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Serviço Geológico do Brasil

GEOLOGICAL SURVEY OF BRAZIL

ASSESSMENT OF THE LITHIUM POTENTIAL IN BRAZIL

Directorate of Geology and Mineral Resources
Department of Mineral Resources
Special Projects and Strategic Minerals Division
Management of Geology and Mineral Resources

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CPRM-Geological Survey of Brazil
Geologist

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Justification

- Growing worldwide demand for lithium due to its use in the production of batteries for mobile telephones, cameras, laptops industries, as well as for the rapidly growing electric and hybrid vehicle industry.

Goal

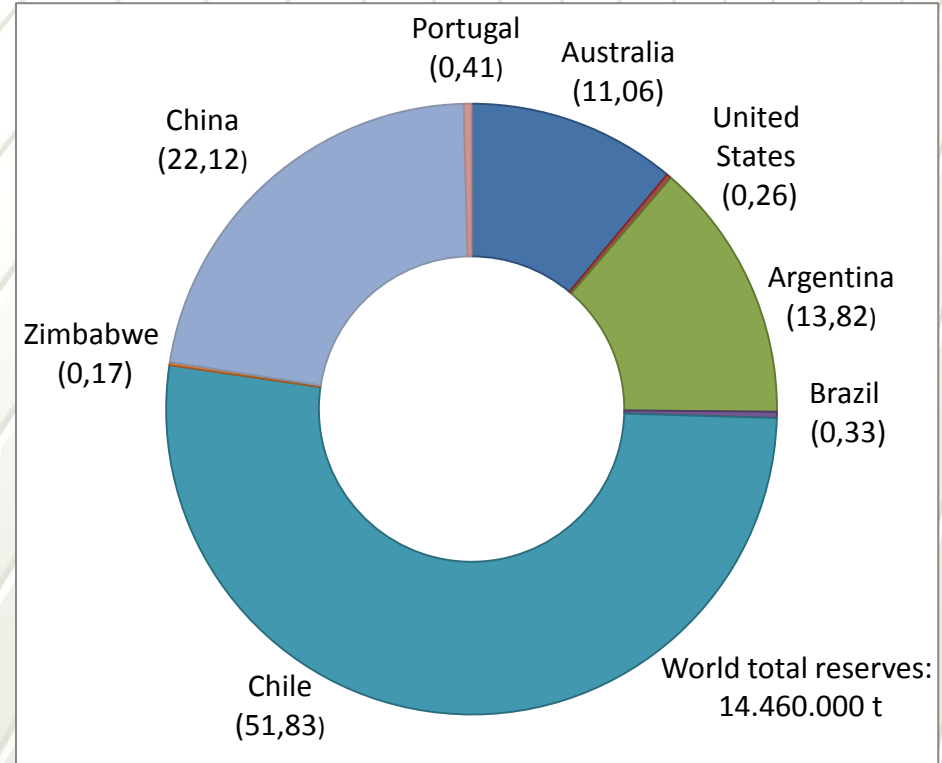
- To improve the knowledge of pegmatite-related lithium occurrences in Brazil.

Expected Results

- Provide an outlook of lithium occurrences in Brazil;
- The identification of areas with high potential for the discovery of lithium deposits.

Lithium in Brazil (USGS, 2017)

