

Figure DR1. Geological map of the study area with sampling localities (modified from Cifelli et al., 2013).

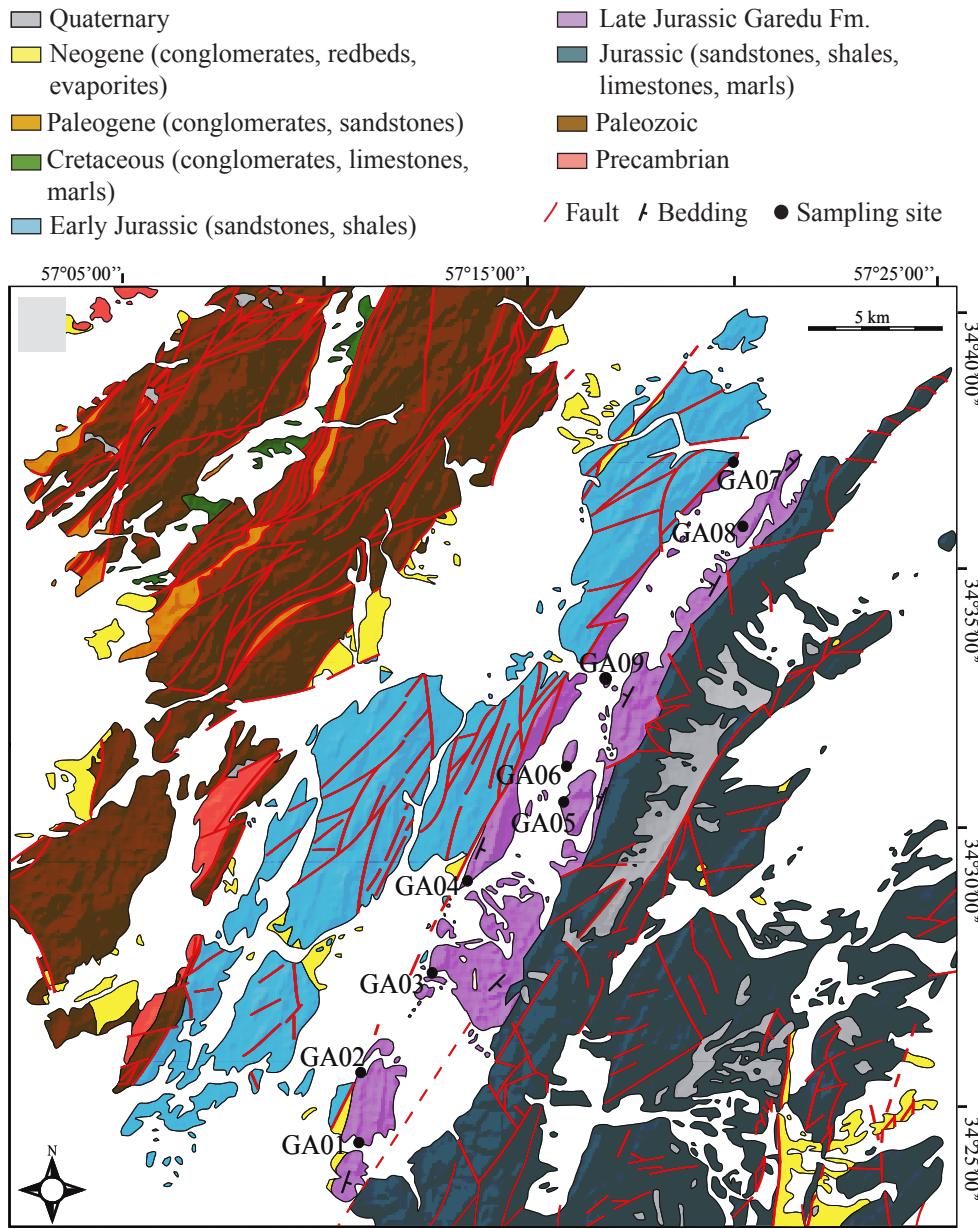


Figure DR2. Vector end-point demagnetization diagrams of representative samples from the Garedu Formation. Closed (open) circles are the projections onto the horizontal (vertical) plane in in-situ (a-h) and tilt-corrected (i-l) coordinates.

