

Wavelets

What lies beneath: UH's La Marque Geophysical Observatory

By Li Chang, Robert Stewart, and Azie Aziz



Figure 1. The research team from the Allied Geophysical Lab of University of Houston (E. Kocel photo).

What was once a military base, Camp Wallace some 15 miles north of Galveston, has become an educational and research preserve of The University of Houston. As part of this 950-acre UH Coastal Center, the Allied Geophysical Lab and the Department of Earth and Atmospheric Sciences have established the La Marque Geophysical Observatory. The mission of the Observatory is to provide a site and capability for advanced geophysical training (**Figure 1**), research, and monitoring.

The Coastal Center, as a whole, hosts a producing oilfield (some 300 BOPD), atmospheric sounding and sampling facilities, and botany and biology labs. As part of developing the Geophysical Observatory, two shallow (450 ft) wells were drilled and cased at the site (**Figure 2**). The wells are currently used to conduct borehole geophysics research and teaching. High

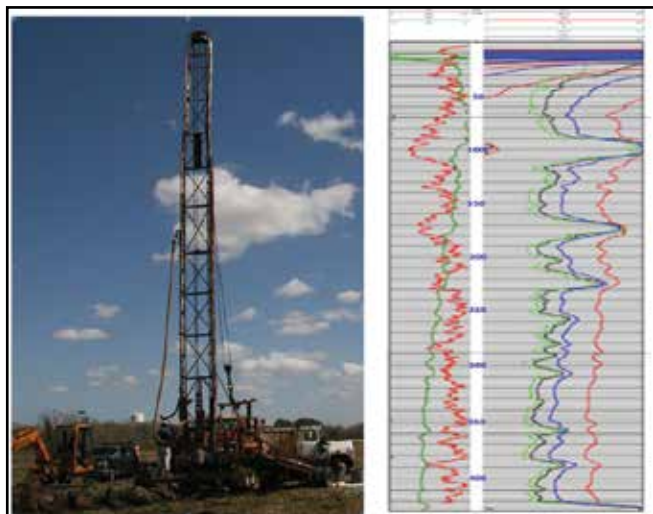


Figure 2: Drilling rig and resulting gamma ray and electrical logs at La Marque Geophysical Observatory.

electrical resistivities on the logs are indicative of fresh-water saturated sands.

In addition, a number of objects (drums, containers) have been buried to become targets of near-surface exploration and remediation surveys. The legacy grid of oyster-shell roads at the site provides excellent access for surface seismic training surveys.

In March, 2012, we acquired a vertical vibe (**Figure 3**) line along the east-west entrance road. We were pleasantly surprised by the quality of the reflection data where we could see events down to about 2 s on the raw data (**Figure 4**).



Figure 3: The AGL's minivibe at the La Marque Geophysical Observatory, Texas.

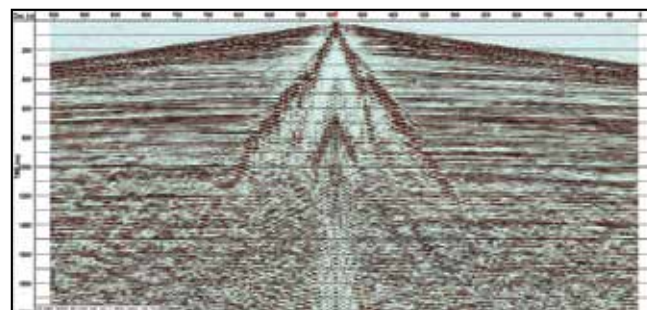


Figure 4: Vertical vibe shot gather at La Marque filtered with a 25-35-100-120 Hz bandpass. The receiver spread consisted of 192 geophones spaced at 5 m.

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The high-quality P-wave data motivated us to try recording pure shear-wave seismic reflection data. In early October 2013, we returned to the site with our IVI mini-vibe now configured as a horizontal shaker. The S-wave test used the minivibe shaking in a crossline direction with a 10 -150 Hz sweep over 12 seconds. Eight 24-channel Geodes recorded a total of 192 horizontal (cross-line) geophones. Vibe points were on the 1/2 station at 5 m intervals. In **Figure 5**, we show a quick brute stack of the resultant data. We can see S-wave reflections down to about 3 s!

We are excited about future developments and use of the Observatory for long-term measurements of geophysical phenomena as well as exploration surveys, tests, and teaching. And we'd be pleased to collaborate!

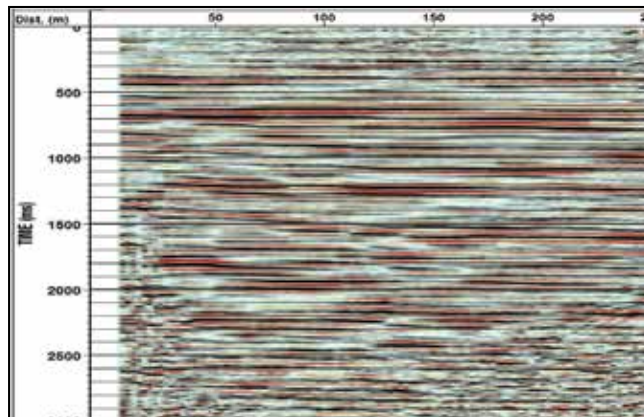


Figure 5. S-wave stack using horizontal vibe and geophones.

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presence in the classroom and advocating in the PTO can lead a child who does not fit in to graduate ultimately with a Masters Degree. There is hope for your children and grandchildren, ladies. **Barbara Bush** did this.

On the humorous side, what if you are a decade younger than your brothers. Your dad has been President. One of your older brothers is a Florida Governor. Another has been a governor of TEXAS, and also President. What will an apparently underachieving little brother become? That is a lot of pressure. Oh well — have six children of your own and see what happens.

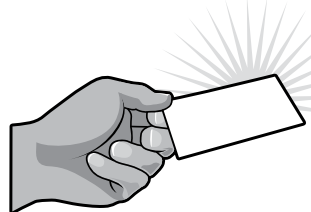
December brings serenading by **“The Kingsmen”**. Ladies will swoon and enjoy a wonderful calming, mood-adjusting program before returning to the hustle and bustle of preparing for the holidays. A lovely lunch at a decorated **Lakeside Country Club** and visiting with old and new friends will become a lovely respite.

As everyone changes out calendars this month, be sure to enter your 2014 HPAC events on those new, empty ones. Start with **February 12, 2014!** That is a Wednesday. Be at **Braeburn Country Club for Game Day**. Do not know how to play? Bring one of your own. “Kings in the Corner”, Bridge, Dominos, and many more will be available, and every table needs just one more person — YOU, to fill all seats at the table. **Daisy Wood** will have lots of prizes to entertain you. It will be a fun, relaxed day — they are allowed, you know — in your hectic schedules!



HPAC Volunteers, Mickey Murrell, Wanda Shaw, and Daria Dick.

See you in the New Year ... have a safe and happy Holiday Season.



Here's My Card

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