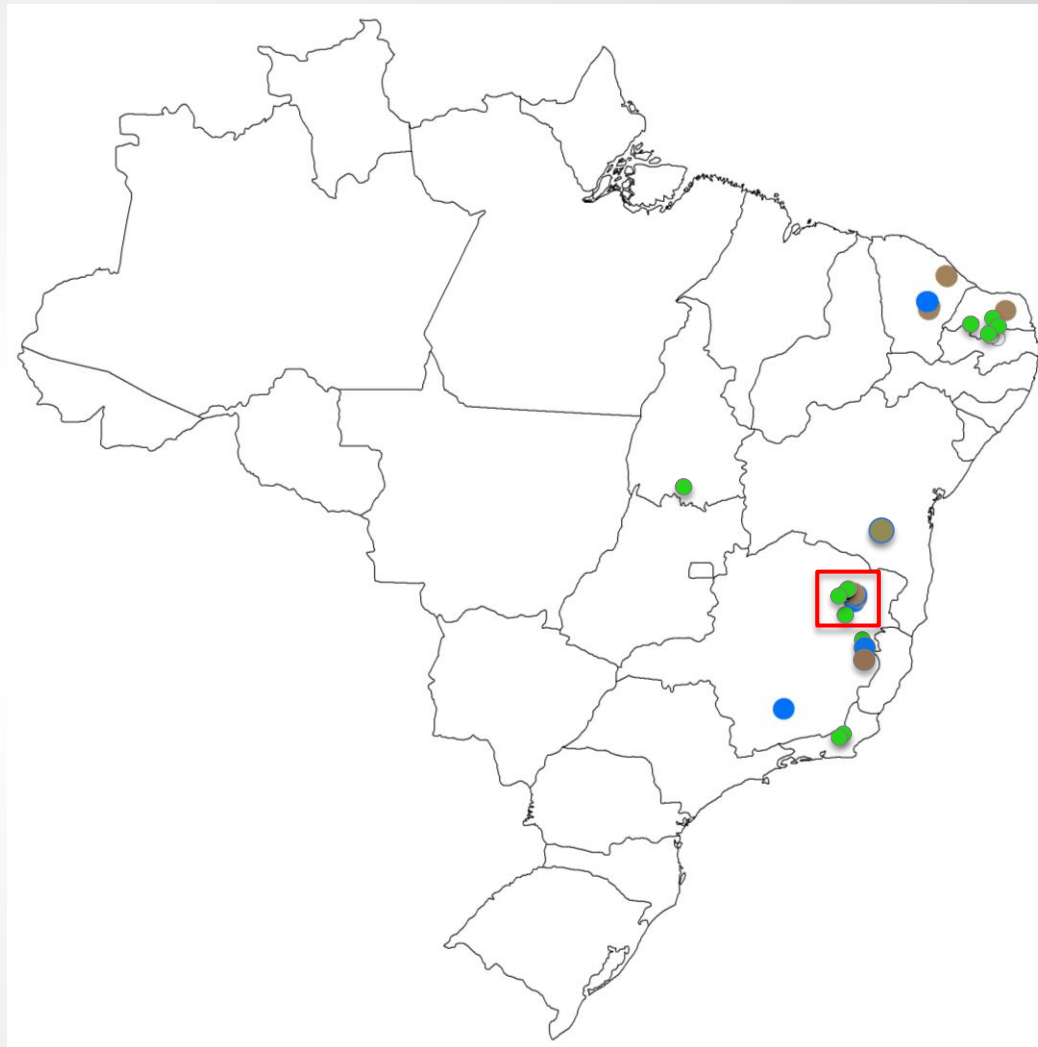
- Reserves → 48.000 t Li₂O content
(Li - Cs - Ta (LCT) pegmatites)
< 0.4% of the world reserves
(Excludes Bolivia)
- Production → ~ 200 t
~ 0,6% of the world production
(Excludes U.S. and Bolivia)



World Reserves (%): U.S. Geological Survey,
Mineral Commodity Summaries, January 2017.

Distribution of Lithium Occurrences in Brazil (Pegmatites)

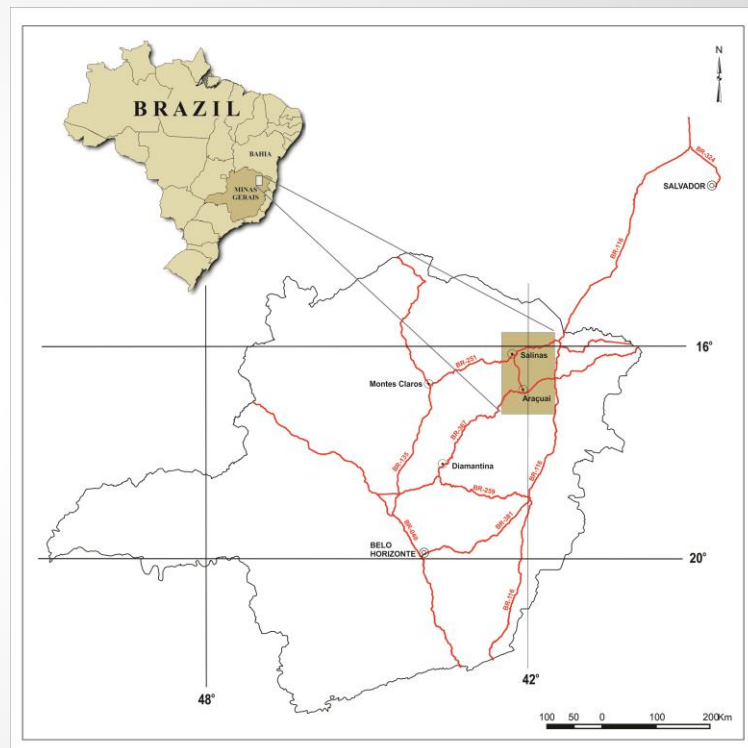
- Mine
- Artisanal mining (Garimpo)
- Occurrence/Evidence
- First phase area (finished)



