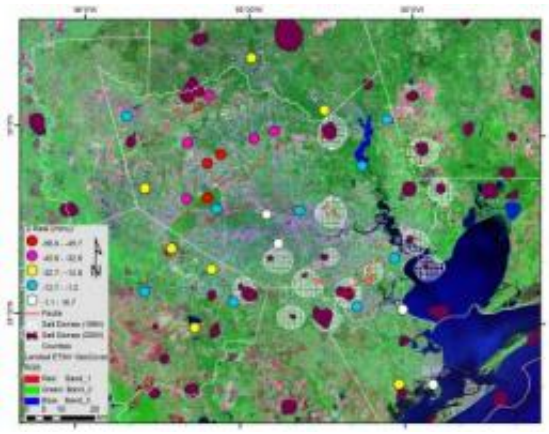
Geologists find parts of Northwest Houston sinking rapidly

September 28 2010



A large section of northwestern Harris County is sinking rapidly, according to a University of Houston geologist who has analyzed GPS data measuring ground elevation in the area. Credit: Shuhab Khan

A large section of northwestern Harris County - particularly the Jersey Village area - is sinking rapidly, according to a University of Houston (UH) geologist who has analyzed GPS data measuring ground elevation in the Houston area.

Some points in Jersey Village are subsiding by up to 5.5 centimeters (about 2 inches) a year, said Shuhab Khan, an associate professor of geology at UH. Khan, along with UH geology professor Kevin Burke and former Ph.D. student and UH alumnus Richard Engelkemeir, studied a decade's worth of detailed GPS data measuring the elevation of various

points throughout the Houston area. They recently published their findings in the journal *Tectonophysics*, an international medium for the publication of research in the fields of geotectonics, geology and physics of the Earth's crust and interior.

"A sprawling area of northwestern Harris County is gradually subsiding, but the points in Jersey Village are sinking fastest," Khan said. "The area is roughly 30 kilometers by 30 kilometers, which is the equivalent of about 18 miles by 18 miles."

The raw data was obtained from the Houston-Galveston Coastal Subsidence District. Khan's study processed and analyzed GPS data from more than two dozen measurement points throughout the county, covering 1995 to 2005. Extrapolating data from six measurement stations, Khan roughly marks the boundaries of the vast subsiding area. At three of those measurement spots, centered around Jersey Village, the sinking was particularly fast.

"Because GPS can pinpoint location with millimeter precision, it is an excellent tool to measure even the most subtle changes over time in the ground," Khan said. "The most likely reason for the sinking of Jersey Village is the withdrawal of water from deep beneath the surface. While groundwater withdrawal has ceased in most of the Houston area, it continues in the northwestern part of the county that has seen a rapid growth in population."

The fate of the Brownwood neighborhood near Baytown illustrates the potential consequences of rapid subsidence, Khan said. When the residential subdivision was first developed in the 1930s, ground elevation was about 3 meters (nearly 10 feet) above sea level. Forty years later, the neighborhood stood just half a meter above sea level and was subject to frequent flooding. In 1983, Hurricane Alicia destroyed the subdivision, and the area became the Baytown Nature Center. The sinking of

Brownwood was attributed to the massive groundwater withdrawal by the petrochemical plants along the Houston Ship Channel.

The research team hopes the new data that pinpoint precisely where and how quickly the ground is moving can aid the region's builders and city planners to mitigate the damage caused by the ongoing subsidence northwest of Houston.

Khan's analysis also showed some gradual rising southeast of Houston along the coast. The coastal area has several vast salt domes deep beneath the surface. Since salt has a lower density than common crustal rocks, it rises and pushes up the ground. He said that further study also might link salt dome activity along the coast to the surface movements occurring elsewhere in the region.

Khan's previous work on the region's elevation has already garnered widespread attention from local media, homeowners and builders. Geologists had long known about the existence of faults in southeast Texas, but Khan and Engelkemeir produced a comprehensive map in 2008 pinpointing the precise locations of some 300 faults traversing the Houston area.

The research team stressed these local fault lines are not the kinds that wreak havoc in earthquake-prone California, but they can move up to an inch per year. Such movement over several years can cause serious damage to buildings and streets that straddle a fault line.

More information: For related research, visit www.uh.edu/news-events/pdf/2008%20faultline%20research%20PR

Provided by University of Houston