# Remote sensing

Mexican Geological Survey (SGM), is in charged of explore country's mineral resources to achieve their optimal use. Remote sensing is used to satellite images interpretation as this let us visualize large areas jointly, instantly and synoptically.

This technology has been incorporated to modernize process of SGM, so it helps to develop different programs from the mapping infrastructure and exploration to specialized geochemistry and geophysics maps.

Nowadays it has 100 per cent coverage of the country with satellite images. Data obtained is used in specialized software using different techniques of digital image processing and they have become an important auxiliary tool in geological - mining mapping, environmental geology, geophysics, etc.

Background.
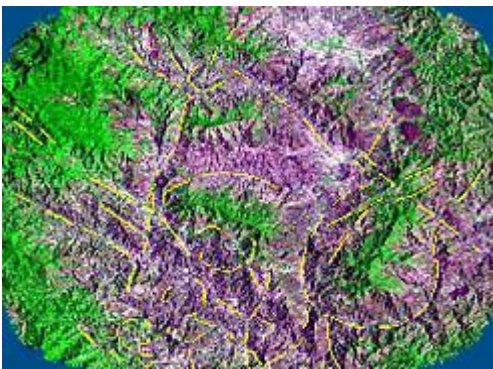
SGM use of information contained in satellite image goes back to 1978, through a 1:1000000 photographic film of the ETRS satellite (Earth Resources Technology Satellite) developed by NASA and launched in 1972.

Later DIAZO film was acquired, which allows overlying four simultaneously shot images to get a more detailed analysis (four band resolution). These images are obtained by LANDSAT satellite Multispectral Scanner Sensor (MSS), ETRS successor.

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SGM
SERVICIO GEOLÓGICO MEXICANO

Contacto:
Blvd. Felipe Angeles Km. 93.50-4, Col. Venta Prieta
Pachuca, Hgo., C.P. 42083
Teléfono: (771) 71 13583
Correo Electrónico: webmaster@sgm.gob.mx

In 1979, Visor Projector Miniaddcol Viewer equipment was used in first digital interpretations, since 1993 digital computer analysis has been used, justified by large data volume contained in multispectral images and the need for fast and efficient information process.

Currently, LANDSAT 5 –seven bands resolution and 180 kilometers wide vision field- maps our soil.

Likewise others satellites such as Aster, Spot, Ikonos, QuickBird and World View I and II, give us partial images coverage. Programs as ERDAS, ENVI and ER-MAPPER makes possible to have a big amount of data which tell us how soil has been used and what features it has, besides offering information to risk measuring, indispensable and strategic aspects of mining sector.

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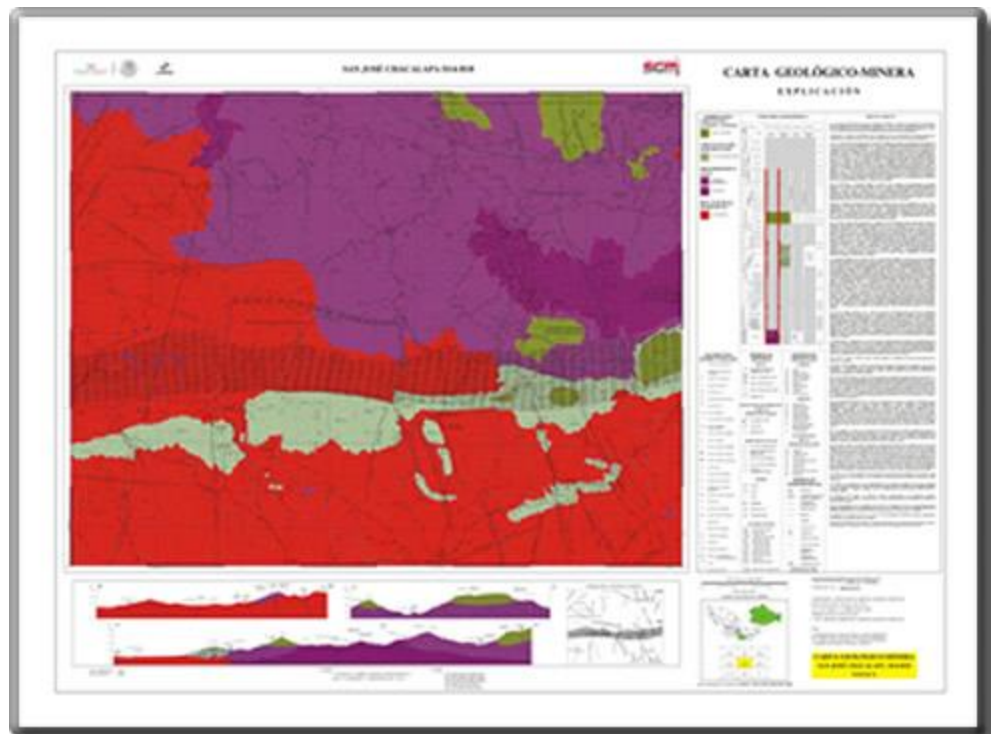
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Enforcement

