& GRIDS & DATUMS

COMMONWEALTH OF THE BAHAMAS

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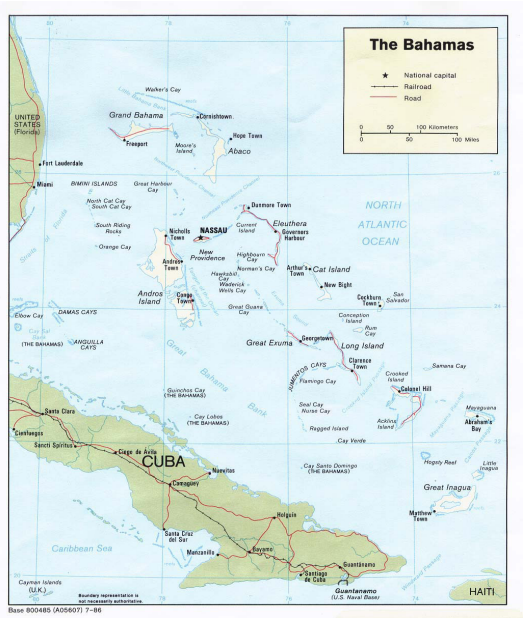
The Grids & Datums column has completed an exploration of every country on the Earth. For those who did not get to enjoy this world tour the first time, *PE&RS* is reprinting prior articles from the column. This month's article on the Commonwealth of the Bahamas was originally printed in 2004 but contains updates to their coordinate system since then.

Inhabited by Lucayan Indians at the time of sighting by Christopher Columbus on 12 October 1492, the islands were assigned to Spain by Papal grant. Subsequently occupied only by slave traders and buccaneers, the Bahamas were granted by the British Crown to Sir Robert Heath in 1629. The Commonwealth of the Bahamas became independent from the United Kingdom (*PE&RS,* October 2003) on 10 July 1973. Comprised of a 700-island and islet archipelago with an additional 2,400 cays and rocks in the North Atlantic Ocean, the total land area is 10,070 km^2, and it is slightly smaller than the State of Connecticut. With a total coastline of 3,542 km, the terrain of the Bahamas is primarily long, low coral formations with some low rounded hills. The lowest point is the Atlantic Ocean (sea level) and the highest point is Mount Alvernia (63 m) on Cat Island. Twenty-two of the main islands are inhabited; 70% of the population of 316,000+ live on New Providence, and 16% live on Grand Bahama.

Prior to World War II, the only surveys performed in the Bahamas were astronomical observations (Astros) of hazards to navigation and local cadastral-type surveys for some privately held properties. Initial geodetic ties of the islands to the mainland coast of Florida were performed with flare triangulations in the 1960s that were soon followed by BC-4 ballistic camera observations of the PAGEOS satellites. Flare triangulations were performed by simultaneous theodolite observations to parachute flares dropped from airplanes flying at high altitudes in order to make geodetic connections over the horizon. BC-4 observations were performed by photogrammetric triangulations of passive



satellite reflections against a background of star fields. Dr. Helmut Schmid (one of the original V-2 rocket scientists) led that geodetic program for the U.S. Coast & Geodetic Survey. The BC-4 program was the intercontinental geodetic program that tied all of the continents into the first worldwide geodetic system. Dr. Schmid was the designer of the BC-4 ballistic camera and was the mentor to Dr. Duane C. Brown, a pioneer of modern analytical photogrammetry. The Bahamas have been referenced to the North American Datum of 1927 (Clarke 1866 ellipsoid) since the 1960s, where a = 6,378,206.4 m and b = 6,356,583.8 m. The datum origin point is Meades Ranch, Kansas (quite a distance away) at: Φ_o= 39º 13′ 26.686″ N, Λ_o = –98º 32′ 30.506″ W., and the reference azimuth to station Waldo is α_o = 75º 28′ 09.64″ (*PE&RS*, April 2000).

