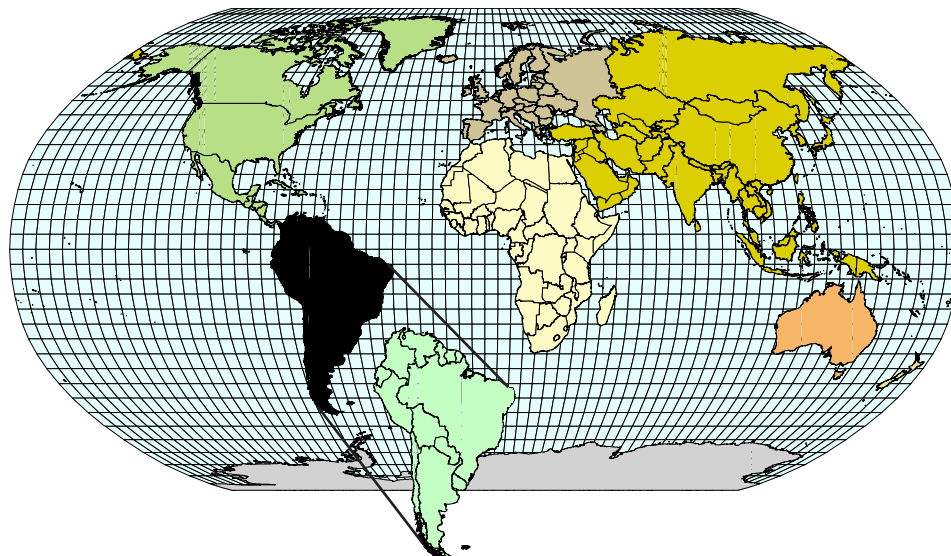


U.S. Department of the Interior
U.S. Geological Survey

MAPS SHOWING GEOLOGY, OIL AND GAS FIELDS, AND GEOLOGIC PROVINCES OF THE SOUTH AMERICA REGION.

Compiled by Christopher J. Schenk, Roland J. Viger, and Christopher P. Anderson



OPEN-FILE REPORT 97-470D

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature. Any use of trade names is for descriptive purposes only, and does not imply endorsement by the U.S. government.

Portions of this database covering the coastline and country boundaries contain intellectual property of Environmental Systems Research Institute, Inc. (ESRI), and are used herein with permission. End users are permitted to use these data for their own internal use, including any derivative work, but are prohibited from using and distributing these data individually or in a derivative work to third parties.

U.S. Geological Survey Open-File Report 97-470D

MAPS SHOWING GEOLOGY, OIL AND GAS FIELDS, AND
GEOLOGIC PROVINCES OF THE SOUTH AMERICA
REGION

Table of Contents

Preface

Introduction

Primary References

Geologic Provinces of South America Region

MAP SHOWING GEOLOGY, OIL AND GAS FIELDS, GEOLOGIC
PROVINCES OF SOUTH AMERICA

MAP SHOWING OIL AND GAS FIELDS AND GEOLOGIC
PROVINCES OF SOUTH AMERICA

PREFACE

This is one of a series of products resulting from the World Energy Project of the U.S. Geological Survey. Inquiries about this CD-ROM or the Project's effort in the South America Region should be addressed to:

Christopher J. Schenk (Coordinator, South America region)
U.S. Geological Survey MS 939
Box 25046
Denver Federal Center
Denver, CO 80225

Tel: 303-236-5796
Email: schenk@usgs.gov

Inquiries about the U.S. Geological Survey's World Energy Project should be addressed to:

Thomas S. Ahlbrandt (Coordinator, World Energy Project)
U.S. Geological Survey
Box 25046
Denver Federal Center
Denver, CO 80225

Tel: 303-236-5776
Email: ahlbrandt@usgs.gov

INTRODUCTION

This digitally compiled map includes geology, geologic provinces, and oil and gas fields of South America. The map is part of a worldwide series on CD-ROM by World Energy Project released of the U.S. Geological Survey . The goal of the project is to assess the undiscovered, technically recoverable oil and gas resources of the world and report these results by the year 2000. For data management purposes the world is divided into eight energy regions corresponding approximately to the economic regions of the world as defined by the U.S. Department of State. South America (Region 6) includes Argentina, Bolivia, Brazil, Chile, Columbia, Ecuador, Falkland Islands, French Guiana, Guyana, Netherlands, Netherlands Antilles, Paraguay, Peru, Suriname, Trinidad and Tobago, Uruguay, and Venezuela.

