

Grids & Datums

REPUBLIC OF LIBERIA

by Clifford J. Mugnier, C.P., C.M.S.

"It is generally believed that before 1822 there were 16 different tribes living in what was called the 'Pepper Coast', 'Grain Coast' or 'Malaguetta Coast'. One of them was exclusively living in what is nowadays Liberia: the Bassa, the other 15 tribes were dispersed in the region. According to the traditions of many African tribes their ancestors were Pygmies, or persons of small size, and memories of them still live on in numerous stories and legends. Although no trace of their existence was ever discovered in West Africa they are well-known to the peoples of this sub region. In Liberia they are called 'Jinna.' No recorded history can prove their existence, but they still play an important role in the oral history and the religious life of some of Liberia's tribes. When the Golas, who are supposed to be the oldest of the Liberian tribes, travelled from the interior of Central Africa to this West African region they reportedly met these small-sized peoples, who were bushmen and who *'dwelt in caves and the hollows of large trees, and lived on fruits and roots of wild trees'*, according to Liberian historian Abayomi Karnga.

"A second group of peoples is reported to have arrived in the region about 6,000 *B.C.* Though their origin is not very clear they most likely came from the Western Sudan. These newly arrived people defeated the Golas and other tribes such as the Kissi, and established an empire under the leadership of King Kumba, after whom they were called. The Kumbas comprised distinct groups which developed into different tribes after the death of their leader; the Kpelle, the Loma, the Gbande, the Mende, and the Mano, all belonging to the same linguistic group. They were chiefly agriculturalists but also developed arts such as pottery, weaving, and basket making. Their blacksmiths were able to make spears, arrow-heads, hoes, knives, rings and iron rods. These iron rods were used as a medium of exchange.

"The third group of peoples who arrived and settled in the region which is now known as Liberia migrated to this part of West Africa quite recently. They were the Kru, Bassa, Dei, Mamba, and Grebo tribes. They came from what is now the Republic of Ivory Coast. Population pressure -- due to the mass emigration of tribes from the Western Sudan where the mediaeval empires had declined after their conquest by the Moroccan army -- had resulted in tribal wars. The Kru arrived in the early sixteenth century. They came by sea, as did -- later -- a part of the Grebo. Those Grebos who took the sea-route were later called 'seaside Grebos' in order to distinguish them from their kinsmen who decided to travel by land, the safer way. Those who braved the dangerous waves still feel superior to these so-called 'bush-Grebos'. All the peoples of this group belong to the same linguistic group.

"The last group of tribes to arrive from 'over land' was the Mandingo-group, comprising the Vai and the Mandingo tribes. The Vai also migrated to the West African central region in the 16th century and had probably the same motivation as the tribes of the third group. They crossed the western part of the actual republic of Liberia, clashed

with the Gola whom they subsequently defeated, and -- later -- moved to the coast where they settled. The Vai form the first tribe of this region which was Muslim, unlike the tribes previously mentioned which were all animists. It was one of the few tribes of Black Africa who developed its own script. About the 17th century the Mandingos began to arrive in Liberia. They were Muslims too. They too originated from the Western Sudan. They left this region after the Empire of Mali -- of which they formed a part -- was considerably reduced by the Emperor of Gao, Askia Mohammed, in the 16th century.

"Documents reveal that the first white men who landed on this part of the West African coast were probably Hanno the Carthaginian and his sailors; in the year 520 *B.C.* Hanno the Carthaginian may have reached the coast near Cape Mount, where he encountered the Golas. Trade started, but the contacts between the two races were limited to only a few trade visits. It was not until the 14th century that further and more frequent contacts were established. About 1364 the Normans settled (temporarily) at a few places on the coast of Liberia and started trading with the coastal tribes from whom they bought ivory, pepper, gold and camwood. The Portuguese also frequented the Liberian coast as from this period and soon even controlled the trade. In fact they had a monopoly for over a century, before they were replaced by other European maritime powers (France, England, Holland). From the 15th century onwards the Portuguese, Spanish, Dutch, English and French sailors and traders became common and accepted visitors of the West African coast. Their influence on the history of the area was considerable and their impact on the lives of the peoples of the coast quite distinct. The Portuguese e.g. named regions, mountains and rivers, and some of these names are still in use. In the Liberian area the Portuguese gave names such as (from west to east) Gallinhas River, St. Paul's River, Mesurado River, St. John River, Cestos River, Sanguin River and Cavalla River, and named the promontories Cabo do Monte (at present Cape Mount), Cabo Mesurado (Cape Mesurado) and Cabo das Palmas (Cape Palmas).

