

CentralAmericaMap:

A mineral occurrence data set for Central America

Instructions for MapInfo and ArcGIS users

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Introduction

CentralAmericaMap is a GIS data set for Guatemala, Belize, El Salvador, Nicaragua, Honduras, Costa Rica and Panama. The *Geography* module provides files for infrastructure (cities, roads, political boundaries, etc.), digital topography (DEM), shaded relief, and bathymetry. The *Geology* module provides up-to-date, published geologic maps and legends for each country in vector format. *TS Units* provides a unified, tectonostratigraphic map and legend for the entire region based on publications from government, industry and academia. *Prospect* locates over 1100 metallic mineral mines and prospects, classifies them according to 18 deposit types, and assembles current information for past production, resources and reserves. The Prospect module also includes locations and ownership for over 1600 non-metallic mineral occurrences. The *Land Status* module locates 2900 metallic and non-metallic mineral concessions (attributed with ownership and contract date) and plots the locations of 70 national parks, forest reserves, and other areas of restricted mineral entry.

Supplementary datasets, described at the end of this readme file, include Multielement Geochemical Data Sets for Panama and Nicaragua, Geophysical Data Sets for Panama, and an Isotopic Ages Data Set with over 2100 radiometric dates covering all of Central America.

CentralAmericaMap is revised and updated as new discoveries are made, as new resources are announced and as production data is updated. Geologic maps are updated to reflect ongoing research. Pricing is covered on the final page of this data set description. New users should pay special attention to the “Installation” section of this Readme file.

Geography, Geology and TS Unit Modules

The *Geography* and the *Geology* modules of the CentralAmericaMap data set are displayed by opening “CA_Geography” and “CA_Geology.” *Geography* includes shaded relief and bathymetry and is accompanied by digital topography (DEM), infrastructure, topographic map indices and Landsat satellite imagery. *Geology* provides, in addition, a mosaic of published geologic maps and legends (one for each country) all in vector format. *TS Units*, a unified tectonostratigraphic map for the entire region, was compiled using published geologic maps as a base but colored with tectonostratigraphic rock unit assignments (e.g., plateau basalt of the Caribbean Large Igneous Province) rather than location-specific lithologic descriptions (e.g., Dumisseau basalt). *Geography*, *Geology* and *TS Units* modules have broad application beyond the mining and exploration industry.

Prospect Module

The *Prospect* module, which includes the *Geography*, *Geology*, and *TS Units* modules, is displayed by opening “CA_Prospects.” Metallic mineral occurrences are plotted using shapes that correspond to deposit types, colors for each metal, and sizes that reflect gross contained metal value. Each mineral occurrence is attributed with location, source of data, deposit type, owners, partners, past production, current resources, current reserves, status (active mine, inactive mine, resource, prospect), geologic observations, recent deals, and references to the literature along with calculated fields for total size (in tons or ounces) and contained metal value in US dollars.

The *Prospects* module includes a subdirectory for non-metallic mineral occurrences, displayed by opening “CA_Non-metallics.” Selecting a specific non-metallic mineral occurrence with the info tool will call up attached information including concession name, number, owner, status, commodities, location, and location reference.

Land Status Module

The *Land status* module is displayed by opening “CA_LandStatus.” Metallic and non-metallic mineral concessions, color-coded and plotted on a shaded relief base map, are attributed with concession type, ownership, status, contract date, and expiration date. Only official government records are used to generate the maps. These maps provide a “snapshot” of land status as of the compilation date. For specific areas of interest, a thorough review of current land status is always necessary.

The land status data set also shows national parks, forest reserves, Indian reservations, national monuments and other areas where mineral exploration and development is restricted or prohibited.

Subdirectories

Concessions subdirectory:

Concession maps for all seven Central American countries are stored in the Concessions subdirectory. Each concession is attributed with the contract date, ownership, and the expiration date (the contract date plus the maximum number of years that a concession can be held). Expired concessions are not eliminated until they disappear from the official government data set. For up-to-date concession information, the user is referred to the Mines Department in each country.

Geography, Satellite images and 50K topo index subdirectories:

The Geography subdirectory includes borders, cities and towns, roads, major drainages, and principal topographic contours from the Digital Chart of the World. Landsat satellite images, compressed using Mr. Sid software, are assembled in the Satellite subdirectory. Indices to published 1:50,000 scale topographic maps are provided in the Topo_Index subdirectory.

Geology subdirectory:

The Geology subdirectory contains the most recent published geologic map and legend for each country. Many of these maps are difficult to obtain or out of print. All of the maps and legends have been digitized and are provided as vector files. Their scale and publication date vary as follows: 1:750,000 for Belize (2008); 1:500,000 for Guatemala (1970), Honduras (1990), Nicaragua (1995), Panama (1991), and Costa Rica (2007); 1:100,000 for El Salvador (1978). These geologic maps have been modified and updated to incorporate more recent published geologic mapping (e.g., Rogers, 2003 in Honduras and Nicaragua; Ratschbacher et al., 2009 for Guatemala; and, Buchs et al., 2011 for Panama).

Prospect subdirectory:

Information pertaining to individual mines and mineral occurrences is stored in a geodatabase (CBPros.gdb) for ArcGIS Pro users or in an MS Access database (CBPros.accdb) for MapInfo users. Only public, non-confidential information is provided. CBPros includes the following information for each mineral occurrence: name, alternate names, location, reference for location, deposit type, district name, owners, partners, deals, production, production period, production reference, reserve, reserve reference, resource, resource reference, status (active mine, inactive mine, resource, prospect), geologic observations, overall size (in ounces or tons) and contained metal value (in US dollars).

Metallic mineral occurrences are classified according to 18 deposit types, listed in the following table. Non-metallic mineral occurrences are stored in the Prospect > Non_Metallic subdirectory.