Satellite images processing allows the production of:

Geological-mining maps:

- Lithological contacts.
- Structural geology.
- Alterations.
- Regional structure determination.
- Mapping and tectonostratigraphic ground delimitation.
- Campaign planning of verification field.
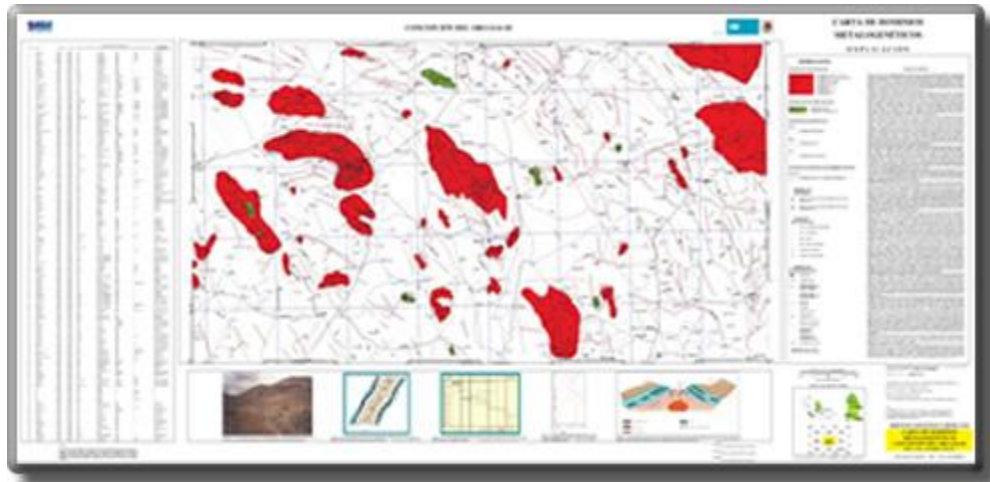- Favorable areas determination to mining prospecting.

Geological-mining map

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In metallogeny:

- Lithological domains.
- Metallogenic domains.

Metallogeny map

Products offered by the Mexican Geological Survey:

- Standard image band combination 7 – 4 – 1.
- Standard image plus digital terrain model (3D).
- Combined images with different information levels, such as geology, mining, geochemistry and geophysics.
- State images.
- Stereoscopic images.

