# Tectonic setting of kimberlites

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Kimberlites and related alkaline rocks (kimberlites *sl*: e.g., kimberlites, lamproites, melnoites, carbonatites) range in age from the Neoarchean to the Cenozoic, and are found on all continents and intrusive in a variety of geological domains (Fig. 1). Their spatial and temporal distribution has been related to mantle plumes or hotspots (Morgan, 1983; Le Roex, 1986), or to tectonic processes involving lithospheric faults formed or reactivated during rifting of continents (Dawson, 1970; Marsh, 1973; Sykes, 1978; Bailey 1992; White et al., 1995; Jelsma et al., 2004; Moore et al., 2008).

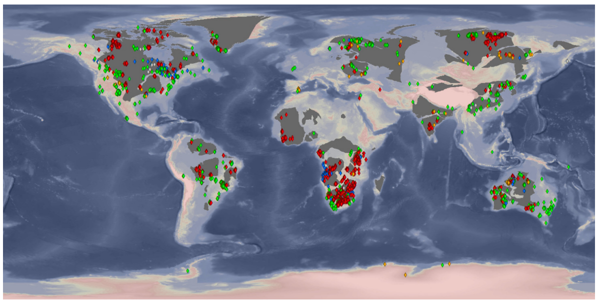

Fig.1 Cratonic domains (grey) and global distribution of kimberlites (red), lamproites (orange), melnoites (green), and carbonatites (blue)

In this study the tectonic setting is reviewed. Spatial and temporal data for kimberlites are compared with the lithosphere anisotropy and surface geological features. It is argued that kimberlites are records of tectonic events in a changing world, marking stages in the assembly or break-up of continents, and are key pieces in palaeocontinent reconstructions.

**Temporal and spatial constraints**

Over time, each continent shows alternating periods set apart either by abundance or scarcity of kimberlite magmatism. Table 1 and Fig. 2 provide an overview of available age data using Southern Africa as an example. Abundance peaks occur during the Mesoproterozoic (1650 Ma, 1330 Ma, 1195 Ma, 1100 Ma), the early Palaeozoic (520 Ma, Pan-African), the Mesozoic (240 Ma, 145 Ma, 121 Ma, 85 Ma, 73 Ma), and the Cenozoic (54 Ma and 31 Ma). Some kimberlite groups are better preserved compared to others, depending on the geological environment (basically an exhumation and burial story: 1km erosion off-the-top of a kimberlite pipe takes out most of the crater- and diatreme components).

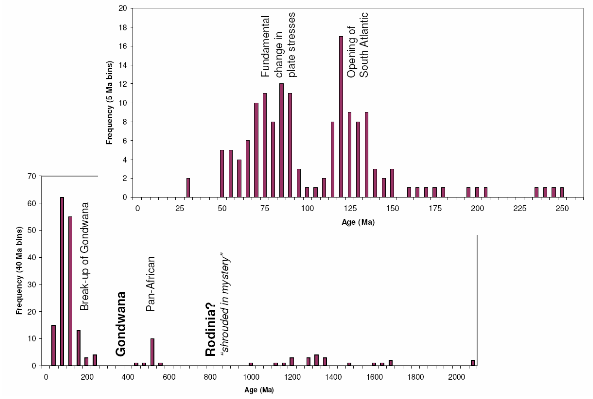


Fig. 2 Kimberlite age data for Southern Africa

In space, Southern Africa is transected by a network of systematic continental lineaments that are considered to be corridors of concentrated, aligned tectonic activity (Fig. 3). Some of these are lithosphere-scale structures that formed focal areas for (often repeated) kimberlite magmatism representing anisotropies associated with gradients in the subcontinental lithosphere mantle (SCLM), measured by seismic velocity, resistivity, or compositional heterogeneities. Within the crust, these gradients may be manifest by (a) terrane boundaries or marginal orogenic belts, (b) incipient continental rifts, (c) extensions of oceanic fracture zones (FZ) or associated accommodation zones within continents, or (d) major dyke swarms. On a regional scale, the distribution of kimberlites is typically clustered along these trans-lithospheric structural corridors (through-going fundamental "flaws" within the continental architecture); many have been repeatedly reactivated over time.