Thanks to John W. Hager, the following positions have been determined in the Bahamas by classical observation techniques. These following geodetic positions (φ, λ) are presumably on the NAD27 while the astro positions (Φ, Λ) are

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independent: Elbow Cay Light (ECL), φ = 26° 32′ 21.715″ N, λ = –76° 57′ 10.870″ W. Also there is the Astro Observations (1940) where Φ = 26° 32′ 22.500″ N, Λ = –76° 57′ 15.353″ W, Astro Observations to light = 126.79 m, α = S 79° 01′ 27″ E true. Flamingo Cay Light (FLA), φ = 22° 52′ 43.48″ N, λ = –75° 51′ 38.28″ W. Great Inagua Island Light, φ = 20° 55′ 56.81″ N, λ = –73° 40′ 37.58″ W. Great Isaac Light (GIL), φ = 26° 01′ 48.30″ N, λ = –79° 05′ 22.08″ W. Great Ragged Island Light (GRL), φ = 22° 11′ 17.29″ N, λ = –75° 43′ 16.03″ W. Great Stirrup Cay (GSC), φ = 25° 49′ 36.41″ N, λ = –77° 53′ 50.20″ W. Gun Cay Light (GUN), φ = 25° 34′ 30.22″ N,λ = –79° 18′ 01.18″ W. Harvey Cay Light (HCL), φ = 24° 09′ 16.19″ N, λ = –76° 28′ 53.95″ W. Hog Island Light (HIL), φ = 25° 05′ 35.3″ N, λ = –77° 21′ 13.5″ W. Hogsty Reef Light (HRL), φ = 21° 41′ 27.71″ N, λ = –73° 50″ 56.81″ W. Hole-in-the-Wall Light (HIW), φ = 25° 51′ 32.522″ N, λ = –77° 10′ 37.938″ W. Observed astro (1940), Φ = 29° 51′ 22.320″ N, Λ = –77° 10′ 37.370″ W. Corrected in 1945, Φ = 29° 51′ 21.1155″ N, Λ = –77° 10′ 36.2901″ W. Little San Salvador Island (LIT), φ = 24° 33′ 53.73″ N, λ = –75° 56′ 08.00″ W. Man Island Light (MAN), φ = 25° 33′ 31.34″ N, λ = –76° 38′ 26.83″ W. Northwest Point Astro (NPA), Φ = 22° 27′ 24.42″ N, Λ = –73° 07′ 44.86″ W. Northwest Point Light (NPL), φ = 22° 27′ 35.56″ N, λ = –73° 07′ 47.43″ W. Pinder Point Light (PPL), φ = 26° 30′ 08.92″ N, λ = –78° 46′ 00.71″ W. Rum Cay Light (RUM), φ = 23° 38″ 36.1″ N., λ = –74° 50′ 05.7″ W. Santa Maria Light (SML), φ = 23° 40′ 54.54″ N., λ = –75° 20′ 27.60″ W. South Point Light (SPL), φ = 22° 50′ 56.48″ N., λ = 74° 51′ 14.42″ W. Stocking Island Astro (SIA), Φ = 23° 32′ 33.97″ N., Λ = –75° 46′ 10.75″ W. Sweetings Cay Light (SWC), φ = 26° 36′ 40.62″ N., λ = –77° 54′ 00.86″ W.

The NGA lists the three-parameter transformation from NAD27 to WGS84 for the Bahamas excluding San Salvador Island as ΔX = –4 m±5 m, ΔY = +154 m ±3 m, and ΔZ = +178 m ±5 m, where the 1987 solution is based on 11 station observations. For San Salvador Island, ΔX = +1 m ±25 m, ΔY = +140 m ±25 m, and ΔZ = +165 m ±25 m, and the 1987 solution is based on one station observation. In 1997, the U.S. National Geodetic Survey observed a number of high-order positions in the Bahamas on the NAD83 datum. The only grid ever used in the Bahamas is the UTM.

The Commonwealth of the Bahamas Update

The U.S. Department of State issued a new paper on Limits in the Seas, No. 128 on the Bahamas Archipelagic and other Maritime Claims and Boundaries on 31 January 2014. "This study analyzes the maritime claims and maritime boundaries of the Commonwealth of The Bahamas, including its archipelagic baseline claim. The Bahamas' Archipelagic Waters and Maritime Jurisdiction (Archipelagic Baselines) Order, 2008 (Annex 1 to this study) took effect on December 8, 2008 and established the coordinates for the archipelagic baselines of The Bahamas.1 The archipelagic baselines are shown on Map 1 to this study. This Order was made in exercise of the powers conferred by section 3.2 of the Archipelagic Waters and Maritime Jurisdiction Act, 1993 (Act No. 37, Annex 2 to this study).2 The 1993 Act also established a 12- nautical mile (nm) territorial sea and 200-nm exclusive economic zone (EEZ). The Bahamas ratified the 1982 United Nations Convention on the Law of the Sea (LOS Convention) on July 29, 1983 and consented to be bound by the 1994 Agreement Relating to the Implementation of Part XI of the Convention on July 28, 1995.3." http://www.state.gov/e/oes/ocns/opa/c16065.htm.

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^4G).

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