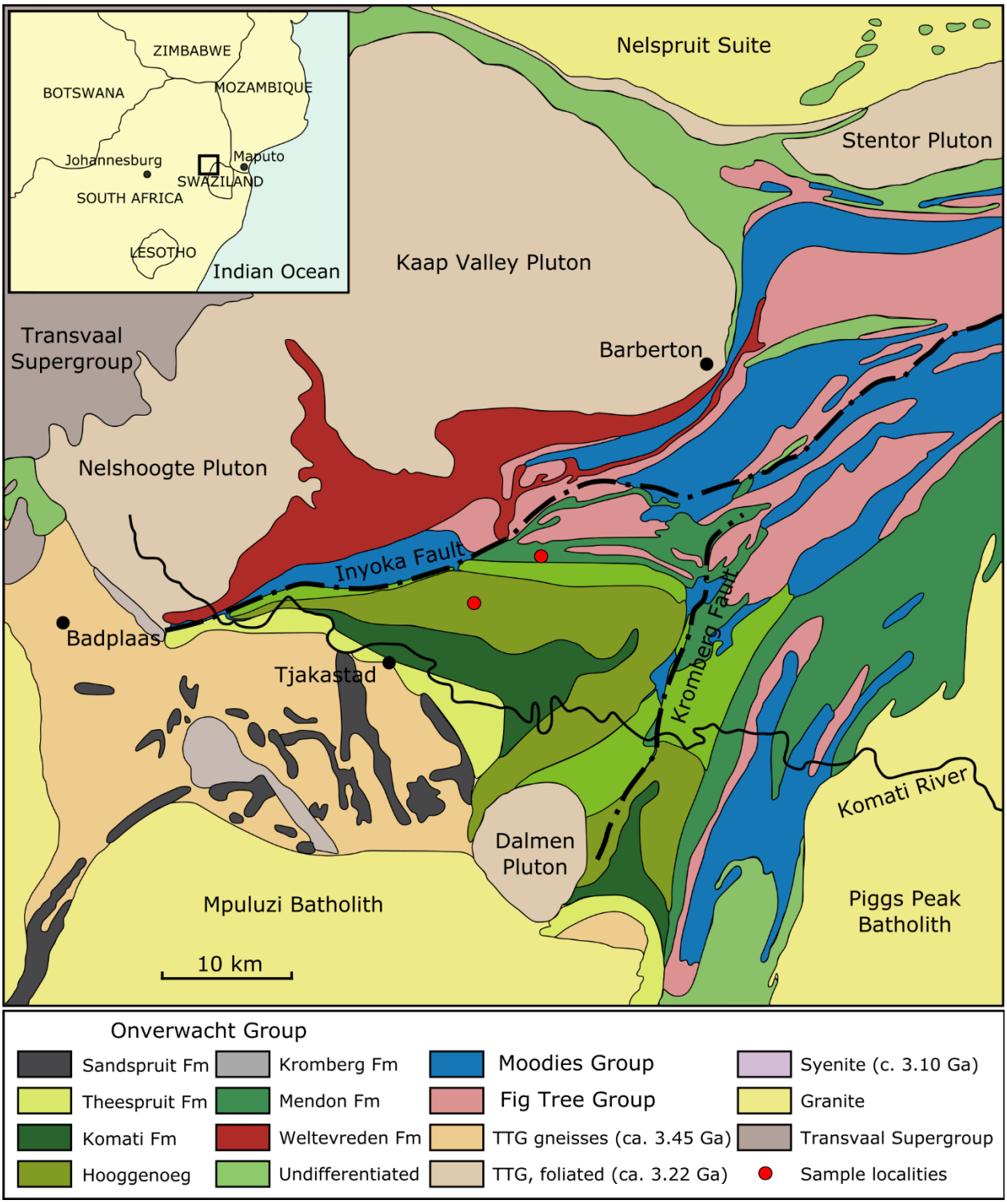
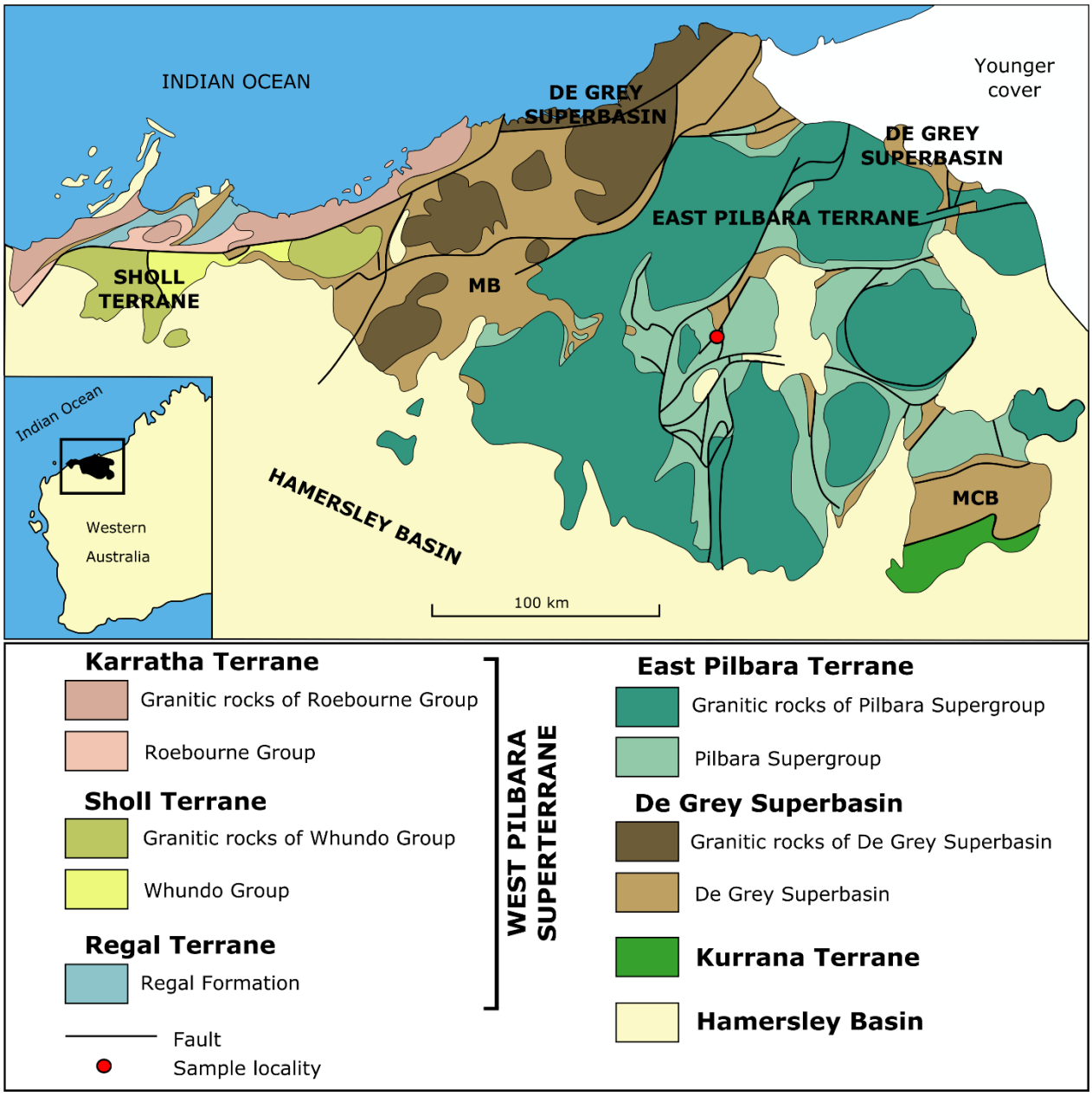
SUPPLEMENTAL FIGURE 1. General geological map of the southwestern part of the Barberton Greenstone Belt (BGB), South Africa and Swaziland (after Blake et al. 2010). Red dots give the sampling localities.



