ColombiaMap:
A mineral occurrence database for Colombia
Instructions for MapInfo and ArcGIS users

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Introduction

ColombiaMap, a mineral exploration database for Colombia, is available in MapInfo or in ArcGIS format. The *Geography* module provides digital topography (DEM files), shaded relief, and bathymetry. *Geology* provides an up-to-date geologic map in vector format. *TS Units* provides a tectonostratigraphic interpretation based on published research. *Radiometric Dates* compiles over 4500 published radiometric ages. The *Prospect* module locates over 2100 metallic mineral mines and prospects and assembles current figures on past production, resources and reserves. *Land Status* locates 20,000 metallic and non-metallic mineral concessions and concession applications (attributed with owner, status and contract date), 574 proposed strategic mineral reserve areas and 900 national parks, forest reserves, Negro and indigenous communities and other areas of restricted mineral entry.

A separate Colombia Multielement Geochemical Database, also described here, provides analytical data for 168,656 rock, soil, pan concentrate, water and stream sediment samples.

ColombiaMap is available in MapInfo or in ArcGIS format; pricing is covered on the last page of this handout. ColombiaMap is constantly revised and updated as new resources are announced for an ever increasing number of metallic mineral occurrences. Geologic maps are updated regularly and tectono-stratigraphic units are modified to reflect ongoing research.

New users should pay special attention to the "Installation" and "Microsoft Access Database" sections of this Readme file. After installing ColombiaMap, open the "COProspects" file to display mines and mineral occurrences on a tectono-stratigraphic base map. Open "COLandStatus" to display metallic and non-metallic concessions along with national parks, national forests, and other areas of restricted mineral entry.

Geography, Geology and TS Unit Modules

The *Geography* and the *Geology* modules of the ColombiaMap database are displayed by opening "COGeography" and "COGeology." The *Geography* module includes shaded relief and bathymetry and is accompanied by Digital Chart of the World (DCW) files and a topographic map index. *Geology* provides the most recent (2015) published geologic map (1:1,000,000) and legend (rock units colored according to age and lithology) in vector format plus *Geography*. The *TS Units* module is a metallogenically-oriented map compiled using the published (2015) geologic map as a base but colored with published tectono-stratigraphic rock unit assignments (e.g. Cretaceous, volcanic arc-related, calc-alkaline intrusions of the South American continental margin) rather than country-specific lithologic descriptions (e.g. Antioquia batholith). The *Geography, Geology* and *TS Units* modules have broad application beyond the mining and exploration industry.

Radiometric Dates Module

The *Radiometric Dates* module compiles over 4500 published radiometric ages along with sample number, sample location, description, analytical method, mineral dated, error and a reference to the literature. Additional fields allow the the database to be sorted by interpretation: inherited age, intrusion/crystallization age, volcanism/crystallization age, age of metamorphism or age of sedimentation. A similar radiometric database, without the interpretation fields and containing only dates published prior to October 2014, is available for free from the SGC at: http://srvags.sgc.gov.co/arcgis/rest/services/Catalogo_Dataciones_Radiometricas_Colombia

Prospect Module

The *Prospect* module, which includes modules for *Geography, Geology, TS Units* and *Radiometric Dates*, is displayed by opening the "COProspects" file. Metallic mineral occurrences are plotted using shapes that correspond to deposit type, colors for each metal, and sizes that reflect gross contained metal value. Clicking on a prospect will call up attached information including 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 values for total precious metal content in ounces, total base metal content in tons, and total contained metal value in US dollars.

COPros1.mdb also contains a field for "geologic observations" that compiles information for each mineral occurrence, e.g. metal content (e.g. Au, Cu, Ni, Pt), mineralogy (sulfide, oxide), origin (orogenic, hydrothermal), form

(lenticular, vein, stockwork) and host rock. This information, along with similar information for the district in which the mineral occurrence is located, is provided in easy-to-read, non-concatenated form in ANM_MetMap_1999, a table in COPros1.mdb.