"The coast between Sierra Leone and Ivory Coast was called 'Malagueta Coast' or 'Pepper Coast' after one of its main products, the Malagueta pepper. The English and the Dutch preferred the name 'Grains of Paradise', referring to the same product. Later they abbreviated this name and it became the 'Grain Coast'. The names of the coastal regions to the east of Cape Palmas were also based on their main commercial products: the Ivory Coast, the Gold Coast and (later) the Slave Coast. The spices, gold and ivory, sought by the Europeans were exchanged for textiles, alcoholic beverages, general merchandise and, later, when this trade degenerated into the barbarous slave trade, horses and weapons. The trade in slaves soon ousted the more common trade and by the end of the sixteenth century all European powers (of that period) were engaged in this historical and inhumane commerce, an activity that resulted in the diaspora of the

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Black race and the loss for Africa of an estimated 20 million people. The damage for Africa was even greater than the mere loss of a large number of its population because the captured sons and daughters of its soil were its most able and most productive workers. When the slave trade was over Africa was left with hostilities between tribes, with a disrupted social and family life and with famines. The resulting weakness and dissensions greatly facilitated the imposition of foreign rule. Historical documents leave no doubt that the people of the coastal area had reached an admirable standard of living. They made many products which were of a higher quality than those produced in pre-industrial Western European countries – as cited by Sir Harry Johnston in his famous two-volume work on Liberia (1906):

‘The traditions of the Norman traders who visited Liberia in the fourteenth century and the authentic records of the Portuguese commerce with that country before 1460 and 1560, reveal a condition of civilization and well-being amongst the untutored natives which is somewhat in contrast to what one finds in the same coast at the present day; still more in contrast with the condition of the Liberian coast lines in the early part of the nineteenth century, suggesting that the rapacity of the Europeans, combined with the slave trade, did much to brutalize and impoverish the coastal tribes of Liberia during the two hundred years between 1670 and 1870. They seem to have been well furnished with cattle, (in Northern, perhaps not in Southern Liberia), with sheep, goats and fowl, to have carried on a good deal of agriculture, and not to have been such complete savages as were the natives of the still little-known parts of Portuguese Guinea, or the people of the Ivory Coast, who were wild cannibals. (...) Having cast a glance at the principal commercial products of these countries when they were first discovered by Europeans, it may be interesting to note the trade goods which Europe was able to offer to the Blacks from the fourteenth to the seventeenth century. To begin with a negative statement, there were no cotton goods, no calicoes in the holds of these vessels such as there would be nowadays. Strange to say, it was the natives of the Gambia and other rivers of Northern Guinea, and Cape Mount in Liberia that impressed the Europeans with the excellence of their cotton fabrics, and actually sent some cotton goods to Portugal. (...) It is possible that no cotton goods were exported from Europe to West Africa till the end of the seventeenth and the beginning of the eighteenth centuries. Since that time the cotton goods of Lancashire, of Germany, and of Barcelona have almost killed the local industries of weaving and dyeing. (...) As early as the time of Ca'da Mosto (middle of the fifteenth century) cannon were taken on the ship and gunpowder was fired to astonish and frighten the Negroes; but there seems to have been no sale of gunpowder till the close of the fifteenth century.’