SUPPLEMENTAL FIGURE 2. General geological map of the northern Pilbara Craton (after Van Kranendonk et al. 2007), showing the East Pilbara Terrane, West Pilbara Superterrane, Kurrana Terrane, and De Grey Supergroup. Red dot gives the sampling locality of AL04-P10. MB – Mallina Basin, MCB – Mosquito Creek Basin.



SUPPLEMENTAL TABLE S1. Comparison of the best fitting angles and planes of different Ca-, Y- and REE-phosphate phases. a) The observed angles of the diffraction pattern (FFT) of the solid inclusion in sample H12 were 33.6 and 63.0°. Notably, only the calculated angles of monoclinic (Ca-Y)-phosphate fit within 1°, thereby confirming the presence of the phase. b) The observed angles of the diffraction patterns (FFT) of the solid inclusion in sample AL04-P10 were 30 and 57°. The best agreement between observed and calculated values corresponds to the monoclinic (Ca-Y)-phosphate phase.

d_{hkl} observed	Xenotime tetragonal Ni et al., (1995)	Monazite monoclinic Ni et al., (1995) 6	$CaYP_7O_{20}$ monoclinic Hamady and Jouini (1994)
	a_0 = 0.68951 nm b_0 = 0.68943 nm c_0 = 0.60276 nm	a_0 = 0.67902 nm b_0 = 0.70203 nm c_0 = 0.64674 nm	a_0 = 2.46661 nm b_0 = 0.68503 nm c_0 = 1.06986 nm
angles between adjacent planes			
a) sample H12			
33.6°	33.75° $(112\|121)$	39.39° $(200\|101)$	33.93° $(103\|2\bar{1}2)$
63.0°	66.70° $(112\|0\bar{1}1)$	53.48° $(200\|10\bar{1})$	62.90° $(103\|\bar{1}11)$
b) sample AL04-P10			
30.0°	37.20° $(121\|020)$	39.39° $(200\|101)$	29.51° $(121\|\bar{6}22)$
57.0°	52.78° $(121\|101)$	53.48° $(200\|10\bar{1})$	56.36° $(121\|202)$

SUPPLEMENTAL TABLE S2. Comparison of the best fitting angles, planes and the *d*-spacing values of xenotime, monazite, $Ca_3Y(PO_4)_3$ and $CaYP_7O_{22}$ phases. The observed angles of the diffraction pattern of the solid inclusion in sample AL03-29B were 39.9 and 49.8°. The best agreement between observed and calculated values corresponds to the cubic (Ca-Y)-phosphate phase. Moreover, the measured *d*-spacing values of the diffraction patterns of cubic Ca-Y phosphate fit better than those of xenotime or monazite.

d_{hkl} observed	$Ca_3Y(PO_4)_3$ cubic Fukuda et al., (2006)	Xenotime tetragonal Ni et al., (1995)	Monazite monoclinic Ni et al., (1995)	$CaYP_7O_{20}$ monoclinic Hamady and Jouini (1994)
	a_0 = 0.9833 nm	a_0 = 0.68951 nm b_0 = 0.68943 nm c_0 = 0.60276 nm	a_0 = 0.67902 nm b_0 = 0.70203 nm c_0 = 0.64674 nm	a_0 = 2.46661 nm b_0 = 0.68503 nm c_0 = 1.06986 nm
d-spacing				
0.402 nm	0.4014 nm ($\bar{2}\bar{1}1$)	0.4530 nm (101)	0.5100 nm ($10\bar{1}$)	
0.340 nm	0.3477 nm (022)	0.3441 nm (020)	0.3990 nm (200)	
0.261 nm	0.2630 nm ($\bar{2}13$)	0.2740 nm (121)	0.3078 nm (101)	
angles between adjacent planes				
39.9°	40.89° ($\bar{2}13$|011)	37.20° (121|020)	39.39° (200|101)Èe	46.43° ($\bar{2}\bar{1}0$|$1\bar{1}0$)
49.8°	49.11° ($\bar{2}13$|$\bar{2}\bar{1}1$)	52.78° (121|101)	53.48° (200|$10\bar{1}$)	59.80° ($\bar{2}\bar{1}0$|$\bar{3}00$)

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