Metallic Mineral Deposit Classification

Deposit Type	Symbol
Epithermal veins and stockworks (Au, Ag, Cu, Pb, Zn)	1
Epithermal disseminated (Au, Ag, Cu, Zn)	13
Epithermal veins and stockworks of Hg and Sb	8 (Hg), 10 (Sb)
Volcanogenic massive sulfide (VMS) deposits	2
Sediment-hosted (Sedex) deposits	14
Volcanogenic (Seafloor) manganese deposits	9
Sediment-hosted (U, Th, V) deposits	27
Banded iron formation (Au, Fe, Mn) deposits	21
Porphyry (Cu, Mo, Au, Ag) deposits	5
Skarn (Au, Ag, Cu, Pb, Zn) deposits	3
Iron skarn (Fe) deposits	24
Carbonate replacement (Au, Ag, Cu, Pb, Zn) deposits	22
Iron replacement (Fe) deposits	23
Greisen (Sn, W) deposits	17
IOCG (Iron-oxide copper gold) deposits (Au, Ag, Cu, Mo)	16
IOCG (U, REE, Fe) deposits	25
Alkaline Rocks and Carbonatites (U, Th, V)	18
Alkaline Rocks and Carbonatites (Sc, REE)	26
Orogenic (shear-hosted, mesothermal) deposits (Au, Ag)	4
Magmatic segregation (Cr, Pt, Pd) deposits	11
Lateritic (Ni, Co) deposits	6
Bauxite (Al, REE, Sc) deposits	12
Alluvial (Au, Ag, Pt, Pd) deposits	7
Alluvial (U, Th, REE, Sc) deposits	28
Alluvial (Fe, Sn, W) deposits	29
unassigned	99

Parks subdirectory:

The Parks subdirectory contains national parks, forest reserves, and Indian reservations for each of the seven Central American countries. These are areas where mineral development is prohibited or restricted.

Survey Indices subdirectory:

The files in this subdirectory show the location of stream sediment surveys and geophysical surveys conducted by companies, governments and international aid organizations. Stream sediment survey indices record the number of samples collected, area covered, sample density, list of elements run, and the original source of the data. Geophysical survey indices include the type of survey (magnetic and/or radiometric), area covered, and the source of the image or data.

Shaded Relief and Bathymetry subdirectories:

Shaded relief maps for Central America are provided in the Shaded relief subdirectory. Ninety-meter (3 arc-second) resolution data used to create shaded relief maps for each country comes from version 2 (2005) of the Shuttle Radar Topography Mission (SRTM) (<http://seamless.usgs.gov>).

Regional bathymetry (as DEM grd files) was downloaded from the Marine Geoscience Data System: Global Multi-resolution Topographic Data portal (MGDS: GMRT) at <http://www.marine-geo.org/portals/gmrt/>. The bathymetric map is created from (shipboard) sonar supplemented, between tracks, by gravity and satellite altimetry data using a process described by Ryan et al., 2009:

<http://onlinelibrary.wiley.com/doi/10.1029/2008GC002332/full>. MGDS: GMRT data was re-gridded to produce maps at an approximate resolution of 200 meters (up to 240 meters depending on location). DEM grd files are also provided.

TS Units subdirectory:

This subdirectory contains files used to create a tectonostratigraphic (TS) map. The TS map uses published geologic maps from the Geology subdirectory as a base. Then, based on government, industry and academic publications, geologic map polygons are assigned additional attributes and new colors according to their tectonostratigraphic setting. For a basalt, for example, in addition to age and formation name (e.g., Tertiary Coyol basalt), the TS_PGONS file includes attributes for tectonic setting (e.g., MORB, plateau, volcanic arc, or back-arc basin). All of the countries use the same tectonostratigraphic legend resulting in a metallogenic map that spans all of Central America and is directly applicable to mineral exploration.

Titles and legends subdirectory:

Title blocks, legends, grids, labels, and scale bars are stored here.

Plots subdirectory:

The Plots subdirectory contains high resolution images for the metallogenic map and the land status map of Central America.

UTM subdirectory:

A UTM index is provided for all of Central America along with grids for each UTM zone. Grids are provided for the following projections: 1) Latitude/Longitude (Equidistant Cylindrical) projection using the WGS 1984 datum, 2) Lambert Conformal Conic projection (origin latitude 39 degrees north, origin longitude 96 degrees west, standard parallels 33 and 45 degrees north) with the NAD 1927 datum, and 3) MapInfo's Latitude Longitude (Equidistant Cylindrical) projection using no datum.

Ancillary Files subdirectory:

The Ancillary Files subdirectory contains files that modify or supplement the user's GIS software. For ArcGIS Pro users, the subdirectory Default Project Databases contains the home folders for each aprx in the data set. For MapInfo users, this subdirectory includes picklists, "MapInfoW.fnt" with special fonts and the file "add_to_MapInfo_prj_file.txt" with supplemental projections. These files are described in a following section on Installation.

A file called "deposit_size_calculations.xlsx" lists the formulas used in calculating deposit size and gross contained metal value. For instance:

$$\text{Au and Ag deposit size} = \text{past production in ounces} + (\text{resource in metric tonnes} * \text{resource grade in ppm} * 1/31.1034768) + (\text{reserve in metric tonnes} * \text{reserve grade in ppm} * 1/31.1034768)$$

$$\text{Base metal, Aluminum, Nickel, Cobalt and Chromium deposit size} = \text{past production in tons} + (\text{resource in tonnes} * 2204.623 / 2000 * \text{resource grade in percent} / 100) + (\text{reserve in tonnes} * 2204.623 / 2000 * \text{reserve grade in percent} / 100)$$

$$\text{Deposit value} = \text{deposit size (in ounces for precious metals, in tons for base metals, aluminum, nickel and cobalt)} * \text{metal price.}$$
 Polymetallic deposit values represent the sum of each of the contained metals.

ArcGIS Pro Installation

Install ArcGISPro on your computer. If this is an update, backup your previous version before erasing the old CBMap directory. Copy your new data set to the root directory of your hard drive (C:\CBMap).