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First Phase: Middle Jequitinhonha River Valley

- 100% of the lithium official reserves of Brazil (DNPM, 2010). Spodumene, Petalite, (Lepidolite), (Amblygonite);
- 17,750 km²;
- Northern Araçuaí Orogen (Neoproterozoic / Cambrian) (Brasiliano - Pan African orogenic system);
- Salinas Formation and Macaúbas Group (host rocks);
- E_y4S Granite Suite (S-type) (Parental Granites);
- Mining Companies: Companhia Brasileira de Lítio (CBL), Sigma Mineração and Falcon Metais.



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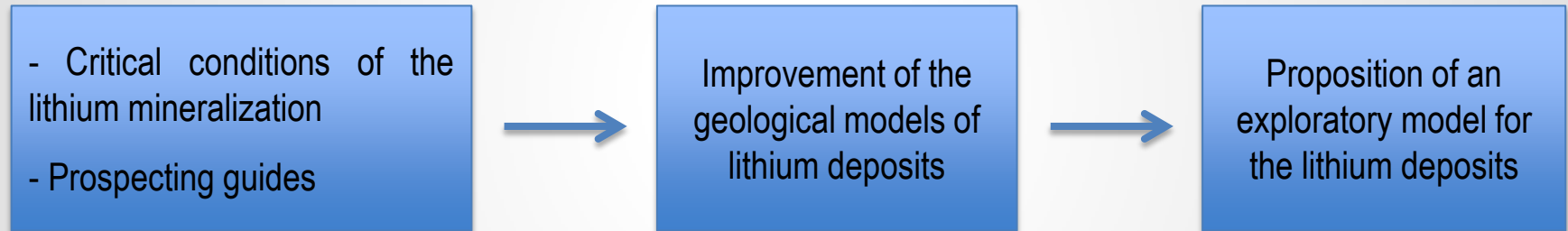
Team

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Methodology



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Main Actions

- 1- Compilation of geological maps;
- 2- Compilation of historical information;
- 3- Geologic mapping of areas with relevant cartographic divergences (~ 2,700 Km²);
- 4- Petrographic and geochemical study of 53 samples of two-mica granites (Cambrian $\epsilon\gamma_4S$ Suite – S-Type) in order to identify “fertile” granites;
- 5- Field study of 45 lithium deposits/occurrences (20 unpublished) which were classified into 8 different types;
- 6- Study of regional metamorphic mineralogy of the metasedimentary rocks that host the pegmatites;

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Main Actions

- 7- Study of contact metamorphic mineralogy of the metasedimentary rocks that host the pegmatites;
- 8- Sampling of the pegmatites, the soils derived from them and their host rocks for spectral study;
- 9- Processing and interpretation of Gamma ray spectrometry and magnetometric airborne surveys data;
- 10- Compilation of geological information on the mineral chemistry of pegmatites and geochemistry of the host rocks from the studied region, as well as on the use of geochemical prospecting of stream sediments to locate lithium deposits;
- 11- Interaction with mining companies and local residents.

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Results

Publication (2016)



- Improvement of geological models of the lithium deposits in their empirical and genetic basis.
- Identification of new areas with lithium potential and the extension of the potential area of lithium-mineralized areas that are already known.
- Proposition of an exploratory model for the lithium deposits.