ColombiaMap can be queried. For instance, one can select:

- all gold deposits with over 500,000 ounces in past production, or
- all porphyry copper occurrences located in Antioquia, or
- all mineral occurrences hosted by calc-alkaline volcanic rocks.

Land Status Module

Land status is displayed using the file "COLandStatus" which plots over 20,000 metallic and non-metallic mineral concessions, 574 proposed strategic mineral reserve areas plus national parks, forest reserves, paramos, indigenous communities and other areas of restricted mineral entry on a shaded relief base map. Concessions are attributed with relevant information including owner (company or individual), contract date, status (exploration or extraction, contract or application), expiration date, and the source of information. Only official government records are used for concession information. These maps provide a "snapshot" of land status as of the date of compilation. For specific areas of interest, a thorough review of current status is always necessary.

Concessions:

Metallic mineral concessions are governed by the mining code of Colombia (Law 685 of 2001). Concessions granted prior to 2001 continue to be governed by the mining law of 1969 (Law 20) or the mining law of 1988 (Law 2655). Law 1382, modifying the 2001 mining code, was passed by congress in February 2010 but was found unconstitutional in May 2011.

Concessions are administered by the National Mining Agency-ANM. This agency replaced the former INGEOMINAS in 2012. Metallic mineral exploration and exploitation concessions can measure up to 10,000 hectares in area and are governed by a single 30-year contract that can be extended for an additional 30 years. Concessions are specific to a named metallic mineral or minerals. Separate concessions may be granted, for instance, for gold and for copper.

For exploration licenses governed by the older (1988) mining law, concessions are valid for two years with provision for a one-year extension; exploitation licenses are valid for ten years with provision for a ten-year extension.

For up-to-date information on any particular area, the user should consult the official mineral concession records maintained at each of the regional offices of ANM (main office: Bogota). Concession status can also be reviewed over the internet at: http://www.cmc.gov.co:8080/CmcFrontEnd/index.cmc.

Mineral Reserve areas:

In February of 2012, ANM established 574 strategic reserve areas. These areas are off-limits to mineral entry except by a special application process. Applications are not yet being accepted because the courts have found that ANM's declaration of strategic mineral reserve areas was done without prior consultation with local Negro and indigenous communities. All of the 574 proposed strategic mineral reserve areas are affected by the court decision.

Areas of restricted mineral entry:

In Colombia, national parks and some protected areas are entirely off limits to mineral exploration and development. Areas where mineral development is allowed but where special restrictions apply include:

1) forest reserves -exploration is permitted, reserve boundaries can be modified if a discovery is made by submitting a petition to modify the size of the reserve area "sustraccion de areas de reserva."
2) insurgent and paramilitary areas - mineral entry for exploration and development is permitted with an accompanying escort from the Ministry of Defense or Ejercito Nacional.
3) Indian and Negro communities – both exploration and development requires the approval of the local community.
4) protected areas - exploration is permitted in most protected areas with the exception of swamps (cienagas). Paramos, defined as elevations above 3200 meters, are also protected. Mining requires approval of a petition to modify the reserve area "sustraccion de area de reserva."

National parks, forest reserves and protected areas are administered by the Ministerio de Ambiente, Vivienda y Desarrollo Territorial. Indian and Negro communities are administered by the Minsterio del Interior.

Subdirectories

Concessions subdirectory:

Concession information including ownership and contract date is stored in the concessions subdirectory and is sourced from the Catastro Minero, an official registry of concessions maintained by ANM. Proposed strategic mineral reserve areas (574), although not yet authorized by law, are also included. For up-to-date concession information, the user is referred to the ANM website: http://www.cmc.gov.co:8080/CmcFrontEnd/index.cmc.