ESRI Geodatabase management

All mineral occurrence information is stored in CB_Pro.s.gdb, a geodatabase located in the Prospects subdirectory. Additions or changes to mineral occurrence information are made directly to the Prospects table in CB_Pro.s.gdb.

Most users will not need to make changes to the information that is stored in CB_Pro.s.gdb. However, if changes are made to production, reserves or resources, then deposit size and value fields should also be updated. These updates are made by running the Python script "UpdateProspects.pyt." The following instructions explain how to add "UpdateProspects.pyt" to the Toolbox.

- Copy the file "UpdateProspects.pyt" from C:\CBMap\Ancillary_Files\Python into the "My Toolboxes" folder (ArcMap) or "Custom Transformations" folder (ArcGISPro). The path to this folder is: C:\Users\[your username]\AppData\Roaming\ESRI\ArcGISPro or Desktop10.8
- Start ArcMap or ArcGIS Pro, and click on the Toolbox button
- In the Toolbox window, right-click in open space below the list of toolboxes, and select "Add Toolbox"
- Navigate to the "Toolboxes" directory, select UpdateProspects.pyt, click Open.
- Select UpdateDepositSizeandValue > right click in the open space underneath > save settings > to default
- Note that the UpdateProspects.pyt file only needs to be installed only once, even if you have more than one data set (e.g., CBMap and EMap) installed.

Now that "UpdateProspects.pyt" is installed, follow these instructions to update deposit size and value fields in CBPros.gdb:

- Open any ArcMap mxd or ArcGISPro aprx file.
- In the Toolbox window, if the UpdateDepositSizeandValue toolbox is not present, right click on open space and load settings > from default.
- In the Toolbox window, double-click the UpdateDepositSizeAndValue toolbox. A list of update scripts will be displayed.
- Double-click the script appropriate for the database table you have installed (e.g. if you have installed CBMap, double-click on CBProsUpdate). A window will appear.
- Click OK to begin running the script. Calculations may take some time ... a couple of minutes for a thousand prospect records is typical. For more records, a proportionately longer time period is needed.
- Save the aprx or the mxd.

Source File Connections

If the CentralAmericaMap data set is copied to a location other than the root directory, some project files may open with broken links. Deposit types appear as event layers; each event layer has a distinct definition query. To repair a broken link: select (click on) the “list by source” icon. Right click on the file that is not opening properly, select properties > source > “set data source,” and browse to the source location, for example: C:\CBMap\Prospect\CB_Pros.gdb.

MapInfo Installation

Start by checking that Microsoft Access and MapInfo Pro are installed on your computer. If this is an update, backup your previous version before erasing the old data set. Copy the new CentralAmericaMap data set to the root directory (C:\) of your hard drive. Rename the folder CBMap-MI (C:\CBMap-MI).

Fonts

CentralAmericaMap map uses several customized fonts that are not delivered with standard MapInfo software. Follow these steps to replace your “MapInfo 3.0 Compatible font” with the customized version provided in the Ancillary_Files subdirectory.

- Exit MapInfo if it is running.
- Be sure that you are displaying hidden files and folders.
 - On a machine that is running Windows 11, open Windows Explorer. Select the “View” tab. Then, under “Show” select the option for “hidden items.”
- Locate the file MAPINFOW.FNT on your computer.
 - On a machine that is running Windows 11, it is found in:
C:\Users\YOURUSERNAME\AppData\Roaming\MapInfo\MapInfo\Professional\2300
(for MapInfo Pro version 23)
- Rename MAPINFOW.FNT; call it MAPINFOW_FNT.OLD
- Copy "MAPINFOW.FNT" from the Ancillary_Files subdirectory into the folder where "MAPINFOW_FNT.OLD" is located.

Datums

CentralAmericaMap map uses several local datums that are not delivered with standard MapInfo software. Although the data set will continue to function without making changes, it is preferable to add the custom datums provided with CentralAmericaMap to the MapInfo projection file.

To do so, use any text editor to open “MapInfow.prj” from: C:\Program Files\MapInfo\Professional. This file contains all of the projections that ship with your MapInfo software. From the Ancillary_Files subdirectory, copy the text contained in “add_to_mapinfow_prj_file.txt” and paste it into MapInfow.prj (at the

end of the file will work just fine). MapInfo.prj will now provide all local datums called by CentralAmericaMap.

Picklists

CentralAmericaMap map uses MapInfo Discover picklists to assign colors to tectono-stratigraphic units, parks and concessions. Although neither Discover nor the picklists are required to run CentralAmericaMap, users who want to edit the picklists (to change colors or add categories) will need to copy the .xml files from the Ancillary_Files subdirectory and paste them to the following subdirectory:
C:\Users\username\AppData\Roaming\Encom\Discover\Picklists

Microsoft Access Database

Mineral occurrence information for MapInfo users is stored in a Microsoft Access database, CB_Pros.accdb, located in the Prospect subdirectory. Prospects, a table in the Access database, compiles relevant information for each mineral occurrence including: location, deposit type, owners, partners, past production, current resources, current reserves, published sources for past production, resource and reserve figures, status (active mine, inactive mine, prospect), salient drill results, geologic observations, ownership, terms of recent sales and joint ventures, and references to the literature. Calculated fields show the total precious metal content in ounces, base metal content in tons, and total contained metal value in US dollars.

New mineral occurrences can be added and changes can be made to existing mineral occurrence information by using MSAccess to modify CB_Pros.accdb. CB_Pros.accdb also contains a series of tables linked to queries that sort records according to deposit type (e.g., porphyry copper, epithermal gold, etc.)

A form in CB_Pros.accdb, "Update Deposit Size and Value" should be used to update gross contained metal values whenever changes are made to production, resources or reserves. This form can also be used to change the metal prices used in the calculation of gross contained metal value.

When adding records to the MSAccess database (CB_Pros.accdb), any nulls (empty fields) should be replaced with zeros (0's) in the entries for production, resource and grade since the calculation of deposit size and value draws numeric values from those fields.