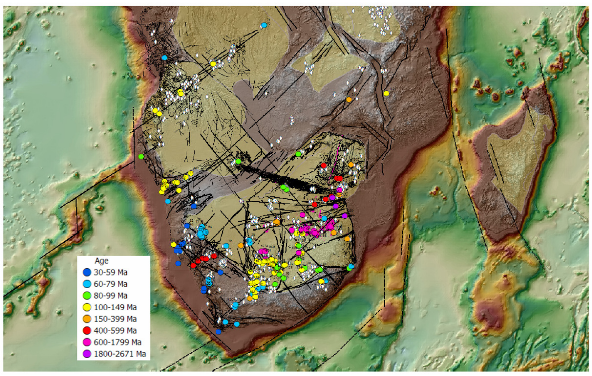


Fig. 3 Distribution of kimberlites in Southern Africa, kimberlite age data, and structural elements, mapped from geological, geophysical, remotely sensed and elevation data

In Southern Africa, a strong association is noted between Mesozoic kimberlites and NE or NW trending structures (e.g., Jelsma et al., 2004). Similar lithosphere trends are observed as anisotropies associated with the cratonic keel (James et al., 2001), craton edges and marginal orogenic belts, the Karoo event, the East Africa Rift, as well as the extension of oceanic FZs into the African continent (Fig. 3, cf. Dirks et al., 2003). Both are associated with Gondwana break-up (see marked fault offsets along the continent margins of Africa, e.g. in Somalia-Kenya, Angola-Namibia).

On a local scale, a key feature is a preferred common long axis of kimberlite pipes or orientation of kimberlite dykes amongst coeval kimberlites (Fig.4). This is observed within a cluster or across several clusters within a continental domain and implies a regional tectonic control on emplacement.

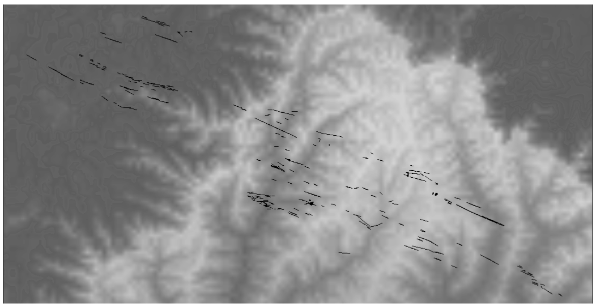
Fig. 4 Lesotho kimberlite dykes (width map 100 km), 90 Ma

**Bottom-up or top-down?**

The Jurassic-Cretaceous kimberlites in Southern Africa are clustered along sets of parallel lineaments widely distributed across a large part of the subcontinent, with the younger groups found closer towards the continent margins (Fig. 3). Repeated magmatism is seen within a number of clusters. Parallelism of same-age kimberlite "tracks" and repeated magmatism at the same sites suggests intrusion along structural discontinuities as a result of plate tectonic processes (Anderson 2001; Vaughan and Scarrow, 2003) rather than an association with deep-seated plumes and hotspot tracks. Systematic younging of kimberlites between 70 Ma (E) and 46 Ma (W) in the western part of South Africa and in Namibia may be attributed to stress propagation.

| Kimberlites | Events | Plate motion vector | Offshore sediments | Onshore sediments | Hotspot manifestation |
|---|---|---|---|---|---|
| *"sensu lato"* | | *cusps* | *unconformities* | *unconformities* | *thermal insulation* |
| ?? | 183 Ma: Karoo, onset spreading Weddell/Somali Basins | | | | 183 Ma: Bouvet (Karoo-Ferrar) |
| 148-141 Ma | 145 Ma: W-E Gondwana separate | 150-142 Ma: AFR-EURAS | | 142 Ma: major folding event | |
| 135-130 Ma | 133 Ma: Etendeke-Parana | 135-133 Ma: AFR-ANT | | | 132 Ma: Tristan, Shona, Kerguelen |
| 127-114 Ma | 133-120 Ma: progressive opening of South Atlantic | 130-125 Ma: AFR-ANT | 127-124 Ma: 5Atl | | |
| | 120 Ma: AFR-SAM and IND-ANT separate | 121 Ma: AFR-EURAS | 120-118 Ma: 6 Atl | 120 Ma: folding event | |
| | 118 Ma: Lower Cretaceous Rift System (C-AFR) | | | | |
| ?? | | | 112 Ma: 13Atl | | |
| 103-101 Ma | | | | 101 Ma: folding event | |
| 95-83 Ma | | | 94-91 Ma: 15Atl | | |
| | 85 Ma: IND-MAD separate | 84 Ma: AFR-EURAS | 86-84 Ma: 16Atl | 84 Ma: major folding event | 85 Ma: Marion, St Helena, 90East, Comores, Reunion |
| 76-70 Ma | 72 Ma: IND-SEY separate | | 74-67 Ma: 21-22Atl | | |
| 65-59 Ma | | 65 Ma: AFR-EURAS | | 66 Ma: major folding event | |
| 56-50 Ma | | 55 Ma: AFR-EURAS | 54-43 Ma | | |
| ?? | | 37 Ma: AFR-EURAS | 40-37 Ma | 37 Ma: folding event | |
| 32-31 Ma | | | | | |
| Table 2 - age data | Jelsma et al., 2004 | Fairhead and Wilson 2004, Eagles and König 2008 | McMillan and Dale 2002 | Fairhead and Wilson 2004 | www.mantleplumes.com |