Geology subdirectory:

The Geology subdirectory contains a geologic map (and legend) of Colombia in vector format. The source for this map is a 1:1,000,000 scale geologic map published by the SGC in 2015. An ArcGIS version of this map is available for free at: http://www2.sgc.gov.co/Geologia/Mapa-Geologico-de-Colombia.aspx

Prospect subdirectory:

Information pertaining to individual mines and mineral occurrences is stored in a Microsoft Access database named COPros1.mdb. Only published, non-confidential information is provided.

COPros1.mdb includes the prospect name, alternate names, location, location reference, deposit type, district, owners, partners, deals, total past production, production reference, reserve, reserve reference, resource, resource reference, status (active mine, inactive mine, resource, prospect), geologic observations, size in ounces of gold and silver, size in tons of base and other metals, and gross contained metal value.

Mineral occurrences are classified as follows. Symbols can be added and classifications can be modified at the user's discretion.

Metallic Mineral Deposit Classification

Deposit Type	Symbol
Epithermal veins and stockworks (Au, Ag, Cu, Pb, Zn)	1
Epithermal high sulfidation deposits (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
Porphyry (Cu, Mo, Au, Ag) deposits	5
Skarn and carbonate replacement deposits (Cu, Pb, Zn, Fe)	3
IOCG deposits	16
Orogenic (shear-hosted, mesothermal) deposits	4
Magmatic segregation (chromite) deposits	11
Lateritic nickel-cobalt deposits	6
Bauxite (aluminum) deposits	12
Emerald deposits	15
Alluvial gold, diamond and Pt group mineral deposits	7
unassigned	99

Parks subdirectory:

The Parks subdirectory contains files that identify areas of restricted mineral entry including national parks, forest reserves, areas where a military escort was required (prior to the 2016 peace agreement with FARC), negro and indigenous areas were local community approval is required to conduct exploration, paramos, and other areas where mining or exploration is subject to restrictions.

Geophysical Survey subdirectory:

Geophysical survey images provided with the ColombiaMap database include Bouguer and Free Air regional gravity maps as well as Total Field and Reduced to Pole Aeromagnetic maps (all as raster images). Digital geophysical data is not included with the ColombiaMap database and, as yet, has not been made available by the government.

Shaded Relief subdirectory:

Shaded relief tiff images are in the Shaded Relief subdirectory. Elevation data for the shaded relief maps (provided as DEM grd files) is from the Shuttle Radar Topography Mission (SRTM) version 4 (2008) at 3 arc-second (approximately 90-meter) resolution.

Digital elevation data tiles downloaded from http://srtm.csi.cgiar.org were converted to Geosoft format using Global Mapper Software (version 11). The resulting grid tiles were manipulated, clipped and/or merged in MapInfo (version 11) using Discover (version 2011).

Registered raster images of the 90-meter grids were created for each of the 1:100,000 scale topographic quadrangle maps using Global Mapper (version 11) and the resulting tiles were set for display in MapInfo. In addition, the 90-meter data was re-gridded to 350 meters in order to provide a shaded relief map for the entire country.

Bathymetry subdirectory:

Regional bathymetric data (DEM 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. (The sea surface is higher over subsurface topography.) The process is described by Ryan et al., 2009: http://onlinelibrary.wiley.com/doi/10.1029/2008GC002332/full. MGDS: GMRT data at 500 meter resolution was re-gridded to produce maps at an approximate resolution of 350m. DEM grd files are provided.

SS Survey Index subdirectory:

This subdirectory shows the location of stream sediment surveys. Attributes include the number of samples collected, sample density, the elements analyzed and the source of the data. Raw geochemical data is stored in the Geochemistry subdirectory, described below.

Geochemistry subdirectory:

This subdirectory provides multielement geochemical data for the Colombia Multielement Geochemical GIS Database, a total of 168,656 stream sediment, rock, soil, pan concentrate and water samples collected by the SGC (Ingeominas) during the period 1998 to 2004 and released to the public in 2015. The original database is available for free download at: http://geoportal.sgc.gov.co/geoportalsgc/catalog/quicklink/basesDatosPublicacion.page.

