

Mississippi Digital Earth Model (MDEM)

Geodetic Control Standards

The original NAD 83 geodetic network was computed mostly by using traditional surveying observations and methods. Very few GPS observations were included in the adjustment computation. The design and implementation of this network preceded the developments of the GPS technology and therefore the practical usage of these control points for GPS applications can be problematic. The first difficulty in using most of these control points is that they are not "GPSable." In other words, the points are located near objects that obstruct the required clear visibility between the receiver and the satellites. The second difficulty is that many of these points are in locations that are not easily accessible. To work efficiently with GPS one needs to have quick and easy access to control points. The third difficulty in using the original NAD 83 network is that control points are spaced irregularly. Hence, there is a high chance that there will be insufficient control points in the vicinity of your project. The final difficulty is that the original NAD 83 network is not accurate enough to serve as control for GPS observations.

To eliminate or significantly reduce these problems, several states (including Mississippi) have developed, in conjunction with the National Geodetic Survey (NGS), a High Accuracy Reference Network (HARN). The HARN was designed to establish GPS-observable geodetic control points accessible 24 hours a day by car or light truck within, at most, 30 to 45 minutes travel from any point in the state. Once the HARN was established, a new adjustment was computed and the points in the network were assigned new coordinates different from those of the original NAD83 adjustment. The results of the new adjustment are named NAD83 (199x), where (199x) is the year in which the adjustment was completed (e.g., NAD83 (1998) was completed in 1998, etc.). Changes in positional (horizontal) coordinates from the original NAD 83 are expected to range between 1-3.5 feet; thus, the code-based GPS data collection will not be affected by the new values.

The new HARN provides the fundamental reference for all subsequent survey projects in the state. Mississippi currently has 210 HARN stations scattered about the state on a 15-mile (25-kilometer) grid. The HARN is available as a part of the National Spatial Reference System (NSRS) and is managed and distributed by the National Geodetic Survey. Data are available from the NGS in a variety of media.

While the accuracy of the new HARN stations is excellent, the spatial density is lacking. Ideal MDEM spacing would be on a grid of approximately 6 miles (10 kilometers) to adequately support airborne photography and elevation mapping. A control densification survey of an additional 800 HARN stations is needed to fill the gaps between the existing stations. This densification effort should be designed and accomplished according to the guidelines of the *National Height Modernization Surveys (NHS) System Manual #NOS-NGS-58* to ensure that the complete network meets an acceptable level of vertical accuracy.

The staff, in conjunction with the PAC and the TUG, recommends:

1. The Council adopts the High Accuracy Reference Network (HARN) points established and maintained by the National Geodetic Survey (NGS) as the standard horizontal geodetic control layer of MDEM.
2. The Council adopts the *National Height Modernization Surveys (NHS) System Manual #NOS-NGS-58* as the standard for increased vertical control of the MDEM geodetic layer.
3. The Council adopts **NAVD88** as the vertical datum standard.