

THE DEPARTMENT OF GUADELOUPE

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The ancient fishermen of the Arawak indian tribe were the apparent original inhabitants of the islands of Guadeloupe several hundred years before Christ. Around the ninth century *A. D.*, the cannibal warriors of the Caraïbes tribe ate the last of the Arawaks! Columbus landed on the island of Karukera (Island of Beautiful Waters) on November 3, 1493 and renamed it Guadeloupe. The Spaniards had no interest in settling the island, and in 1635 the *Compagnie des Îles d'Amérique* introduced volunteer farmers from the French provinces of Normandie, the Bretagne, and the Charente. Working conditions were not conducive to further European labor, so the slave trade with Africa was encouraged. The *Compagnie* sold Guadeloupe to Charles Houël, who started the major economic growth of the island with plantations of sugar, coffee, and cocoa. During the 18th century, Guadeloupe was a favorite base for buccaneers and pirates. On February 4, 1794, the Convention in Paris voted for the abolition of slavery and sent Victor Hughes to Guadeloupe to control the implementation. Many estate owners departed via the guillotine. On March 19, 1946, Guadeloupe was changed from a colony to a French Overseas Department.

Guadeloupe is an archipelago of inhabited islands near the southern part of the Leeward Islands. This includes Basse-Terre (or Guadeloupe proper), Grande-Terre, Marie-Galante, La Désirade, Îles des Saintes, and Saint Barthélemy. Part of Saint Martin is included, but it is 300 km from Basse-Terre and is located in the northern end of the Leeward Island Archipelago north of 18° N. (The other part of Saint

Martin is Sint Maarten, which has been Dutch since 1648). The highest peak is on Basse-Terre, which is the active volcano of Soufrière at 1467 m (4813 ft).

The first topographic surveys of the interior of Guadeloupe were performed by the Royal French Army Topographic Engineers from 1763 to 1768. The first hydrographic charting expeditions to Guadeloupe were run by Ploix in 1867 and by Caspari in 1869, both of the French Navy, and they utilized the old topographic surveys to fill in details of the interior. Subsequent surveys performed in the service of the government as well as private surveys were based mainly on the work of Ploix and Caspari. Over time these dependant surveys were haphazard in planning and execution and were not unified. Different maps compiled from these various survey sources resulted in serious deficiencies in reliability. The paucity of reliable cartographic works proved to be unfavorable for the continued economic development of the island.

In 1946, Principal Hydrographic Engineer Roger Grousseau led the *Mission Géodésique de la Guadeloupe* (Geodetic Mission of Guadeloupe) to establish a new coordinate system for the colony. A prismatic astrolabe was used to astronomically establish an origin point for the Guadeloupe Datum of 1947 at the pillar of station Sainte-Anne-1 where: $\phi_0 = 16^\circ 15' 17.3''$ North, $\lambda_0 = -61^\circ 25' 33.4''$ West of Greenwich. The defining azimuth was determined from Sainte-Anne-1 to Petite-Terre Lighthouse (35 km away) as: $\alpha_0 = 104^\circ 44' 32.6''$. Guadeloupe Datum of 1947 is referenced to the International 1924 ellipsoid where $a = 6,378,288$ meters, and $1/f = 297$. This datum origin also defined the point of origin for the first Grid used in Guadeloupe, which was based on the Gauss-Schreiber Trans-

verse Mercator Projection. The Guadeloupe Grid is defined at the Datum origin such that the scale factor at origin (m_0) is equal to unity, False Easting = 57,927.49 m, and False Northing = 96,169,49 m. (This equates approximately to a Central Meridian of $-61^\circ 30'$ West and a False Easting of 50 km.)

The geodetic system used in Guadeloupe is the IGN system established in 1951-1952. This system constituted a synthesis of the surveys performed by: Grousseau in 1946-1948 (First Order triangulation), by Maillard in 1948-1948 (First Order and Second Order triangulation), and by Bouchilloux in 1951-1952 (Second Order triangulation). The first aerial photography was flown by the IGN in 1946. In all probability, the Guadeloupe Grid was the tool used for the computations of these surveys. Things started changing in the geodesy of the Caribbean during these post-war years, because the U.S. Army Map Service (AMS) founded the Inter American Geodetic Survey (IAGS) in 1946. The geodesy of Europe was changing at this same time also, and the Universal Transverse Mercator (UTM) Grid was concocted by the Army. AMS started the computational adjustment of the European Datum of 1950 with the UTM Grid as the unifying tool. By the late 1940s, AMS was ardently pushing for the member countries of the Pan American Institute of Geography and History to adopt the UTM Grid. France was in agreement with the "universal" adoption of the UTM Grid for all of its colonies in principle, but delayed adoption of the UTM in those areas that were "in the pipeline" already with active triangulation. Therefore, only the Central African French colonies immediately adopted the UTM.

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By 1957, Guadeloupe was using the UTM Grid. IGN flew new aerial photography of St. Martin in 1968-1969, and Hydrographic surveys were performed in 1971-1972, 1979, and 1984 in all the islands of Guadeloupe. However, "in 1979 an inventory of triangulation monuments listed in the IGN Trig List revealed that the majority of points had been disturbed by vandals. In particular, those destroyed stations included the fundamental point of the Datum origin (Sainte-Anne-1), and the two First-Order end-points of the baseline."

In April and May of 1984, a geodetic survey party verified the following 4 points: Cape Marie Galante I (First Order IGN), Sainte Anne II (Second Order IGN), Le Chateau ("the camel" – Third Order IGN), and Phare de la Petite Terre (lighthouse – Second Order IGN). As it turned out, Sainte Anne II was one of the refer-

ence marks set by IAGS when they observed a triangulation survey in 1951-1952 (RM). Since Bouchilloux of the IGM was there at the same time, my guess is that most of the field work performed was by IAGS and he was the IGM representative supervisor for France. The standard operating procedure for IAGS was to set several reference marks at important triangulation monuments. That policy paid off in Guadeloupe – the French Navy recovered IAGS RM1 and IAGS RM3. They decided that RM3 was to be the "reset mark" Sainte Anne II where $\phi = 16^{\circ} 15' 51.804 \text{ N}$, $\lambda = -61^{\circ} 23' 49.850 \text{ W}$, $H = 86.96 \text{ m}$. Oh, and note that Petite Terre lighthouse was also the original defining azimuth mark for the Datum. This emphasis on the recovery of existing trig points indicates that the original Guadeloupe Datum of 1947 was continuing to be perpetuated. By 1984, the U.S. Navy Transit doppler satellite system had been in common use for almost 6

years with the unclassified broadcast ephemeris. The NWL 10 D Datum is referenced to the WGS 72 ellipsoid where: $a = 6,378,135 \text{ meters}$, and $1/f = 298.26$.

The published results of the 1984 geodetic survey were listed in Guadeloupe Datum of 1947 UTM coordinates (Zone 20) and in NWL 10 D Datum coordinates. I computed the 3-parameter shift values where: $\Delta X = -462.452 \text{ m}$, $\Delta Y = -55.272 \text{ m}$, $\Delta Z = -289.216 \text{ m}$. An example test point computation can be used to verify these shift parameters where for Sainte Anne II (IAGS RM2), the NWL 10 D Datum coordinates are $\phi = 16^{\circ} 15' 42.730 \text{ N}$, $\lambda = -61^{\circ} 24' 04.700 \text{ W}$. I would consider the accuracy of this transformation to be reliable to within $\pm 10 \text{ meters}$ on Grand-Terre and Marie-Galante Islands and within $\pm 20 \text{ meters}$ on the Îles des Saintes.

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