) 850-990 ka
small tool ‘microlithic’ MA
(ZY2003; RA2006)</td><td>Attirampakkam, Kortallayar Valley, Tamil Nadu
(palaeomag.) ~780 ka
(PSG2003, PS2003)</td><td>Ola Bula, Soa, Flores
(ZFT) between 800±80 ka and 840±70 ka
only core-and-flake tools, but plant polish; implied watercraft</td><td>Bose, China
(AR/AR associated tektites)
803±3 ka (HY2000)
fully Middle Acheulian site among core-and-flake sites</td></tr>
<tr><td>Kariandusi, Kenya
(Ar/Ar 4 m below top of MA bearing sediments) 973±3 ka
(DA2004)</td><td>Evron Quarry, Israel
Unit 4 (multi-method) >780 ka and likely 900 ka
(RH2003)</td><td>16R Dune, Didwana, Thar Desert, Rajasthan
(Th/U) >390±50 (Raghavan, Rajaguru, Misra 1989)
(MS1992, JH2005); quartz crystal manuports (PSo2001)</td><td>Lampang and Phrae River Thailand
Ban Mae Tha and Don Mun
(paleomag.) >730K
only core-and-flake tools</td><td rowspan="2">Zhoukoudian Cave, China
Locality 1, Layers 5-10
600-800 ka (BN2004)
only core-and-flake tools
Layers 7-10: Homo erectus; Upper 8,Quartz Horizon 2: ~20 quartz crystals, 1 perfect fully faceted, probably from 7 km away (Pei 1931) and spheroids (BL1985; BR1991)</td></tr>
<tr><td>Bouri, Dakanihilyo Member, Ethiopia
(max. Ar/Ar max 1.042±.003 Ma, min. 790 ka, or ~1 Ma (AB2002);
Homo erectus (AB2002)</td><td rowspan="2">Gesher Benot Ya’aqov, Jordan River, Israel
(multi-method) OIS19, high intensity artifacts ~750-780 ka (GN2000); Homo erectus; 2 naturally perforated ‘bead-like’ crinoid fossils natural to site and angular quartz crystals in same deposit (GN1991); 46 pitted cores, blocks – ‘nutcrackers’ (GN2002)</td><td>Singi Talav, Didwana, Thar Desert, Rajasthan,
(U/Th) >390 ka (Raghavan et al 1989) (CP2004); 6 quartz crystals, no use-wear, too small for tool manufacture, non-local
(d’Errico, Gaillard, Misra 1989) (BR2003, BR1993; JH2005)</td><td rowspan="2"></td></tr>
<tr><td>Tan Tan, Morocco
Middle Acheulian (est. age 300-500 ka) (Kuckenburg 2001) (BR2002, BR2003) but MA in Morocco currently dating 600-700 ka at Thomas Quarry, STIC Quarry, Sidi Abderrahmen, etc. (RJ2004, RJ2003, RJ1999, MS2000); anthropomorphic figurine, artificial grooves, pigment traces, earliest painted object (BR2001; BR2003)</td><td>Hunsgi II, V, Hunsgi Valley, Karnataka
>350 ka for related sites in Valley (Szabo 1990) (NN2003); ochre nodules (Sankalia 1976); hematite with wear facets, striated, ‘crayon’ (BR1990; BR1993; BR1994)</td></tr>
<tr><td colspan="5">Reconstructed MA Route: From Africa (~990 ka) through Southwest Asia (~850-900 ka) through (coastal?) India (~780 ka) reaching China (~803 ka). Diagnostic MA assemblages not yet found in SE Asia, but sites in comparable time range may be either persisting Developed Oldowan or actually Middle Acheulian core-and-flake small tool sub-facies.</td></tr>
</table>

Later Acheulian (~200-650 ka): General technology: bifaces more symmetrical and refined, cordiform, amygdaloid, ovate handaxes; some assemblages ovate dominates; greater use of soft hammer; increase use of Levallois technique, but some sites no Levallois; disappearance of core-choppers; often length of handaxes decrease*s*; denticulates, notches, scrapers continue; few blades late contemporaneous with Final Acheulian; and during this time period prior technological modes may persist at some sites				
Bodo, Ethiopia (multi-methods) between **0.55±0.03** and **0.64±0.03 Ma** *(CJ1994)*; Acheulian, well-made handaxes, cleavers, *H. rhodesiensis* or *heidelbergensis;* skull cutmarks = 'intentional postmortem defleshing' *(WT1986)*	Berekhat Ram, Israel (Ar/Ar integrated age) **470±8** ka; artifacts near base of palaeosol between basalt flows *(FG1983),* base paleomag. reversed, so may date earlier *(PN2002*); first appearance of Levallois in Levant *(BO1994, 1998)*; female figurine, natural shape with artificial grooves *(GN1986,1995; MA1996, 1997, DF2000)*	Sadab, Hunsgi-Baichbal Valley, Karnataka, India (Th/U Elaphas molar) **290.4+21.0/-18.2 ka** (Szabo 1990) *(MS1992)* Teggihalli, Hunsgi-Baichbal Valley, Karnataka, India (Th/U Bos molar) **287.7+27.2/-22.4 ka** and (Elaphas molar) **> 350 ka** (Szabo 1990) *(MS1992)*	Upper Irrawaddy Terraces, Myanmar (geol.) ~500 ka; only cores, flakes, proto-bifaces *(WJ1982)*	Nanjing, Tangshan Cave, China (Useries) >580 and probably ~620 ka *(ZJ2001);* Homo erectus // Europe, Africa, no tools *(LW2004)* Yunxian, Hubei, China (ESR mean age) 581±93 ka *(CT1996); Homo erectus* with features of *archaic Homo sapiens*; no tools *(TL1992)*
Olduvai Gorge, Tanzania Masek Beds, ~**490-780 ka**; Later Acheulian, *H. erectus (TE1995; MS2000)*;		Maihar, Satna, Madhya Pradesh, India Flat centripetally flaked sandstone disc, ~70 mm diam., too soft to be a tool (JN Pal) // Bhimbetka Acheulian disc *(BR1992; BR1993)*	Tham Khuyen Cave, Long Son, northern Vietnam Units S1-S3 (Useries and ESR) **475±125 ka** *Homo erectus* (Cuong 1971, Kha & Cuong 1975) *(CR1996)*	Zhoukoudian Cave, Locality 1, China Layers 2-4 (TIMS U-series) **400-500 ka** *(SG2001; BN2004)*; cleavers, points, flake tools *(LJ1998)*; roasting of horseheads *(BL1986)*

Wonderwerk Cave, South Africa – 'Kathu Pan phase': (Useries) **~350 ka;** 2 ironstone slabs bearing engraved sub-parallel lines; abundant ochre fragments every level; exotic quartz crystals, small 'pretty' colored river pebbles (Beaumont 1990, 1999) *(BJ1992; BR2003; BR1993)* Erfoud, eastern Morocco manuport cuttlefish fossil, probably natural (no evidence of working, but very weathered), has 'life-size shape of penis' (Fiedler, 1984) *(BR2002)*		Bhimbetka, near Narmada River, Raisen District, Madhya Pradesh (microerosion) Chief's Rock *cupule* **>100 ka** *(BR2005)* Later Acheulian layer underlies FA layer OSL preliminary dating 106±20 ka, hence Later Acheulian **>106±20 ka** *(BR2005)*; cupule and undulating groove petroglyph at Acheulian level; and chalcedony stone disc similar to Maihar (Kumar 1990) *(BR1992)*; Chief's Rock 9 cupules and marks of red pigment *(BR2005, KG1996)*	Cagayan River Basin, Luzon, Philippines (fauna) **~250 ka** (Coppens) *(PA2005)* only core-and-flake industry	Kommonmoru, North Korea (geobiostratig.) **400-600 ka**; picks, handaxes (BK)
El Greifa E, Fezzan, Libya (Useries) **~ 200 ka** 3 fragments ostrich eggshell disc beads (Ziegert 1995) *(BR1997)*		Daraki-Chattan, Madhya Pradesh; Levels 3-6: exfoliated slabs bearing cupules, hammerstones for engraving; Level 6: hematite nodule; cave walls with 500+ cupules, 2 engraved grooves *(BR2005, KG1996)*		

Reconstructed LA Route 1: From Africa (~550-640 ka) through Southwest Asia (~470 ka) to western coast of India (~290 ka) apparently reaching China and Korea (~400-500 ka), unless we count sites such as Zhoukoudian and Kommonmoru as a convergent innovation, in which case the East Asian sites might be considered more advanced at least showing evidence of points prior to their appearance in Final Acheulian of Africa.

Reconstructed LA Route 2: Datings suggest a well-established Late Acheulian transsubcontinental Narmada Crossing route across South Asia was in effect around ~200 ka, through Gujarat (Umrethi, ~190 ka; Kaldevanhalli-I, Karnataka, ~170 ka), following the Narmada River through Madhya Pradesh (sites such as Bhimbetka; Daraki-Chattan; Hathnora *heidelbergensis* hominid site, ~200-300 ka; Maihar) towards its source, and crossing overland to rivers such as the Chambal, Betwa and Son (many sites around ~200-300 ka) down to the Ganges and thence eastward. As during the Middle Acheulian timeframe, and given sparse data, sites in SE Asia, such as Upper Irrawaddy, evidence only Developed Oldowan type industries. However, given the East Asian Later Acheulian sites, we may not positively posit a 'Movius Line' for this time period for Southeast Asia. Whether the East Asian sites reflect a convergent evolution from MA roots appears an open question.