Open Database Connectivity - ODBC Issues

MapInfo connects to the Prospects database (CB_Pros.accdb) via a dsn file (CB_Pros.dsn) which resides in the Prospect subdirectory. All changes made to the database in MapInfo automatically flow through to the Access database when the MapInfo table CB_Pros.tab is saved. (MapInfo may ask you to browse to the

location of the MSAccess database.) Once changes have been saved to the MSAccess database, MapInfo will give you the option to “refresh” the linked MapInfo table. Answer “yes.” If inconsistencies arise between the data in the Access database and the data in the MapInfo tables, MapInfo will issue a warning message that prompts the user to resolve the conflict.

It is best to refresh the linked MapInfo tables, including CB_Prospects.tab, whenever changes are made to the mineral occurrence information whether from within MapInfo or from within Microsoft Access. After refreshing the MapInfo linked tables, close any open DBMS connections using the “File > Close > Close DBMS button.

MapInfo cannot read MSAccess queries. For this reason, deposit type selections are saved not only as queries in the MSAccess database but also as linked MapInfo tables in the Prospects subdirectory.

You are now ready to run CentralAmericaMap. Open the prospects data set and metallogenic map by opening CA_Prospects. Open the land status data set and concession map by opening CA_LandStatus. You can also create your own workspaces (MapInfo) or project files (ArcGIS).

Ordering information, copyright and disclaimer

The CentralAmericaMap GIS data set, including the *Geography*, *Geology*, *TS Units*, *Prospect*, and *Land Status* modules (in MapInfo or in ArcGIS format), is available through Recursos del Caribe, S.A. To order the data set or for any questions, write to Carl Nelson at: carlericnelson@gmail.com.

Information on pricing is provided below. Updates are free for a year and half price for four additional years. Prospective clients are invited to “test drive” the data sets via a screen sharing session before making a purchase. Examples of maps generated using the data sets are displayed on the website: www.CBMap.net.

CentralAmericaMap is the property of Carl E. Nelson and Recursos del Caribe, S.A. It is intended for the sole use of the purchaser. The data set cannot be copied, sold, transferred, or distributed without express written permission from Carl E. Nelson.

Reasonable efforts are made to ensure that the information contained in the CentralAmericaMap data set is accurate and, with the exception of concessions, is updated regularly. Carl Nelson and Recursos del Caribe, S.A. do not warrant the accuracy of information provided in the CentralAmericaMap data set.

Pricing

CentralAmericaMap: a GIS data set for *Geography*, *Geology*, *TS Units*, *Prospects*, and *Land Status* covering Guatemala, Belize, El Salvador, Honduras, Nicaragua, Costa Rica, and Panama. Available as a package in
either MapInfo or ArcGIS format for: US\$30,000
both MapInfo or ArcGIS format for: US\$37,500

CentralAmericaMap is also available as stand-alone modules as follows:

<i>Geography</i> (infrastructure, DEM, and shaded relief):	\$ 5,000
<i>Geology</i> (<i>Geography</i> plus vector geology for all 7 countries):	\$10,000
<i>TS Units</i> (<i>Geography</i> and <i>Geology</i> plus a regional tectono- -stratigraphic interpretation):	\$20,000
<i>Prospects</i> (<i>TS Units</i> plus metallic mineral mines and prospects):	\$30,000
<i>Land status</i> (<i>Geography</i> plus metallic mineral concessions, national parks, forest reserves and other protected areas):	\$10,000
<i>Plots</i> (high resolution tiff images of the metallogenic map):	\$ 5,000

A data set for an individual country includes *Geography*, *Geology*, *Prospects*, *TS Units*, and *Land status*: \$10,000

Descriptions of Supplementary Data Sets including Multielement Geochemical Data Sets for each country in Central America, Aeromagnetic datasets for Panama, and a Radiometric Data Set for Central America appear, with pricing, on the following pages.

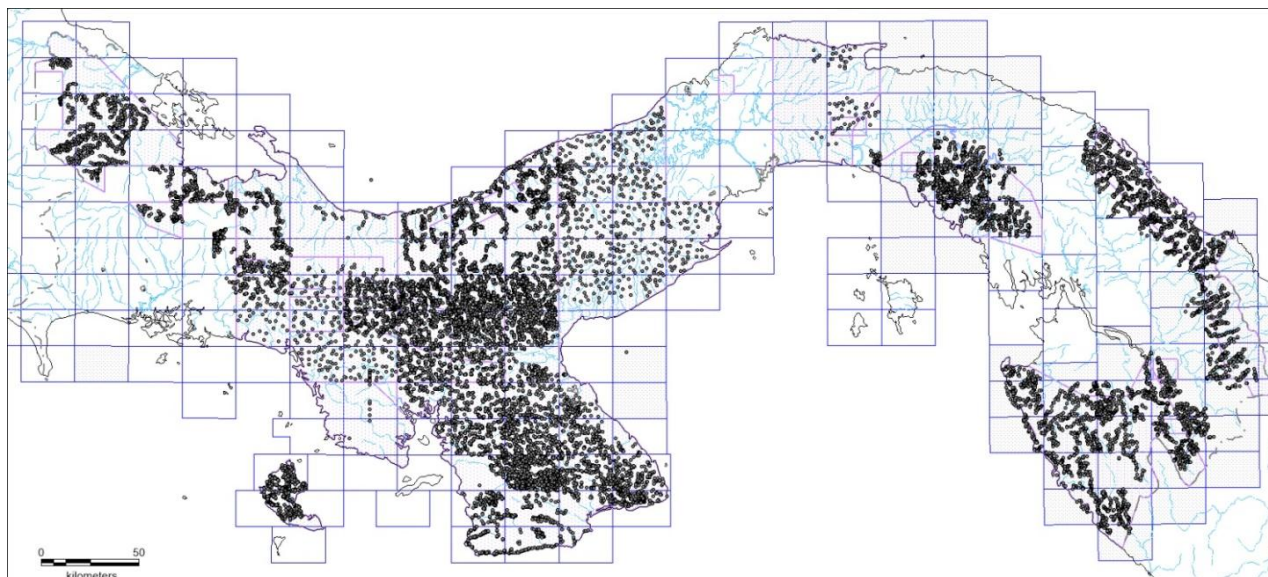
Central America multielement geochemical GIS data sets

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These data sets contain multielement geochemical data, with an emphasis on stream sediment samples, for each Central American country. The data has been captured in vector format for Panama (22,000 samples) and Nicaragua (7,700 samples). Copies of original reports and sample location maps (as pdf files) are provided for those who wish to check the accuracy of the data. Sample location maps and detailed descriptions of the Panama and Nicaragua stream sediment data sets follow below.