Fig. 5 Time-event chart for Southern Africa

Fig. 5 compares the timing of magmatism with major events affecting Gondwana. Kimberlite emplacement age windows coincide with: (i) cusps and jogs in the relative plate motion paths of continents (AFR-EURAS, AFR-ANT), based on a fit of seafloor magnetic anomaly isochrons with oceanic FZ traces or on the construction of apparent polar wander paths from palaeomagnetic data; (ii) unconformities in the offshore and onshore stratigraphic record; (c) hotspot family manifestation. Hargraves and Onstott (1980) already noted the synchronicity of kimberlite ages and changes in Apparent Polar Wander curves. In Hargraves words, "these relationships suggest that the emplacement of kimberlites may coincide with episodes of changes in the direction of plate motions."

Kimberlite age data for "Laurasia" and West Gondwana are shown in Fig. 6. Members within each of these supercontinents (e.g. Southern Africa and South America in West Gondwana) show similar age peaks, reflecting a common history, but different peaks are visible when members across the two supercontinents are compared. For instance, the 370 Ma reconstruction shows continent break-up and associated magmatism affecting Siberia, and continent stability and lack of magmatism in Southern Africa and South America. In North America Jurassic-Cretaceous kimberlite magmatism begins following the opening of the Central Atlantic and CAMP magmatism at 201 Ma. In West Gondwana, magmatism begins following the onset of spreading in the Weddell Sea and Somali Basin at 155 Ma. At 124 Ma, seafloor spreading in the South Atlantic causes rifting of Africa and South America and is accompanied by a major peak in kimberlite magmatism. The subsequent peak at 85 Ma is marked by concomitant magmatism in Southern Africa and South America, after continental break-up, and heralds major plate reorganization (Fig. 5).

The temporal association between the main pulses of kimberlite magmatism and hotspots (starting at 183 Ma, 130 Ma, and 85 Ma) and associated Large Igneous Province (LIP) magmatism is also significant. Sears (2001) proposed that the stalled Gondwana supercontinent "drove its own break-up by insulating the underlying mantle, causing thermal expansion, uplift, fracturing and associated LIP magmatism".

The trigger for kimberlite magmatism appears to be related to tectonic change - stress change induced within the continental plate because of supercontinent fragmentation (or late orogenic collapse, 520 Ma), and changes in the direction and velocity of plate motion (e.g. Marsh, 1973; Jelsma et al., 2004; Moore et al., 2008). Unconformities in the stratigraphic record in onshore and offshore basins document this episodic tectonic instability (Fig. 5; cf. Jelsma and Smith, 2004; Moore et al., 2008). Strain is accommodated on discontinuities within the lithosphere causing localized decompression melting near the base of the SCLM (Vaughan and Scarrow, 2003). In contrast, periods devoid of kimberlite magmatism correspond to times of supercontinent stability (a sluggish Gondwana at 500-250 Ma), or smooth plate motion paths.

Variable endowment across continental regions may be related to the transient chemical composition and physical state of a potential kimberlite source area, plus a required minimum size of continents to be able to cause effective insulation of the underlying mantle, plus the presence and orientation of anisotropies within continents to be exploited as transfer faults and to be able to allow effective stress propagation within the continents, plus tectonic change.