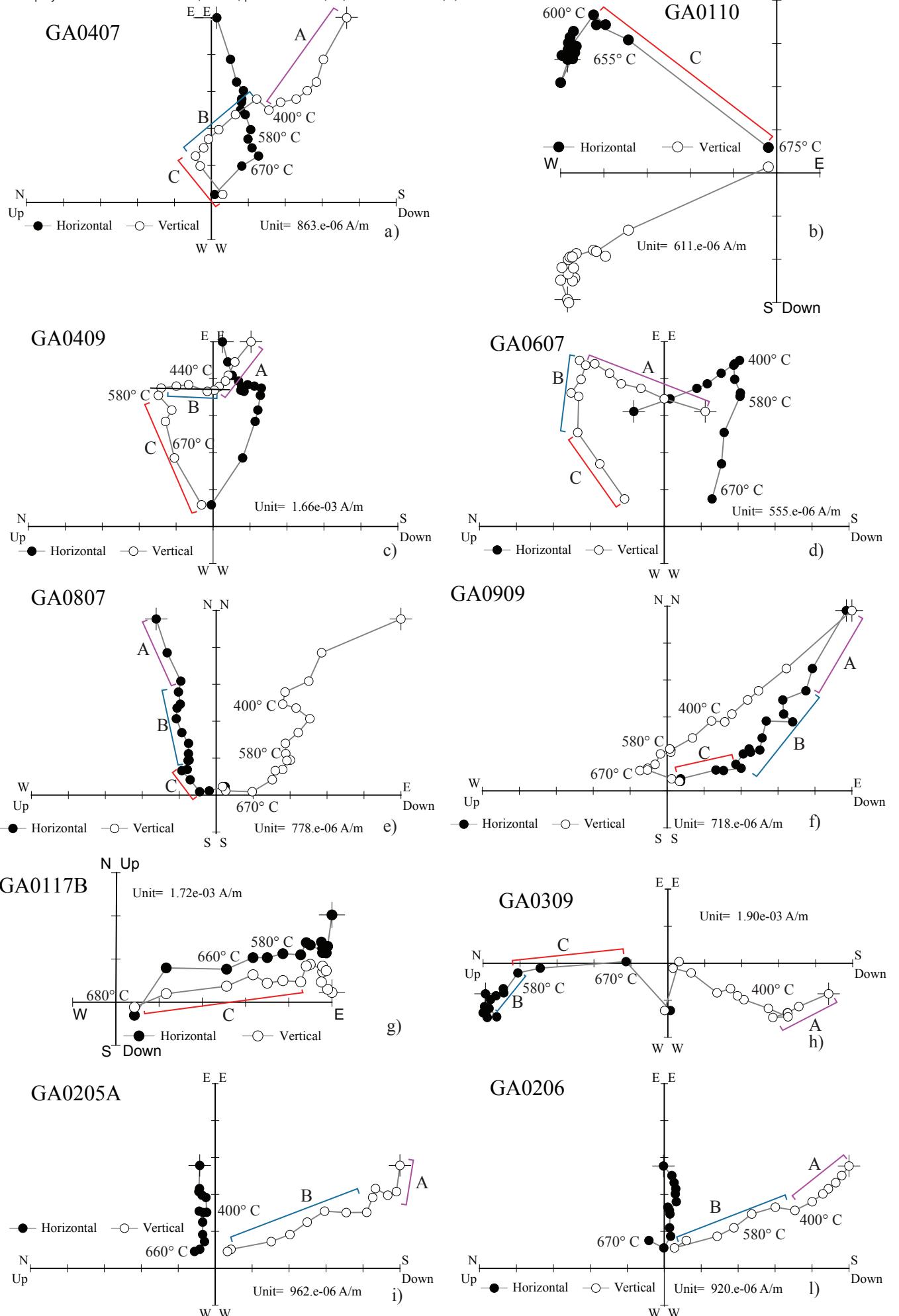


Table DR1. Paleomagnetic data from the Garedu Formation.

