

## Republic of Guinea

The original inhabitants of Guinea were forced out of the area around 900 A.D., and numerous kingdoms were subsequently established. By the mid 1400s, the Portuguese visited the area and a slave trade was established. The area was under active trade with the British, French, and Portuguese in the 17<sup>th</sup> century; and the coastal region was declared a French Protectorate in 1849. Administered at various times by Senegal and the Rivières du Sud, the territory of French Guinea was made a colony in 1893. The Federation of French West Africa, which included Guinea as a member, was established in 1895. Its status was changed to that of an overseas territory in 1946, and on 02 October 1958, Guinea became the first state of the former French West Africa to gain independence. Guinea includes the Los Islands, an island group west of the capitol city of Conakry. The seacoast is marshy and is about 274 km long; the interior rises to hilly and plateau regions. The highest point is Mount Nimba (1,752 m), near the tripoint with Côte d'Ivoire and Liberia. Going clockwise from the north Atlantic Ocean to the west, Guinea shares borders with Guinea-Bissau, Senegal, Mali, Côte d'Ivoire, Liberia, and Sierra Leone. The Guinean maritime boundary is defined in large part by a single, unique (in the world) Straight Baseline. By Decree of the President of the Republic in 1964, the limits of the territorial waters are fixed "to the north, by parallel of altitude 10° 56' 42.55" north, and to the south, by parallel of altitude 9° 03' 18" north, along a distance of 130 sea miles seaward, reckoning from a straight line passing by the southwest of Sene Island of the Tristao group, and to the south, by the south-west foreland (cape) of Tamara Island, at low tide." The boundary between Guinea and Guinea-Bissau was established through a Franco-Portuguese convention of 12 May 1886. The demarcation of the 384-km boundary with straight lines between 58 markers and along thalwegs of rivers was completed and approved by 1906. In 1915 an *arrêté* (decision) by the Governor General of French West Africa promulgated a French decree establishing a 328 km boundary between French Guinea and Senegal. Early in 1934 an *arrêté* promulgated a decree of the previous December changing the French Guinea – Senegal boundary in the sector between the

head of the Tanague River and the junction of the Bitari and Koila Kabé. A Franco-Liberian convention of 08 December 1892 delimited a boundary between the possessions of France (Côte d'Ivoire and French Guinea) and Liberia inland from the mouth of the Cavalla River to the tripoint with Sierra Leone. That 560 km boundary with French Guinea was redrawn on 18 September 1907. Further surveys and commissions settled the matter with several *procès verbaux* (verbal proceedings) finally in 1926. The Guinea-Sierra Leone boundary has a length of approximately 648 km. Established by Anglo-French convention of 28 June 1882, a boundary was delimited from the Atlantic Ocean inland along the drainage divide of the Great Scarcies and Mélikhouré (rivers) to an indefinite point in the interior. Later determined by field surveys, the last agreement fixing the boundary was signed on 04 September 1913. In places, the boundary measurements are described to the closest half-meter. Reading between the lines, I'd guess that the boundary commission surveyors had people literally looking over their shoulders during that process!

When the federation of the eight territories constituting French West Africa came into being in 1904, the *Annexe de l'Institut Géographique National à Dakar* had the local responsibility for topographic mapping. Also known as the *Service Géographique de l'Afrique Occidentale Française* - SGAOF (Geographic Service of the French West Africa), topographic mapping of Guinea has been largely at the scales of 1:200,000 and 1:500,000. This agency has performed a small amount of mapping at the scales of 1:20,000, 1:50,000, and 1:100,000. Topographic mapping of Guinea was in the past largely the result of rapid ground surveys. After WWII, the French adopted aerial photography controlled by astronomical points ("Astro" stations) as the means of surveying and mapping at scales of 1:50,000 and 1:200,000. These compilations were also used for derivative mapping at smaller scales. There is complete coverage of the country at 1:500,000 scale, and at 1:200,000 scale. The latter

consists of sheets mainly based on ground surveys. A small portion of Guinea has 1:50,000-scale topographic sheets compiled, mostly by the French IGN in the coastal west, and by a cooperative agreement with the Japanese (JICA) for some sheets around Kankan and Kérouané-Macenta.

The oldest coordinate system in Guinea that I have been able to locate (with help) is the Conakry Datum of 1905 where  $\Phi_0 = 9^\circ 30' 58.997''$  N,  $\Lambda_0 = 13^\circ 42' 47.483''$  West of Greenwich,  $\xi_0 = -4.50''$ ,  $\eta_0 = -0.02''$ , and the ellipsoid of reference is the Clarke 1880 (IGN) where  $a = 6,378,249.2$  m and  $1/f = 293.4660208$ . Thanks go to both John W. Hager, retired from NIMA, and to Russell Fox of the Ordnance Survey of the U.K. The origin point is at the Public Works Building in Conakry, and John W. Hager went on to say: "Reingold cites *Les Manuels Coloneaux*, 'Cartographie Coloniale,' Paris, 1935 and 'Catalogue de Positions Géographiques,' Paris, 1923 give the position to the nearest second. *Annales Hydrographiques*, 4e Série, Tome 1, Année 1950, Paris 1951, p. 155 gives the above but is listed as 3rd order. A position for the Railway Astro Pillar is given as latitude =  $9^\circ 30' 54.5''$  N and longitude =  $13^\circ 42' 47.1''$  W, a difference in position of 138.6 meters. I would assume that the astro pillar was not permanently marked."