Final Acheulian (~150-300 ka): General technology (African/SW Asia definition): multiple reduction strategies, Acheulian bifaces, sometimes made on Levallois flakes, Levallois and disc cores; variable presence of handaxes, cleavers as well as points, blades; termed 'Final Acheulian' or 'Intermediate' with regional variants; blades in African Kapthurin and Fauresmith and Levantine Mugharan Tradition				
Kapthurin Formation, Tugen Hills, Rift, Kenya Sites in or below upper basaltic tuffs of Bedded Tuff (lower K4) **>284±12 ka** and above Grey Tuff <509±9 *(DA2002)*; GnJh15: 74 pieces red ochre (>5 kg) pulverized and chunks, grindstones *(TC2006; MS2005; DA2002; MS2000)*	Tabun Cave, Mt. Carmel, Israel, Unit E XIII: Yabrudian (TL mean) **302±27 ka** XI: Acheulo-Yabrudian and Amudian (TL mean) **264±28 ka** *(MN2003, 1995,1994, BO199, VH1998)*	Bori, Kukdi River; Nevasa, Pravara Basin; Yedurwadi, Krishna Basin, Maharashtra each of 3 sites dated (Th/U) **~200K** (Korisettar 2002) *(BR2005)*	Tham Wiman Nakin Cave, northern Thailand (U-series capping layer) 130±18 to 169±15 ka (Esposito et al 1998) *(DF2004);* no tools; '*Homo* between *H. erectus* and *H. sapiens*' *(TJ1998)*	Luonan Basin, China 50 open air sites with handaxes, cleavers, trihedral picks *(WS1998);* (TL) 1st Terrace 182.8±9.1 ka; 2nd Terrace **251.05±12.5 ka** *(WS2005)*
Melka-Kontouré, Awash, Ethiopia Garba III: **~250 ka** Final Acheulian; remains 'earliest' *archaic Homo sapiens* (Hours 1979; Chavaillon et al. 1987) *(MJ2001)*		Bhimbetka, Madhya Pradesh III F-23-I (Misra Trench), FA/Intermediate Layer (EIP Project Preliminary OSL central) **106±20K** with 'Eastern Micoquian'-like bifaces *(BR2005)*		
Bir Tarfawi and Bir Sahara East, southwestern Egypt **250-320 ka** (OIS9) *(SB1995)*				
Blind River Mouth, South Africa -- Fauresmith FA large grindstone incised with checkerboard crisscross lines *(LP1933)*				

To condense space the following table lists additional **African** sites horizontally in descending chronological order, sometimes by geographic area.				
Sai Island, Nile River, northern Sudan Site 8-B-11 Levels 4-6: Sangoan (OSL) L5 and L6, between **182±20 ka** and **223±19 ka** L6: dense concentration of red and yellow ochre lumps, some with ground surfaces; sandstone slab, top pecked flat, grinding hollow, with 7 cupules; several chert pebbles with red/yellow ochre adhering, one with black inclusions, 'symbolic'; L5: stone circle with 2 more slabs with depressions *(VPP2003)*	Herto, Upper Herto Member, Ethiopia (Ar/Ar on underlying and overlying tuffs) **154±7-160±2 ka** *(CJ2003)* Latest securely dated (Final) Acheulian in Africa, later than Rooidam and Kaphturin *(MS2003)* *H. sapiens idaltu* between Bodo, Kabwe *rhodesiensis* and *Homo sapiens sapiens (WT2003)*; all 3 bear defleshing cutmarks and scrape marks, juvenile polishing (not processing for food), 'indicative of mortuary practice' *(CJ2003)*			
Reconstructed FA Route: This appears to be a wave from Africa (~285 ka) through Southwest Asia or perhaps originating there (~300 ka) that spreads to India, Gujarat and Maharashtra (~200 ka) and into the Narmada valley (at least by ~100 ka) and in China (~250 ka). Within limits of the database there is no evidence for Final Acheulian sites in Southeast Asia, although Thailand does show an *archaic Homo sapiens* (~130-170 ka). Apparently, we cannot posit a 'Movius Line' for this time period.				

EARLY-Middle Paleolithic (Middle Stone Age) (Africa ~150 to 300 ka): General technology (African /Southwest Asia definition): elongated or large, relatively thick, blades and point blanks flaked from radial, single or opposed platform cores, recurrent and some Levallois, with minimal preparation of striking platform; retouched points—many elongated, prismatic blades, endscrapers and burins common; no backed microliths; evidence of hafting points and blades (tangs, grooves, mastic); intra-regional point styles suggesting diverse cultural traditions; use of color pigments, extensive by Mid-MSA; *archaic Homo sapiens*				
Olorgesailie, Kenya Locality B, Olkesiteti Base (Ar/Ar) **340 ka** to Upper **220, 225 ka** Locality G, Olkesiteti 220, 226 ka *(BA 2005)*	Tabun Cave, Mt. Carmel, Israel – Unit IX = Layer D (TL mean) **256±26** ka *(MN2003)* but (ESR LU) 203±26 ka *(GR2000)*	16R Dune, Didwana, Thar Desert, Rajasthan (Th/U) **150±10 ka** and 144±12 ka; (TL) 163±21 from underlying level *(MS1992, JH2005)*	(repeats from previous chart) Tham Wiman Nakin Cave, northern Thailand 130±18 to 169±15 ka *(DF2004);* no tools; '*Homo* between *H. erectus* and *H. sapiens*' *(TJ1998)*	Zhoukoudian, China Locality 4 New Cave: (Useries) 120 ka; (possible min. age hominid) 248-269 ka; *archaic Homo sapiens;* Locality 15: direct percussion multi-directional and alternating flaking, disc cores, flakes, no Levallois *(SG2003)*
Florisbad, South Africa (ESR direct) *Homo helmei* **259±35 ka** Units N, O, P: (OSL) 281±73; 279±47 ka *(GR1996, RR1997, KK1999);* curved wooden implement with longitudinal // incisions on end (Volman 1984) *(BM2003; BRe2003; BR1992)*	Hayonim Cave, Israel Lower E (TL 5 flints) **~200 ka** *(VH1998);* Tabun D, several flints retained red ochre on retouched edge*(BO1995, 1997)*	Lakhmapur East and 189 other MP localities, Kaladgi Basin, Karnataka 'Early MP' industries' sites range **100 ka** to 50 ka *(PM2003)*	Tham Om Cave, Nghe An, central Vietnam 140-250 ka *(DF2005);* no tools; *Homo sapiens (DF2004)*	Dali, Shaanxi, China (Useries) **209±23 ka** (Chen et al 1994) (but association uncertain *BP2006*); *archaic Homo sapienc*; cores, flakes, scrapers (Wu 1981, 1989) *(KS1996; BP2006)*
Kapthurin Formation, Kenya Koimilot (Ar/Ar) **~200-250 ka** *(TC2006)*	Rosh Ein Mor (D15), Negev, Israel (U-series) **200+9.5/-8.7 ka** *(RW2003)*		Pajitan/Pacitan, Baksoka Valley, Java **~130 ka** *(BP1997)*	

Twin Rivers Kopje, Zambia (TIMS Useries) A-block: 'likely mean age' **~265 ka** F-block: **140-200 ka** *(BLP2002)*; Lupemban; A and F-blocks: 306 specularite, hematite, limonite, manganese dioxide pieces, some evident striations for powder; brown, red, yellow, pink, purple, blue-black; manganese and huge quantity suggest ritual use *(BLpig2002)*; pestle stone with hematite stain on working surface *(CJ2001)*			Kampung Gelok and Kampung Temelong, Bukit Jawa, Lenggong Valley, Perak, Malaysia MP tools **100 ka** *(VD2001)*	
Taramsa 1, Upper Egypt (Hill – Conc. 17): (OSL) **~210 ka** *(VVP1998)*			Arubo 1, Luzon, Philippines n.d., but horsehoof cores // Javanese Pajitanian dated ~130 ka and 'Australian Core-Tool and Scraper Tradition' plus Levallois points *(PA2005)*	
Border Cave, South Africa Strata 4-6 'MSA1' or 'Early MSA' (TL) ~**165-180 ka** (ESR) ~80-227 ka **(OIS5-6)**; Ochre pieces ;OES beads *(BP1978; WI1999)*				
Omo Kibish, Ethiopia (Ar/Ar) **195±5K** *H. sapiens sapiens*				
Reconstructed EARLY-Middle Paleolithic (Middle Stone Age) Route: This appears to be a wave from Africa (~225-340 ka or ~280 ka) through Southwest Asia (~260 ka) that spreads to India (~150 ka), Southeast Asia (~130 ka). Although *archaic Homo sapiens* appears in China (~250 ka) and innovation of radial core multiple reduction strategies occurs at Zhoukoudian, apparently such methods were not used to produce points or blades—though this may reflect limits of my database or overall research—or might still be interpreted as a regional variant.				