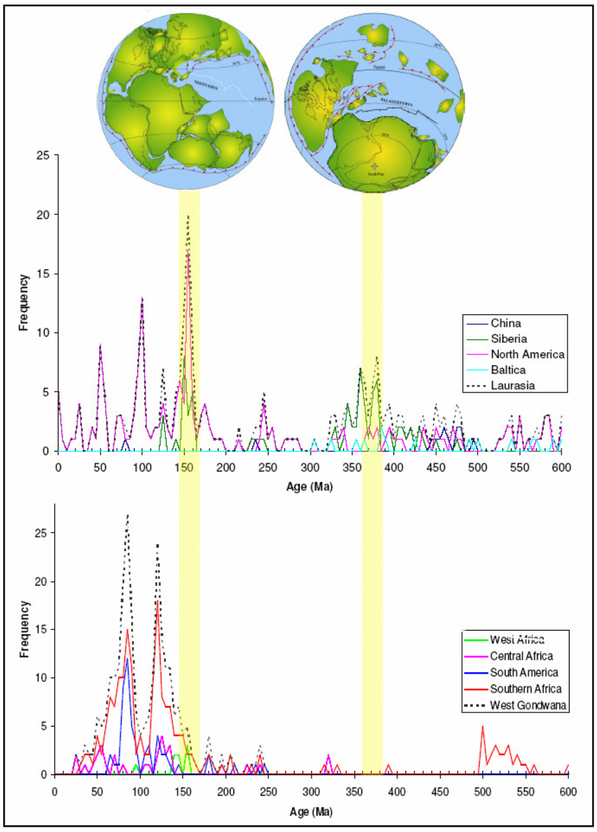


Fig 6 Kimberlite age data for "Laurasia" (top) and West Gondwana (bottom) with continent reconstructions at 370 Ma and 170 Ma (Torsvik, pers. comm., 2003)


## Acknowledgements

De Beers is thanked for permission to present this work and D Apter, B Wyatt, C Smith, C Hatton, E Barton, P Dirks, and M de Wit for valuable discussions.