Additional multielement geochemical data sets, currently in pdf format, are available for Guatemala (13,000 samples), Honduras (20,000 samples), Costa Rica (8000 samples) and El Salvador (8000 samples).

For a complete list of assembled surveys for which data is available, go to:
<http://www.cbmap.net/wp-content/uploads/caribbean-stream-sediment-surveys-summary.pdf>.



Stream sediment geochemical coverage for Panama (22,000 samples)

Panama multielement geochemical GIS data set

Recursos del Caribe, S.A.

www.cbmap.net

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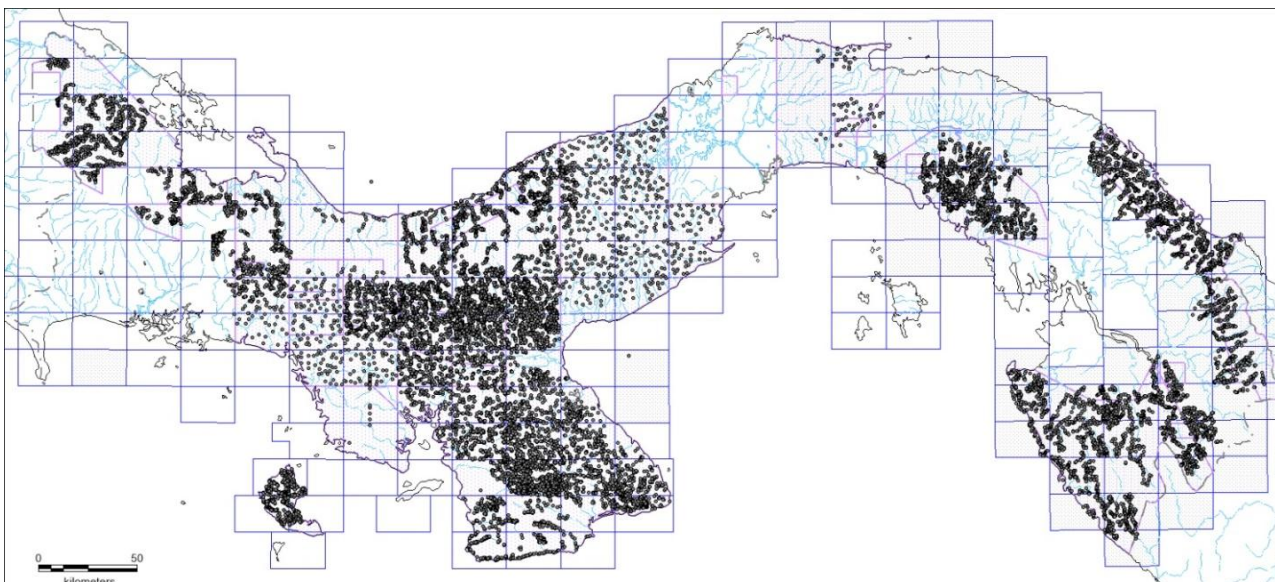
Recursos del Caribe, S.A. offers multielement geochemical data for Panama in GIS format (MapInfo or ArcGIS). The data set contains 22,000 stream sediment samples and 10,000 rock, soil and pan concentrate samples. Pricing is provided on the final page of this handout.

Stream sediment surveys in Panama began in 1967 with a series of base-metal programs sponsored by the United Nations. The Rio Pito and the Petaquilla (Cobre Panama) porphyry copper-gold deposits were discovered by these surveys.

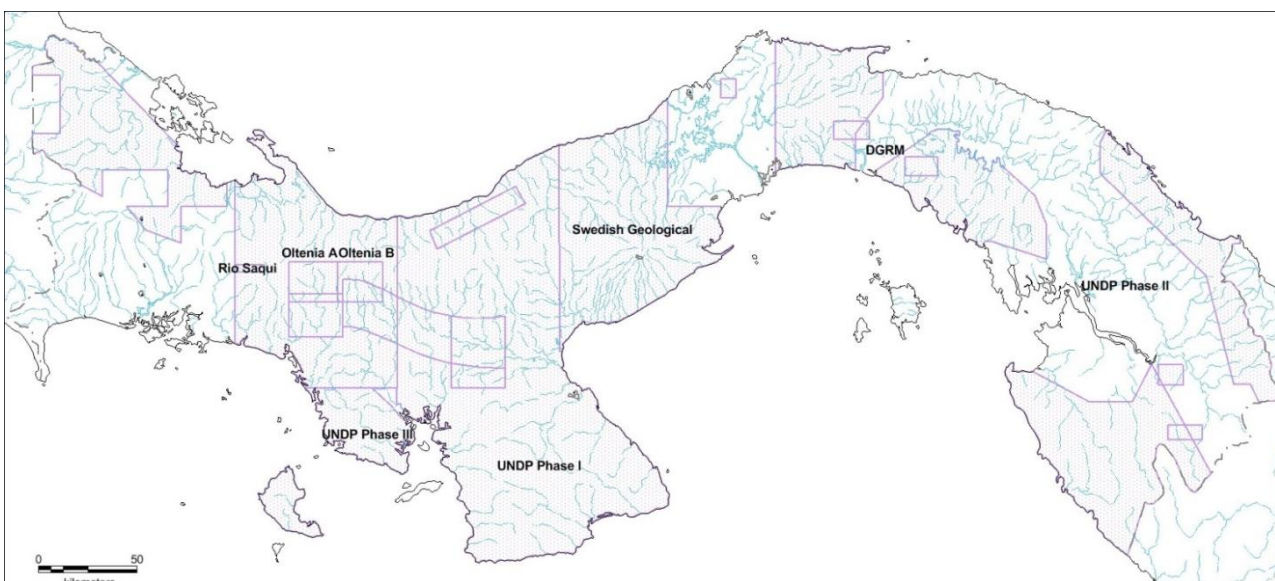
Stream sediment surveys conducted since the 1970's focused increasingly on precious metals. The most comprehensive, carried out by Swedish Geological International (1988-1990), covers much of the area not reached by the United Nations and includes precious as well as base metals.