<table>
<tr><td colspan="5">MID-Middle Paleolithic (Middle Stone Age) (~60-150 ka; OIS 5 = 74-130 ka; OIS 4 = 59-74 ka; African dry spell 60-20 ka): General technology (African, Southwest Asia): continuation of Early MP/MSA production of blanks by multiple reduction methods (single, double, multiple platforms, radial disc cores, Kombewa), sometimes ovoid and large flakes, regional variants of specialized prepared core techniques (e.g., Levallois, Nubian) and specialized point, blade or scraper styles (e.g., African Nazlet Khater, Aterian, Pre-Aurignacian, North African Mousterian, Ethiopian MSA, Kenya Rift MSA, Mumba Industry, Final Lupemban, Katanda MSA, Bambatan, Pietersburg, MSA-IV, Howiesons Poort, Stillbay; Levantine Nahr Ibrahim, Denticulate or ‘Typical’ Mousterian, Mousterian of Acheulian Tradition, Tabun C); Homo sapiens sapiens; increased frequency and variety of symbolic behavior, palaeoart, ‘burials’</td></tr>
<tr><td>Omo, Kibish Formation, Ethiopia
(Ar/Ar; geostratig.) 195±5 ka (MI2005); early H. sapiens sapiens (earliest well-dated aMH) ; but tools not diagnostic (MI2005)</td><td rowspan="2">Tabun Cave, Mt. Carmel, Israel - Layer C – Units I-V ‘Tabun C’
(TL) (Unit I) 165±16 to (Unit V) 222±27 ka (MN2003) but (U-series ESR)
(Unit I) 135+60/-30 to (Unit II) (EU) 133±13 ka (LU) 203±26 ka (GR2000)
[Note: TL dates make Layer C close to Layer D; so ESR more likely ~130-200 ka]</td><td>Patpara, Middle Son Valley
<103 ka (100-150 ka); blade, flake blade, scraper industry (JH2005)</td><td rowspan="2">Liang Bua Cave, Flores
Layer 9 ‘Pulse C’:
(ESR+Useries) 74+14/-12 ka and other loci dated 74-95 ka; multi-method reduction, Kombewa flakes, points and blades; flakes reduced to cores, façonnage; Homo floresiensis (MM2007, MM2004)</td><td>Tongtianyan Cave, Guangxi, south China
(Useries) 61±1 to 68±1 ka or more likely ~111-139 ka; Liujiang hominid, H. sapiens sapiens (SG2002)</td></tr>
<tr><td>Mumba Shelter, Lake Eyasi, Tanzania – Level VIA, B ‘MSA’, Levallois; Homo sapiens sapiens (BG1988); (U-series) ~130 ka (MM1987; MS2000)</td><td>Samnapur, Narmada Valley, Madhya Pradesh
‘MP’
Youngest Toba Ash
74±2 ka (Misra et al 1990) (JH2005)</td><td>Bailiandong Cave, China
(U-series on capping flowstone) ~<160 ka; H. sapiens sapiens (SG2002)</td></tr>
<tr><td>Buri Peninsula, Abdur Reef, Red Sea Coast, Eritrea
‘Early MSA’ with bifaces (TIMS U-series) 125±7 ka (WR2000) [‘Mousterian of Acheulian Tradition’?]</td><td>Hayonim Cave, Israel
Upper E
(TL) ~150 ka (VH1998)
Tabun C industry</td><td>Baghor Formation, Son Valley
‘MP’
Youngest Toba Ash
74±2 ka (RB2005)</td><td rowspan="3">Malakunanja II, Kakadu, Australia
Pit (TL) 52±11 ka
Base artifacts (TL) 61±13 (but base TL questioned) (RR1990; OJ2004); bipolar horsehoof cores, flakes, scrapers; ground hematite, red and yellow ochres, grindstone (RR1990; FJ1990)</td><td rowspan="3">Huanglong Cave, Yunxi, Hubei, China
(U-series, ESR, fauna) either 103±1.6 ka;
stone tools typical of south and north China [i.e., continues Early MP, scraper-based, no points or blades; 5 teeth, Homo. sapiens sapiens (WX2006)</td></tr>
<tr><td>Bir Tarfawi and Bir Sahara, Egypt
‘Early Nubian’; (U-series, TL, AAR) ~100 to ~125 ka (VPP1998; SB1995; MN1999)</td><td rowspan="2">Skhul, Israel – Layer B
(TL) (B2) 119±18 ka (M N1994, MN1995, VH1998) and (ESR U-series) ~100 to 130 ka Tabun C (GR2005); burials (BA1992) H. sapiens sapiens with some archaic features; S5 burial with wild boar mandible; marine shells not related to food acquisition (BO1995), 2 shells are beads (VM2006)</td><td>Jetpur, Hiran Valley, Saurashtra, Gugarat
‘MP with small choppers’
(Th/U) 56.8+5.4/-4.8 ka
(above 2 layers MP tools) (JH2005)</td></tr>
<tr><td>Taramsa 1, Upper Egypt
Nubian points, Levallois flakes; (OSL) ~120 ka (VVP 1998)</td></tr>
</table>

Sai Island, northern Sudan Site 8-B-11 Upper Levels 1-3 Nubian, Levallois, radial reduction techniques **OIS 5** *(VPP2003)*	Qafzeh, Israel Layers XVII-XXIV (TL) range **85-102 ka**; isochron 92±5 ka *(MN1994, MN1995, VH1998)*; Tabun C; 18 MNI *Homo sapiens sapiens*; 3-7 burials, 1 with large fallow deer antler over hands over upper chest, *(BO1993; BA1992)*; or not burials, rockfall *(GR1999)*; min. 84 ochre pieces at every level, 6 worked, specific hues selected and manuported 40 km, % associated with burial loci and levels *(HE2003)* red ochre on working edges of some tools, 4 naturally perforated *Glycymeris* marine shells *(BO1993, 1995, VM2006)*; 1/3rd m. away from Q8 burial, broken Levallois core (recurrent centripetal flaking), triangular flat surface, 'plaquette', incised with mostly parallel stroke marks truncated by accidental break or intentional snap; grinding between two sets of lines and associated ochre fragment with scrape marks on both faces *(HE1997; HE2003)*		Nauwalabila I, Kakadu (OSL bracket dates for peak artifact density) **53±5.4** (290 cm.) **60.3±6.7 ka** *(RR1990)* but dates questioned *(BM2000; OJ2004)*; bipolar horsehoof cores, flakes, scrapers; '1 kg piece of hematite bearing ground facets and striations—clear signs of scraping to produce powder paint' *(FJ1990)*	
Nazlet Khater, Lower Nile, Egypt – Site NK2 Mousterian 'K' ('Denticulate or Typical Mousterian') (geostratig.) **~110 ka** *(VPP1998)*				
Aduma, Ardu Beds, Middle Awash, Ethiopia Levallois, micro-Levallois, micro-Aduma industry; grindstones (Ar/Ar, U-series, OSL) **80-100 ka** *(YJ2005)*				
Mumbwa Caves, central Zambia Basal MSA: **OIS5e** *(BLP2002; BL1995)*; 1 kg+ blocks of non-local hematite showing grinding or scraping; probably natural, anthropomorphic piece (Barham 2000) *(BR2003)*			Devil's Lair, SW Western Australia (OSL, ABOX) (calibr.) 50 ka, thus **<50** *(GR2002;TC2001)* or 'range **41-46 ka**' *(OJ2004)* flakes, small tools, possibly adzes for hafting; split pointed bones, bone points, resin on stone tools; bird bone pendant, 3 bone beads, 1 naturally perforated flat marl pebble with 4 wear grooves, possibly as pendant *(FJ1990; BR2003; BR1997)*	

Klasies River Mouth, South Africa (U-series, OSL, geostratig.) 'MSA I' OIS5e ~**111-130 ka** 'MSA II' **101±12 ka** *(GR2005; ES2005; SR1982; DH1989, 2001)* MSAII-a and II-b, 180 red ochre pieces, >50% with wear facets, incisions to remove powder, 14 from MSAI; 1 bone fragment with 4 thin // grooves, 2 with serrated edges; Cave 5: 1 hematized shale 'crayon' *(SR1982, DH2001; WI1999)*; MSA I, II, III *Homo sapiens sapiens (SR1982);* have cut and percussion marks and burning, indicates cannibalism *(WT1987; DH2001)*; or mortuary ritual	Nahr Ibrahim (Asfurieh) Cave, Lebanon (geostratig.) **80-92 ka**;Tabun C and Tabun B *(TI2000)* partial skeleton of fallow deer (*Dama m.*) 'burial' with red ochre; bones gathered in pile, some still articulated, unbroken, and skull cap placed on top, in association with flints, unusually large number just above the skeleton, pieces of red mag-ochre scattered in it *(SR1982, MA1990)*		Lake Mungo, Willandra Lakes, NSW Australia (OSL) between **43** and **45 ka** (*BJ2003; GR2006);* horsehoof cores, small flake tools typical of 'Australian Core Tool and Scraper Tradition'*(BJ1970; MJ1999)*; *Homo sapiens sapiens*: LM1 female, cremation, hearths, burnt animal (in situ kangaroo, wallaby, wombat, cat) and fish bones, emu egg fragments, mussel shells; LM3 male, ochre burial, no tools *(MJ1999, FJ1990; BJ1970)*	
Florisbad, South Africa Unit F: (ESR EU) **121±6** (OSL) 138±31 ka *(GR1996, RR1997, KK1999);* large ochre grinding slabs *(MS2000)*	Har Karkom, central Negev, Israel HK190a, 190b and several other sites: Mousterian of Acheulian Tradition *(AE2006)*; rhomboid with engraved circle 'navel' figurine, 2 other possible 'female' figurines, fluid-shaped 'pick'; triangular nuclei with 'vulva' and possible zoomorphs *(JBH, OriginsNet.org online*)		Huon Peninsula, Papua New Guinea (TL) **~47 ka** (U-series between tephras ~44 and ~61 ka; waisted axes *(GL1986, OJ2004)*	
Apollo 11 Cave, Namibia Levels G G (AAR) **≥83 ka** *(MG1999)* Stillbay, 2 notched bone fragments, pigment *(WW 1974, WW1976*)			Carpenter's Gap, Kimberley, Western Australia (calibr. AMS) max. **44 ka** *(GR2002)*; Exfoliated fragment with red pigment painted on it in layer with ochre *(FJ1997)*	