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| Occurrence | XLong | YLat | RockType | Age | Reference |
|---|---|---|---|---|---|
| Schwarzeberg | 15.4000 | -27.2000 | | 30 | Spriggs, 1988 (4 results) |
| Kundelungu (Kambeli-Msipe | 27.9750 | -10.4917 | Kimberlite | 32 | Batumike et al., 2007 |
| Kaukausib | 15.5650 | -26.9010 | Carbonatite | 49 | Verwoerd et al., 1993 |
| Keishohe | 15.9000 | -26.5920 | Carbonatite | 49 | Verwoerd et al., 1993 |
| Dicker Willem | 16.0167 | -26.4666 | Carbonatite | 50 | Reid et al., 1990 |
| Rehoboth | 17.0460 | -23.0750 | | 52 | Marsh, pers. comm., 2002 |
| Zaris-1 | 16.4058 | -24.9058 | Kimberlite | 52 | Hoosen et al., 2000 |
| Brakfontein (Kap-Kap) | 18.4269 | -30.2192 | Melnoite | 54 | Davis, 1977 |
| Klinghardt | 15.7230 | -27.2380 | Phonolite | 54 | Marsh, pers. comm., 2002 |
| Chameis Bay | 15.5600 | -28.3800 | Mellite | 55 | reported in Moore et al., 2008 |
| Biesjesfontein-1 | 17.9658 | -30.9842 | Melnoite | 56 | Moore and Verwoerd, 1985 |
| Dikdoorn | 18.0047 | -30.7178 | Melnoite | 56 | Marsh, pers. comm., 2002 |
| Alphards Bank | 19.3400 | -34.7700 | Trachyte | 58 | Dingle and Gentle, 1972 |
| Uitkoms-4 | 16.4111 | -24.8694 | Kimberlite | 59 | from Moore et al., 2008 |
| Spioenkop | 19.5069 | -29.2042 | Melnoite | 59 | Moore and Verwoerd, 1985 |
| Platbakkies | 18.4808 | -30.2800 | Melnoite | 62 | Haggerty et al., 1983 |
| Spiegel River | 21.0647 | -34.0378 | Melnoite | 63 | Duncan et al., 1978 |
| Melkfontein | 29.3578 | -30.0061 | Melnoite | 63 | Davis, 1977 |
| Robertson | 19.9931 | -33.8783 | Melnoite | 64 | Duncan et al., 1978 |
| Mukorob-1 | 18.1622 | -25.4861 | Kimberlite | 64 | Davies et al., 1991 |
| Rietkuil-07 | 17.6019 | -25.6178 | Kimberlite | 64 | Davies et al., 2001 |
| Bokputs Group | 18.4628 | -30.1872 | Melnoite | 65 | Davis, 1978 (3 results) |
| Riembreek | 18.4247 | -30.1194 | Melnoite | 69 | Davis, 1977 (2 results) |
| Mbujimayi-1 | 23.6076 | -6.1671 | Kimberlite | 70 | Kerschhofer et al., 2000 |
| Lushof | 23.0164 | -30.7983 | Kimberlite | 71 | Davis, 1977; Davis, 1978 (2 results) |
| Anis Kuibub | 17.8147 | -24.9806 | Kimberlite | 71 | Davies et al., 2001 |
| Berseba Reserve-6 | 17.5725 | -25.7192 | Kimberlite | 72 | Davies et al., 1991 |
| Gibeon Reserve-2 | 17.5678 | -25.7200 | Kimberlite | 72 | Davies et al., 2001 |
| Rietfontein | 20.0383 | -26.7456 | Kimberlite | 72 | Davis, 1977 (2 results) |
| Berseba Reserve-10 | 17.5364 | -25.6744 | Kimberlite | 72 | Spriggs, 1988 |
| Deutsche Erde-1 | 17.7403 | -25.4811 | Kimberlite | 72 | Davies et al., 1991 |
| Hanaus | 17.7089 | -25.2392 | Kimberlite | 72 | Davies et al., 1991 |
| Saltpetrekop | 20.8428 | -32.4731 | Melnoite | 73 | Duncan et al., 1978 (2 results) |
| Gibeon Reserve-3 | 17.8011 | -24.9931 | Kimberlite | 73 | Spriggs, 1988 |
| Gross Brukkaros | 17.7847 | -25.8683 | Carbonatite | 74 | Davies et al., 2001 |
| Sutherland Commonage | 20.9364 | -32.2447 | Melnoite | 74 | Duncan et al., 1978 (2 results) |
| X154 | 29.2399 | -24.2327 | Kimberlite | 74 | Skinner et al., 1992 |
| Hartebeestfontein | 22.5600 | -31.2650 | Kimberlite | 74 | Smith et al., 1994 |
| Britstown Group | 23.5006 | -30.5900 | Kimberlite | 74 | Smith et al., 1994 |
| Blue Hills | 17.7964 | -25.9310 | Pegmatite | 75 | Phillips et al. 2000 |
| Hardie | 20.9853 | -32.2894 | Melnoite | 76 | Moore and Verwoerd, 1985 |
| Swakopmund | 14.6200 | -22.6400 | Syenite | 76 | Whitehead et al., 2002 |
| Swartheuwel | 18.4319 | -29.8611 | Melnoite | 77 | Moore and Verwoerd, 1985 |
| Molopo M1 | 22.1750 | -26.2042 | Kimberlite | 78 | Daniels et al., 1994 |
| Erasmushope | 25.1550 | -29.2261 | Kimberlite | 79 | reported in Moore et al., 2008 |