The area covered by each stream sediment survey is shown in map form on page 2; a summary of United Nations and government sponsored surveys (with the number of samples, elements analyzed, laboratory, etc.) is provided on page 3. This data has been digitized (captured as vector files) and is provided in ArcGIS or in MapInfo format. Copies of the original reports and sample location maps are also provided. Similar multielement geochemical data sets are available for Mexico, Nicaragua, Colombia and for other Caribbean countries.

Panama has several known porphyry copper deposits and numerous porphyry copper prospects with resource potential. Cerro Colorado contains 1.38 billion tonnes of 0.76% Cu, 0.08 ppm Au, and 5.1 ppm Ag (11.5 tons Cu, 3.5 Moz Au and 226 Moz Ag) in a single deposit. Petaquilla contains 25 Mtons Cu, 15.5 Moz Au and 205 Moz Ag in a cluster of deposits. Other porphyry deposits are known (e.g. Cerro Chorchá, Rio Pito) and a porphyry-related breccia pipe at Cana produced over two million ounces of gold. There are, in addition, several epithermal gold deposits (Santa Rosa, Remance, Cerro Quema) and numerous porphyry and epithermal prospects.



Panama stream sediment sample coverage



Panama stream sediment survey locations

United Nations and Government sponsored Stream Sediment Surveys of Panama

Program	Location	Area (sq km)	Number of ss samples	Sample density	Elements Analyzed	Lab
UNDP Phase I (1965-1968)	Azuero Peninsula	17,000	5,794	0.34	Cu, Pb, Zn, Mo, Co, Mn, Ni	DGRM Panama
UNDP Phase II (1969-1972)	A: Bocas de Toro	3950	1151	0.41	Cu, Pb, Zn, Mo	DGRM Panama
	B: Maje	2800	1011	0.49	Mn, a few Ni, Co	
	C: Darien, S. Blas	3850	1817	0.47	Some Au, As, Ag	
	D: Pirre	4800	2200	0.46		
UNDP Phase III	Sona Peninsula	1542			Cu, Pb, Zn,	DGRM Panama
	Coiba Island	511	535	0.59	Ag, As, Co, Mo, Ni, Mn	
Codemin -1980	Cerro Colorado	750	324	0.43	Cu, Pb, Zn, Mo, Au, Ag, As	DGRM Panama
DGRM -1982	Rio Tabasara	526	262	0.44	Au, Ag	DGRM Panama
IAEA -1984	Veraguas	760	87	0.12	Cu, Pb, Zn, Mo Au, As, Mn, U	DGRM Panama
Swedish Geological (1988-1990)	West Area	7,550	388	0.05	Cu, Pb, Zn	DGRM Panama
	Central Area	6,149	561	0.08	Co, Ni, Cr,	
	East Area	1,925	71	0.00.6	Mn, Au, As plus 9 major oxides	

Panama Multielement Geochemical Data Set: Pricing

Multielement geochemical data, as vector files in ArcGIS or in MapInfo format, is provided for over 22,000 stream sediment samples and 10,000 pan concentrate, rock and soil samples. The data set includes original reports (as pdf files) and sample location maps (as georeferenced tiff images).

Cost of the data set is US\$22,000.

Prospective clients are invited to “test drive” the data sets via a screen sharing session before making a purchase

Nicaragua multielement geochemical GIS data set

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Multielement geochemical data for a total of 9,360 samples has been captured from original sources and compiled as MapInfo (.tab) or ArcGIS (.shp) files. Analytical results are provided for 36 elements including: Au, Ag, Cu, Pb, Zn, Mo, Ni, Co, Cr, As, Sb, Hg, Cd, Bi, Fe, Mn, Te, Ba, V, Sn, W, La, Al, Mg, Ca, Na, K, Sr, Y, Ga, Li, Nb, Sc, Ta, Ti, and Zr.