Blombos Cave, South Africa M3: (OSL) **98.9±4.5 ka** (OIS5c 97-103 ka), provisionally 100-140 ka most utilized ochre of all levels M2: (TL) 76±7 and 105±9 (OSL) range **76.8±3.1 ka to 84.6±5.8 ka** (OIS5a high sea level 74-91 ka) 21 worked bone tools; some bone tools with evenly spaced incisions; MII (CF): 2 and MI: 39 *Nassarius* (tick) shell beads, perforated, with string wear M1: (TL) **74±5 ka** and **78±6 ka** (OIS5a 74-91 ka) Stillbay, 10+ bone tools; 1 mandibular fragment engraved with '11 subparallel lines and 1 obliquely crossing line'; 2 geometrically engraved ochre pieces (1 with tri-line over row Xs (BCC CD); 1 crosshatched (BCC CC), associated hearths; 8000 pieces of ochre, most worked by scraping and grinding, in all levels *(HC1997, HC2001, HC2002; DF2001, DF2005; SM2004; HC2004)* dating *(JZ2006; TC2006)*	Wadi Arah, Bir Khasfa, southern Oman Mousterian of Acheulian Tradition *(RJI2004b)* Har Karkom, Negev, Israel – HK148b Aterian, hut floor *(AE2006)*; (North and Northeast Africa dated **OIS5 74-130 ka** or earlier); around inside perimeter of hutfloor zoomorphic, anthropomorphic and geometric figurines *(JBH, OriginsNet.org online*) Bani Khatmah, Rub' al-Khali, Saudi Arabia Aterian *(PM2004; BA2006)*			

To condense space the following table lists additional **African** sites horizontally in descending chronological order, sometimes by geographic area.				
Pomongwe Cave, Matopos Hills, Zimbabwe (14C) >42 ka; probably **125 ka** (Klein 1978) *(BRe2003)* Layers 22-27: Proto-Stillbay ochre from all spits Layers 13-21: Bambata Stillbay, increased ochre and stained lithics; *(CJ1965, CJ1982; WI1999);* 'MSA levels': 2 granite slabs stained with ochre *(BA2000, BRe2003; BR1992)*	Hollow Rock Shelter, South Africa Stillbay, >1000 pieces pigment, 45% use wear by weight, *(WI1999);* 2 incised and notched (serrated) ochre fragments *(MS2000)*	Bambata Cave, Zimbabwe probably **125 ka** (Klein 1978) *(BRe2003)*; Stillbay, evidence of ochre use *(BRe2003)*	Olieboompoort, Transvaal, South Africa 'MSAII': 304 pigment pieces, mostly specularite, 'crayons', 11.95 kg, 18.2% modified by weight, 1 of 5 grindstones with ochre stain (WI1999)	Porc Epic Cave, Dire Dawa, Ethiopia 'Late MSA'[=late Mid-MSA] (obsidian hydration) occupied **61 to 77.5 ka** *(CJ1984), H. helmei (MS2000)*; 298 fragments of ochre, at least 40 with clear wear facets from grinding (CJ1984; Clark 1988) *(MS2000; BR1992)*
Border Cave, South Africa Stratum 3 (AAR) bracketed >56 <100 ka (ESR) **58±2 to 76±4 ka** (*GR2001*; *MG1999)*; 'MSA2' = Howiesons Poort BC3 infant skeleton, stained by red ochre, with perforated *Conus* shell in 'shallow grave'; higher level, *Conus* manuported 80 km *(GR2001; MS2000);* ochre, 27.7% wear facets by weight *(WI1999)*	Klasies River Mouth, South Africa Howiesons Poort, 102 utilized ochre pieces *(SR1982)* ~**70 ka** *(WS1999)*	Apollo 11 Cave, Namibia Level F (AAR) **63±6** and **69±7,** Howiesons Poort, 3 ostrich eggshell fragments with incised crisscross lines; pigments; 2 notched bones *(WW 1974, WW1976*)	Cave of Hearths, South Africa - Bed 9 Howiesons Poort. broken circular ostrich eggshell pendant, 3 cm diameter, central perforation) *(MS2000)*	Howiesons Poort, South Africa – H.P Level 1 hematite fragment, ground trihedral base with 18 (3, 11, 4) notches along its edges; 1 bone point *(SP1928)*
Boomplaas Cave, South Africa – Level OCH OCH: Howiesons Poort (U-series, AAR) **~60-70 ka** *(VJ2001);* ochre pieces *(WI1999)*	Diepkloof Shelter, South Africa – H.P. Level (TL) **71±8 ka** *(VH2005)*; 2 ostrich eggshell fragments engraved with subparallel lines *(MS2000)*	Rose Cottage Cave, South Africa 'MSA II' : (TL mean) 70.5±5 'HP' (TL) between 56.3±4.5 and 60.4±4.6 ka; (OSL) 66±4 ka *(VH2005);* pigment pieces all levels *(WI1999)*	≠Gi, Botswana (TL, AAR) **70-80 ka** or 77 ka 'Bambatan', highly retouched, broad foliate and triangular points; points highly curated; grindstones stained with ochre *(KK1989; MS2000)*	Die Kelders Cave, South Africa 'Late MSA', blades (OSL) **60-70 ka** *(FJ2000)* (ESR) **70±4 ka** *(SH2000)* *H. sapiens sapiens*; ochre stained grindstones *(MS2000)*

To condense space the following table lists additional **African** sites horizontally in descending chronological order, sometimes by geographic area.				
Rhino Cave, Tsodilo Hills, Botswana (tool style) analogous to MSA ≠Gi ~77 ka (other Tsodilo Hills sites dated 64 ka and 96 ka) *(S. Coulson, interviews on line)*; MSA: specularite mining, hammerstone, grindstones; 'ritual deposition' of finely made quartz and rock crystal, polished points, those with red color burnt white; rock wall of cupules and abraded grooves, engravers in MSA level, 'image of python' *(S. Coulson interviews on line)*		Windhoek, Namibia n.d., 'earliest' MSA, in pile 1.3 m in diameter, 75 cm high, 36 spheroids, (35 of 'fine crystalline quartz', 1 of 'red sandstone') each weighting 600-1200 g; mostly 8-10 cm. diam; all have notch, 1.5 cm diam. and 'few' mm deep *(FG1954)*	El Guettar, Tunisia 'Mousterian with foliates, tanged points' '// Tabun C' *(GM1954)*; (14C) 47±4, 57±7 ka *(AN2006)* but moist phase fauna, Libyan, East Sahara wet phases = **65-90 ka** and 120-155 ka *(SB1995);* in spring, pile 60 spheroids, 1 tanged point in base center of pile, elongated points near top, apex spheroid white cortex, flaked black one pole, red ochre other pole; triangle and lozenge plaques at base *(GM1954)*	Dar-es-Soltan I and II, Morocco Aterian, *H. sapiens sapiens*; 'enigmatic heap of sandstone slabs 1 m diameter, 30 cm high' *(MS2000)*; (AAR) **60-70 ka** *(RJ2004)* or Libyan Aterian 60-90 ka *(MS2000)*
Oued Djebanna, Algeria Aterian, perforated shell of *Arcularia gibbonsula* (Morel 1974) *(MS2000)*	Taforalt Cave, Algeria Aterian, perforated marine shells from ~35km away; *(Nick Barton, online*)	Seggédim, eastern Niger Aterian, 4 drilled quartzite flakes, probable pendants *(MS2000)*	Grotte Zouhra, Morocco Aterian, bone pendant *(MS2000)*	
Reconstructed MID-Middle Paleolithic (Middle Stone Age) Route: This appears to be a wave (or waves) possibly originating in Africa (~195 Omo Kibish or ~130 Mumba Shelter) or Southwest Asia (~150-160 ka) especially if early Tabun Cave C ESR dates (~130-200 ka) are accepted. Mid-MP subsequently occurs in India (~100 ka), Southeast Asia (~75 ka) and Australia (~55 ka). *Homo sapiens sapiens* seems to occur in China (~150 ka) but apparently continues using an Early MP stone technology during the Mid-MP time period.				