| McKenzies Post | 22.2806 | -26.4683 | Kimberlite | 80 | Davis, 1977 |
| Tembabi Ranch | 31.7478 | -28.6339 | Melnoite | 80 | Colgan et al., 1989 |
| Zenza do Itombo | 14.3020 | -9.2050 | Phonolite | 80 | reported in Allsopp and Hargraves, 1985 |
| Emtilombo | 31.5417 | -28.8500 | Mellite | 81 | Allsopp et al., 1989 |
| Klein Arendskraal | 24.6186 | -30.3317 | Kimberlite | 81 | Smith, pers. comm. |
| Beyersfontein | 22.5394 | -31.0342 | Kimberlite | 82 | reported in Moore et al., 2008 |
| Nxau-Nxau | 21.2047 | -18.9112 | Kimberlite | 83 | Tsodilo Press Release, 7 Jan 2008 |
| Bultfontein-1 | 24.7916 | -28.7693 | Kimberlite | 84 | Kramers et al., 1983 |
| Letlhakane DK1 | 25.6897 | -21.5194 | Kimberlite | 84 | Evans, 1988 |
| Kaalvallei | 26.8239 | -28.0294 | Kimberlite | 85 | reported in Moore et al., 2008 |
| Kimberley | 24.7525 | -28.7406 | Vein | 85 | Kinny and Dawson, 1992 |
| Jagersfontein | 25.4190 | -29.7623 | Kimberlite | 86 | Smith et al., 1985 |
| Benfontein | 24.8431 | -28.8139 | Kimberlite | 86 | Batumike et al., 2007 |
| Kamfersdam | 24.7206 | -28.6892 | Kimberlite | 87 | Davis, 1977 |
| Agate Mountain, Camp Hill | 12.0833 | -18.4500 | Carbonatite | 87 | Holtar and Forsberg, 2000 |
| Saaiplaas | 26.8528 | -28.0294 | Kimberlite | 87 | Allan, 1988 |
| Mothae | 28.8270 | -28.9660 | Kimberlite | 87 | Davis, 1977 |
| De Beers | 24.7764 | -28.7389 | Kimberlite | 87 | Batumike et al., 2007 |
| Dutoitspan | 24.8036 | -28.7561 | Kimberlite | 88 | Allsopp and Barrett, 1975 |
| Monastery | 27.4222 | -28.8111 | Kimberlite | 89 | Batumike et al., 2007 |
| Wesselton | 24.8298 | -28.7697 | Kimberlite | 89 | Batumike et al., 2007 |
| Kao | 28.6400 | -29.0240 | Kimberlite | 89 | Kramers and Smith, 1983 |
| Katete | 26.8108 | -18.2194 | Carbonatite | 89 | Lee, 1973 |
| Belgravia | 24.7750 | -28.7444 | Kimberlite | 90 | Raber and Haggerty, 1979 |
| De Beers Peridotite Dyke | 24.7897 | -28.7406 | Parakimberlite | 90 | Raber and Haggerty, 1979 |
| Leicester | 24.6528 | -28.3708 | Kimberlite | 90 | Griffin et al., 2000 |
| Taylors Kopje | 24.7269 | -28.7397 | Kimberlite | 90 | Raber and Haggerty, 1979 |
| Koffiefontein | 24.9925 | -29.4168 | Kimberlite | 90 | Davis, 1977 |
| Palmietfontein | 26.9558 | -25.3058 | Kimberlite | 92 | Skinner, 1989 |
| Orapa AK1 | 25.3700 | -21.3078 | Kimberlite | 93 | Davis, 1977 |
| Letseng-la-terae | 28.8670 | -29.0060 | Kimberlite | 95 | Allsopp et al., 1989 |
| Rietfontein | 26.8361 | -26.7417 | Kimberlite | 95 | Smith et al., 1985 |
| Uintjiesberg | 22.5392 | -30.8183 | Kimberlite | 101 | Smith et al., 1985 |
| Pampoenpoort | 22.7156 | -31.1017 | Kimberlite | 103 | Smith et al., 1994 |
| Cyrus Group | 24.6542 | -28.2333 | Kimberlite | 110 | Skinner, 1989 |
| Longlands (Last Hope) | 24.3869 | -28.4267 | Kimberlite | 112 | Davis, 1978 |
| Frank Smith | 24.5151 | -28.2457 | Kimberlite | 114 | Smith et al., 1985 |
| Newlands | 24.3961 | -28.3506 | Kimberlite | 114 | Smith et al., 1985 |
| Muanga | 18.8300 | -9.7600 | Kimberlite | 115 | P Davies, pers. comm. 2008 |
| Sweetput-Soutput | 23.5042 | -30.2506 | Kimberlite | 116 | Smith et al., 1994 |
| Welgevonden | 22.9114 | -30.0900 | Kimberlite | 116 | Smith et al., 1994 |
| Goedgevonden | 26.7556 | -26.6736 | Kimberlite | 117 | Allsopp and Kramers, 1977 |
| Kalkput | 22.7639 | -30.4478 | Kimberlite | 117 | Smith et al., 1994 |
| Mayeng Sill | 24.6361 | -28.1500 | Kimberlite | 117 | reported in Apter et al., 1984 |
| Middlewater | 22.7544 | -30.1694 | Kimberlite | 118 | Smith et al., 1994 |
| Witberg Dyke | 22.3461 | -29.1819 | Kimberlite | 118 | Smith et al., 1994 |
| Sover-Doringkloof | 24.5036 | -28.2081 | Kimberlite | 118 | Gurney et al., 1973 |