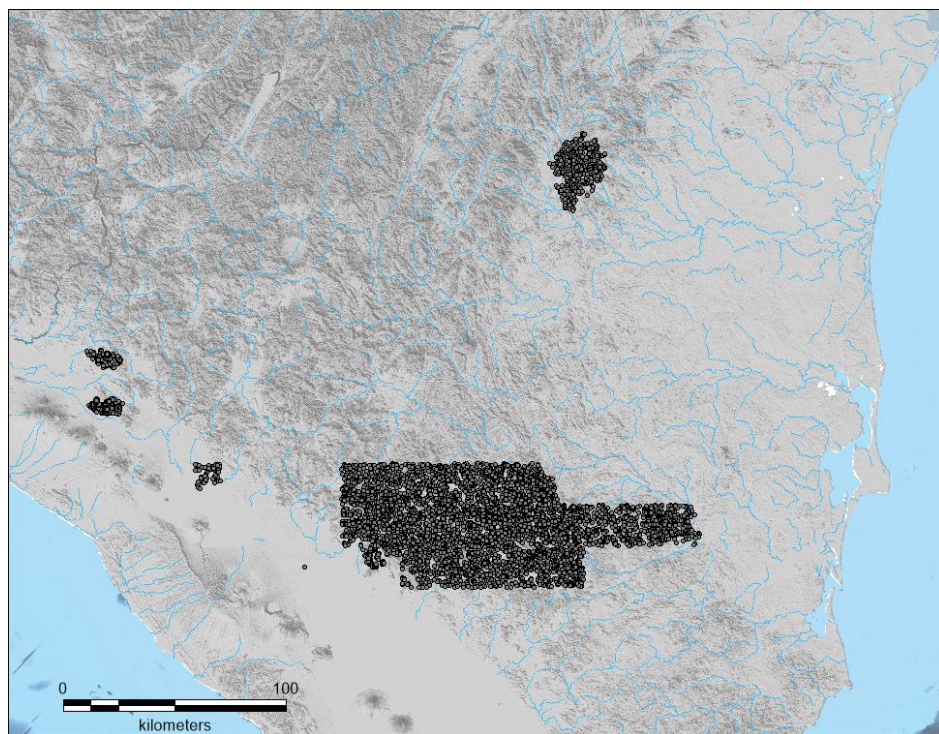
The data set is composed of 1324 traditional stream sediment samples, 6431 non-traditional stream sediment samples (quartz fragments in stream sediments), 219 pan concentrate samples, 1 soil sample and 1385 rock samples. A drainage map and a shaded relief base map are included to aid with interpretation and application of the data set to exploration.

A sample location map along with a list of surveys from which the data set was compiled are provided on the following pages. Sampling and analytical procedure is described in survey reports which are provided, as pdf files. The Nicaragua Multielement Geochemical Data set is designed to be used as a stand-alone product or with CentralAmericaMap, a regional GIS data set for geology, mines and mineral occurrences, land status and radiometric dates.

Pricing, in ArcGIS or MapInfo format:

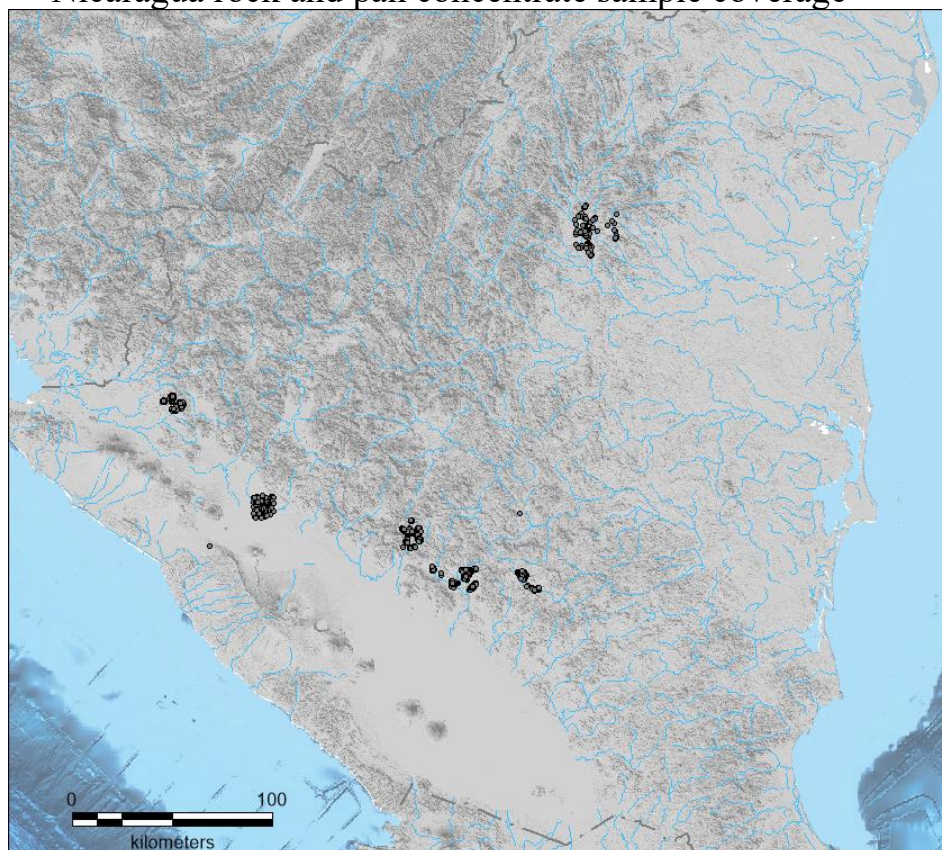
US \$13,000.

Prospective clients are invited to “test drive” the data sets via a screen sharing session before making a purchase.



Nicaragua multielement stream sediment sample coverage

Nicaragua rock and pan concentrate sample coverage



Nicaragua Multi-Element Geochemical Data Set

Program	Location	Area (sq km)	Number of ss samples	Sample density	Elements Analyzed
SAREC (1983)	Santa Emilia	1	19	19	Au, Ag plus trace elements
	Santa Pancha	0.6	9	15	
	Mojon	15	31	2	
SGAB – INMINE (1982)	Garcero	86	149	1.6	Au
SGAB – INMINE (1984)	El Garcero	33	0	9.5 6	Au and Ag
	La Ceibita	4	38		Au and Ag
	El Zapote	18	111		Au and Ag
	Los Jobitos	12	0		Au and Ag
SGAB – INMINE (1984)	Nata-Pitahaya Talavera Norte	66	229 0	3.5	Au plus 31 elements
SGAB (1987)	Boaco - Rama	6,210	6,111	1	Au, Ag plus 31 elements
SGAB - INMINE (1988)	Sauce Oeste	24 24	0 205 rock	0	Au, Ag
INMINE (1988)	La India	55.4	86	11	Au, Ag, Pb Zn, Cu, Mo, Co
INMINE (1989)	Juigalpa Norte	20	101 rock	5	Au, Ag, Pb, Zn plus major elements
INMINE (1991)	Siuna	517	498	1	Au, Ag, As, Pb, Cu, Zn
Total			7755		