LATE-Middle Paleolithic (Middle Stone Age) (~30/35 to 60 (100) ka; OIS3 = 24-59 ka; African dry spell 20-60 ka): General technology: (African) continuous Levallois for production of blades as in UP and thin flakes, light-duty flake tools, or single, double platform or radial cores for flakes and blades; high % denticulates; notches, Tayac point, end- and sidescrapers; but no LSA geometrics; no backed pieces like Howiesons Poort and no bifacial points like Stillbay *(KR2004)*; (Levant Tabun B) return to triangular blanks, removed from mainly unipolar convergent Levallois cores, broad-based Levallois points; short thin flakes and some blades; also radially prepared cores in upper contexts of Tabun B *(BO1995)*				
Taramsa 1, Qena, Upper Egypt (Conc. 28): ~30-65 ka (OSL mean) **55.5±3.7 ka**; Levallois flakes, blades, // Boker Tachtit, Negev; *H. sapiens sapiens*, intentional burial *(VPP1998)*	Tabun Cave, Mt. Carmel, Israel – Layer B (Combined Useries/ESR) **104+33/-14 ka** *(GR2000)*; Tabun B *(BO1992)*; probable *Neanderthal (CA2005)*	Attirampakkam sites, Tamil Nadu, India Layer 2 (ESR) **45-50 ka** *(BB2005, PSG2003, PS2003)*; 'Late MP/UP' with knives, points; rare handaxes and cleavers *(PS2001)*	Ngarrabullgan Cave, Queensland, Australia (calibr. AMS) Level 3: **36±2 ka** *(GR2002)*; processing starchy grains and fibers; resin hafted woodworking; possible skin-working *(FR1997)*	Ryonggok Cave, North Korea (Useries) **46-48 ka** *(NC2000)*; 5 H. sapiens, 1450 to 1650cc so not *H. erectus* as thought *(BK1992) = early H. sapiens sapiens* [=similar cc to Skhul-Qafzeh]
Sodmein Cave, eastern desert, Egypt MP2: (14C) >30ka, Emireh points UP2: (14C) 25.2±0.5 *(MN1999)*	Kebara Cave, Mt. Carmel, Israel – F (TL) occupations from **48.3±3.5 ka to 61.6±3.6 ka** *(MN1994, VH1998) Homo neanderthalis(BO1992,1993)* 1 bone engraved with / and V marks *(DS1974)* [at **~57 ka**]	Bhimbetka III F-23, Madhya Pradesh, India - Layers 4-5 (EIP Preliminary OSL) **45±8 ka** *(BR2005)*; 'Middle to late phase of MP' with blade and flake-blade cores, blades, knives, burins *(JH2005)*	Sandy Creek I, Cape York, Australia Lower occupations (14C calibr.) **34.4 ka**; some even lower flakes and red pigment; clear or milky quartz, split pebble core reduction, 1 ground-edge axe, waisted and grooved, 11 pieces red pigment;*(MJ1995; FJ1997)*; cupules on wall *(BR2006)*	Myoungo-ri, Nam Han River, South Korea (est.) ~40-50 ka; 'Late MP' bifaces, choppers, picks, scrapers, points, denticulates, knives, notches *(BK1992)*
Khor Musa, Sudan - 34A, 34D: (redated 14C) **>40 ka**, possibly 60 ka *(MS2000)*; 'Khormusan MP' blade-and-burin industry, grindstones, few polished bone tools *(VPP1998; BA2006)*	Biqat Quneitra, Israel (ESR) **39.2±4.2** to **53.9±5.9** *(MA1996, TI2000)*; flint with cortex incised with 4 nested semicircles and diagonal lines *(MA1996)*	Kalpi, Yamuna Valley, Ganga Plains, Uttar Pradesh, India (TL) **~45 ka**; 'MP with choppers' *(CP2006)*		Hongsu Cave, South Korea ~40 ka; child, *H. sapiens sapiens (NC2000)*
Jebel Gharbi, northwestern Libya **40-**80 **ka**; Aterian at spring sites to escape drier areas of North Africa *(GE2006)*	Amud, Israel – B1, B2 (TL) **~56-57 ka**; 14 MNI, 3 *H. neanderthalis(TI1988, VH1998)*; A7 infant in niche, 'burial' with red deer maxilla (Hovers et al 1995) or 'exposed' *(GR1999)*	Mula Dam, Maharashtra (14C) 31.98+5.72/-3.34; 'MP'*(BR2005)*		Pyeongchang-ri & Juwol-ri, Imjin-Hantan, South Korea (overAT) **>29.4±1.9 ka;** Late MP (contemp. with UP), choppers, handaxes, picks, notches, denticulates, backed knives, trapezoids, 'pseudo-prismatic cores', points, scrapers, and awls *(SC2004)*

Mumba Shelter, Lake Eyasi, Tanzania Mumba industry, backed geometrics // H.P. (Useries) 46.6 ka, 65.7 ka (AAR) 45-65 ka *(BG1988; AS1998; WR2000)*; eggshell beads (AAR direct) **52 ka** *(MS2000)*	Har Karkom, central Negev, Israel -- HK19: 6 hut floors, 'Levallois Mousterian' flints *(AE2006)* [// Tabun B dating?]; 3 zoomorphic flints at east entry to one hut, 2 'equid heads' *(JBH, OriginsNet.org online*)	Upper Son Valley, India 'MP with tanged points' *(JH2005)*	Mandu Mandu Creek Shelter, Pilbara, Western Australia (AMS between) **30.9±0.8** to **35.2±1 ka;** 22 perforated *Conus sp*. shells and modified fragments *(MK1993)*	
Matupi Cave, DR Congo (14C) >40.7 ka *(BA1995)*; LSA microlithic cores but lacks microblade cores, thus MSA *(MS2000)*	Dederiyeh Cave, Syria (TL) Layers 2-4 **50-70 ka** Layers 8-9 **60-90 ka** *(GC2004)*; 15 MNI *H. neanderthalis*; Layer 8: infant, slab top of head, triangular flint at heart, 'intentional burial' *(AT1995, ATM1995)*; or death by fall into cave *(GR1999)*		Sandy Creek II, Cape York, Australia Lower: (AMS over pigment layer on rock wall) (calibr.) ~**27 ka**; *(CN1995)*; bipolar, single platform cores; flakes, blades, ground-edge axe fragment; pigment utilized *(MJ1995)*	
Loiyangalani, Tanzania (n.d.); MSA, 2 OES beads, ochre pencils, bone artifacts *(TJ2004)*				
Border Cave, South Africa Stratum 2: 'MSA 3', (ESR) lower 41±2 ka; upper 63±2 ka *(GR2001);* rib fragment with 12 notches along edge *(BR1992);* ochre pieces *(BP1978; W11999)*	Geula B Cave, Mt. Carmel, Israel B1: (14C) **42±1.7 ka**; early H. sapien sapiens; Tabun B; ochre *(BA2002)*		Woodstock 65B, Pilbara, Western Australia (microwane analysis on 2 circle petroglyphs) range ~**16 to ~38 ka;** petroglyphs: circles, anthropomorphs *(BR2001)*	
Apollo 11 Cave, Namibia Level E (AAR) **59±6 ka** *(MG1999)*; 'Late MSA/LSA', blades, gum mastic on blade, 6 painted slabs (1 'feline with human legs'; 1 'zebra' or 'giraffe'; 1 'antelope'; 1 'rhino'; 2 with minimal markings, indeterminate image), 1'painted pebble' *(WW 1974, WW1976*)	Shanidar, Iraq 9 *H. neanderthalis*; S1: (14C) 46.9±1.5 ka; S5: (14C) 50.6±3 ka *(SY1988);* S1 crippled, amputated arm = *altruistic behavior*; S4 niche 'flower burial'; S6 S7 S8 'secondary burial' *(SR1971)* but contra *(SJ1999);* S1 and S5, cranial deformation *(TE1983)*		Mushroom Rock West, Cape York, Australia Lower: (TL) **28.7±3.5 ka; 26.7±4 k**; (14C ~15? ka); bipolar, single and multi-platform cores, flakes, blades, core tools, ground-edge tools; used pigment for painting; cupules on buried slab unprovenanced, but also on shelf *(MJc1995; MJa1995)*	

Sibudu Cave, KwaZulu-Natal, South Africa 'Late MSA' (OSL) occupations from **53.4±3.2 ka** to **60.8±2.3 ka;** 'Final MSA' (OSL) **26.0±0.42 ka to 35.2±1.8 ka** *(WL2004)*;); Late MSA: 3 notched bones: 1 with 10 or 11 equally spaced // notches; residue plant fiber, cells and starch grains (but direct AMS 28.88±0.17) and 1 fragment w/1 notch; Final MSA: 1 with series of 3 flaked notches on edge;1 bone pin *(CC2006; CC2004)*			New Guinea II, Snowy River, Australia Unit 4, core, scrapers, bone points (14C) **21+0.9/-0.8 ka** reoccupied **~13-16 ka**; digital fluting, diagonal crossing lines, circles // Koonalda style *(OP1995, FJ1997, FJ1990)* Kow Swamp, southern Australia (OSL) **~19-22 ka**; *H. sapiens archaic* (Rhys Jones); grave goods: ochre, shells, marsupial teeth, cranial deformation? *(FJ1990)*	
Ysterfontein 1 Shelter, South Africa (AMS) **~46-57 ka**; Late MSA, red ochre and black manganese pieces, 1 of each color striated, diorites with ochre rubbing or grinding smears, maybe for hafting or for art *(KR2004)*			Koonalda Cave, Nullarbor Plain, Australia (14C calibr.) **16-27 ka** *(GR2002)*; 'MP' flint quarry; Extensive digital fluting meanders, crisscross lines, lattices, herringbone; Squeeze entrance: SW side 2 sets of 4concentric circles; lattice grids above entry *(WR1971)*; standing stones & stones with zoomorphic and anthropomorphic shape (Gallus) Pre-Panaramitee tradition *(FJ1997)*	
Rose Cottage Cave, South Africa MSAIII: (TL) **50.5±4.6 ka;** points, knives, scrapers, backed tools; Late MSA: **27.7-30.8 ka;** *(VH2005)* pigment pieces all levels*(WI1999)*				

