

JUST THE FACTS

Start Date:

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Duration:

12 months

End Date:

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Funding:

Federal SPR Funds

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SPECIAL POINTS OF
INTEREST:

- Problem Addressed
- Objectives of Research
- Methodology Used
- Implementation Potential

Measurement of Operational Real-Time Kinematic Global Positioning Service for Southeastern Louisiana

PROBLEM

The establishment of accurate and reliable vertical elevations in Louisiana is exceedingly critical due to the substantial impact on flood control, hurricane protection projects, and navigation projects of rapidly changing vertical elevations due to subsidence. Measurement of vertical elevations requires either very long survey level runs from a sparse network of National Geodetic survey (NGS) fixed monuments or one to two days of continuous Global Positioning System (GPS) observations (measurements) at a new benchmark to establish its absolute elevation.

OBJECTIVES

The U.S. Army Corps of Engineers (USACE), New Orleans District, has identified a requirement to supplement and access enhanced services from Louisiana State University's (LSU) Center for GeoInformatics GULFNet GPS network in South Louisiana. LSU is currently enhancing its system to enable a Real-Time Kinematic (RTK) system to serve surveying, engineering, construction, dredging, GIS, and other users. The LSU RTK system currently consists of 42 continuous GPS reference stations, 30 stations equipped with RTK controller software, and servers located at LSU.

This project consists of a services contract to provide expanded RTK coverage and licenses to enable government resources and USACE agents to more efficiently obtain vertical elevations in South Louisiana.

METHODOLOGY

The expanded RTK Network system will extend operational service for RTK surveying and related services throughout the Mississippi River and Atchafalaya River corridors. The north to south limits of this coverage shall be from Old River near Simmesport to the Gulf of Mexico. To complete the RTK coverage in these corridors, LSU will establish three new Continuously Operated Reference Stations (CORS) on USACE's behalf at these locations:

1. USACE Old River Auxiliary Control Structure,
2. USACE Bayou Sorrel Lock Structure, and
3. Atchafalaya DWF or other locations to benefit USACE projects.

At the USACE facilities, the government will provide cooperation for LSU placement, operation, egress, utilities, and possible Internet access via DSL.

The Center for Geoinformatics at LSU, in cooperation with the National Geodetic Survey (NGS), has created the Louisiana Spatial Reference Center (LSRC). LSRC is building a state-wide network of high precision GPS receivers, termed GULFNet, that will re-establish the official federal coordinate reference system within the state. This state-wide positional infrastructure will be the backbone for surveying in Louisiana as well as supporting all GIS development, detailed topographic mapping, precision farming, navigation, and other geospatial applications. The system will also focus on pinpointing the location of subsidence and measuring exactly how fast the coast is sinking. This will provide current levee heights and locations as part of a levee safety program.

A special feature of RTK solutions determined using the LSU network is that they are based on officially sanctioned CORS that constitute the National Spatial Reference System in Louisiana. The referenced datums are NAD83 (horizontal) and NAVD88 (vertical). The x, y, and z coordinates for each CORS are updated every three days during national adjustments performed by NGS and LSU. Using dual frequency GPS receivers, an appropriate antenna, and following common RTK surveying procedures, surveyors can obtain accurate and precise horizontal and vertical measurements under typical conditions. With observation times of ~ one minute following initialization, RTK can allow dual frequency GPS users to achieve accuracies of $\sim \pm 3$ cm for horizontal and $\sim \pm 5$ cm for vertical.

IMPLEMENTATION POTENTIAL

LSU is providing the USACE with up to 10 licenses and access codes that will allow access to the existing LSU network in the current cellular coverage area. Using the GULFNet GPS Reference Network will allow the USACE, New Orleans District, to obtain accurate measurements of existing levees. These measurements will reflect actual elevations of levees. The GPS measurements will avoid problems with sinking benchmarks since fixed benchmarks are not set, allowing for faster collection of data.

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