“The Europeans were not only responsible for the naming of places, the exchange of products, the introduction of fire-arms and the carrying off of millions of Africans, but also for the introduction and spreading of hitherto unknown diseases, such as dysentery, syphilis and certain parasites. In the region which is now called Liberia the (slave) trade thus contributed to the impoverishment of and the hostilities between tribes. Up till the present day the inter-tribal relations are affected by the events of this period. The Golas, Krus, Kpelles and Kissis were notorious slave traders conniving with unscrupulous Europeans who looted the coastal areas. Besides this,

the northern tribes of the Mano and the Gio were feared because of their cannibalism, a practice which was also not uncommon among the Greboes and the Krus. It was in this environment of slave trade, suspicion, fear and open discord and hostilities that the first colonists arrived, aboard an American ship, in 1820. They came from the U.S.A. where their African ancestors had been sold to white masters. With the arrival of these black and colored people an experiment in ‘black colonialism’ started” (*van der Kraaij, The Open Door Policy of Liberia – An Economic History of Modern Liberia, Bremen, 1983, 2 volumes, pp. 1-5*).

Established as a republic in 1847, Liberia has been subject to political turmoil starting in 1980, and has only recently begun the process of rebuilding the social and economic structure. Slightly larger than Tennessee, Liberia is bordered by Guinea (563 km), Côte d'Ivoire (716 km) (*PE&RS*, February 2006), and Sierra Leone (306 km). With a coastline of 579 km, Liberia is mostly flat to rolling coastal plains rising to rolling plateau and low mountains in the northeast. The lowest point is the Atlantic Ocean (0 m), and the highest point is Mount Wuteve (1,380 m) (*World Factbook, 2010*).

“In 1926, the then Firestone Tire & Rubber Company leased 1,600 square miles of jungle in Liberia, West Africa, with the goal of producing its own rubber. Selected then for its location, soil and climatic conditions, Liberia is now home to the world's largest single natural rubber operation. Today, Firestone Liberia operates on a much smaller area of land with close to 8 million rubber trees planted on 200 square miles at its Harbel location (named after Firestone founder Harvey Firestone and his wife Idabelle)” (*Firestone Rubber Co., 2010*).

Thanks to John W. Hager in December, 2010, there was a Firestone Datum, but that may just be another name for Jidetaabo (*NGA Geonames Server*), where Jidetaabo Astronomic Station is at: $\Phi_0 = 04^\circ 34' 40.33'' \text{ N} \pm 3.7''$ probable error, $\Lambda_0 = -07^\circ 38' 55.74'' \text{ West of Greenwich} \pm 2.16''$ probable error, and a reference azimuth to an unlisted point is $\alpha_0 = 359^\circ 42' 41.5''$, with the reference ellipsoid likely the Clarke 1866 where $a = 6,378,206.4 \text{ m}$, and $b = 6,356,583.6 \text{ m}$. *Google Earth™* shows this location to be in the vicinity of a road intersection, and the *NGA Geonames Server* shows this location to be in the middle of a number of Firestone properties. With the reference azimuth being mere minutes of arc from a cardinal direction, there are a number of properties in the vicinity of Jidetaabo that resemble the Rectangular Survey of the Public Lands in the United States – not likely a coincidence.

Furthermore, thanks to Dave Doyle of the U.S. National Geodetic Survey (*Personal communication, December 2010*), a 1934 survey of the Firestone Plantations Company property at Cape Palmas Liberia by the U.S. Coast & Geodetic Survey lists the point of beginning at a concrete monument (corner No. 1) where: $\phi = 4^\circ 34' 49.221'' \text{ N}$, $\lambda = -07^\circ 39' 21.895'' \text{ W}$. Quoting from the U.S.C. & G.S. report, “The Astronomic datum determined at Gedetarbo (*sic*) by meridian telescope is the one upon which the initial position N. Cor. (Corner No. 1) is based. The position North Cor. (Corner No. 1) given in this description has been determined by second order triangulation, which depends upon the position of Astronomic station and azimuth from East Base to West Base. It may be defined in terms of the position of East Base as follows: $\Phi_0 = 04^\circ 34' 40.187'' \text{ N}$, $\Lambda_0 = -07^\circ 38' 55.739'' \text{ W}$, and azimuth to West Base is $\alpha_0 = 86^\circ 35' 41.5''$ (C.F. Maynard, 3/12/31).”