Recursos del Caribe, S.A. (RdC) took the raw analytical data, converted text to numeric fields as appropriate, found and corrected 772 duplicate entries and 702,330 data entry errors and added 54,553 missing sample locations. The result, after a total of 31,538,671 edits, is a user-friendly GIS database that can be applied with confidence.

RdC's revised and corrected geochemical database is designed to work with the ColombiaMap database but is available separately; it is not sold as part of ColombiaMap. Pricing information for the Colombia Multielement Geochemical GIS Database is provided on the final page of this document.

Type of Sample	Number of Samples	Elements analyzed
Pan Concentrate	4,547	Ag, Al, As, Au, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, Hg, K, Mg, Mn, Mo, N, Na, Nb, Ni, P, Pb, Pd, Pt, S, Sb, Sc, Se, Sn, Sr, Th, Ti, Tl, U, V, W, Y, Zn, Zr
Rock	65,598	Ag, Al, As, Au, B, Ba, Be, Bi, Br, Ca, Cd, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ge, Hf, Hg, Ho, In, Ir, K, La, Li, Lu, Mg, Mn, Mo, N, Na, Nb, Ni, P, Pb, Pd, Pr, Pt, Rb, S, Sb, Sc, Se, Si, Sm, Sr, Ta, Tb, Te, Th, Ti, Tl, U, V, W, Y, Yb, Zn
Soil	21,265	Ag, Al, As, Au, B, Ba, Be, Bi, Br, Ca, Cd, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ge, Hf, Hg, Ho, I, In, Ir, K, La, Li, Lu, Mg, Mn, Mo, N, Na, Nb, Nd, Ni, Os, P, Pb, Pd, Pr, Pt, Rb, Re, Ru, S, Sb, Sc, Se, Si, Sm, Sn, Sr, Ta, Tb, Te, Th, Ti, Tl, Tm, U, V, W, Y, Yb, Zn, Zr
Stream Sediment	72,536	Ag, Al, As, Au, B, Ba, Be, Bi, Br, Ca, Cd, Ce, Cl, Co, Cr, Cs, Cu, Dy, Er, Eu, F, Fe, Ga, Gd, Ge, Hf, Hg, Ho, In, Ir, K, La, Li, Lu, Mg, Mn, Mo, N, Na, Nb, Nd, Ni, P, Pb, Pd, Pr, Pt, Rb, Re, Ru, S, Sb, Sc, Se, Si, Sm, Sn, Sr, Ta, Tb, Te, Th, Ti, Tl, U, V, W, Y, Yb, Zn, Zr
Water	3774	Ag, Al, As, Au, B, Ba, Be, Bi, Br, Ca, Cd, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ge, Hf, Hg, Ho, In, Ir, K, La, Li, Lu, Mg, Mn, Mo, Na, Nb, Nd, Ni, Pb Pd Pr Pt Rb Re Ru Sb Sc Se Si Sm Sn Sr Ta Tb Te Th Ti Tl U V W Y Yb Zn Zr

DCW and 50K topo index subdirectories:

The DCW subdirectory includes borders, cities and towns, roads, major drainages, and principal topographic contours from the Digital Chart of the World. The 100K topo index subdirectory includes an index to the 1:100,000 scale topographic maps for Colombia.

Radiometric Dates:

The Radiometric Dates subdirectory compiles radiometric dates for 4500 samples. Each sample is attributed with sample number, location, lithology, sample description, analytical method, rock type, material dated, age, error and source reference. The database also includes fields for original and current interpretation (inherited age, intusion/crystallization age, volcanism/crystallization age, age of metamorphism, etc.)

