BRIGHTSPOTS

Allied Geophysical Laboratories University of Houston

NEWSLETTER OCTOBER 2011 VOL. 1, NO.1

WELCOME!

We are delighted to welcome you to the inaugural issue of "Brightspots", our AGL news communiqué. There're lots of exciting things happening at AGL and we look forward to sharing them with you. Geophysics at the University of Houston is flourishing with over 150 graduate students – making it one of the largest geophysics programs in the world. We're embedded in a city of energy where geophysics thrives. This proximity, along with a global community of wonderful colleagues, provides many educational, professional, and research opportunities and challenges. Interest in geophysics is burgeoning, along with the problems that we all are urgently called upon to solve. We hope that Brightspots will engage you with enthusiasm and edify with the efforts that we bring to our science and application of geophysics.

Dr. Robert Stewart
Director, AGL

SEG PRESENTATIONS BY AGL MEMBERS:

(The full abstracts are available online at http://www.agl.uh.edu/resources-seg11.php)

Presenter	Topic
Jingqiu Huang (Daisy)	Integrated well-log, VSP and surface seismic analysis of near-surface glacial segments: Red Lodge, Montana
Bode Omoboya	Uniaxial stress and ultrasonic anisotropy in a layered orthorhombic medium
Johny Seales	Channel and fracture indicators from narrow-band decomposition at Dickman field, Kansas
Robert Stewart	Physical modeling of anisotropic domains: Ultrasonic imaging of laser-etched fractures in glass
Qiong Wu	Case study: Comparison on shear wave velocity estimation in Dickman field, Ness county, Montana
Soumya Roy	Density prediction from ground-roll inversion
Henrique Fraquelli	Reservoir volume uncertainty

IN THIS ISSUE

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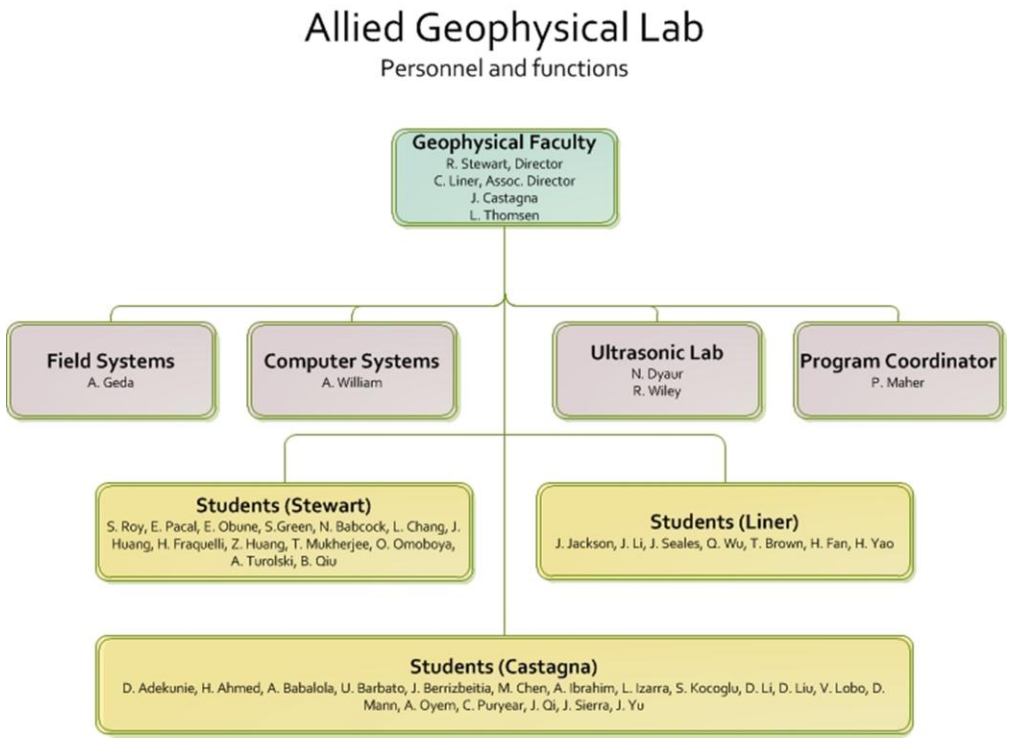
Recent AGL M.S. and Ph.D. theses (available online at www.agl.uh.edu/resources-thesis.php)

