

## Surface Geochemical Calibration Study Phase III Proposal

The **Surface Geochemical Calibration (SGC)** study is a multi-year research program currently underway by the *Geochemistry Group* at the Energy & Geoscience Institute, University of Utah. The SGC research project has been subdivided into three major phases:

- **Phase I - Empirical Observations:** Key objectives are to provide improved seep interpretation guidelines, pitfalls, and limitations; best practices for near-surface geochemical sample collection and analysis; and comprehensive review of seep detection methods using a worldwide surface-subsurface database with over 12,000 sites from both onshore and offshore from multiple surface detection methods.

**Status:** Completed October 15, 2002

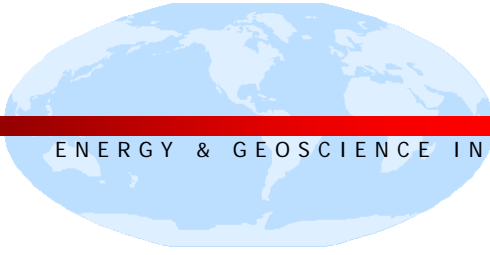
- **Phase II - Laboratory and Modeling Studies:** Key objectives are to evaluate surface geochemical hydrocarbon oil & gas sediment extraction procedures and analytical methods utilizing processed sediments charged with known hydrocarbon gas and liquid standards; quantitative evaluation hydrocarbon partitioning in near-surface sediments and sample cans using laboratory experimentation and quantitative modeling; and development of new extraction and analytical protocols and methods to detect hydrocarbon seepage in near-surface marine sediments.

**Status:** To be completed October 30, 2004

- **Phase III - Field Operations:** Key objectives will be to test analytical methods and procedures developed in Phase II; evaluate new contractor methods, and provide revised best practices guidelines for sample collection, analysis, and interpretation based on Phase III field study results (see more detailed summary of objectives below).

### **Phase III Project Objectives:**

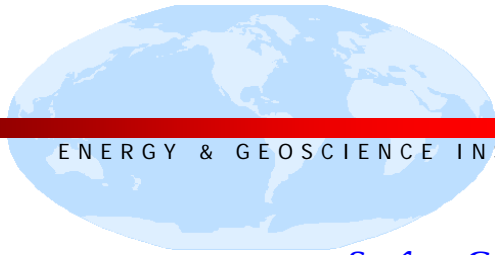
1. field test analytical methods and protocols developed in Phase II and compare to existing methods and protocols:
  - a. disrupter versus headspace sediment gas extraction methods,
  - b. SPME (solid phase micro-extraction) gasoline range extraction and detection procedure, and
  - c. new high molecular weight (C<sub>15</sub> plus) solvent extraction (polar solvent mix) and multi-component separation procedures.



### Surface Geochemistry Calibration Study Phase III Proposal, cont.

#### Phase III Project Objectives, cont.:

2. evaluate volatile loss in deep water sediment sample collection:  
Examine potential volatile loss and phase fractionation from cores collected in deep water by utilizing IODP pressured core barrel.
3. examine new surface geochemical contractor or research methods during field operations:
  - a. *Hanby Colometric Test* (HCT) kits provide an inexpensive on site method to determine presence anomalous aromatic hydrocarbons in surface sediments. We would propose a field test to determine HCT kit effectiveness in detecting low level surface seepage.
  - b. Portable methane sensor under development by University of Victoria and Woods Hole Oceanographic Institute (WHOI) capable of measuring low concentrations of methane in real time and deep water.
  - c. *SARD* (Serial Analysis Ribosomal DNA): Test Taxon's bacterial diversity profiling using DNA sequences in marine sediments.
4. provide revised best practices guidelines and limitations for sample collection, analysis, and interpretation based on Phase II/III results.  
Update Phase I best practices guidelines and limitations based on results from SGC Phase II and III.
5. develop best methods to collect ocean surface hydrocarbon slick.  
Test different methods ranging from surface skimmers, water collection with molecular sieve, and sorbent collectors to evaluate best practices for collection of thin ocean surface hydrocarbon bearing slick with minimal fractionation.
6. laboratory evaluation sorbed light hydrocarbon gas analysis.  
Conduct laboratory experiments in conjunction with University of Victoria to evaluate process of sorption and how acid extraction procedure relates to migrated thermogenic hydrocarbons.
7. migration modeling and mechanism evaluation.  
Examine near-surface migration issues in conjunction with work underway by Professor Ron Klusman at the Colorado School of Mines.



## Surface Geochemical Calibration Study

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### Surface Geochemical Calibration Study Phase III Proposal cont.

#### Key Deliverables:

1. Digital geochemical database from field and laboratory studies.
2. Research report both hard copy and digital documenting:
  - summary of key observations from laboratory and field studies,
  - evaluation of new technologies and methods, and
  - best practices guidelines and limitations for sample collection, analysis, and interpretation.

#### Field Operations:

We propose collecting sediment samples in the offshore Gulf of Mexico (US), west Africa (Nigeria and Angola), Australia (NW Shelf and Great Australian Bight), and South America (Brazil). The samples will be collected in conjunction with existing proprietary, consortium, and geological survey research programs to minimize operational costs.

#### Estimated program cost:

Phase III is estimated to be \$37,055 per sponsor (assuming 8 sponsors)

#### Research Team:

- Michael Abrams: principal investigator
- Nick Dahdah: laboratory analysis
- Eva Francu: laboratory analysis and modeling studies
- Janice Erickson: laboratory technician

#### Project timing:

The *Surface Geochemistry Calibration* study Phase III will start on December 15, 2004 and span 21 months. We anticipate 4 project update meetings both in Europe and US for Phase III sponsors.

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