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North-South Alignment of Burma's Old Walls

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From the reports of the Archaeological Survey of Burma and readings[1] of aerial photographs made by U Aung Myint, Chief Conservator, Forest Department, Upper Burma, we come to know that quite a number of north-south trending walls of old Burma are not pointing straight to true north, i. e. geographic north. Geographers might know the reason and fortunately Dr Tin Htoo[2], Head of the Geography Department, Arts and Science University, Mandalay, comes to our rescue. According to him, the deviation of magnetic north from true north varied with time and he gives us the following data as collected at two observation points — London (51°30′N) and Paris (48°52′N).

Deviation of Magnetic North from True North Observed at London and Paris[3]

Year	London		Paris	
	To the West	To the East	To the West	To the East
1963	7°			
1940			9°	
1935	11°30′			
1900	17°			
1840			21°30′	
1820			22°	
1800	24°			
1740			16°	
1700	7°			
1680			8°	
1665	No Deviation			
1660			No Deviation	
1640				4°
1580		11°		10°
1540		7°30′		6°

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1) Aung Myint and Khin Maung Myint: "Aerial Photographic Readings of (32) Old Burma Towns," *Union of Burma Journal of Science and Engineering* (Publication in Burmese), III, i, February 1970, pp. 81–117 (38 Illustrations and 1 Map); Aung Myint: *Aerial Photographic Readings of* (19) *Old Burma Towns*, Paper read at the Annual Research Congress held in Rangoon in December 1973, mimeographed and privately circulated; Aung Myint: *Aerial Photographic Readings of* (9) *Old Burma Towns*, written as third part of the series and privately circulated in December 1974; see also Thin Kyi: "The Early Capitals of Burma — A Brief Geographical Appraisal" (with 11 diagrams and 1 map), *New Burma Weekly*, IV, iv, 24 January 1959, pp. 143–8

From the above data kindly furnished by Dr Tin Htoo, we notice that the change of declination of magnetic north is like the swing of a pendulum. From a trend-line where the alignments of the two norths coincide, the magnetic north swings east to the farthest extent of eleven degrees and comes back to the original position in a matter of 160 years and then it continues the swing towards the west to the farthest extent of twenty four degrees and comes back to the original position in a matter of 320 years. Thus one complete cycle of movements is made in the course of 160–320–480 years. We also notice that the deviations of magnetic north are larger at London than at Paris; and we may say that magnetic deviation increases with the distance from the equator. Perhaps we could present a rough idea of how deviation differs with latitudes as follows:

Probable Deviations on North Latitudes at Intervals of 5 Degrees

Latitudes	Farthest Degrees to the West	Farthest Degrees to the East
50°N	23°	10°30′
45°N	22°	10°
40°N	21°	9°30′
35°N	20°	9°
30°N	19°	8°30′
25°N	18°	8°
20°N	17°	7°30′
15°N	16°	7°
10°N	15°	6°30′
5°N	14°	6°
Equators	13°	5°30′

As most of the old places of Burma where there are fortifications or enclosure walls are located within the latitudes 15° and 25° north, deviations to the east would be within 7 and 8 degrees at the farthest and deviations to the west would be within 16 and 18 degrees at the farthest. Anything beyond these would be interpreted as the influence of terrain.

Using the cyclic nature of the changes in the deviation of magnetic north from true north at Paris through years, allow me to project the said cyclic trend into the past and into the future as follows:

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2) Without whose help this paper would have been impossible.

3) References: Holmes, Arthur; 1965: *Principles of Physical Geology.*
Leet, L. D. & Judson, S.; 1965: *Physical Geology.*
Simon & Schuster; 1957: *The Planet Earth.*
Encyclopaedia Americana; 1959: XVIII, p. 129.
Encyclopaedia Britannica; 1973: XI, p. 311.

The Cyclic Trend of Deviations (Conjectural)

Extreme Deviation West	No Deviation	Extreme Deviation East
	A. D. 1980	
A. D. 1820		
	A. D. 1660	
		A. D. 1580
	A. D. 1500	
A. D. 1340		
	A. D. 1180	
		A. D. 1100
	A. D. 1020	
A. D. 860		
	A. D. 700	
		A. D. 620
	A. D. 540	
A. D. 380		
	A. D. 220	
		A. D. 140
	A. D. 60	
100 B. C.		
	260 B. C.	
		340 B. C.
	420 B. C.	
580 B. C.		
	740 B. C.	

From the readings made by U Aung Myint we derived the following lists. They show how some of the existing walls or scars of former walls are not aligned properly with true north. With the help of the projection made above, we might try to fix in approximate dates of when these walls were first constructed and we believe that none of them would go far too wrong.

Old Sites with North-South Trending Walls deviating towards the East

Name of the Site	Degree of Deviation	Approximate Date
Tonbyaw (Tenasserim)	21°	Late 16th. Century
Wagaru (Moulmein)	15°	Late 16th. Century
Zalun (Tenasserim)	6°	Late 16th. Century
Old Kyangin	5°	Early 16th. Century
Kagadit (Thaton)	10°	Early 7th. Century
Makkhaya (Kyaukse)	11°	Early 7th. Century
Theyekhittaya (Prome)	17°	Mid 2nd. Century

Old Sites with North-South Trending Walls deviating towards the West

Name of the Site	Degree of Deviation	Approximate Date
Hmawbi (on the Salween)	13°	Late 14th. Century
Kale	20°	Mid 14th. Century
Lamaing (Moulmein)	17°	Mid 14th. Century

Nandawya (Thazi)	13°	Early	14th.	Century
Pinya (East Wall)	20°	Early	14th.	Century
Pinya (West Wall)	13°	Early	14th.	Century
Wedi (Myingyan)	13°	Early	14th.	Century
Mahamuni (Arakan)	10°	Late	13th.	Century
Maing Maw (Kyaukse)	10°	Late	13th.	Century
Myedu (Shwebo)	10°	Late	13th.	Century
Old Myaungmya	11°	Late	13th.	Century
Pegu	13°	Late	13th.	Century
Yindaw (Meikhtila)	10°	Mid	10th.	Century
Old Tagaung	11°	Early	10th.	Century
Yamethin	11°	Early	10th.	Century
Old Pyinmana (Kyaukse)	30°	Late	9th.	Century
Thegon (Prome)	15°	Late	9th.	Century
Zothok (Thaton)	7°	Late	5th.	Century
Donwun (Thaton)	13°	Late	4th.	Century
Wethali (Arakan)	23°	Late	4th.	Century
Thaton	13°	Mid	4th.	Century
Hanlin (Shwebo)	13°	Mid	1st.	Century B. C.
Peikthano (Taungdwingyi)	13°	Late	2nd.	Century B. C.