Radiometric dates without fields for interpretation and containing only dates published prior to October, 2014 are available for free download from: http://srvags.sgc.gov.co/arcgis/rest/services/Catalogo_Dataciones_Radiometricas_Colombia

TS Units subdirectory:

This subdirectory contains files used to create a TS (tectono-stratigraphic) map. The TS map uses the 1:1,000,000 scale geologic map as a base. Then, based on technical publications and on graduate school theses, geologic map polygons are assigned colors according to their tectono-stratigraphic setting. For instance, rather than coloring rock units according to age and lithology (e.g. Cretaceous basalt) the TS map identifies the geotectonic setting of that basalt as Pacific ocean floor, Proto-Caribbean ocean floor, intraoceanic island arc or back arc basin. The effect is to simplify the published rock unit legend and, at the same time, to make it easier to interpret and, consequently, easier to apply to exploration.

Infrastructure:

These files include population centers, cities, department boundaries, municipality boundaries, roadways, and the country border. These files are more detailed than the files included in the DCW subdirectory.

Titles and legends subdirectory:

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

UTM subdirectory:

A UTM index is provided for Colombia along with grids for each of the five local datums. Grids are provided for the Bogota, East Central, East, West and Western West Zones.

Plots subdirectory:

The Plots subdirectory contains a high resolution tiff image for the metallogenic map of Colombia.

Installation (MapInfo Users)

Start by checking that Microsoft Access 2000 (or higher) and MapInfo version 10.0 (or higher) are installed on your computer. If this is an update, backup your previous version of the ColombiaMap database and erase the old database. Copy the new database to the root directory (C:\) of your hard drive. Name the folder ColombiaMap (C:\ColombiaMap).

Fonts

Follow these steps to replace your "MapInfo Compatible font" with a customized font file provided with the ColombiaMap database.

- Exit MapInfo if it is running.
- Be sure that you are displaying hidden files and folders.
    - On a machine that is running Windows 10, open Windows Explorer and go to File > "Change Folder and Search Options." Select the "View" tab. Under "Hidden files and folders" select "show hidden files, folders and drives".
- Locate the file MAPINFOW.FNT on your computer.
    - On a machine that is running Windows 10, it is found in:
    C:\Users*YOURUSERNAME*\AppData\Roaming\MapInfo\Professional\1000
- Rename MAPINFOW.FNT; call it MAPINFOW_FNT.OLD
- Copy "MAPINFOW.FNT" from the ColombiaMap root directory into the folder where "MAPINFOW_FNT.OLD" is located.

Datums

ColombiaMap map uses several local datums that are not delivered with standard MapInfo software. Although the database will continue to function without making changes, it is preferable to add the custom datums provided with ColombiaMap to the MapInfo projection file. To do so:

Use any text editor to open "MapInfow.prj" from:

C:\Program Files(x86)\MapInfo\Professional (for Windows 10)

This file contains all of the projections that ship with your MapInfo software. From the ColombiaMap database, 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). MapInfow.prj will now provide all local datums called by ColombiaMap.

You are now ready to run ColombiaMap. Open the prospects database and metallogenic map by opening COProspects. Open the land status database and concession map by opening COLandStatus. You can also create your own workspaces (MapInfo) or project files (ArcGIS).

Picklists

ColombiaMap map uses a MapInfo Discover picklist to assign colors to tectono-stratigraphic units. Although neither Discover nor the picklist is required to run ColombiaMap, users who want to edit the picklist (to change colors or to add TS units) will need to copy "r_TectStrat_picklist.xml" from the TS Units\Picklist subdirectory of the ColombiaMap database to: C:\Users*username*\AppData\Roaming\Encom\Discover\Picklists

Installation (ArcGIS Users)

Install Microsoft Access 2000 (or higher) and ArcGIS version 10.0 (or higher) on your computer. If this is an update, backup your previous version of ColombiaMap and erase the old directory. Copy the new ColombiaMap database to the root directory (C:\) of your hard drive. Rename the folder ColombiaMap (C:\ColombiaMap).

If the ColombiaMap database is copied to a location other than the root directory, then some of the project files will not open properly. Broken links can be re-established using the procedure described in a following section, Open Database Connectivity - OBDC Issues (for ArcGIS Users).