Topic	Author	Advisor	Details
Reservoir Characterization and Steam Monitoring in Heavy Oil Reservoirs	Ayato Kato	Dr Robert Stewart, Dr De-hua Han	PhD, Dec 2010
Subsalt Seismic Illumination Study	Anna Belen Sanz Fernandez	Dr Chris Liner	MS Thesis, December 2010
Enhancing Geologic Interpretations with Seismic Attributes in the Gulf of Mexico	Scott H. Rubio	Dr Chris Liner	MS Thesis, December 2010
Mapping Deep Structure in Ness County, Kansas for CO2 Storage Characterization	Shanon Nikole LeBlanc	Dr Chris Liner	MS Thesis, May 2011
Seismic Imaging of Anisotropic Domains: Physical Modeling and a Bakken Shale Field Case	Omoboya Olabode Kingsley	Dr Robert Stewart	MS Thesis, August 2011
VSM-Assisted Seismic Interpretation: Glacial Terraces, Red Lodge, Montana and AVO Effects, Garden Banks, Gulf Of Mexico	Jingqiu(Daisy) Huang	Dr Robert Stewart	MS Thesis, August 2011
Salt Reconstruction and Study of Depositional History, Upper Jurassic, East Texas Basin	Krista Modelli	Dr Chris Liner	MS Thesis
Building Subsurface Velocity Models Using Ocean-Bottom Seismic Data: Green Canyon, Gulf of Mexico	Ken Obiora Uduanochie	Dr Robert Stewart	MS Thesis, October 2011



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AGL MINIVIB

Ady Geda, Field Systems

AGL has recently added a seismic source to its fleet – the Minivib from Industrial Vehicles International, Inc. Tulsa. Our T-15000 Minivib is capable of generating sweeps over a range of 5.8 octaves from 10 to 550 Hz.

Before heading to the 2011 YBRA Geophysics Field Camp, situated near Red Lodge Montana, the Minivib's communication systems and telemetry capacity were established. The UH Research Park area served as our test site for initial seismic recording. We used our StrataVisorNZ and Geode recording systems with vertical and 3C geophones as receivers.

Left to right from the top: AGL field team at Montana, testing with StrataVisor NZ, VSP results (edited using Gedco Vista).

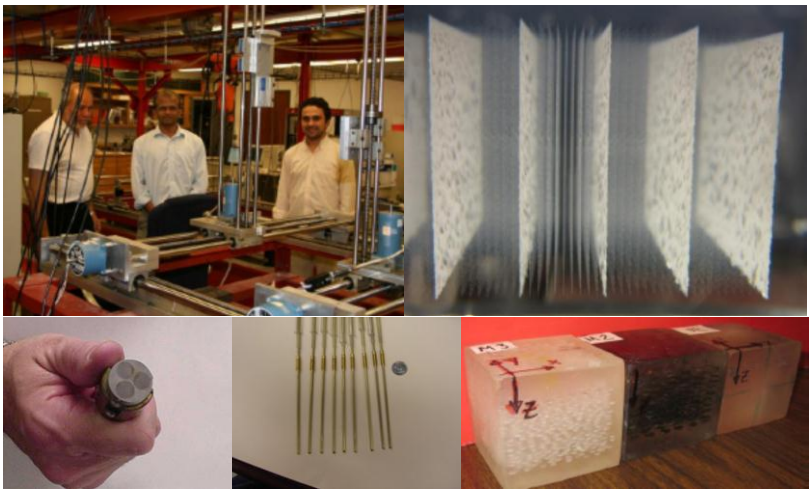
After mobilizing our equipment to Montana, we undertook a number of geophysical surveys (vertical seismic profiling in the YBRA wells YB1 & YB2; multicomponent lines at the nearby Glacial Bench and in Wyoming at the Elk Basin oil field). The resulting data were excellent and are now being processed at UH in various courses (and theses) as well as at UT Austin and even by visitors from the National Geophysical Research Institute in India!