Each region is then further divided into geologic provinces on the basis of natural geologic entities and may include a dominant structural element or a number of contiguous elements. Some provinces contain multiple genetically related basins.

Geologic province boundaries for the South America are delineated using data from a number of geologic maps, and other tectonic and geographic data (see References). Offshore province boundaries are defined by the 4000 meter bathymetric contour. Each province is assigned a unique number; the first digit is the region number. It is attempted to number the provinces in geographical groups; onshore, offshore, and combined on and offshore. The list of the provinces sorted by Code is shown in Adobe Acrobat samgeo.pdf file (see section V below).

Oil and gas field data from Petroconsultants International Data Corporation worldwide oil and gas field database are allocated to these provinces. The geologic provinces are being further subdivided into petroleum systems and assessment units in order to appraise the undiscovered petroleum potential of selected provinces of the world.

Specific details of the data sources and map compilation are given in the metadata file on this CD-ROM. Smaller stratigraphic subdivisions of Phanerozoic rock are combined to simplify the map and to maintain consistency with other maps of the series. Precambrian rocks are undivided. Oil and gas field markers represent field centerpoints published with permission from Petroconsultants International Data Corp., 1996 database.

This map is compiled using Environmental Systems Research Institute, Inc. (ESRI) ARC/INFO software. Political boundaries and cartographic representations on this map were taken, with permission, from ESRI's ArcWorld 1:3M digital coverages, have no political significance, and are displayed as general reference only.

Portions of this database covering the coastline and country boundaries contain intellectual property of Environmental Systems Research Institute, Inc. (ESRI), and are used herein with permission. Copyright 1992 and 1996, Environmental Systems Research Institute, Inc. All rights reserved.

REFERENCES

Audemard, F., and Lugo, J., 1997, Petroleum geology of Venezuela: American Association of Petroleum Geologists, Short Course Notes, Dallas, Texas, April 5-6, 1997, chapter paginated.

Bigarella, J.J., 1973, Geology of the Amazonas and Parnaíba Basin, in Nairn, A.E.M., and Stehli, F.G., eds., The ocean basins and margins; the south Atlantic: Plenum Press, New York, v. 1, p. 25-86.

Cainelli, C., and Mohriak, W.U., 1998, Geology of Atlantic eastern Brazilian basins ; Brazilian Geology, Part 2: 1998 AAPG International Conference and Exhibition Short Course, November 12-13, 1998, Rio de Janeiro, Brazil, unpaginated.

Committee on the World Geologic Map, 1964, Geologic map of South America: Rio de Janeiro, Brazil, 2 sheets, 1:5000000 scale.

Jordan, T.E., and Allmendinger, R.W., 1986, The Sierras Pampaneas of Argentina: a modern analogue of Rocky Mountain foreland deformation: American Journal of Science, v. 286, p. 737-764.

Kingston, J., 1994, Undiscovered petroleum resources of South America: U.S. Geological Survey Open-File Report 94-559, 443 p.

McGettigan, C.K., and Hunt, D.G., 1996, Columbia continues to yield major oil, gas discoveries: Oil and Gas Journal, July 15, 1996, p. 40-45.

Mordojovich, C., 1981, Sedimentary basins of the Chilean Pacific offshore, in Energy Resources of the Pacific Region: American Association of Petroleum Geologists, Studies in Geology, v. 12, p. 732-749.

Ojeda, H.A.O., 1982, Structural framework, stratigraphy, and evolution of Brazilian marginal basins: American Association of Petroleum Geologists Bulletin, v. 66, no. 6, p. 732-749.