Site	Location		Fm	Lithology	n/N	S0	C	BTC				ATC				
	Lat (°N)	Lon(°E)						D°	I°	K	α ₉₅	D°	I°	K	α ₉₅	
This Study:																
GA01	34°23'51.6"	57°10'59.1"	GA	siltstones	9/19	116,56	B	320.8	41.9	53.8	7.1	67.7	70.6	59.3	6.8	
					6/19		Ch	103.5	28.2	11.4	20.7	286.1	22.9	8.4	24.6	
GA02	34°25'13.6"	57°10'54.7"	GA	siltstones	13/13	112,75	B	293.9	28.1	31.7	7.5	104.8	76.8	31.7	7.5	
					5/13		Ch	325.0	-46.4	9.6	26.0	315.9	21.8	9.6	26.0	
GA03	34°27'11.9"	57°12'40.5"	GA	siltstones	9/9	119,52	B	305.1	28.2	39.8	8.3	314.1	78.9	39.8	8.3	
					9/9		Ch	338.0	-11.7	11.6	15.7	329.1	28.4	11.6	15.7	
GA04	34°28'57.2"	57°13'43.4"	GA	siltstones	10/10	208,77	B	311.8	38.7	22.8	10.3	60.1	66.4	22.8	10.3	
					7/10		Ch	119.7	38.7	29.0	11.4	118.3	-25.5	29.0	11.4	
GA05	34°30'28.2"	57°15'47.3"	GA	siltstones	3/7	312,46	B	331.2	37.8	36.7	20.6	330.6	-6.4	36.6	20.7	
					4/7		Ch	110.8	-67.4	10.5	29.7	126.7	-22.6	10.5	29.7	
GA06	34°31'10.3"	57°15'54.9"	GA	siltstones	4/9	293,25	B	312.4	49.6	26.6	18.2	306.8	25.5	26.6	18.2	
					6/9		Ch	102.7	-41.5	85.9	7.3	105.0	-16.8	85.9	7.3	
GA07	34°37'06.9"	57°19'56.4"	GA	siltstones	9/10	variable	B	340.5	33.9	29.9	9.6	45.4	51.7	29.7	9.6	
GA08	34°36'00.1"	57°20'16.7"	GA	siltstones	3/12	variable	B	328.5	30.9	70.3	14.8	331.1	-30.8	69.9	14.9	
					9/12		Ch	301.5	66.2	33.9	9.0	312.8	1.2	31.8	9.3	
GA09	34°32'57.9"	57°16'54.1"	GA	siltstones	5/10	variable	B	354.1	62.3	60.1	10.0	14.5	48.0	60.1	10.0	
					7/10		Ch	85.6	4.6	18.1	14.6	81.0	-18.0	19.2	14.1	
Mean (9 sites)							B	321.2	39.7	19.7	11.9	357.5	54.3	2.9	36.5	
(8 sites)							Ch	121.0	38.1	2.8	41.1	296.8	24.5	18.8	13.1	
Soffel et al. (1989):																
107.1A			GA		12		Ch	124.2	-34.4	27.0	13.1	122.7	-9.7	27.0	13.1	
107.1B			GA		2		Ch	307.4	46.1	61.9	6.6	304.2	21.5	61.8	6.6	
107.2A			GA		8		Ch	129.5	-44.3	39.7	8.3	126.0	-19.9	39.8	8.3	
107.3A			GA		5		Ch	109.8	-28.8	22.8	10.3	110.4	-3.9	22.8	10.3	
Overall Mean (8 sites from this study,								Ch	297.3	6.5	3.2	29.3	298.1	18.7	21.4	9.6
4 from Soffel et al., 1989)																

Notes: Abbreviations: Fm—geological formation (GA—Garedu Formation); n/N—total number of stable directions at a site/number of demagnetized samples; S0—bedding attitude (azimuth of the dip and dip values). C—paleomagnetic component designation; D°, I°—site mean declinations and inclinations calculated before tectonic correction (BTC) and after tectonic correction (ATC); K—precision parameter; α₉₅—confident limit (statistical parameters after Fisher, 1953).

Table DR2. Apparent polar wander paths from the literature rotated into Arabian and Eurasian coordinates.

