

Grids & Datums

REPUBLIC OF NICARAGUA

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Two basic culture groups existed in pre-colonial Nicaragua. In the central highlands and Pacific coast regions, the native peoples were linguistically and culturally similar to the Aztec and the Maya. Most people of central and western Nicaragua spoke dialects of Pipil, a language closely related to Nahuatl, the language of the Aztec. Most of Nicaragua's Caribbean lowlands area was inhabited by tribes that migrated north from what is now Colombia. The various dialects and languages in this area are related to Chibcha, spoken by groups in northern Colombia. When the Spanish arrived in western Nicaragua in the early 1500s, they found three principal tribes, each with a different culture and language: the Niquirano, the Choctegano, and the Chontal. The Chontal were culturally less advanced than the Niquirano and Chorotegano, who lived in well-established nation-states. Occupying the territory between Lago de Nicaragua and the Pacific Coast, the Niquirano were governed by chief Nicarao, or Nicaragua, a rich ruler who lived in Nicaraoali, now the city of Rivas. The Chorotegano lived in the central region of Nicaragua. These two groups had intimate contact with the Spanish conquerors, paving the way for the racial mix of native and European stock now known as mestizos. The Chontal (the term means for eigner) occupied the central mountain region. (*Library of Congress Country Studies, 2009*.)

Slightly smaller than the state of New York, Nicaragua is bordered by Costa Rica (309 km) (*PE&RS, May 2008*), and Honduras (922 km) (*PE&RS, July 1999*). The terrain is comprised of extensive Atlantic coastal plains rising to central interior mountains with a narrow Pacific coastal plain interrupted by volcanoes. The government has 15 geographic departments: Boaco, Carazo, Chinandega, Chontales, Esteli, Granada, Jinotega, Leon, Madriz, Managua, Masaya, Matagalpa, Nueva Segovia, Rio San Juan, Rivas and the two autonomous regions of Atlantico Norte and Atlantico Sur. The national holiday is Independence Day, 15 September 1821 (*The World Factbook, 2009*).

The first map of the region was prepared by Christopher Columbus in 1502 and covered the Caribbean coast. Nicaragua was noted for its paucity of surveying and mapping for many years into the 20th century. "Conventional mapping was impossible in the undeveloped eastern two-thirds of the country with its constant cloud cover vast areas, lack of roads, flat terrain combined with heavy jungle, and extensive coastal swamps, all making plane table techniques unworkable" (*Collaborative Mapping in Nicaragua, 1957*). "The Military Intelligence Division, General Staff, U.S. Army, published during 1929-1934, a hachured 1:250,000 scale map series covering the entire country" (*Foreign Maps, TM 5-248, 1963*). "In 1946 the *Oficina de Geodesia* (Office of Geodesy) was organized as a part of the *Ministerio de Guerra, Marina y Aviación* [Ministry of War (Army), Navy and Air Force] and an agreement was made between Nicaragua and the United States to establish basic geodetic control in Nicaragua" (*Topographic Mapping of the Americas, Australia, and New Zealand, M. L. Larsgaard, 1934*). An old publication of the U.S. Army Map Service Inter-American Geodetic Survey (IAGS) lists the first director of the *Oficina de Geodesia* in 1946

as General Anastasio Somoza DeBayle, who later rose to become the infamous Dictator of Nicaragua for decades! Initial geodetic surveys commenced in 1949.

The oldest geodetic datum of Central America is the Ocotepeque Datum of 1935, which was established at Base Norte in Guatemala where $\phi_o = 14^\circ 26' 20.168''$ North, $\lambda_o = 89^\circ 11' 33.964''$ W est of Greenwich, and $H_o = 806.99$ meters above mean sea level. The defining geodetic azimuth to Base Sur is: $\alpha_o = 358^\circ 54' 21.790''$, (*Memoria de la Dirección General de Cartografía, Guatemala, Sept. 1957*), and the ellipsoid of reference is the Clarke 1866 where $a = 6,378,206.4$ meters and $1/f = 294.9786982$. The corresponding astronomic observations at that mountainous location are: $\Phi_o = 14^\circ 26' 13.73''$ North ($\pm 0.07''$), $\Lambda_o = 89^\circ 11' 39.67''$ West ($\pm 0.045''$), and the defining astronomic azimuth to Base Sur is: $\alpha_o = 358^\circ 54' 20.37''$ ($\pm 0.28''$) (*Informe Detallado de la Comisión Técnica de Demarcación de la Frontera entre Guatemala y Honduras*). The difference between these two sets of coordinates is due to the local gravimetric deflection of the vertical.

The IAGS developed a series of map projections for each of the Central American countries during the late 1940s through the 1950s. Each of these coordinate systems were based on the Lambert Conformal Conic projection with two standard parallels, similar in treatment as the Coast & Geodetic Survey did for those applicable states in the U.S. The two Lambert Conformal Conic zones for the Republic of Nicaragua are: Nicaragua North (*Norte*) and South (*Sud*) Zones - Both zones use the same Central Meridian ($\lambda_o = 85^\circ 30' 00''$ West of Greenwich and False Easting of 500 km. Zone *Norte* has a Latitude of Origin ($\phi_o = 13^\circ 52'$ North, the False Northing = 59,891.816 m, and the scale factor at origin ($m_o = 0.99990314$). Zone *Sud* has a Latitude of Origin ($\phi_o = 11^\circ 44'$ North, the False Northing = 288,876.327 m, and the scale factor at origin ($m_o = 0.9992228$). Sometime in the 1960s, the IAGS extended the North American Datum of 1927 (Clarke 1866 ellipsoid) into Central America. Because of that work, the published 3-parameter datum shift from NAD27 to WGS84 for the region that includes Costa Rica through Nicaragua is: $\Delta X = 0$ m, ± 8 m, $\Delta Y = +125$ m, ± 3 m, $\Delta Z = +194$ m, ± 5 m, and the relation is based on a solution of 19 stations. Boundary disputes with neighboring countries were finally settled in 1960 (and re-monumented with Costa Rica in 2004) except for a continuing squabble with Colombia regarding Isla de San Andrés and Isla de Providencia in the Caribbean Sea (*Geographic Notes, Department of State, Office of the Geographer September 8, 1986*). The national mapping agency (now civilian since 1981), of Nicaragua is the *Instituto Nicaragüense de Estudios Territoriales (INETER)*.



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 (C⁴G).