

AUSTRAL/MALVINAS OIL STUDY

**REGIONAL PETROLEUM GEOCHEMISTRY
OF CRUDE OILS FROM THE
AUSTRAL AND MALVINAS BASINS, ARGENTINA**

GEOMARK
RESEARCH, INC.

A PROSPECTUS

EXECUTIVE SUMMARY

GeoMark Research has completed a non-exclusive geochemical evaluation of a suite of oil samples from the producing basins along the southern coast of Argentina. Each of the oils in the study was characterized using a detailed analytical program which includes quantitative biomarker and stable carbon isotope analyses. With this information, we have grouped the oils into genetically related families and predicted the character of their respective sources. The results have been used to address several questions of exploration significance, including:

- Determine the number of distinct oil families active in the two basins, and characterize their sources.
- Determine if all of the oils have all been generated by a single Cretaceous source (Springhill).
- Compare the Malvinas oils to those from the Austral Basin to determine if a mature, organic rich Springhill source rock extends into the offshore.
- Map the distribution of the oil families along the southern Argentine coast.
- Map the distribution of oil families in the southern Argentine coastal basins and determined if the coastal Argentine oils have any similarities to either Brazilian or African oils.

All of the analytical data generated from the oils have been compiled together with an interpretive report. The reports includes full color, wall-sized maps of oil family and subfamily distributions. In addition, the results include a regional petroleum geology synthesis.

The cost of the complete study is US \$12,500, and is immediately available to participating companies

INTRODUCTION

Sedimentary basins along the eastern margin of South America are currently receiving increased exploration attention. This is due to the recent discovery of large reserves along this trend, and to even more impressive discoveries in West Africa (Edwards and Bignell, 1988). In southern Argentina interest is also due to the opening of offshore blocks in the area.

Experience gained in numerous oil studies suggests that future exploration efforts along the eastern margin of South America would be greatly enhanced by regional evaluations of oil geochemistry. Previous geochemical studies in the region (e.g., Mello *et al.*, 1988; Zumberge, 1984; Talukdar *et al.*, 1988) have documented the inter-relationships of many of the oils, and similar studies in West Africa have confirmed the value of the regional oil study approach.

To this end, GeoMark Research has completed a non-exclusive study of selected oil samples from each of the producing regions along the northern and eastern margins of South America. The study includes 112 oils from South America and 18 from West Africa

These studies are for sale to interested oil companies. This proposal outlines the individual study of the Austral and Malvinas Basins of southern Argentina. This particular study consists of the analysis of 16 oils listed in Appendix A, and illustrated in Figure 1.

METHODOLOGY AND EXPLORATION APPLICATIONS

In areas such as the Austral and Malvinas Basins, where production has been established, a regional oil study is an excellent way of identifying, evaluating and comparing the various petroleum systems that have contributed to reserves. A regional oil study approach is particularly important in the study area because of possible genetic relationships between the petroleum systems on both sides of the Atlantic Ocean.

Regional petroleum systems can be evaluated by first determining the number of effective source units within a region by establishing the number of compositionally distinct oil families. The source facies of each oil family can then be deduced from the oil geochemistry (e.g., Zumberge, 1987; Moldowan *et al.*, 1985). Conclusions can be reached regarding source lithology, anoxicity, salinity, organic input (marine, non-marine or marginal marine) and thermal maturity using a variety of parameters based on molecular and bulk composition. In some cases it may be possible to bracket the age of the source from the oil data.