You are now ready to run ColombiaMap. Open the prospects database and metallogenic map by opening COProspects.mxd. Open the land status database and concession map by opening COLandstatus.mxd. Use the mxd files provided with the ColombiaMap database or create new ones.

Microsoft Access Database (MapInfo and ArcGIS Users)

All prospect information is stored in a Microsoft Access database, COPros1.mdb, located in the Prospect subdirectory. COPros1, 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.

A second table in COPros1.mdb, INGEOMINAS_MetMap_1999, provides additional geologic information for each mineral occurrence and for the mining district in which it is located.

New mineral occurrences can be added and changes can be made to existing mineral occurrence information by using MSAccess to modify the COPros1 table. COPros1.mdb also contains a series of queries that select all deposits for each of the deposit types shown on page 5.

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

The file "readme_calculatedfields.txt" (in the Prospects subdirectory) describes the calculation of deposit size and contained metal value.

When adding records to the MSAccess database (COPros1.mdb), 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.

Deposit size and gross contained metal value are calculated using the following formulas:

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

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

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

Open Database Connectivity - OBDC Issues (MapInfo Users)

MapInfo connects to the Prospects database (COPros1.mdb) via a dsn file (COPros1.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 COPros1.tab is saved. You can also make changes directly to COPros1.mdb, the Prospects database, via MS Access.

Open Database Connectivity - OBDC Issues (ArcGIS Users)

ArcGIS connects to the Prospects database (COPros1.mdb) via an Object Linking and Embedding data base (OLE DB) link that is embedded in each mxd file. The OLE DB file, COPros1.odc, resides in the ODCfile subdirectory of the Prospect subdirectory.

If any mxd files contain OLE DB links that are broken, those links can be re-established using ArcCatalog. Open ArcCatalog, right click on the mxd file that is not opening properly, select "set data source(s)," and set the data source as: C:\ColombiaMap\Prospect\ODCfile\COPros1.odc. ArcCatalog will save the modified mxd as a "Copy of" the old filename.

Database Management System - DBMS (MapInfo Users)

All mineral occurrence information is stored in COPros1.mdb, a Microsoft Access database located in the Prospects subdirectory. Changes made to COPros1.mdb from within MapInfo are written to the MSAccess database when the MapInfo table 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 all of the MapInfo tables, including COPros1.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 "file > close DBMS connection" or the "disconnect 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. Workspaces read the linked tables and create MapInfo queries (with a "cb_" prefix). This allows the user to make changes to both the position of prospects and their attached information from within MapInfo.

Database Management System - DBMS (ArcGIS Users)

All mineral occurrence information is stored in COPros1.mdb, an MSAccess database located in the Prospects subdirectory. Changes to the

mineral occurrence information must be made directly to COPros1.mdb from within MSAccess. Size and gross contained metal value can then be updated using the "Update_size_and_value" form in COPros1.mdb.

Ordering information, copyright and disclaimer

The ColombiaMap GIS database, including *Geography, Geology, TS Units, Radiometric Dates, Prospect* and *Land Status* modules (in MapInfo or in ArcGIS format), is available through Recursos del Caribe, S.A. To order the database of for any questions, write to Carl Nelson at: nelson@cbmap.net.

Information on pricing is provided below. Updates are free for a year and half price for four additional years. Purchasers are encouraged to update within the five-year period.

Examples of the maps that can be generated using the database are displayed on the web site at www.CBMap.net.

ColombiaMap is the property of Carl E. Nelson and Recursos del Caribe, S.A. It is intended for the sole use of the purchaser. The database 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 ColombiaMap database is accurate and, except for the land status module (metallic mineral concessions), is kept up-to-date. Carl Nelson and Recursos del Caribe, S.A. do not warrant the accuracy of information provided in the ColombiaMap database.

