

Grids & Datums

DEPARTMENT OF GUIANA

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The region known as Guiana is on the northeastern coast of South America. It is comprised of the former British Guiana, now Guyana (*PE&RS*, April 2003), the former Netherlands Guiana, now Suriname (*PE&RS*, March 2002), and French Guiana. Originally inhabited by the Surinen Indians, the coast was probably sighted by Christopher Columbus in 1498 and by Ojeda and Vespucci in 1499. Vicente Yáñez de Pinzón in 1500 was the first to sail close along the shore. He entered some of the rivers, and the Oyapock River was at first called the Yáñez Pinzón River by the Dutch, and later called the Vincent Pinzón River by the French. Originally this region was thought to contain El Dorado, the "City of Gold." Both Spanish and Portuguese mariners avoided the coast between the Oyapock and the Orinoco rivers. In 1597-1598, a Dutch expedition examined the river mouths from the Amazon to the Orinoco. This started a series of colonies settled initially by the Dutch, then by the French at Cayenne in 1604.

In 1635 Cayenne was founded by French traders; in 1643 the Cap Nord Company was formed at Rouen, and a large number of settlers under the *Sieur de Brétigny* went out to Cayenne, but after a series of hardships and struggles, they were finally massacred by the Carib Indians. Groenewegen, capable governor of Essequibo from 1645 to 1664, made friends with the Caribs and was able to explore the interior. Francis, Lord Willoughby of Parham, governor of Barbados, sent over from Barbados in 1650 an expedition of 40 persons, which founded Paramaribo under Anthony Rowse, who was governor there from 1651 to 1654. In 1652, Louis XIV granted to a new Cap Nord Company letters patent for the exclusive right of trading and settling in Guiana; and 800 persons under De Royville, a Norman, sailed from Havre to Cayenne, but this expedition also soon failed. In 1663, the Equinoctial Company sent 200 colonists out from La Rochelle to Cayenne, and under De la Barre they established the permanent settlement there. French Guiana passed under the control of the French Crown in 1674; Cayenne was captured by the Dutch Admiral Binckes in March 1676, and retaken by the French in October 1676. "The Portuguese and British occupied it during the Napoleonic Wars, but the Congress of Vienna (1815) restored French authority. French Guiana was used as a penal colony and place of exile during the French Revolution, and under Napoleon III permanent penal camps were established. Devil's Island, one of the Îles du Salut, became notorious. The penal colonies were evacuated after World War II.

In 1947, French Guiana became an overseas department of France, and in 1974 it also became an administrative region. A rocket-launching base at Kourou, established in 1968, is used by the European

Space Agency for communication satellites." (*Columbia Encyclopedia*, 2005.) French Guiana is bordered by Brazil (673 km), Suriname (510 km), and has a coastline on the North Atlantic Ocean (378 km). It is slightly smaller than Indiana, the lowest point is the Atlantic Ocean (0 m), and the highest point is Bellevue de l'Inini (851 m). The country is mostly an unsettled rainforest wilderness with the coastal plain containing the majority of the population.

Although *La Guyane Française* is the oldest of the French colonies, a local mapping organization was only established in 1934 with *Le Service Géographique de l'Inini*, and its influence has mainly been only of a local nature. The first hydrographic survey datum of the 20th century was at Mât de Fort Cépérou in 1929 under the direction of M. H. Legrand, Hydrographic Engineer First Class where: $\Phi_0 = 04^\circ 56' 16.5''$ N, $\Lambda_0 = 52^\circ 20' 19.2$ West of Greenwich, and is in the vicinity of the capitol city of Cayenne. A subsequent hydrographic survey in the vicinity of the city of Saint Laurent de Maroni in July of 1937 by Naval Lieutenant M. J. Yayer established the local datum of Saint-Laurent where: $\Phi_0 = 05^\circ 30' 13.9''$ N, $\Lambda_0 = 54^\circ 01' 49.2$ West of Greenwich. Both of these datums were referenced to the Clarke 1880 ellipsoid where $a = 6,378,249.2$ m, and $1/f = 293.466021$. Note that both of these local datums had local grid systems established at the origin points, and the projection in fashion at the time was the Hatt Azimuthal Equidistant. No false origins were used, and the coordinates of features had associated signs according to the quadrant in which they were located. Another hydrographic survey by Principal Hydrographic Engineer M. Georges Lémierre was of the Îles du Salut in 1947-1948, and it was referenced to the Cépérou Datum of 1929.

The U.S. Army Map Service took aerial photography of the country during WWII, and the Inter American Geodetic Survey (IAGS) organized an initial field survey in 1947-1948 as one of the initial surveys. The density of the foliage in the interior proved to be virtually impenetrable, and ground control was impossible at the time. This trimetrogon photography was adjusted by the French *Institut Géographique National* (IGN) and served as the initial planimetric maps at a scale of 1:100,000. The map sheets were on a "Gauss projection," the moniker for the Transverse Mercator, and likely were compiled on the UTM grid whether the grid was actually printed on the sheets or not. This was the time of the great recasting of map sheets and new compilations and triangulations of the French Territories and Colonies onto the UTM grid. U.S. Army Colonel Floyd Hough proposed the idea to the European Allies in this post-war era, and

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France enthusiastically agreed to participate in this “Universal System of Grids” for places outside of France. (Their homeland remains to this day on the Lambert Conformal Conic except for the NATO series.)

The IGN performed a new geodetic survey of the Department of Guiana and published it in 1967. The *Centre Spatial Guyanais 1967* Datum (CSG 67) was referenced to the International 1909 ellipsoid where $a = 6,378,388$ m and $1/f = 297$, and the Grid system was the UTM north zones 21-22. The classical vertical datum established was the *Nivellement Général de Guyanne 1977* (NGG1977). IGN has published the transformation parameters from CSG 67 to WGS 84 as: $\Delta X = -186$ m, $\Delta Y = +230$ m, $\Delta Z = +110$ m. The new datum, *Réseau Géodésique Français de Guyane 1995* (RGFG 95) is referenced to the GRS 80 ellipsoid and IGN has published the seven-parameter transformations from CSG 67 to RGFG 95 (**in standard American and Australian rotation convention sign**) as: $\Delta X = -193.066$ m, $\Delta Y = +236.993$ m, $\Delta Z = +105.447$ m, $R_x = -0.4814''$, $R_y = +0.8074''$, $R_z = -0.1276''$, and Scale Factor = $+1.5649$ ppm. The caveat offered by IGN is that the transformation is **not** guaranteed better than 10 meters.

From RGFG 95 to WGS 84, IGN offers the following: $\Delta X = +2$ m, $\Delta Y = +2$ m, $\Delta Z = -2$ m. Information regarding transformation parameters and projections of France and its Departments and Colonies used to be quite the enigma. However, IGN has taken the trouble to openly publish its various coordinate systems' parameters and their relations to WGS 84. Someday that will be the norm rather than the exception that is practiced now only by the developed countries of the world. Russia, China, and India, are you reading this?



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