INFORME DE RECURSOS MINERAIS

PROGRAMA GEOLOGIA DO BRASIL

Série Minerais Estratégicos, nº 03

Gestão Estratégica da Geologia, da Mineração
e da Transformação Mineral



**PROJETO AVALIAÇÃO DO
POTENCIAL DO LÍTIO NO
BRASIL – ÁREA DO MÉDIO
RIO JEQUITINHONHA,
NORDESTE DE MINAS GERAIS**

Belo Horizonte – 2016

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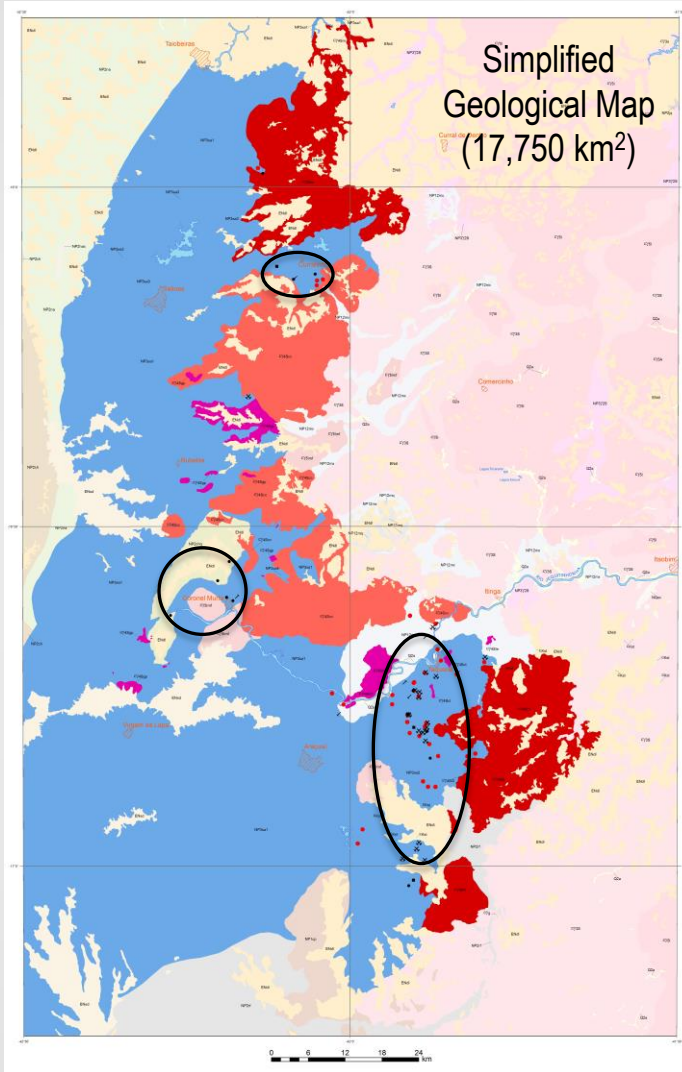
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Cambrian (γ 4 Suite)

- Fertile Granites
- Barren Granites (with rare fertile domains)
- Pegmatitic Granites (with rare muscovite granites)

Neoproterozoic (metasediments of Salinas Formation)

- Favourable host Unit
- Lithium mine
- Lithium deposit
- Lithium small and chaotic 'mines' (i.e. digs)
- Lithium occurrence
- Andalusite and/or cordierite (contact metamorphism)

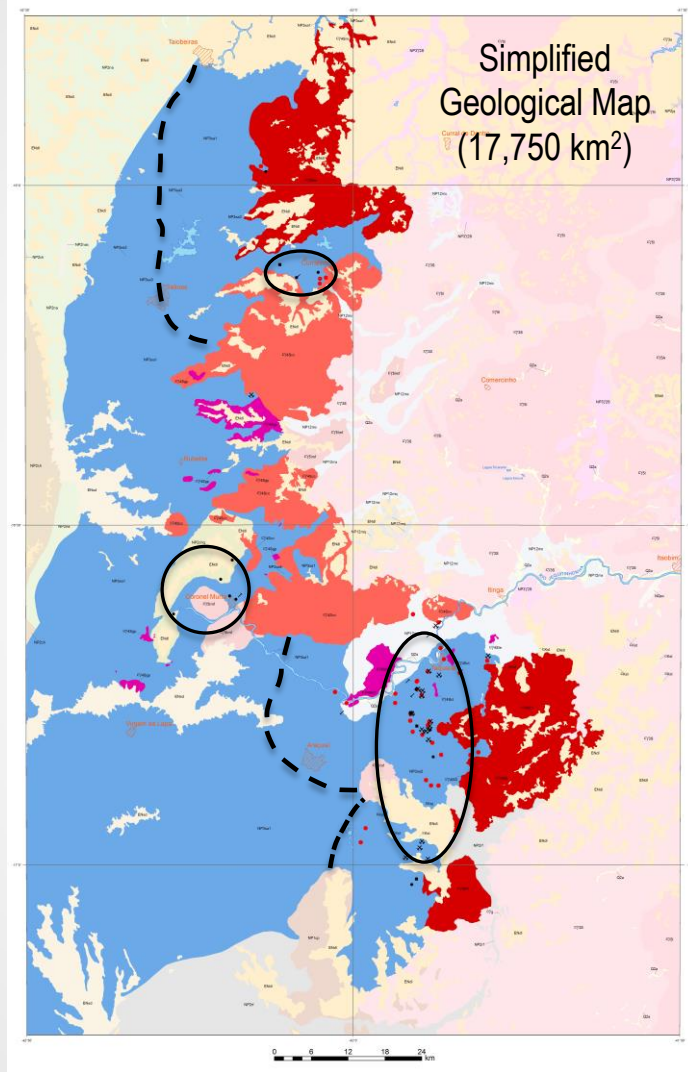


Original limits of the pegmatitic fields

New potential area

ESTIMATION

Brazil: reserve expansion
→ from 0,4% to ~8,0% of world reserves (>1Mt Li₂O content)
Garcia (2013, 2014)