| Sanddrift Extension | 22.8906 | -29.5147 | Kimberlite | 118 | Allsopp et al., 1989 |
| X045 | 23.9167 | -28.1611 | Kimberlite | 118 | Phillips et al., 1999 |
| X165 | 23.6442 | -28.1817 | Kimberlite | 118 | Phillips et al., 1999 |
| Finsch | 23.4450 | -28.3850 | Kimberlite | 118 | Smith et al., 1985 |
| Aarons Prospect | 24.5859 | -28.6465 | Kimberlite | 119 | Phillips et al., 1999 |
| Postmas-2 | 23.1114 | -28.2731 | Kimberlite | 119 | Phillips et al., 1999 |
| Jonkerwater | 22.6361 | -30.1778 | Kimberlite | 120 | Smith et al., 1994 |
| Poortjie | 24.2908 | -28.0139 | Kimberlite | 120 | Smith et al., 1985 |
| Doros | 14.2900 | -20.7600 | Gabbro | 120 | Siedner and Mitchell, 1976 |
| Eendekuil | 20.9364 | -32.2447 | Kimberlite | 120 | Clark, 1987 |
| X127 | 24.3972 | -28.4944 | Kimberlite | 120 | Phillips et al., 1999 |
| Makganyene | 22.9250 | -28.1464 | Kimberlite | 121 | Brown et al., 1989 |
| Bellsbank | 24.4017 | -28.0913 | Kimberlite | 122 | Smith et al., 1985 |
| Otjohorongo | 15.4900 | -20.8700 | Porphyry | 122 | McNeill, 1989 |
| Blaauwbosch | 25.4900 | -28.5579 | Kimberlite | 124 | Smith, 1983 |
| Roberts Victor | 25.5585 | -28.4940 | Kimberlite | 124 | Allsopp and Barrett, 1975 |
| Star | 26.7969 | -28.3094 | Kimberlite | 124 | MacIntyre and Dawson, 1976 |
| Zoet en Zuur | 25.4947 | -28.5225 | Kimberlite | 125 | MacIntyre and Dawson, 1976 |
| Sanddrift | 22.9342 | -29.5064 | Kimberlite | 125 | Smith et al., 1994 |
| New Elands | 25.4958 | -28.5068 | Kimberlite | 126 | Smith et al., 1985 |
| Messum | 14.1900 | -21.4100 | Syenite | 127 | Renne et al., 1996 |
| Okorusu | 16.7600 | -20.0100 | Syenite | 127 | Milner et al., 1995 |
| Markt | 22.3652 | -30.2555 | Kimberlite | 127 | Skinner et al., 1992 |
| Njoio | 13.4340 | -14.1330 | Syenite | 130 | Allsopp and Hargraves, 1985 |
| Kwaggaspan | 15.2500 | -20.5333 | Carbonatite | 130 | Verwoerd, 1993 |
| Brandberg | 14.5060 | -21.1380 | Granite | 130 | Schmitt et al., 2000 |
| Okenyenya | 15.3100 | -20.8500 | Syenite | 130 | Watkins et al., 1994 |
| Tchivira | 13.8100 | -14.4650 | Syenite | 131 | Allsopp and Hargraves, 1985 |
| Voorspoed | 27.0917 | -29.0083 | Kimberlite | 132 | Phillips et al., 1999 |
| Etendeka | 14.1800 | -21.2700 | Quartz latite | 132 | Renne et al., 1996 |
| Erongo | 15.6400 | -21.6100 | Alkali granite | 132 | Wigand et al., 2004 |
| Luderitz alkaline province | 15.1500 | -26.6400 | Alkali basalt | 133 | Allsopp et al., 1984 |
| Nova Lisboa-1 | 15.7728 | -12.3431 | Kimberlite | 133 | Raber, 1978 |
| Lace | 27.1278 | -27.4433 | Kimberlite | 133 | Phillips et al., 1999 |
| Besterskraal_N | 27.0597 | -27.4489 | Kimberlite | 134 | Phillips et al., 1999 |
| Saltpetrepan | 24.5467 | -29.2458 | Kimberlite | 134 | Phillips, 1996 |
| Val do Queve | 15.8333 | -12.5667 | Kimberlite | 134 | Davis, 1977 |
| Cape Cross | 14.0300 | -21.7700 | Syenite | 135 | Milner et al., 1995 |
| Stieniesrus | 26.7006 | -28.3097 | Kimberlite | 136 | Phillips et al., 1999 |
| Paresis | 16.2700 | -20.3800 | Comendite | 137 | Milner et al., 1995 |
| Skietkop | 22.8072 | -31.4992 | Kimberlite | 140 | Smith et al., 1994 |
| Niassa-TX3 | 35.0206 | -12.5580 | Kimberlite | 141 | Key et al. 2006 |
| Impala Platinum Mines | 27.2167 | -25.6167 | Lamproite | 141 | Smith, pers. comm. |
| Melton Wold | 22.7397 | -31.5019 | Kimberlite | 143 | Smith et al., 1994 |
| Swartruggens | 26.6525 | -25.5917 | Kimberlite | 145 | Phillips, 1991 |
| Klipspringer (Marsfontein) | 29.1931 | -24.2639 | Kimberlite | 148 | Westerlund, 2000 |
| Ramatseliso's Gate | 28.9425 | -30.0425 | Kimberlite | 150 | Naeser and McCallum, 1977 |
| Mzongwana | 29.0000 | -30.1111 | Kimberlite | 152 | Smith et al., 1985 |
| Klipfontein-3 | 24.0972 | -28.4041 | Kimberlite | 159 | Smith et al., 1985 |