Tankard, A.J., R. Suarez, S., and Welsink, H.J., eds., Petroleum basins of South America: American Association of Petroleum Geologists Memoir 62, p. 63-77.

Travis, R.B., Gonzales, G., and Pardo, A., 1975, Hydrocarbon potential of coastal basins of Peru: American Association of Petroleum Geologists Memoir 25, p. 331-338.

Urien, C.M., and Zambrano, J.J., 1973, The geology of the basins of the Argentine continental margin and Malvinas Plateau, in Nairn, A.E.M., and Stehli, F.G., eds., The ocean basins and margins; the south Atlantic: Plenum Press, New York, v. 1, p. 135-169.

Urien, C.M., Zambrano, J.J., and Yrigoyen, M.R., 1995, Petroleum basins of southern South America: a review, in Tankard, A.J., R. Suarez, S., and Welsink, H.J., eds., Petroleum basins of South America: American Association of Petroleum Geologists Memoir 62, p. 63-77.

Yrigoyen, M.R., 1991, Energy resources map of the Circum-Pacific region ; southeast quadrant: U.S. Geological Survey Circum-Pacific Map Series, Map CP-39, 2 sheets, 1:10000000 scale.

6001 oceanic basins around South America
6002 Guyana Shield
6003 Brazilian Shield
6004 Brazilian Shield
6005 Brazilian Shield
6006 Andean Province
6007 Familina Province
6008 Canadon Asfalto Province
6009 Deseado-Falklands Province
6010 Tacutu Basin
6011 Solimoes Basin
6012 Amazonas Basin
6013 Sucunduri Province
6014 Parecis Province
6015 Xingu Province
6016 Parnaiba Basin
6017 Sao Francisco Basin
6018 Diamantina Province
6019 Araripe Province
6020 Parana Basin
6021 Guyana-Suriname Basin
6022 Foz de Amazonas Basin
6023 Santana Platform
6024 San Luis Basin
6025 Barreieinas Basin
6026 Caera Basin
6027 Potigar Basin
6028 Pernambuco Basin
6029 Sergipe-Alagoas Basin
6030 Jatoba Basin
6031 Tucano Basin
6032 Reconcavo Basin
6033 Bahia Sul Basin
6034 Espirito Santo Basin
6035 Campos Basin
6036 Santos Basin
6037 Pelotas Basin
6038 Santiago Basin
6039 Huallaga Basin
6040 Ucayali Basin
6041 Putamayo-Orient-Maranon Basin
6042 Acre Basin
6043 Madre dos Dios Basin
6044 Beni Basin
6045 Santa Cruz-Tarija Basin
6046 Oran-Olmedo Basin

6047 Chaco Basin
6048 Bolsones Basin
6049 Bermejo Basin
6050 Mascasin Basin
6051 Cuyo Basin
6052 Mercedes Basin
6053 Laboulaye-Macachin Basin
6054 Salado Basin
6055 Neuquen Basin
6056 Niriuhau Basin
6057 Colorado Basin
6058 San Jorge Basin
6059 Magellanes Basin
6060 North Malvinas Basin
6061 East Patagonia Basin
6062 Malvinas Plateau
6063 Malvinas Basin
6064 Burdwood Bank- North Scotia Ridge
6065 Altiplano Basin
6066 Moquegua-Tamaruga Basin
6067 Salar de Atacama Basin
6068 Curico Basin
6069 Temuco Basin
6070 Osorno-Llanquihue Basin
6071 Diego Ramirez Basin
6072 Madre de Dios Basin
6073 Penas Basin
6074 Central Chile Forearc Basin
6075 Mollendo-Tarapaca Basin
6076 Pisco Basin
6077 Lima Basin
6078 Salaverry Basin
6079 Trujillo Basin
6080 Sachura Basin
6081 Talara Basin
6082 Lancones Basin
6083 Progreso Basin
6084 Manabi Basin
6085 Borbon Basin
6086 Cuaca Basin
6087 Choco-Pacific Basin
6088 Pacific Offshore Basin
6089 Upper Magdalena Basin
6090 Middle Magdalena Basin
6091 Lower Magdalena Basin
6092 Eastern Cordillera Basin