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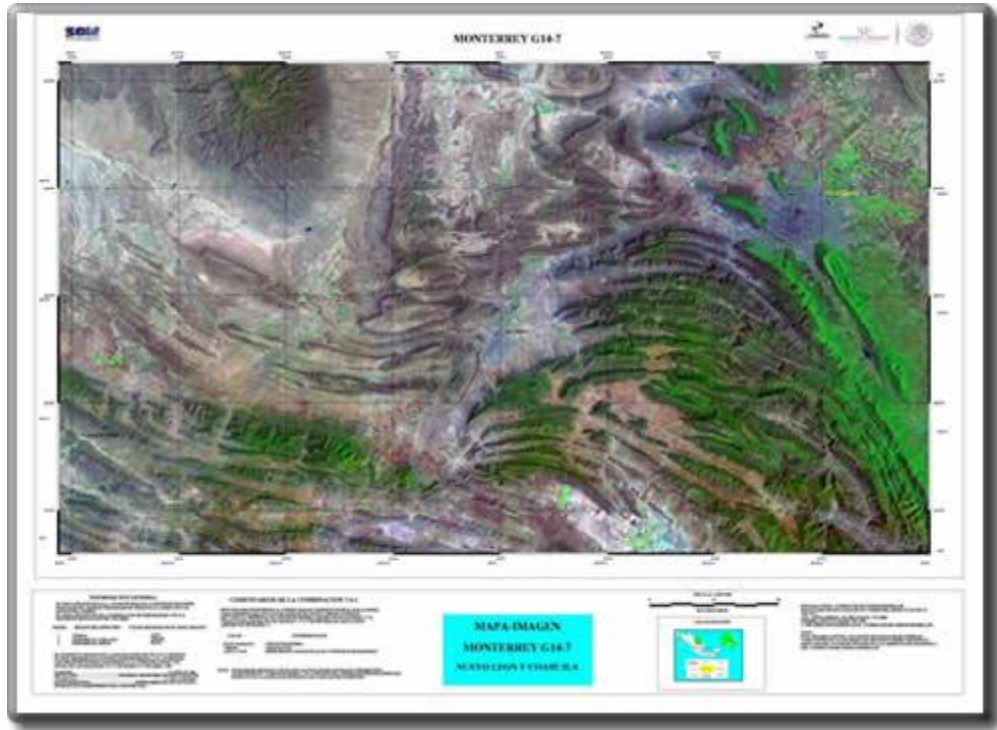
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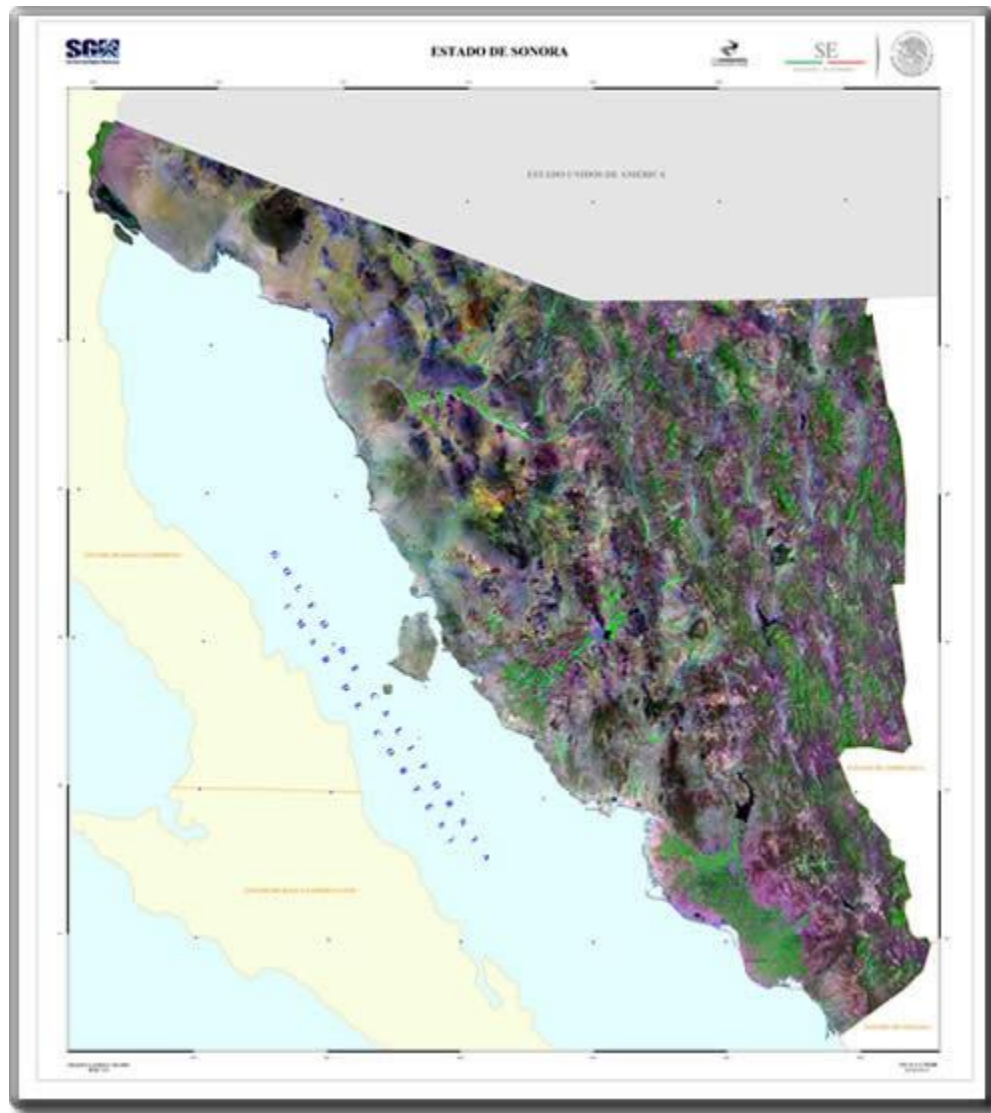
Sonora state image

Techniques used for the interpretation:

- Enhancements.
- Bands combination.
- Bands coefficient.

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Monterrey map - image