Boomplaas Cave, South Africa- MSA III Levels (14C, Useries, AAR) ~**20-45 ka** (*MG1999)*; pigment all levels *(WI1999)*; OLP (~35-45 ka) 1 complete and 1 unfinished ostrich eggshell bead *(DF2005)*			Kalate Egeanda Cave, Papua (comparison other sites) possibly ~15-20 ka; digital fluting petroglyphs *(FJ1997)*	
Nswatugi, Zimbabwe (14C) infinite >40 ka; Late MSA 'Tshangulan', beads; 3 granite slabs with 1 definite, 2 probable ochre stains *(MS2000; BR1992)*			Lake Nitchie, NSW, Australia (14C) **6.5-7.0 ka; '**robust' or *archaic H. sapiens*; burial: ochre pellets, necklace of 178 pierced Tasmanian devil teeth (from MNI 47), missing 2 central upper incisors // male initiation rite (FJ1983)	
To condense space the following table lists additional Late MSA **African** sites horizontally in descending chronological order, sometimes by geographic area.				
Zombepata Cave, Zimbabwe (14C) infinite, **>40 ka**; MSA, 2 stone rings of micaceous schist, ornamental *(DF2005)* [industry unclear]	Lion's Cavern, South Africa (14C) **10 ka to 43 ka** or infinite >40 ka; ochre mine *(MS2000)*	Umhlatuzana, South Africa (date?) Final MSA, pigment pieces (WI1999)	Bushman Rock Shelter, South Africa (date?) MSA, OES beads *(DF2005)* [industry?]	
Reconstructed LATE-Middle Paleolithic (Middle Stone Age) 'Route': Seems earliest in Southwest Asia (~70/100 ka), or possibly later if the Tabun Cave B dates are too high, and if so at least ~60 ka, and in Africa (~55 ka), India (~45-50 ka), Southeast Asia (~30 ka). China (~40-50 ka) and Australia (~30-35 ka). Most probably these are all local developments, more or less convergent.				

<table>
<tr><td colspan="5">Early, Middle and Late Upper Paleolithic/Early, Middle and Late Later Stone Age (~5-60 ka; African dry spell 20-60 ka): General UP: retouched blades and bladelets, scrapers on blades, small and microlithic tools; bone tools, soft hammer, more art; (Africa): microblade cores; often but not always backed bladelets; endscrapers, distinctive burins (CJ1970; MS2000); probable first hafted projectile points after 40 ka, but not during MSA (SJ2006); (Southwest Asia): EUP single platform reduction strategy for blade blanks, slender elongated interior blades, for El Wad points and retouched blade and bladelet blanks, dominated by endscrapers, burins, truncations, some sites continue Levallois blanks, endscrapers, denticulates; MUP and LUP differentiation into distinct reduction strategies for blades versus bladelets; (India): blade-based; prismatic cores, scrapers, increase of burins and backed blades, microlithic, bifacial and tanged points, but standardization of retouched forms not comparable to Aurignacian or other UP Europe; ostrich eggshell in over 40 sites dating 25-40 ka (BR2003); (East Asia): retouched points, blades, bladelets, small and microlithic tools; bone tools, soft hammer, more art</td></tr>
<tr><td>White Paintings Rock Shelter, Tsodilo, Botswana
‘MSA/LSA’: (OSL) 55.4±4.7 ka (RR1997) or 38-50 ka (MS2000)</td><td rowspan="2">Boker Tachtit, Negev, Israel
Level 2: (14C) >45.49, 46.93±2.42, 47.28±9 ka; EUP, opposed platform Levallois-point, quasi-discoidal, single- and opposed-platform blade reduction (MA1983);
‘Bohunician Behavioral Package’ dispersal to central Europe, Siberia (TG2003)</td><td>Site 55, Pakistan
~45 ka; UP, flake blades, microblades
(CP2006, JH2005)</td><td>Malangine Cave and Koongine Cave, South Australia
(Useries over Karake at Malangine Cave) ~28 ka
3 superimposed petroglyph styles:
I: Digital fluting
II: Karake Style: CLMs, ‘x tracks' (minimum 28 ka)
III: Circles, lattice (BR1999)</td><td>Shiyu, Shanxi, China
Upper (14C) 28.135±0.37 ka
Lower (14C) 32.220±0.625 (BR1991); ‘combine MP and UP features’; perforated stone disc (BR1991; BR1994)</td></tr>
<tr><td>Olduvai Gorge, Naisiusiu Beds, Tanzania
(ESR) 60±10 ka; (AMS 14C) > 42 ka; Early LSA Lemuta industry (AS2002)</td></tr>
<tr><td rowspan="2">Enkapune ya Muto Shelter (GtJi12), Kenya
MSA/LSA Endingi industry > 50 ka; ochre on 2 flakes, stained grindstone;
LSA Nasampolai industry, ~40-50 ka; ochre on back of several backed blades suggests hafting;
LSA Sakutiek industry (14C) 39.9±1.6 or ~37-40 ka; ostrich eggshell, 13 beads, 12 perforated preforms, 593 shell fragments (MS2000; AS2002; AS1998)</td><td>Ksar Akil, Lebanon
(14C XXVI underlying EUP) 43.75±1.5 ka (MA1983); (est.) ~ 50 ka (KS1999); EUP Levallois blades UP retouch; XXIII (‘unique, maybe intrusive’) 1 bone awl incised 14 cutmarks in 7 pairs (NM1974, CL1977); perforated shell beads (KS2001)</td><td>Chandresal, Kota, Chambal Valley, Rajasthan, India
(14C) Lower 38.9±0.7 ka Upper 36.55±0.5; UP, blades, small and tanged points, scrapers, burins, lunates; ostrich eggshell beads and fragments, 1 engraved (KG1988)</td><td>Karlie-ngoinpool Cave, South Australia 3 styles in sequence
I: Digital fluting (possibly pits and grooves)
II: Karake; circle, barred, concentric circles, CLMs of 2-5 lines; !maze, dots, parallel stroke marks; arcs, !stars, multiple wavy lines, xtracks, enclosures
III: shallow lines (FJ1997)</td><td>Suyanggae, Nam Han River, South Korea
‘Early UP’: end and side scrapers on blades (BK1992); Layer IV: (14C) 16.4 to 18 ka tanged points, microblades (LY2000)</td></tr>
<tr><td>Kebara Cave, Mt. Carmel, Israel, E -Units I-IV
E -IV (AMS) 42.5±1.8 ka; EUP, blades, endscrapers; E I-IV 28-42 ka; EII: few lumps of ochre (BO1992)</td><td>Bhimbetka III A-28, Raisen District, Madhya Predesh
UP level: 2 ostrich eggshell tablet beads; found at neck of burial H. sapiens sapiens (KG1988; BR2003)</td><td></td><td>Hinatabayashi B, Nagano, Japan
30 ka; UP ground and polished tools (Tokyo National Museum online)</td></tr>
</table>

