

Introduction

Mexico it's known from its Ag-Au epithermal potential in various world class deposits, such as Pachuca-Real del Monte and Guanajuato. Most of these deposits are typically related to volcanic and subvolcanic environments hosted in the physiographic provinces known as Sierra Madre Occidental (SMOc) and Meseta Central(MC).

The VMS and SEDEX potential in the southern and central parts of Mexico started to be recognized around mid 70's and early 80's, deposits in the south part of the country such as Rey de Plata and Tizapa are known and found in literature as VMS typologies, the metal inventory of this deposits tend to be Pb-Zn-Cu-(Ag). These deposits are encircled in the tectonostratigraphic terrane known as Guerrero terrane; witch is related to various subduction related process (sedimentation in back arc, calc-alkaline magmatism and metamorphism of accreted exotic terranes?) during the Mesozoic. Even though Francisco I. Madero in Zacatecas State it's not reported in the actual literature as a VMS deposit, it's exploration model worked as so.

Location

The first Field Trip from Mexico UNAM Student Chapter was made in two world class deposits, Fresnillo and Francisco I. Madero they are both located in Central Mexico in

Zacatecas State (Figure 1). The capital city of Zacatecas state has the same name as the state, Francisco I. Madero it's a project 30 Km from Zacatecas city while the Fresnillo project it's located approximately 60 Km to the NW of Zacatecas city. The distance between Mexico City and Fresnillo it's 704 Km, this means 7 and a half hours of driving.

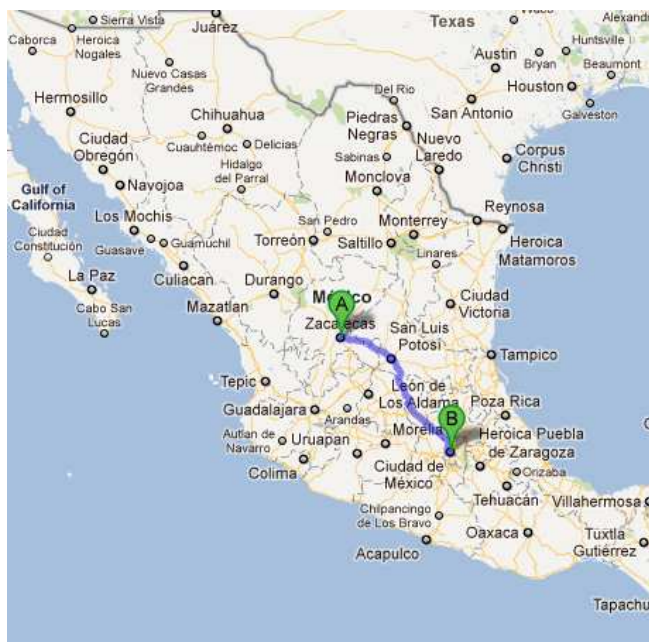


Fig. 1 Approximate location of Fresnillo and Zacatecas, both in Zacatecas State. Taken from Google maps. A refers to Zacatecas city and B refers to Mexico City.

Objective

The First field trip of the Mexico **Student Chapter Mexico UNAM** was to visualize and meet an epithermal world class deposit with more than 400 years in production with Ag-Au as main ores. And to meet a Skarn (proposed also as VMS) deposit that enter in to production from year 2001.

Both deposits offer a high complexity for their geologic understanding and the opportunity to visiting both ore deposits gave us a chance to understand the importance of recognizing guides of mineralization, such as structural trends in Ag-Au rich veins, or the recognition of important guides of mineralization (stratigraphic control in the case of Francisco I. Madero).

Geologic knowledge was not the only objective in these visits but also the further understanding of various mine engineering aspects during exploitation such as cutoff grade, mining methods, visualizing volumes of daily production, milling and leaching processes and most importantly understand and appreciate the work of the geologist in a producing unit not only for keep the production rate in an adequate way but also to increase actual resource and reserves.