| Middlepits | 21.4295 | -26.7186 | Kimberlite | 165 | Allsopp et al., 1989 |
| Dullstroom | 30.1067 | -25.5322 | Kimberlite | 171 | Smith et al., 1985 |
| Droogfontein | 22.2697 | -31.6472 | Kimberlite | 174 | Smith et al., 1994 |
| Marangudzi | 30.6079 | -22.0098 | Carbonatite | 178 | Liebold et al., 1969 |
| Clarkton | 29.3578 | -30.0061 | Melnoite | 194 | Davis, 1977 |
| Dokolwayo-2 | 31.3000 | -26.0900 | Kimberlite | 200 | Allsopp and Roddick, 1984; Moore, 1988 |
| Shawa | 31.7039 | -19.1917 | Carbonatite | 208 | Nicolaysen et al., 1962 |
| Jwaneng DK1 | 24.8086 | -24.6478 | Kimberlite | 235 | Kinny et al., 1989 |
| Kapamba-6 | 31.5064 | -13.1164 | Lamproite | 240 | Phillips, 1986 |
| Jwaneng DK2 | 24.7014 | -24.5233 | Kimberlite | 244 | Smith, 1983 |
| Jwaneng DK7 | 24.7700 | -24.5483 | Kimberlite | 250 | Kinny et al., 1989 |
| Beit Bridge-1 | 29.8808 | -22.1700 | Kimberlite | 430 | Kramers and Smith, 1983 |
| Garub | 18.2000 | -27.9500 | Carbonatite | 491 | Allsopp et al., 1979 |
| Grunau_SW16 | 18.2000 | -27.9500 | Melnoite | 500 | Kröner, 1973 |
| Colossus | 29.1750 | -19.2876 | Kimberlite | 502 | Allsopp et al., 1985 |
| The Oaks | 28.3139 | -22.9528 | Kimberlite | 504 | reported in Jelsma et al. 2004 |
| Marnitz | 28.3200 | -22.9600 | Kimberlite | 507 | Phillips et al., 1999 |
| Uitkomst-5 | 18.9175 | -27.7089 | Melnoite | 514 | Spriggs, 1988 |
| Venetia-4 | 29.3293 | -22.4342 | Kimberlite | 519 | Phillips et al., 1999 |
| Marinkas Quellen | 17.4300 | -28.1600 | Carbonatite | 520 | Verwoerd, 1993 |
| Uitkomst-4 | 18.9106 | -27.7161 | Melnoite | 524 | Spriggs, 1988 |
| Kuboos-Bremen | 16.9900 | -28.5600 | Carbonatite | 529 | Smithies and Marsh, 1996 |
| Sese-1 | 30.6705 | -20.5006 | Kimberlite | 538 | Smith et al., 2004 |
| Bremen | 17.8600 | -27.8600 | Carbonatite | 550 | Verwoerd, 1993 |
| Glenover | 27.1700 | -23.8800 | Carbonatite | 1000 | Verwoerd, 1967 |
| Mwenezi | 30.6500 | -21.5800 | Kimberlite | 1100 | reported in Jelsma et al. 2004 |
| National | 28.5247 | -25.7583 | Kimberlite | 1155 | Allsopp and Kramers, 1977 |
| Goudini | 26.2000 | -25.2833 | Carbonatite | 1190 | Harmer, 1992 |
| Pilanesberg | 27.0689 | -25.2550 | Foyaite | 1195 | Harmer, 1992 |
| Premier | 28.5153 | -25.6736 | Kimberlite | 1202 | Kramers and Smith, 1983 |
| Derdepoort | 27.5200 | -25.1200 | Carbonatite | 1269 | Harmer, 1992 |
| Kruidfontein | 27.5200 | -25.1200 | Carbonatite | 1269 | Harmer, 1992 |
| Tweerivier | 27.5200 | -25.2700 | Carbonatite | 1269 | Harmer, 1992 |
| Buffelsdrift | 28.2972 | -25.5639 | Carbonatite | 1332 | Harmer, 1992 |
| Franspoort | 28.3964 | -25.6900 | Syenite | 1332 | Harmer, 1992 |
| Leeufontein | 28.3636 | -25.6481 | Carbonatite | 1332 | Harmer, 1992 |
| Leeuwkraal | 28.2542 | -25.3739 | Phonolite | 1334 | Harmer, 1992 |
| Spitskop | 29.8200 | -24.9600 | Syenite | 1341 | Harmer, 1992 |
| Roodeplaats | 28.3489 | -25.5561 | Carbonatite | 1342 | Brandt et al., 1994 |
| Stukpan | 20.9400 | -28.8300 | Carbonatite | 1354 | Verwoerd et al., 1993 |
| Klipdrift | 28.2672 | -25.4358 | Syenite | 1464 | Harmer, 1992 |
| Riries | 23.7458 | -27.9572 | Kimberlite | 1605 | reported in Shee et al., 1989 |
| Zero Satellite | 23.7219 | -27.2817 | Kimberlite | 1635 | Shee et al. 1989 |
| Elston | 23.6183 | -27.2147 | Kimberlite | 1674 | Shee et al. 1989 |
| Bathlaros | 23.3175 | -27.2942 | Kimberlite | 1695 | Shee et al. 1989 |
| Phalaborwa | 31.1300 | -23.9900 | Carbonatite | 2061 | Reischmann, 1995 |
| Schiel | 30.2800 | -23.1000 | Syenite | 2095 | Walraven et al., 1992 |
| Limpopo Lamproyphres | 30.0000 | -22.3000 | Lamproite | 2671 | Watkeys and Armstrong, 1995 |

Table 1 Age data for kimberlites in Southern Africa