Some minor hydrographic surveys were performed by the French Navy, and these were based on local astro stations that served as origins of grids computed on the Hatt Azimuthal Equidistant projection. The Tabola River survey had its origin at Cabrion Base North End (1936) where  $\Phi_0 = 9^\circ 56' 08.1''$  N and  $\Lambda_0 = 13^\circ 54' 42.4''$  West of Greenwich. The defining azimuth to Cabrion Base South

*continued on page 563*

---

***"I once read a science fiction novel about a disgruntled cartographer on a lonely expedition to a new planet. He chose risqué names for his gazetteer, and that fact went undiscovered for many years. While perusing the report of the French Navy hydrographic survey of the mouth of the Saloum River, ... guess what I found?"***

---

continued from page 561

End was  $\alpha_0 = 123^\circ 34' 00''$ , and the baseline length was 1017.537 m. I was wondering why the French performed a survey in such a tiny locale that did not even appear on the standard CIA map of the country. I examined my *Carte Générale of Guinée* and noticed that there is a road to there through the town of Koba that winds north up into the hills. Apparently, something valuable was being trucked out of those hills to the port of Taboriya. Hager found one at "Binari 1949 (code BIN) at the I.G.N. Astro, latitude =  $10^\circ 30' 26.2''$  N, longitude =  $14^\circ 38' 45.0''$  W (1) or ...  $41.03''$  (2) or ...  $40.0''$  (3), Clarke 1880. Position (1) is from *Annales Hydrographiques*, 4e série, Tome Sixième, Année 1955, p. 247. Position (2) is from *Annales Hydrographiques*, 4e série, Tome Dixième, Années 1959-1960, p. 65, Paris 1961. Position (3) is a footnote to (2) and refers to the 1954 survey by M. Sauzey."

There have been some other rather curious coordinate systems devised for Guinea during the 20<sup>th</sup> century. Prior to and during WWII, there were a number of military Grids that were collectively termed the "British Grids." These were all documented and computed into projection tables by the U.S. Army. One published by the U.S. Army Corps of Engineers Lake Survey in 1943 was the Guinea Zone based on the Lambert Conical Orthomorphic Projection Tables. The defining parameters are Latitude of Origin, ( $\varphi_0$ ) =  $7^\circ$  N, Central Meridian ( $\lambda_0$ ) =  $0^\circ$  (Greenwich), Scale Factor at the Parallel of Origin ( $m_p$ ) = 0.99932, False Northing, FN = 500 km, and False Easting, FE = 1,800 km. The wording for the projection is characteristically British, as is the method of presenting the defining parameters, and the projection is definitely the fully conformal version rather

than the French Army version of the time. Furthermore, the parameters given for the Clarke 1880 ellipsoid were the British version where  $a = 6,378,249.145$  m and  $1/f = 293.465$ . This grid continued in use by the U.S. Army Map Service for a couple of decades after WWII.

Immediately after WWII, the French Institut Géographique National devised a number of grids for l'A.O.F. useage as of 12 December 1945. The region of French Guinea was to be covered by two *fuseau*, or zones: "Fuseau Sénégal" with  $\lambda_0 = 13^\circ 30'$  West of Greenwich, and "Fuseau Cote d'Ivoire" with  $\lambda_0 = 6^\circ 30'$  West of Greenwich. The scale factor at origin ( $m_0$ ) = 0.999 and the ellipsoid of reference was to be the International (Hayford 1909) where  $a = 6,378,388$  m and  $1/f = 297$ . Because there was not a great deal of existing mapping in French West Africa at the time, most datums were established by astro shots and few classical chains of quadrilaterals had been surveyed. The introduction of a new ellipsoid was therefore not of major geodetic importance to existing cartographic work. French Navy Hydrographic surveys of the late 1940s in Guinea were cast on the Fuseau Sénégal Grid. When I was in college, I once read a science fiction novel about a disgruntled cartographer on a lonely expedition to a new planet. He chose risqué names for his gazetteer, and that fact went undiscovered for many years. While perusing the report of the French Navy hydrographic survey of the mouth of the Saloum River (*Mission Hydrographique de la Côte Ouest d'Afrique, 11 Mai 1950 - 18 Mai 1952*), guess what I found? Yep, an American vulgarism and an American gangster's name for triangulation stations!

The U.S. Army Map Service concocted the Universal Transverse Mercator (UTM) Grid

System for worldwide use in 1948. France had been trying to gain an international consensus for some sort of similar system, and quickly adopted the UTM for most of its colonies. As of 30 September 1950, all new surveying and mapping of French Guinea was done on the UTM Grid. That situation remains to this day. The only information available on a datum shift from the local datum to WGS84 for the entire country of Guinea is the entry in NIMA's TR8358.2 for "Dabola Datum" where  $\Delta a = -112,145$ ,  $\Delta f \times 10^4 = -0.54750714$ ,  $\Delta X = -83m \pm 15m$ ,  $\Delta Y = +37m \pm 15m$ , and  $\Delta Z = +124m \pm 15m$ . This four-point solution was published by NIMA in 1991. Because there is only a 1:200,000 scale map published of Dabola, and there are no 1:50,000-scale topographic maps nearby, I am unable to find a plausible reason for the choice of this transformation name or location other than it is more or less in the center of the country. I have found no other evidence of such a datum in existence.



**Prof. Cliff Mugnier** teaches Surveying, Geodesy, and Photogrammetry at Louisiana State University. He is the Chief of Geodesy at LSU's Center for Geoinformatics (Dept. of Civil and Environmental Engineering), and his geodetic research is mainly in the subsidence of Louisiana and in Grids and Datums of the world. He is a Board-certified Photogrammetrist and Mapping Scientist (GIS/LIS), and he has extensive experience in the practice of Forensic Photogrammetry.

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 (C<sup>4</sup>G).