General Geology of the Area

Both deposits are hosted in the physiographic province known as the Mesa Central (MC), This province it's defined as a topographic depression between the Sierra Madre Oriental, Sierra Madre Occidental physiographic ranges (Figure 2). It comprises rocks from Triassic to Pleistocene. Mesozoic rocks comprise sedimentary rocks of main marine origin ranging in sedimentary environments from pelagic limestones to turbidites. The Cenozoic rocks are mainly composed by volcanic sequences and continental detritus.

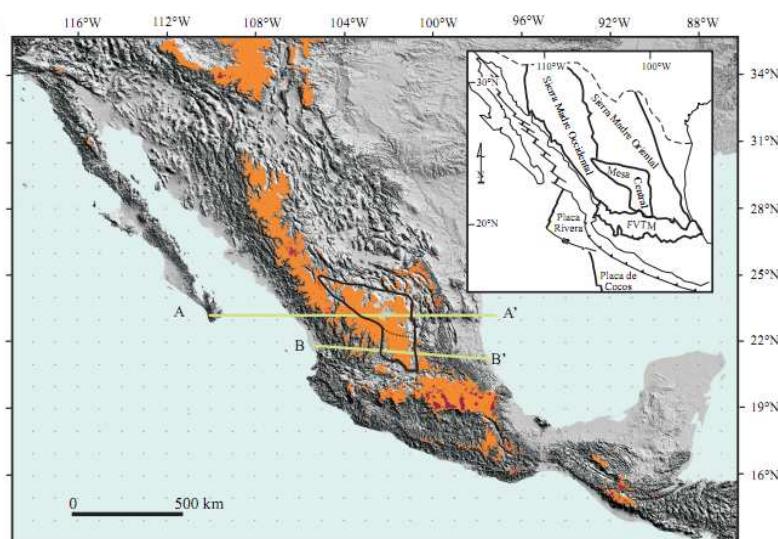


Fig. 2 Location of the physiographic province known as the Mesa Central, between Sierra Madre Oriental and Sierra Madre Occidental, orange means topographic highs greater than 2000 m above sea level, taken from Nieto-Samaniego *et al.*, 2005.

General Description of the deposits

Mexico-Fresnillo (August 2nd 2011)

We Moved from Mexico City to Fresnillo.

Fresnillo (August 3rd 2011)

Fresnillo it's a world class deposit classified as an epithermal Ag-Au type. The mineralization in these deposits it's hosted in veins ranging from 80 cm to 3 m wide and with lateral continuities from 5 to 7 km with a general E-W trend dipping south (Figure 3 and 4). These veins are hosted in Eocene Rhyolites and conglomerate and Arkose of the Fresnillo Formation.

The deposit itself has reserves 365.5 Moz of Ag and 746,000 Oz of Au. The production rate it's 8000 tons per day and the cut off grades for both metals are 324g/t for Ag and 1g/t Au. It is worth mentioning that Fresnillo started production since 1554 (further information, <http://www.fresnilloplc.com/operations.aspx>) so this means Fresnillo it's not only one of the biggest Ag deposits in the world but also one of the oldest who have reported activity ever since.



Fig.3 Eng. Leyva showing the Student Chapter the mining infrastructure and the current development of the mine in the San Carlos Vein.



Fig. 4 Typical Banded texture from the San Carlos Vein, some of the dark bands are galena and sphalerite with some minor Ag Sulfides.

Francisco I. Madero

Francisco I. Madero it's a newly found deposit classified as a VMS Zn-Cu-Pb-(Ag) type according to the exploration model given by Mexican Geological Survey (*Consejo de Recursos Minerales* and *Peñoles Exploracion*). The genesis of this deposit has been controversial, evidences for a distal skarn model have been proposed based on mineralogical data (Canet *et al.*, 2009, for further reading). Both dikes of dacitic composition and ore stratification in massive aggregates were seen in the mining works.



Fig. 5 Student Chapter members to see drilling techniques.