- 6093 Perija-Venezuelan Coastal Ranges
- 6094 Cesar Basin
- 6095 Guajira Basin
- 6096 Llanos Basin
- 6097 Barinas-Apure Basin
- 6098 East Venezuela Basin
- 6099 Maracaibo Basin
- 6100 Falcon Basin
- 6101 Bonaire Basin
- 6102 Cariaco Basin
- 6103 Tobago Trough
- 6104 South Caribbean Deformed Belt
- 6105 Sierra Nevada de Santa Marta
- 6106 West-Central Cordillera
- 6107 Lesser Antilles Deformed Belt



MAP SHOWING GEOLOGY, OIL AND GAS FIELDS, AND GEOLOGIC PROVINCES OF SOUTH AMERICA

Compiled by

Christopher J. Schenk, Roland J. Viger, and Christopher P. Anderson



INTRODUCTION

This digital geologic province map of the continent of South America was produced for the World Energy Project of the U.S. Geological Survey. The purpose of this project is to provide a quantitative assessment of the undiscovered recoverable oil and gas resources in priority provinces of the world. For this project the world was subdivided into eight regions that generally correspond to the economic regions defined by the U.S. Department of State and to the international market regions recognized by the U.S. Department of Energy. South and Central America are included in Region 6 for the World Energy Project (Klett and others, 1997).

The purpose of this map is to illustrate the geologic provinces of South America and the distribution of oil and gas fields. Using the geologic units and many other sources of data, the entire continent was subdivided into geologic provinces (Committee on the World Geologic Map, 1964; Bigarella, 1973; Jordan and Zambrano, 1973; Travis and others, 1975; Montogovich, 1981; Ojeda, 1982; Jordan and Allmendinger, 1986; Yrigoyen, 1991; Kingston, 1994; McGettigan and Hunt, 1996; Andemand and Lago, 1997). The offshore boundary of the provinces differs depending upon the location. The offshore boundary of provinces along the northern and western tectonically active margins was placed at an isobath of 2000 m, whereas the offshore boundary of provinces along the eastern passive margin was placed at approximately the 3800 m isobath. A total of 106 geologic provinces were defined in South America. Names for most of the provinces reflect common usage in the literature. The provinces are being further subdivided into petroleum systems and assessment units that form the basis for the resource assessment.

Oil and gas data were digitally allocated to the geologic provinces, and these provinces were then ranked according to known oil and gas resources to provide a prioritization for the resource assessment (Klett and others, 1997). For this assessment the priority provinces in South America are Campos Basin, Neuquen Basin, San Jorge Basin, Magallanes Basin, Santa Cruz-Tarjia, Putumayo-Orient-Maranon, Llanos Basin, Magdalena Basins, Maracaibo Basin, East Venezuela Basin, and the Tobago Trough.

The oil and gas data were obtained from Petroconsultants (1996), and the oil and gas field centerpoints are used on this map with permission of Petroconsultants International Data Corporation.

Political boundaries shown on this map were taken, with permission, from the ESRI ArcWorld 1:3 million scale digital world coverage and are displayed for general reference only.

This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards or with the International Stratigraphic Code.

REFERENCES CITED

Asmus, H.E., and Ponte, C.F., 1973, The Brazilian marginal basins, in Naim, A.E.M., and Siehl, F.G., eds., *The Ocean Basins and Margins*, v. 1, The South Atlantic: Plenum Press, New York, p. 87-133.

Andemand, F., and Lago, J., 1997, *Petroleum geology of Venezuela*: American Association of Petroleum Geologists Short Course Notes, Dallas, Texas, unpaginated.

Bigarella, J.J., 1973, *Geology of the Amazonas and Parana basins*, in Naim, A.E.M., and Siehl, F.G., eds., *The Ocean Basins and Margins*, v. 1, The South Atlantic: Plenum Press, New York, p. 25-86.