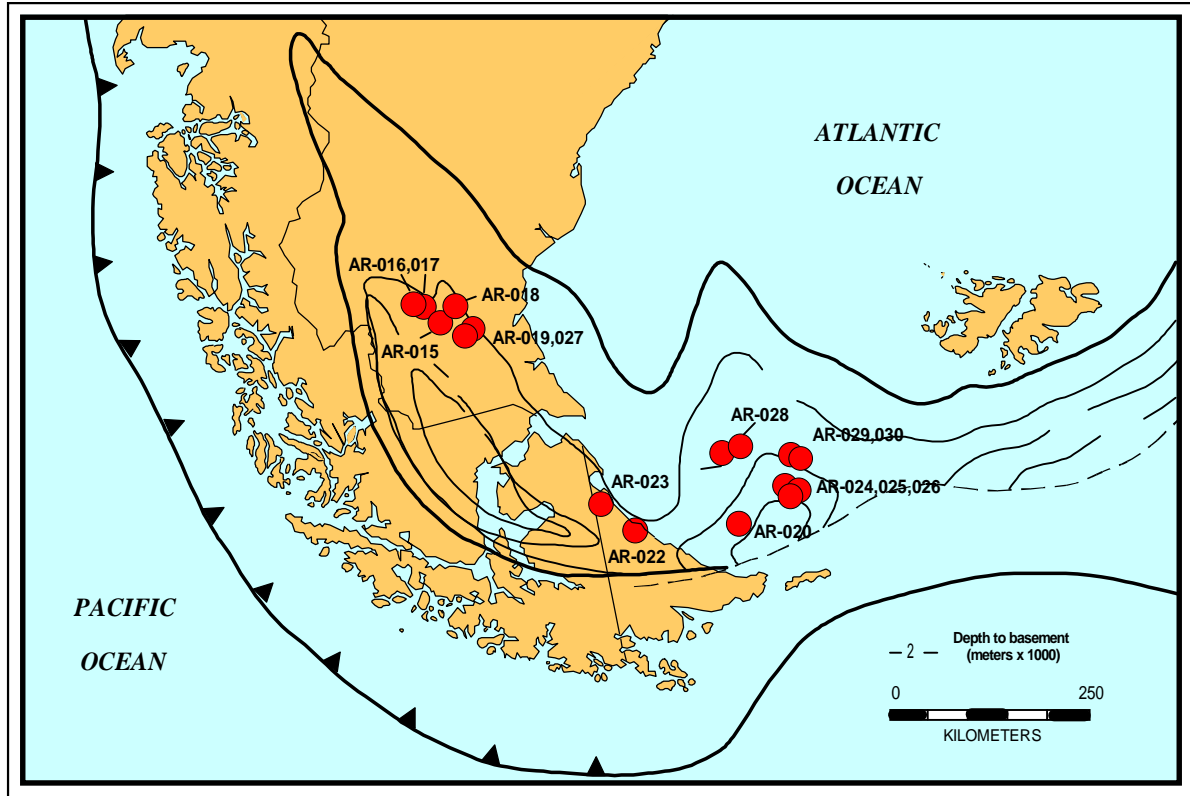


Figure 1. Location Map Showing Position of Samples in the Austral/Malvinas Oil Study.

ANALYTICAL PROGRAM

The following techniques were employed on each of the oil samples:

- API Gravity
- % Sulfur
- C15+ vs. <C15+
- Deasphalting
- Liquid Chromatography (%Sat %Aro %NSO)
- Capillary GC of Whole Crudes
- Stable Carbon Isotopes for both Sat and Aro Hydrocarbon Fractions
- GC/MS of Saturates for Terpane/Sterane Distributions (quantitative)

PRESENTATION OF RESULTS

Results of the study are presented in both analytical and interpretive formats to insure that all findings are readily accessible to explorationists and research personnel. All of the analytical data is provided in hard copy and on personal computer disks. Whole oil chromatographic and GC/MS raw data are available on mini-tape cassettes.

Analytical data are presented within a **Data Volume**, and include the following:

- physical property data
- liquid chromatographic data
- gas chromatographic results
- stable carbon isotope data
- GC/MS mass chromatograms.

A synthesis and interpretation of all information is presented in a comprehensive **Final Report**. This Report includes sections for:

- regional petroleum geology,
- production histories,
- differentiation of oil families by multivariate statistics,
- interpretation of oil characteristics,
- inferred oil/source correlations,
- oil generation and migration.

In addition, the geographic distribution of oil families and associated petroleum systems will be presented on a large format, colored map.

PARTICIPATION

The cost of the Austral/Malvinas Study is US \$12,500. The report is complete and immediately available.

FOR ADDITIONAL INFORMATION CONTACT:

Mr. Stephen W. Brown
GEOMARK RESEARCH, INC.
9748 WHITHORN DRIVE
HOUSTON, TX 77095
Telephone: (281) 856-9333
Fax: (281) 856-2987
E-mail: sbrown@geomarkresearch.com

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APPENDIX A

OILS ANALYZED FOR THE
AUSTRAL/MALVINAS OIL STUDY

<u>SAMPLE NO.</u>	<u>FIELD NAME</u>	<u>WELL NAME</u>
<i>Austral Basin:</i>		
AR-015	La Carmen	SC ALCA X-7
AR-016	Campo Boleadoras	SC ACBA X-P7
AR-017	Campo Boleadoras	SC ACBO X-P10
AR-018	An Aike	SC AAA X-1
AR-019	Puesto Peter	SC APP X-1
AR-022	Sur Arroyo Candelaria	TFSA CA X-1
AR-023	Sur Arroyo Gamma	AGS X-1
AR-027	Puesto Peter	SC APP X-1
<i>Malvinas Basin:</i>		
AR-012	Krill	X-1
AR-020	Ciclon	X-1 DST-5
AR-024	Wildcat DST	SALMON X-1
AR-025	Wildcat DST	SALMON X-1
AR-026	Wildcat DST	SALMON X-1
AR-028	Calamar-1	CMA-12 CA X-1
AR-029	Wildcat DST	SALMON X-2
AR-030	Wildcat DST	SALMON X-2