Historical production up to 2005 is 9.6 Mt of ore containing 4.74 MOz silver, 30.28 Kt of lead and 309.7 Kt of zinc with a plant capacity of 7000 tons per day, cut off grades have been changing according to price variability of Zn and Pb. Up dated reserves would give the Francisco I. Madero mine 18 years of living with out making any significant discovery (Figure 5 and 6).



Fig. 6 Peñoles staff showing to the Student Chapter an XRF Niton device, for quantifying metal content in several core samples.

Activities



Fig. 7 Participants from 1st Student Chapter Mexico UNAM.

- August 2nd 2011 Travel from Mexico City to Fresnillo Zacatecas (7 ½ hour travel).
- August 3rd 2011 Visit to Fresnillo Mine, Veta San Carlos and Veta Santa Cruz were the visited areas where discussion and further explanation took place.

- August 4th 2011 Visit to Francisco I. Madero Mine, Mineralized bodies 2001 and C43 were the visited areas where discussion and further explanation took place.
- August 5th Return to Mexico City (7 ½ hour travel).

Expenses and Budget (Receipts are included in Annual report)

Table 1 Expenses realized during field trip to Fresnillo and Francisco I. Madero, monetary units are in U.S. Dollars multiply for 12.5 to pesos conversion (Last unit may be variable, according to exchange rates).

Date	Food	Lodging	Buses	taxis	total
02-08-11			232		232
03-08-11		109.2			109.2
03-08-11	26.88				26.88
03-08-11	22.32				22.32
03-08-11			14.4		14.4
04-08-11	17.6				17.6
04-08-11				32	32
05-08-11		336			336
05-08-11			280.8		280.8
06-08-11					
Final Balance	-71.2			total	1071.2
Apply *12.5 for pesos				SEGFund	1000

*Red balance means that participants had to cover this additional cost.

See Appendix.

Acknowledges

Industrias Peñoles and Fresnillo PLC are specially thanked for the kind gesture of giving us the opportunity of this Field Trip. All Peñoles and Fresnillo PLC personnel involved during the Field Trip are also thanked for their time and consideration during the explanations and discussions. Also we would like to thank Eng. David Giles (our industrial advisor) for the coordination and guidance of this 1st Field Trip. Finally we thanked the SEG-SAC for trusting these funds to Student Chapter Mexico UNAM.

Further Reading

Albinson T. F., 1998, Geologic Reconstuction of Paleosurfaces in the Sombrerete, Colorada and Fresnillo Disctricts, Zacatecas State Mexico, Economic Geology, Vol. 83 pp. 1647-1667.

Canet C., Camprubi A., Gonzáles-Partida E., Linares C., Pura A., Piñeiro Fernandez F., Prol-Ledesma R. M., 2009, Mineral assemblages of the Francisco I. Madero Zn–Cu–Pb–(Ag) deposit, Zacatecas, Mexico: Implications for ore deposit genesis, Ore geology Reviews, Vol. 35, pp. 423-435.

Folio: TC000554073 No Operación: 46773358
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Tipo de Servicio: PRIMERA
Asiento: 32 Importe: \$ 580.00
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LUIS ABEL JIMENEZ
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Origen: MEXICO DF
Destino: FRESNILLO
Tipo de Servicio: PRIMERA
Asiento: 31 Importe: \$ 580.00
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Fecha: Martes 02/Agosto/2011
Hora: 17:00 tarde
Origen: MEXICO DF
Destino: FRESNILLO
Tipo de Servicio: PRIMERA
Asiento: 30 Importe: \$ 580.00
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Fecha: Martes 02/Agosto/2011
Hora: 17:00 tarde
Origen: MEXICO DF
Destino: FRESNILLO
Tipo de Servicio: PRIMERA
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Huésped: MARCELO GODEFROY RODRIGUEZ

Empr: SIN DEFINIR

Observaciones:

NOMBRE DEL HUESPED: MARCELO GODEFROY RODRIGUEZ

Gpo:

Hab: 107 -

In: 02/08/2011 Out: 03/08/2011

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Total Factura:	\$1,365.00
Propina:	\$0.00
Importe Total:	\$1,365.00

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