(*Hager, op. cit.*) continued: “Liberia 1964 at Robertsfeld (yes, one word) Astro, $\Phi_0 = 6^\circ 13' 53.02'' \pm 0.07'' \text{ N}$, $\Lambda_0 = 10^\circ 21' 35.44'' \pm$

0.08" W, $\alpha_o = 195^\circ 10' 10.57'' \pm 0.14''$ to Robertsfield Astro Azimuth Mark from south, Clarke 1880, elevation (H_o) = 8.2331 meters.

Liberian Government (no code assigned). Possibly this is Jidetaabo 1928, correct time frame.

C.F. Maynard identified Du Plantation as being on Liberian Government datum but I have no position. Further on C.F. Maynard, he and J.A. Bond published *The Triangulation of the Philippine Islands*, Vol. I, Department of Commerce and Communications, Bureau of Coast and Geodetic Surveys, Manila, 1927. He was evidently in the Philippines in 1927 and then in Liberia in 1928 or 1929. That is not the U. S. Coast and Geodetic Survey but the Philippine.

"Zigida at Zigida: $\Phi_o = 8^\circ 02' 01.33''$ N, $\Lambda_o = 9^\circ 34' 09.07''$ W, Clarke 1866. The Clarke 1866 is logical in that those surveys were done by Americans for an American company. Clarke 1880 for Liberia 1964 is in line with the recommendations of the I.G.G.U. for use in Africa.

"The U. S. Coast and Geodetic Survey created the Hotine RSO for a map series at (maybe) 1:250,000 or even smaller. I can't remember if it was a photo mosaic or a line map but the photo coverage was incomplete. The grid tables are dated 1952 so it is possible that the Gedetarbo 1928 datum was used. But the ellipsoids don't agree, not that that would be important at that map scale. I have no idea why they chose the International ellipsoid. In the 1964 era, a SHORAN trilateration net was established based on the Liberia 1964 datum. Photography was flown with the photo nadir points determined by SHORAN, and 1:250,000 maps of the entire country and 1:50,000 maps of selected areas compiled."

For the Liberian Rectified Skew Orthomorphic projection, the Latitude of Origin (ϕ_o) = $6^\circ 35'$ N, Longitude of Origin (λ_o) = $9^\circ 25'$ W, Scale Factor at Origin (m_o) = 0.99992, False Northing = 0, False Easting = 1,500,000 meters, Azimuth of Initial Line at Origin (γ_o) = $126^\circ 21' 47.451''$ (from South), $N = 0.6x + 0.8y$, $E = -0.8x + 0.6y + 1,500,000$; $x = 0.6N - 0.8E + 1,200,000$, $y = 0.8N + 0.6E - 900,000$ (*Personal communication, John W. Hager, 15 August 2005*).

A partial trig list furnished by Hager included a couple of undated points that appear to be in the near vicinity of the Liberian Government Datum of 1929 origin where at W. Base, $\phi = 6^\circ 27' 55.113''$ N, $\lambda = 10^\circ 27' 04.868''$ W, and at E. Base, $\phi = 6^\circ 27' 57.845''$ N, $\lambda = 10^\circ 26' 21.903''$ W.

(Doyle, *op. cit.*) Liberia Project No. 13-017-448, 1953 Annual Report by George E. Morris, Jr., Cdr., U.S.C.&G.S., "The project is divided into two principal tasks. The first is to provide the field inspection on the aerial photographic and airborne magnetometer surveys of Liberia under a Technical Cooperation Project. The second one is to organize and operate the Liberian Cartographic Service for surveying and mapping in Liberia. The second task includes the training of Liberian citizens in field and office procedures."

According to **TR 8350.2, From Liberia 1964 Datum To WGS 84 Datum**, (Clarke 1880),

$\Delta X = -90m, \pm 15m$, $\Delta Y = +40m, \pm 15m$, $\Delta Z = +88m, \pm 15m$, and is based on collocation at 4 points as of 1987.



The contents of this column reflect the views of the author, who is responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the American Society for Photogrammetry and Remote Sensing and/or the Louisiana State University Center for Geoinformatics (C²G).