Mumba Shelter, Lake Eyasi, Tanzania - Level III 'well before 40 ka' or **30 to >37 ka**; LSA, ostrich eggshell beads *(MS2000)*	Üçagizli Cave and Kanal, south central Turkey G-I: EUP; H: (AMS calibr) ~**41-44 ka**; E-F: transitional; Layers B1-B4 (14C) 29-32 ka (uncalibr); 'Stage 2 UP'; *(KS1999, KS2001)*; perforated shell beads (all levels except D), perforated predatory bird phalanx *(KS 2001, VM2006)*	Nagda, Ujjain and Ramnagar, Mandasor, Chambal Basin, Madhya Pradesh, India EUP Level (14C) **> 31 ka**; Nagda: 1 ostrich eggshell disc, 35 mm diam., smoothed margin; Ramnagar: 5 engraved eggshell fragments *(KG1988; BRm1992)*	Leang Burung 2, Maros, South Sulawesi Layers II-V (14C) **~22-31 ka;** Bipolar, bifacial disc cores, 1 blade core, minor use of Levallois, scrapers, knives, blades, with phytolith edge gloss, perhaps for basketry or matting; hematite fragments all levels, 3 abraded (1 ochre pellet with cross-cutting striation, as if used for pigment) *(GI1981; OJ2004)*	Zhoukoudian, China Upper Cave 101, 102, 103 (AMS) suggests ~**24-29 ka** (though 14C ~10-18 ka) *(BP2006)*; UP tools, flakes, some scrapers, knives; 1 bone needle, polished antler; ~10 MNI *H. sapiens sapiens (CD2003; WJ1982)*; hematite lumps; ochre in burials, 1 elderly burial with perforated shell and fox canine; total 141 ornaments, some with traces of red ochre (125 perforated deer, fox teeth, 3 perforated shells, 1 perforated ovoid pebble, 1 perforated fish supra-orbital, 7 perforated stone beads, 4 tubular bone sections with // cut marks) typical of UP Europe and Siberia *(BR1991; UNESCO Peking Man website)*
Border Cave, South Africa Stratum 1: (AMS, ESR) **36±1 and 39±3 ka** *(GR2001*; *MG1999)*; Early LSA, ostrich eggshell beads; incised notched bone *(AS2002; MS2000)*	Har Karkom, Negev, Israel At least 16 sites, 'Karkomian –EUP/MP transitional', Levallois large blades, backed blades, points, endscrapers; HK86b: 'Paleolithic sanctuary': spiral circle of standing stones with natural anthropomorphic shapes, smaller zoomorphic and anthropomorphic (Z-A) stone figurines with retouch; HK86a, HK87b: stone heaps associated with hutfloors; HK203a: pebble drawings or geoglyphs; HK210: 53 Z-A stones; some on perimeter of hut floor, 1 in its floor; between other 2 huts a small circle of Z-A stones with 1 round, mask-shaped in the center *(AE2006, AE2001, AE1996, AE1993)*	Fa Hien Cave, Sri Lanka **31 ka**; *H. sapiens sapiens;* geometric microliths; *(JH2005)*	Mushroom Rock West, Cape York, Australia Middle: (TL) **20.7±3 ka** to **9.5±1.9 ka** (14C) 7.7 ka or ~10-15 ka; bipolar, single and multi-platform cores, blade and burin cores, flakes, blades, core tools, scrapers, adze; used pigment for painting *(MJc1995; MJa1995)*	
Nazlet Khater, Upper Egypt NK4: (OSL) **38-45 ka**; Early UP chert mine NK2 (UP Level): (14C) **37 ka;** burial with bifacial axe, facing east, grave covered with blocks, 2nd burial with fetus bones and ostrich eggshell fragments; *H. s. s.,* 1400cc, with some African MSA archaic features *(PRS2000, VP1984, VP2003; RB1992)*		Batadomba-lena, Sri Lanka **28.5 ka**; *H. sapiens sapiens*; geometric microliths, bone points, ostrich eggshell beads *(JH2005)*	Sandy Creek II, Cape York, Australia (AMS over superimposed hematite pigment layers on rock wall) (calibr.) **15-16 ka**; (calibr.) **7.499 k** *(CN1995)*; (14C, TL) Lower Middle: **~12 to ~15** Upper Middle: **~7.7 to ~10**; bipolar, single platform cores; flakes, blades, ground-edge axe fragment; pigment utilized *(MJ1995)*	Sokchang-ni, Kum River, South Korea (14C) **20.83±1.88 ka**; Layer 12: blade cores, end scrapers on blades, side scrapers, burins, becs, points; microcores // Aurignacian *(BK1992)*

Nturnot, Ntuka River, Kenya (GvJh11): 8 Upper: LSA with microblades, microcores (horizon just above horizon dated (14C) **30 ka** (AAR) **32 ka *(AS2002)*** Kisese II Rock Shelter, Tanzania 'MSA/LSA': (14C) **31.48 k**; ostrich eggshell beads ochre crayons with wear facets *(DF2005; RB1992)*	Qafzeh, Israel – Level VII-IX or D, E Early Ahmarian *(CG1989)*, D: Stage 2 UP; E: Stage 1 UP; limestone slab and hand stone smeared with red ochre *(BO1997)*	Patne, Maharashtra, India Levels 5-7 (14C) **25.5±0.2 ka** Late UP: prismatic blade cores for blades, microlithic blade and bladelets, geometric lunates and triangles *(JH2005)*; 3 ostrich eggshell beads (1 perforated, 1 centrally scored, 1 disc) and eggshell fragments, 1 fragment engraved with Xs in // lines *(BR1997; BR2003; KG1988)*	Sandy Creek I, Cape York, Australia Middle occupations ~18 ka to ~9 ka; layer containing exfoliated engraving (14C at 162 cm.) 12.62±0.27 (calibr.) **14.4 ka*;*** 14 pieces red pigment; partially buried panel: 'pecked lines, curves, bird tracks'; exfoliated pecked engraving confirms panel dating; = regional variant of Panaramitee tradition *(MJ1995, FJ1997)*	Mandal-ni, Sangmaryong River, Hwachon, North Korea (fauna) 20 ka; UP: 7 microblade cores (6 obsidian, 1 quartzite); bone tools, mostly points; *Homo sapiens sapiens (BK1992)*
White Paintings Rock Shelter, Tsodilo, Botswana LSA (14C, AAR) **33 and 37 ka**; (AMS direct) **26 ka;** bone harpoons and other bone tools, ostrich eggshell fragments, preforms, beads *(MS2000)*	Abu Noshra II, southern Sinai, Egypt (14C) **38-39 ka** *(KS1999, GI1999)*; Lagaman EUP, 1 bone point *(GI1999)*	Khaparkheda, Narmada Valley, India UP level: Ostrich eggshell beads manufacturing factory site *(KG2001)*	Early Man Shelter, Cape York, Australia (14C calibr.) **14.4 ka**; buried engraved frieze: 'cupules, xbird tracks, !tridents, circles, mazes'; 1 buried engraved slab, 'xbird track' (calibr.) **4.536 ka;** 'typical of petroglyphs 5 ka to present' *(CN1995)*	Longgu Cave, Xinglong, Hebei, China (AMS) **13.065±0.27 ka**; Cervus elaphas *antler engraved with multiple // and wavy lines, figure 8 motif, and zigzag, oblique crosshatch and horizontal // lines; noniconic art = in sophistication to Siberia, Russia, Europe* (BR1991; BR1994)
Apollo 11 Cave, Namibia D: (14C) **12.5 to 19.8 ka**, ELSA, 'OES beads and containers, seashells, pigments and minerals' C: (14C) **6.2 to 10.4 ka**, LSA 'Wilton', 'OES engraved fragments & beads, pendants of OES and seashells, OES containers, pigments and minerals' *(WW1976; MG1999)*	Qadesh Barnea, northeast Sinai, Egypt - sites QB9, QB501, QB601 (14C) **32-34 ka** *(GI1993)*; Lagaman EUP, QB601: ochre extensively used, ostrich eggshell,; 5 *Dentalium* shell pieces; QB9: 1 limestone scraper with // incised lines on dorsal face *(GI1999)*	Inamgaon, Maharashtra **~21-25 ka**; blades, points, fluted cores, rare backed blades *(JH2005)* Chandrawati, Rajasthan UP level: fluted core bearing pre-fluting spiral rhomboid design *(KG2001)*	Song Terus, Southern Java ~10 ka; burial, mandible *Homo sapiens sapiens (LA2004)* Sturts Meadows, NSW (14C on carbonate overlying varnish) thus **> 10.25±0.17, 10.41±0.17 ka**; Panaramitee style rock art *(FJ1997)*	

Mumbwa Caves, Zambia (date?) MSA/LSA Transition and LSA, ground bone points, drilled bone fragments, 1 decorated bird bone, beveled end, 2 pair notches on one surface, 1 pair obverse, with traces of hematite *(BLP2002; BL1995)*	Lagama, Sinai, Egypt VII (14C - corrected) range **30-34 ka**; Lagaman, X: 82 pieces of Dentalium shell, and few shells other levels;) flint artifacts stained with red ochre *(BO1997; GI1999; CG1989)* Boker BE, Negev, Israel III: (14C) **26-27.5 ka;** Late Lagaman UP, basalt grinders for ochre *(GI1999)*	Baghor I, Son Valley UP/Epipaleolithic level **~8 to 9 ka** *(KJ1983)*; backed, truncated and serrated blades, scalene triangles and trapezes *(MV2005);* in center of circle of sandstone rocks, female anthropomorphic stone with concentric triangles in base// similar stones in rock circle<1 mi. away in current use representing Mai, the Mother Goddess *(KJ1983)*	Panaramitee North, Olary, South Australia (date?); type site for Panaramitee style: pit, groove, circle, arc, track (macrcopod and bird), star, maze, parallel strokes, vulva, human footprint *(FJ1997)* Ingaladdi Shelter, Northern Territory, Australia engravings: 'xbird tracks' and abraded grooves on buried sandstone slab (14C) **6.8** to **4.9 ka** *(FJ1990)*; unifacial and bifacial points appear at about **2.8 ka** *(CC2002, MJ1999)*	Paleolithic-Neolithic Transition = 'Incipient Jomon' (10-13 ka) 'Kamikuroiwa Cave, Ehime, Japan - Layer 9 (14C) **12.165±0.35 ka**; UP tools, bifacial foliate points, shouldered arrowheads, pressed 'ridge pattern' earthenware; grooved whetstone or grindstone, engraved natural cylindrical pebbles, ~ 4 cm in length, possibly depicting 'breasts, skirts, long hair' *(BR2003; Wikipedia)*
Boomplaas Cave (14C) **4.45±0.75, 5.0±0.75**; Late LSA Wilton industry; 4 painted stones like those at Klasies River Mouth Cave 5 LSA *(SR1982)*	Ksar Akil, Lebanon VII/VIII-XIII (14C) **32 ka** *(CG1989)*; Aurignacian; XI, cobble for crushing ochre *(GI1991)*		Mt Yengo Shelter, New South Wales, Australia (14C) **5.98**; also **4.59**; **2.84 ka**; buried engravings, Panaramitee style: 'circles, dots, tracks' associated to **5 to 6 ka** dates *(FJ1997)*	
	Ein Aqev (D31), Negev, Israel 12: (14C) **19.0±1.2 ka** 5-11: (14C) **17-18 ka**; Non-Aurignacian/Non-Lagaman; *Dentalium, Nassa gibberula, Mitrella shells;* red and yellow ochre all levels, 3 *Nassa* smeared with ochre *(MA1976, WJ2003)*		Mushroom Rock West, Cape York, Australia Upper: (14C calib) **4.5 ka** (TL) 8.6 ka; bipolar, single and multi-platform cores, blade and burin cores, point, backed micro-blades, elourae, ground-edge adzes; used pigment for painting *(MJc1995; MJa1995)*	

