

Assessment of Undiscovered Oil and Gas Resources in Central and South America

The U.S. Geological Survey recently completed an assessment of undiscovered conventional oil and gas resources in 130 selected petroleum provinces of the world (USGS, 2000). Of these 130 provinces, 23 are in South America, Central America, and the Caribbean area (fig. 1). The assessed provinces range from established petroleum provinces with long histories of production such as the Maracaibo Basin to frontier provinces with little or no petroleum production such as the Guyana-Suriname Basin. Not all provinces with historic production or potential production were assessed for the USGS 2000 Assessment. At present we are assessing many of the remaining oil and gas provinces in Central and South America. In each province we (1) geologically defined total petroleum systems, (2) defined assessment units within total petroleum systems, and (3) assessed the volume of undiscovered conventional oil and gas in each assessment unit. We defined 26 total petroleum systems and 55 assessment units in the 23 provinces.

The assessment results are summarized in table 1. For the 23 provinces, we assessed mean totals of 105 BBO and 487 TCFG. The South and Central America region ranked third in the world for undiscovered oil and gas behind the Middle East and the Former Soviet Union (USGS, 2000). The potential for giant oil and gas fields is greatest in the provinces along the Atlantic margin of eastern South America, from the Santos Basin in the south to the Guyana-Suriname Basin in the north. The potential for giant fields is mainly offshore, in water depths to 3,600 m. Several giant oil fields have been discovered offshore in the Campos Basin, and similar fields may yet be found in the Campos and adjacent provinces.

The provinces along the northern part of South America such as the Maracaibo Basin and the East Venezuela Basin have long been producers of oil and gas, and have been the locations for many giant oil accumulations. The potential for additional giant fields in this suite of provinces is considered to be much less than for the offshore provinces along the eastern margin of South America.

However, provinces such as the Maracaibo and East Venezuela (and offshore Trinidad) were assessed to contain significant natural gas resources.

In Andean-related provinces, including the Santa Cruz-Tarija, Neuquen, Magallanes, and San Jorge, the potential for undiscovered giant oil fields is low given the geology, exploration maturity, and history of oil discoveries. These provinces have been explored for decades, and the discovery history indicates that smaller oil fields remain to be discovered. However, the potential for large natural gas fields does exist in a few of the Andean provinces.

Reference Cited: U.S. Geological Survey World Energy Assessment Team (USGS), 2000, U.S. Geological Survey world petroleum assessment 2000—Description and results: U.S. Geological Survey Digital Data Series DDS-60, 4 CD-ROMs, Adobe Acrobat format. <http://geology.cr.usgs.gov/energy/WorldEnergy/DDS-60/>

Figure 1.
Map of Central and South America showing assessed provinces (red areas), province boundaries (red), and country boundaries (black).

Table 1. South and Central America Assessment Results.

[MMBO, million barrels of oil; BCFG, billion cubic feet of gas; MMBNGL, million barrels of natural gas liquids. Results shown are fully risked estimates. For gas fields, all liquids are included under the NGL (natural gas liquids) category. Undiscovered gas resources are the sum of non-associated and associated gas. F95 represents a 95 percent chance of at least the amount tabulated. Other fractiles are defined similarly. Fractiles are additive under the assumption of perfect positive correlation. (See USGS (2000) for details.)]

<i>Provinces</i>	<i>Total undiscovered resources</i>											
	<i>Oil (MMBO)</i>				<i>Gas (BCFG)</i>				<i>NGL (MMBNGL)</i>			
	F95	F50	F5	Mean	F95	F50	F5	Mean	F95	F50	F5	Mean
Guyana-Suriname Basin	2,793	13,937	32,582	15,247	7,035	36,802	95,909	42,058	365	1,981	5,555	2,330
Foz do Amazonas Basin	0	0	0	0	7,628	27,785	58,079	29,840	71	271	620	298
Sergipe-Alagoas Basin	197	1,271	3,527	1,487	1,368	7,004	19,909	8,334	62	338	1,035	415
Espirito Santo Basin	304	2,338	7,736	2,959	3,710	27,381	88,581	34,287	165	1,243	4,341	1,612
Campos Basin	3,442	14,235	36,479	16,293	3,745	16,501	46,667	19,691	101	451	1,357	553
Santos Basin	4,117	21,963	46,265	23,209	17,600	74,416	163,657	80,547	837	3,763	9,024	4,194
Pelotas Basin	0	2,548	7,184	2,938	0	19,642	55,792	22,806	0	919	2,838	1,107
Falklands Plateau	0	3,948	17,274	5,833	0	10,464	51,265	16,581	0	217	1,200	370
Malvinas Basin	161	900	2,327	1,031	1,675	9,765	26,190	11,327	51	303	870	362
Putumayo-Oriente- Maranon Basin	1,028	2,787	6,066	3,098	236	746	4,604	1,596	4	16	182	55
Santa Cruz-Tarija Basin	277	1,719	5,548	2,145	10,618	28,401	61,092	31,107	380	1,133	2,802	1,300
Neuquen Basin	412	1,213	2,413	1,290	3,667	11,582	23,870	12,416	53	182	426	203
San Jorge Basin	160	470	928	498	1,068	3,491	7,363	3,774	20	68	157	75
Magallanes Basin	226	665	1,306	704	4,752	13,440	25,380	14,040	101	291	581	310
Talara Basin	484	1,625	3,214	1,711	1,243	4,404	9,637	4,795	62	227	539	255
Progreso Basin	47	205	534	237	98	556	1,770	695	4	26	86	33
Middle Magdalena	220	655	1,373	709	919	2,946	6,861	3,292	32	111	292	130
Llanos Basin	793	3,180	8,001	3,631	1,089	5,061	15,338	6,217	56	268	853	337
East Venezuela Basin	2,155	10,509	26,740	11,875	19,454	84,444	201,516	93,561	842	3,886	10,235	4,465
Maracaibo Basin	3,133	7,868	14,199	8,183	5,857	16,476	32,854	17,576	307	889	1,928	973
Tobago Trough	0	0	0	0	4,249	17,908	43,111	20,103	40	173	456	201
Lesser Antilles Deformed Belt	0	157	6,092	1,536	0	1,238	46,876	11,957	0	57	2,334	582
North Cuba Basin of Greater Antilles Deformed Belt	142	464	941	494	159	540	1,200	592	9	32	76	35
TOTAL	20,090	92,658	230,727	105,106	96,168	420,994	1,087,521	487,190	3,561	16,843	47,788	20,196

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