PHYSICAL MODELING AT AGL

A. William, System Analyst, AGL

Overview

With more than a three-decade history, the AGL has been a leading center for physical modeling. In the last three years, AGL has updated the lab to reflect the advancements in technology and demand for physical modeling. At present, we have built two state-of-the-art physical modeling systems and other computational resources based on the National Instruments platform. The systems we have are as follows:



From top left to right: AGL members, magnified view of a model, 3C transducer, pinducers and models.

Land System

This system is built to simulate land acquisition of seismic data. This system can support four simultaneous receiver channels with sampling rate of 10 Mega Samples per second (MS/s) per channel and can support two independent sources. The robotic system gantry can run modeling using complex geometries of sources and receivers.

Marine System

This system is built to simulate marine environments. With a large tank and robotic gantry for sources and receivers, this system can handle bulkier models in marine environments. This system can support a maximum of sixteen simultaneous channels with a sampling rate of 10MS/s per channel and can support up to eight receivers.

Transducers

We have experimented with various kinds of transducers (50KHz to 5MHz) to simulate different environments.

Models

We are constantly exploring new ways to build models to represent real world environments. In addition to the previous modeling facilities, we are especially excited about our new laser-etched models as well as novel 3D printed models.

COURSE SCHEDULE FOR FALL 2011 AND SPRING 2012:

Courses	Instructor	Day/Time
Multicomponent Seismic	Dr. Robert Stewart	4:00pm - 5:30pm T Th, Fall 2011
Geophysical Data Processing	Dr. Chris Liner	7:00pm - 8:30pm M W, Fall 2011
3-D Seismic Exploration I	Dr. Chris Liner/ Dr. Janok Bhattacharya	4:00pm - 5:30pm M W, Fall 2011
Computational Geophysics	Dr. John Castagna	7:00pm - 10:00pm T, Fall 2011
Applied Geophysics Seminar	Dr. John Castagna	10:00am - 4:00pm F, Fall 2011
Geophysical Data Acquisition	Dr. Robert Stewart	Spring 2012
Reservoir Geophysics	Dr. John Castagna	Spring 2012
3D Seismology	Dr. Fred Hilterman	Spring 2012
Potential Methods	To Be Announced	Spring 2012
Seismic Data Processing	To Be Announced	Spring 2012

FEATURED ABSTRACT

(The full abstract is available online at http://www.agl.uh.edu/resources-seg11.php)

Density prediction from ground-roll inversion

Soumya Roy and Robert R. Stewart

Bulk densities are often predicted from seismic velocities using the Gardner's relation if density information is unavailable. P-wave velocity is used in the Gardner's relation. We used a modified Gardner's relation to predict bulk densities from S-wave velocities where we estimated S-wave velocities using the noninvasive ground-roll inversion method. Different types of seismic data sets have been used: i) numerical and physical modeling; ii) data from: Red Lodge, Montana, and the Barringer (Meteor) Crater, Arizona. The main objectives of the paper are: i) to test the modified Gardner's relation for different types of materials, ii) to estimate errors between known and predicted bulk densities, and iii) to compare different empirical exponent values to minimize the error. We estimate predicted densities with maximum error of 0.5 gm/cc for known values (the blank glass model and Montana site). A maximum change of ± 0.01 in the exponent values provide a better match for the known models. We find exponential values for the modified Gardner's relation varying from 0.21 to 0.23 for all the cases compared to the suggested value of 0.22. So, the prediction of bulk densities for varied materials maintains a confidence level of above 90%.

Well-logging at AGL

Recently, we conducted several well-log surveys at the API Logging Calibration facility situated at the University of Houston. The logging runs where undertaken as part of the Multicomponent Seismic Exploration course thought by R. Stewart. The probes we used included the gamma ray-temperature instruments and the sonic probe which are part of the AGL's logging arsenal.

A SPECIAL THANKS TO OUR SUPPORTERS:

ConocoPhillips EXXON GEDCO Geokinetics Marathon Oil Corporation. HESS bp

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