<table>
<tr>
<td rowspan="4">Klasies River Mouth, South Africa
Cave 1, Layers 1-12, LSA, red ochre, ostrich eggshell; Lower and Upper Midden, LSA, perforated cowry shell, perforated slate pendant, bored circular stone disc; slate palette with traces of red ochre;
Cave 5 Cutting and Midden, LSA, many pecked pebbles bearing traces of red and black pigment; 12 other rock fragments with black or brown ochre; 1 flat boulder painted in black with thin white lines, a man and 4 fish or dolphins; flat pebble with red grid pattern on both faces; striated slate palette;
(14C) 315±105 bp;
(SR1982)</td>
<td rowspan="2">Hayonim, Israel – Layer D
(14C) 27-29 ka; Aurignacian; 5 engraved gazelle scapulae (tally marks?) (DS1974); several limestone slabs bearing red ochre and black pigment; 2 engraved limestone slabs, 1 ‘speared horse’ ‘Ys, bi-lines, hooks, fluid lines’ overmarked with red ochre; perforated horse and deer teeth, wolf canine; bone pendants (BO1997, MAa1997)</td>
<td></td>
<td>Sandy Creek II, Cape York, Australia
Upper Levels: (calibr. 14C) 4.232 to 1.992 ka; (TL) 5.4±0.7; 4.4±0.2 (MJ1995) ‘more consistent blade production’, burren adze slugs, 3 backed tools: 1 geometric microlith, 1 Bondi point, 1 eloura; pigment utilized (MJ1995)</td>
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<td>Roonka, South Australia
(14C) ~4.0 ka; 2 skeletons, H. sapiens sapiens, adult and small child in ‘most elaborate status burial yet found’, skin cloak with bone pins, paws of animal pelts, fringe of bird feathers, child bore bird skull pendant, necklace of reptile vertebrae, feet stained with ochre (FJ1983)</td>
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<tr>
<td>El Wad D, E
E: Lower Aurignacian
D: Upper Aurignacian (GI1991, CG1989); twin pendants (BO1997) [breasts--JBH]</td>
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<tr>
<td>Erq el-Ahmar D, B, Israel
D: Lower Aurignacian
B: Upper Aurignacian
(GI1991); Dentalium shell beads, bone beads (BO1997)</td>
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<table>
<tr><td colspan="5">To condense space the following table lists additional Levant/Southwest Asia sites horizontally in descending chronological order, sometimes by geographic area.</td></tr>
<tr><td colspan="5">Late Levantine UP: General: multiple reduction strategies (opposed platform for large blades; single platform for bladelets), soft-hammer, ‘classic’ blade and bladelet products, abundant microliths, bladelets with fine, continuous retouch; backed bladelets and points are rare; large tools include endscrapers, burins, truncated blades (FC1988); red ochre reported from almost every site dating between 30 ka and 8 ka (BO1997); every listed Early Kebaran (Epipaleolithic or Mesolithic) (20-30 ka) and Geometric Kebaran (13-20 ka) site has symbolic art as well as red ochre</td></tr>
<tr><td>Boker BE, Negev, Israel
Levels IV, II; Boker (D100) Area A; Ein Aqev East (D34)
Late Ahmarian (FC1988)
E. Aqev E., Dentalium bead (GI1999)</td><td>Ksar Akil, Lebanon- VI-VII
VI (AMS) 31.2±1.3 and 32.4±1.1; VII (14C) 32.0±1.5 (MP1989); Atlitian, UP Stage 5 [Late UP] (CG1989)</td><td>Nahal Ein-Gev I, Israel
~20-25 ka (BO1997);
Atlitian, female H. sapiens sapiens burial (BA1992) or Aurignacian (GI1991)</td><td>Ksar Akil, Lebanon
I: (AMS) ~22-23 ka;
III: (AMS) 21-29 ka
with 8ac (AMS) 29.3±0.8 (MP1989; Level I-II, Early Kebaran, H. sapiens sapiens burial;
Level III (8c) gazelle metatarsal awl 10 cm, 167 / incisions in 5 columns, 32-35 marks each, some ‘V, X’s, hooks’ (TJ1974)</td><td>Ohalo II, Israel
(14C calibr.) 22.5-23.5 ka (BA1992); Early Kebaran, H. sapiens sapiens burial with gazelle bone polished and incised with // marks behind head and similarly incised wooden object (ND2006); few standing stones, e.g. elongated amygdaloid shape outside perimeter of huts and small erect stones under floors; hundreds of Dentalium and Columbella shell beads (ND2003, 2004)</td></tr>
<tr><td rowspan="2">Jiita Cave, Lebanon
Level II (est.) ~21-29 ka; Early Kebaran; 3 gazelle bone tools (1 awl, polished, incised with 1 row ‘zigzags’ 2nd row ‘zigzags and Vs’, 3rd row ‘several bi-lines,1 X’ like Ksar Akil; ochre; Dentalium beads, other shells with natural or intentional perforations (CL1977)</td><td>Urkan e-Rub IIa, Israel
(14C) 14.4 ka, but too young in light of Early Kebaran tools; abundance shell beads, polished limestone pebble (not local) engraved with 8 sets of parallel lines, 3 with ‘ladders’; obverse 2 ‘ladders’ in ‘V with fill of cross-hatch’ (HE1990); may represent gazelle drive corridors (BO1997)</td><td>Ein Gev I and II, Israel
~16 ka (BA1992);
Kebaran; Ein Gev I female H. sapiens sapiens buried in hut, flexed on right side, 3 bovid horns near left shoulder (BA1992, GI1991)</td><td>Wadi Mataha, southern Jordan
(14C calibr.) 16.5-17.6 ka; Geometric Kebaran, burial (GI1991)</td><td>Neve David, Israel
(14C calibr.) ~15 ka; Geometric Kebaran; 2 fragmentary skeletons, covered with a few mortars and stone bowls (BA1992, BO1997)</td></tr>
<tr><td>Yabrud III, Syria
Levels 4, 6, 7; Geometric Kebaran, perforated shell beads, ochre, grinding stones (RA1950, GI1999)</td><td>Wadi Dhobai K, Jordan
Kebaran, hut stone circles, with orthostats (structural?), few beads (AT2005)</td></tr>
</table>

Qasr Kharaneh IV, Jordan Phases A, B, C, D (estimated) ~12-20 ka; B: Classic Kebaran, 2 skeletons buried beneath living floor, 1 with 2 medium-sized stones over head and 2 over legs; D: Final Geometric Kebaran, Dentalium shells, several pieces of ochre; engraved bone radius incised with 9 regular incisions *(MM1988)*	Öküzini Cave, s. w. Turkey Epipaleolithic (Zarzian) **~13-14 ka**; 2 engraved pebbles: 1st 'aurochs, speared'; 2nd 3 sets of 4x8x8'ladder' patterns; obverse 'ladder corridor' enters circle with small circles around interior perimeter, 'intentional cumulative marking' *(BO1997, MAa1997)* latter may represent corridors for gazelle drives *(BO1997)*			
Reconstructed Early-UP/ELSA 'Route': EUP/ELSA industries seem first to occur in Africa (~50/60 ka), Southwest Asia (~>45 ka), South Asia (~45 ka), Southeast Asia (~31ka), Australia (~>28 ka) and East Asia (~32 ka). Considering these dates it appears possible that EUP may have diffused from Africa to Southwest Asia and South Asia but the simultaneous dates for Southeast Asia, Australia and East Asia suggest that in these regions and possibly all regions EUP industries could reflect independent, multi-regional, convergent innovations built on shared Mid-MP technologies. **Reconstructed Mid-UP/ELSA 'Route':** Mid-UP (microblade) industries appear first to occur in Africa (~30-32 ka), Southwest Asia (~32 ka), South Asia (~25 ka), Southeast Asia (no data), Australia (~5-9 ka) and East Asia (~21 ka). These microlithic industries appear to occur across the 'Southern Route' about 10k years later than the emergence of EUP industries although this could reflect a dispersal at around ~40-50 ka it could just as well be convergent innovation in each region. This is the most likely hypothesis for Australia and perhaps also Southeast Asia. Also the contemporaneous dating for the Aurignacian and Atlitian in the Levant is further indication of a mosaic of multi-regional evolution.				