Muttoni et al. (2013) Adria-Africa APWP in Arabian and European coordinates.

(Age) (...)	(A95)	Arabia ¹		Europe ²⁺³	
		(Lat)	(Long)	(Lat)	(Long)
85	3.6	62.0	241.2	75.1	180.3
130	6.3	46.2	269.0	77.0	187.3
145	3.1	38.6	270.7	71.9	200.7
151	4.1	30.8	271.9	60.1	195.5
183	3.2	72.3	283.1	64.2	75.4
201	4.6	63.6	259.2	63.5	103.6
238	7.6	57.0	229.9	49.2	115.9
252	5.8	45.6	250.2	57.8	140.7
280	4.4	36.8	250.4	54.1	154.9

Kent and Irving (2010) North America APWP in Arabian and European coordinates.

(Age) (...)	(A95)	Arabia ²⁺¹		Europe ³	
		(Lat)	(Long)	(Lat)	(Long)
90	3.4	63.3	252.4	80.2	178.1
100	4.4	59.7	259.7	81.8	175.8
110	4.5	57.5	265.1	82.3	164.0
120	2.7	49.5	268.1	78.6	191.7
130	2.4	44.0	270.7	76.4	197.6
140	6.8	36.0	271.3	70.1	209.2
145	9.0	31.8	272.7	66.9	214.5
160	7.5	59.8	270.2	73.7	114.0
170	6.5	59.9	269.9	71.1	112.0
180	5.5	58.4	278.3	74.2	104.5
190	6.7	59.8	279.0	73.5	99.4
200	3.8	66.6	256.2	61.3	98.6
210	2.9	63.0	246.9	58.3	107.1
220	2.3	58.7	238.3	54.0	114.8
230	5.7	56.2	236.9	52.8	118.6

Besse and Courtillot (2003) South Africa APWP in Arabian coordinates⁴.

(Age) (...)	(A95)	(Lat)	(Long)
90	4.9	61.8	260.6
100	7.0	60.5	259.6
110	4.6	52.5	267.3

120	2.7	48.5	268.6
130	2.9	44.4	269.1
140	6.2	40.0	270.8
150	6.2	47.4	268.0
160	5.1	49.6	267.7
170	6.0	55.3	269.4
180	5.4	60.5	269.8
190	4.2	59.2	268.6
200	4.3	57.1	262.4

Torsvik et al. (2012) South Africa APWP in Arabian coordinates⁵.

(Age)	(A95)	(Lat)	(Long)
(...)			
90	2.5	64.6	252.6
100	3.3	61.5	257.6
110	3.3	51.8	268.2
120	2.6	47.0	269.8
130	2.8	42.7	269.1
140	6.0	39.2	269.8
150	6.4	46.7	266.2
160	5.1	49.0	265.4
170	4.6	49.6	263.7
180	3.4	55.6	268.6
190	2.9	60.3	268.0
200	2.8	63.3	257.4
210	2.2	59.4	250.9
220	2.3	53.8	243.9
230	2.5	48.5	242.1
240	3.6	43.3	246.7
250	3.6	39.4	250.3
260	2.6	38.9	251.3
270	2.9	34.6	249.1
280	2.8	29.4	245.6

Notes: (Age) = Central Age window, in Ma; (A95) = radius of 95% confidence circle around the mean paleopole; (Lat), (Long) = latitude and longitude of mean paleopole.

Notes:

¹ Northwest Africa to Arabia (and *vice versa*): rotation parameters of Besse and Courtillot (2002).

² Northwest Africa to North America (and *vice versa*): rotation parameters of Kent and Irving (2010) (from 139.2 Ma to 180–252 Ma) and Torsvik et al. (2008) (from 133.1 Ma to 83.5 Ma).

³ North America to Europe: rotation parameters of Kent and Irving (2010) (from 118 Ma to 252 Ma) and Torsvik et al. (2008) (from 110 Ma to 85 Ma).

⁴ South Africa to Arabia: rotation parameters of Besse and Courtillot (2002).

⁵ South Africa to Arabia: rotation parameters of Torsvik et al. (2012).