Committee on the World Geologic Map, 1964, *Geologic Map of South America*: Rio de Janeiro, Brazil, 2 sheets, 1:5,000,000 scale.

Environmental Systems Research Institute, Inc., 1992, *ArcWorld 1:3 million digital database*, ESRI, Redlands, California.

Jordan, T.E., and Allmendinger, R.W., 1986, The Sierras Pampaneas of Argentina: a modern analogue of Rocky Mountain foreland deformation: *American Journal of Science*, v. 286, p. 737-764.

Kingston, J., 1994, *Undiscovered petroleum of southern South America*: U.S. Geological Survey Open-File Report 94-559, 443 p.

Klett, T.R., Ahlbrandt, T.S., Schmoker, J.W., and Dolton, G.L., 1997, *Ranking of the world's oil and gas provinces by known petroleum volumes*: U.S. Geological Survey Open-File Report 97-463, one CD-ROM.

McGettigan, C.K., and Hunt, D.G., 1996, Columbia continues to yield major oil, gas discoveries: *Oil and Gas Journal*, July 15, 1996, p. 40-45.

Montogovich, C., 1981, *Sedimentary basins of the Chilean Pacific offshore*, in *Energy Resources of the Pacific Region*: American Association of Petroleum Geologists Studies in Geology, v. 12, p. 63-68.

Ojeda, H.A.O., 1982, *Structural framework, stratigraphy, and evolution of Brazilian marginal basins*: American Association of Petroleum Geologists Bulletin, v. 66, no. 6, p. 732-749.

Petroconsultants, 1996, *Petroconsultants Worldwide Oil and Gas Field Database 1996*: Petroconsultants International Data Corporation, Geneva, Switzerland.

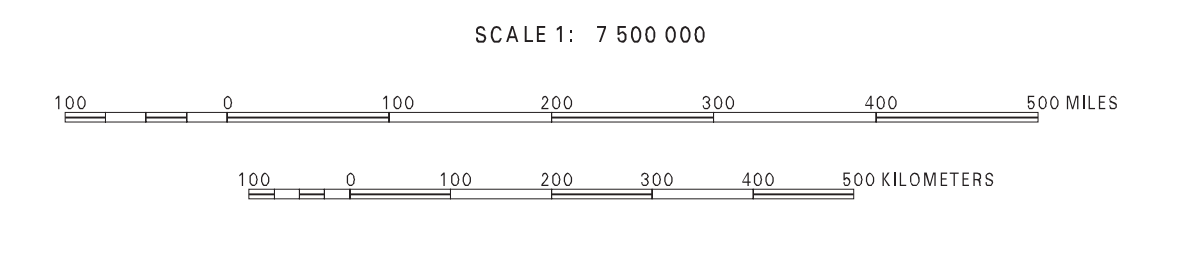
Travis, R.B., Gonzales, G., and Pardo, A., 1975, *Hydrocarbon potential of coastal basins of Peru*: American Association of Petroleum Geologists Memoir No. 25, p. 331-338.

Urien, C.M., and Zambrano, J.J., 1973, *The geology of the basins of the Argentine continental margin and Malvinas Plateau*, in Naim, A.E.M., and Siehl, F.G., eds., *The Ocean Basins and Margins*, v. 1, The South Atlantic: Plenum Press, New York, p. 135-169.

Yrigoyen, M.R., 1991, *Energy resources map of the Circum-Pacific region, southeast quadrant*: U.S. Geological Survey Circum-Pacific Map Series, Map CP-39, 2 sheets, 1:10,000,000 scale.

EXPLANATION

- Oil and gas fields
 - Province boundaries
 - Country boundaries
 - 6000 Province number
- Bipolar Oblique Projection
Units: Meters
False Easting: 0, False Northing: 0



MAP SHOWING OIL AND GAS FIELDS AND GEOLOGIC PROVINCES OF SOUTH AMERICA

Compiled by

Christopher J. Schenk, Roland J. Viger, and Christopher P. Anderson