Geophysical Surveys of Panama

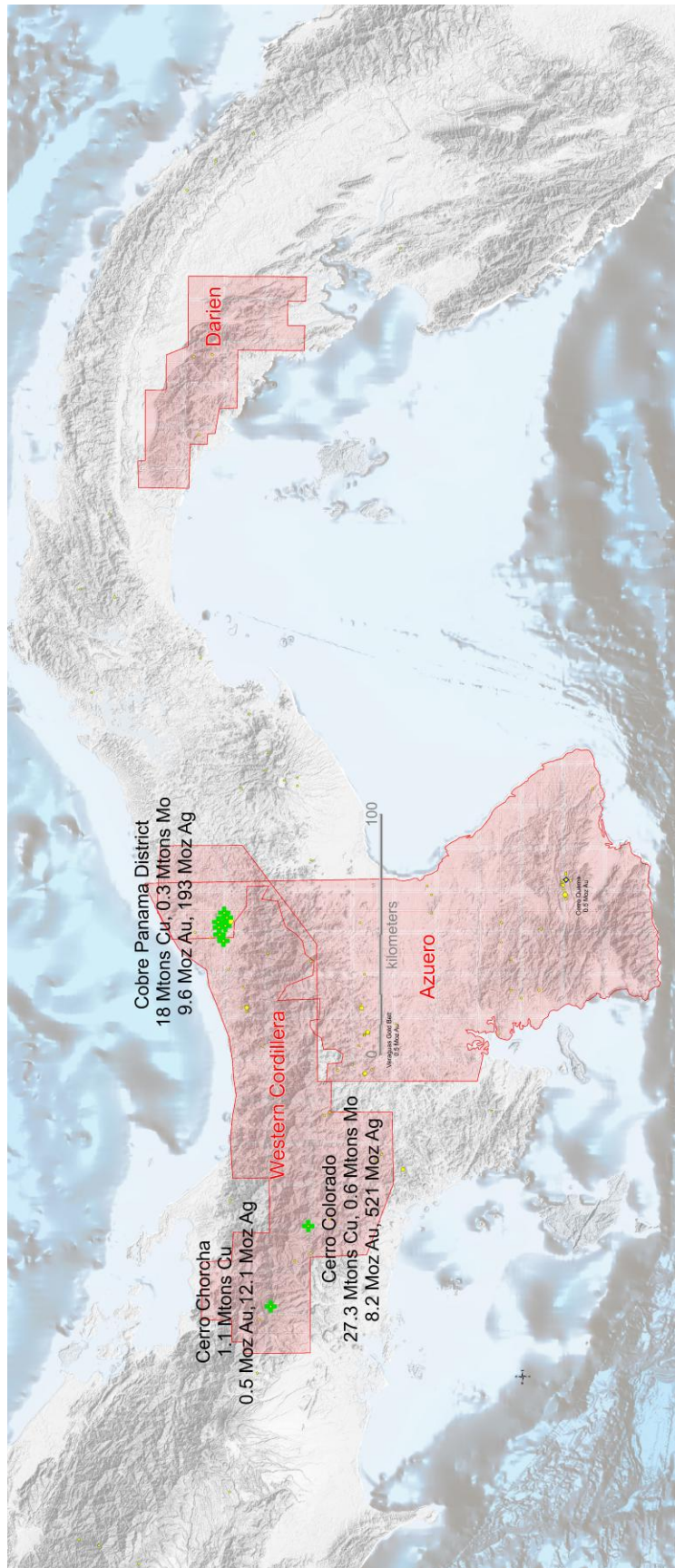
Carl E. Nelson, president
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Airborne geophysical surveys in Panama began with a 1966 aeromagnetic survey of the Azuero Peninsula carried out by Lockwood Survey Corporation and sponsored by the United Nations Development Program (UNDP). This fixed-wing survey was flown (at a height of 150 meters) along N-S flight lines spaced at one kilometer. Total magnetic intensity (TMI) and reduced-to-pole (RTP) data were gridded to 500 meters.

Cyprus Minera de Panama S.A. conducted helicopter-borne, aeromagnetic and radiometric surveys (at a 500-meter line spacing) of the Western Cordillera and the Darien region in 1995. Permission for these surveys was granted by the Direccion General de Recursos Minerales (DGRM) of the Ministerio de Comercio e Industrias (MCI). The MCI document authorizing the survey (Resolution 95-5) specifies that, after two years, the results be released (to the DGRM) for use by the mineral exploration community.

Raw data (as data points on each flight line) and grid files (.grd) for each of the surveys listed below are available through Recursos del Caribe, S.A. (RdC) at a price equal to two percent of the estimated current cost to repeat the survey. The areas covered relative to porphyry Cu-Mo deposits (green) and porphyry Cu-Au deposits (yellow) are shown on the following page. Prospective clients are welcome to review the surveys via a screen sharing session.

Sponsor	Location	Area km2	Survey Cost (2022 estimate)	Line km / line spacing	RdC Price
UNDP (1960's)	Azuero Peninsula	14,030	\$330,000 (fixed wing)	14,030 km / 1000 meters	\$ 6,600
Cyprus (1995)	Western Cordillera	9,919	\$3,200,000 (helicopter)	19,038 km / 500 meters	\$60,500
Cyprus (1995)	Darien Region	2,970	\$940,000 (helicopter)	5,940 km / 500 meters	\$18,800



Central America Radiometric GIS Data Set

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The Radiometric GIS Data Set compiles over 2100 isotopic ages (e.g., U/Pb, Ar/Ar, Re/Os) along with sample number, sample location, sample description, analytical method, mineral dated, analytical error, and reference publication (data source). Two additional fields record the original and the current interpretation for each radiometric date, e.g., age of intrusion/crystallization, inherited age, age of volcanism/crystallization, age of metamorphism, age of metamorphism, age of exhumation, age of hydrothermal alteration, and age of sedimentation. Cost is US\$5000.