Pricing

ColombiaMap: a GIS database for Colombia (in MapInfo or ArcGIS)
Available as a package for: US$30,000

ColombiaMap is also available in modules as follows:
Geography (digital elevation models and shaded relief): $ 5,000
Geology (*Geography* plus vector geology): $10,000
Radiometric Dates (radiometric dates only, with locations): $ 5,000
TS Units (*Geography, Geology* and *Radiometric Dates* plus a
regional tectono-stratigraphic interpretation): $20,000
Prospects (*TS Units* plus metallic mineral mines and prospects): $30,000
Land status (*Geography* plus metallic mineral concessions, $10,000
     mineral reserve areas, national parks, forest reserves, paramos,
     indigenous and Negro communities, and other protected areas)
Plots (high resolution tiff images of the metallogenic map): $ 5,000

Colombia Multielement Geochemical Database: This database contains multi-element geochemical data collected by Ingeominas (now the Servicio Geológico Colombiano) through 2004 and released to the public in 2015. The SGC database is available for free download at: http://geoportal.sgc.gov.co/geoportalsgc/catalog/quicklink/basesDatosPublicacion.page.:

Recursos del Caribe, S.A. (RdC) took the raw analytical data provided by the SGC, converted text to numeric fields as appropriate, found and corrected 772 duplicate entries and 702,330 data entry errors and added 54,553 missing sample locations. The result, after a total of 31,538,671 edits, is a user-friendly GIS database that can be applied with confidence.

RdC's revised and corrected geochemical database is designed to work with the ColombiaMap database but is sold separately.

Colombia Multielement Geochemical GIS Database: $36,000

Type of Sample	Number of Samples	Elements analyzed
Pan Concentrate	4,547	Ag, Al, As, Au, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, Hg, K, Mg, Mn, Mo, N, Na, Nb, Ni, P, Pb, Pd, Pt, S, Sb, Sc, Se, Sn, Sr, Th, Ti, Tl, U, V, W, Y, Zn, Zr
Rock	65,598	Ag, Al, As, Au, B, Ba, Be, Bi, Br, Ca, Cd, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ge, Hf, Hg, Ho, In, Ir, K, La, Li, Lu, Mg, Mn, Mo, N, Na, Nb, Ni, P, Pb, Pd, Pr, Pt, Rb, S, Sb, Sc, Se, Si, Sm, Sr, Ta, Tb, Te, Th, Ti, Tl, U, V, W, Y, Yb, Zn
Soil	21,265	Ag, Al, As, Au, B, Ba, Be, Bi, Br, Ca, Cd, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ge, Hf, Hg, Ho, I, In, Ir, K, La, Li, Lu, Mg, Mn, Mo, N, Na, Nb, Nd, Ni, Os, P, Pb, Pd, Pr, Pt, Rb, Re, Ru, S, Sb, Sc, Se, Si, Sm, Sn, Sr, Ta, Tb, Te, Th, Ti, Tl, Tm, U, V, W, Y, Yb, Zn, Zr
Stream Sediment	72,536	Ag, Al, As, Au, B, Ba, Be, Bi, Br, Ca, Cd, Ce, Cl, Co, Cr, Cs, Cu, Dy, Er, Eu, F, Fe, Ga, Gd, Ge, Hf, Hg, Ho, In, Ir, K, La, Li, Lu, Mg, Mn, Mo, N, Na, Nb, Nd, Ni, P, Pb, Pd, Pr, Pt, Rb, Re, Ru, S, Sb, Sc, Se, Si, Sm, Sn, Sr, Ta, Tb, Te, Th, Ti, Tl, U, V, W, Y, Yb, Zn, Zr
Water	3774	Ag, Al, As, Au, B, Ba, Be, Bi, Br, Ca, Cd, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ge, Hf, Hg, Ho, In, Ir, K, La, Li, Lu, Mg, Mn, Mo, Na, Nb, Nd, Ni, Pb Pd Pr Pt Rb Re Ru Sb Sc Se Si Sm Sn Sr Ta Tb Te Th Ti Tl U V W Y Yb Zn Zr