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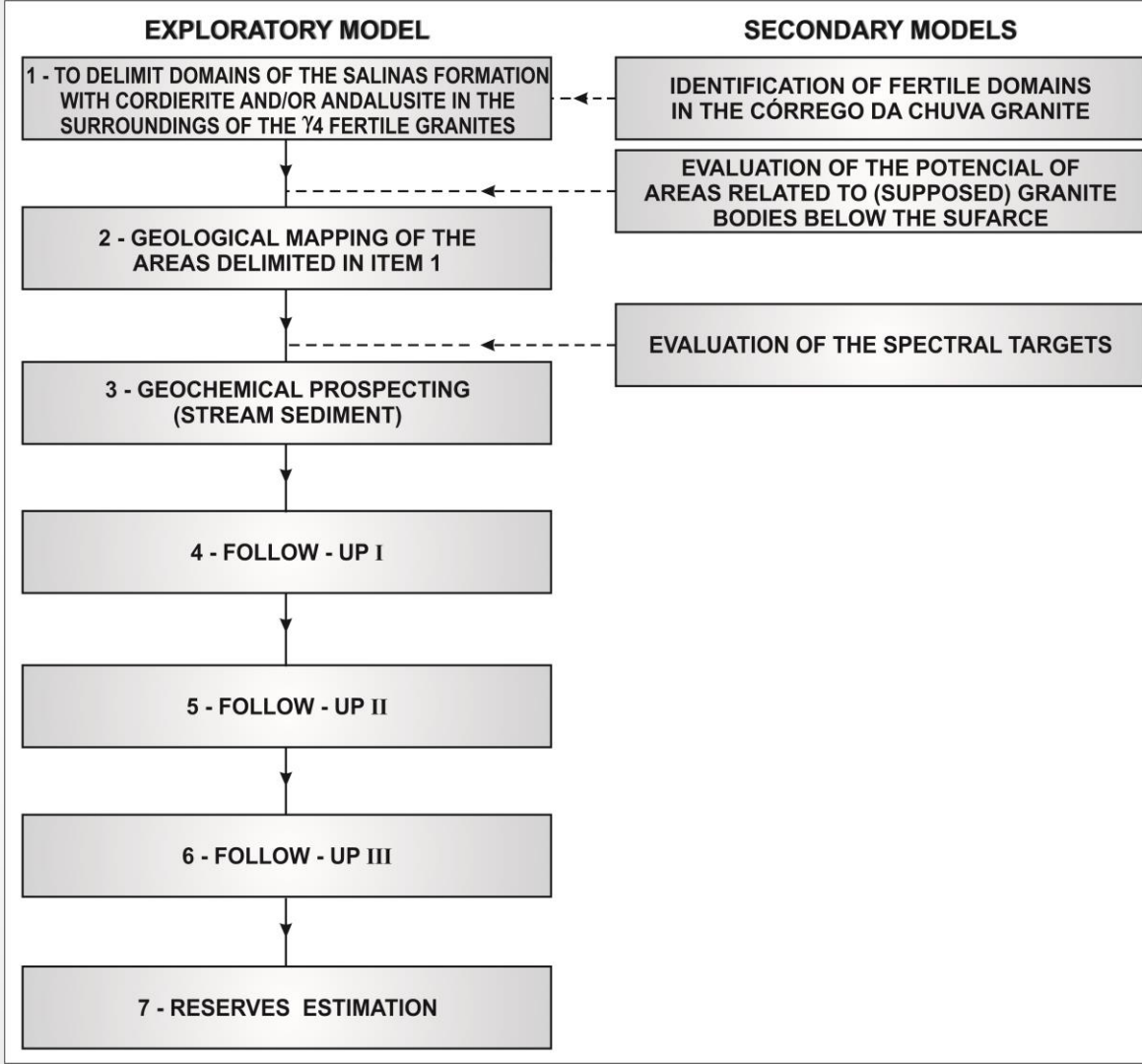
○ Original limits of the pegmatitic fields

- - - Border of potential areas

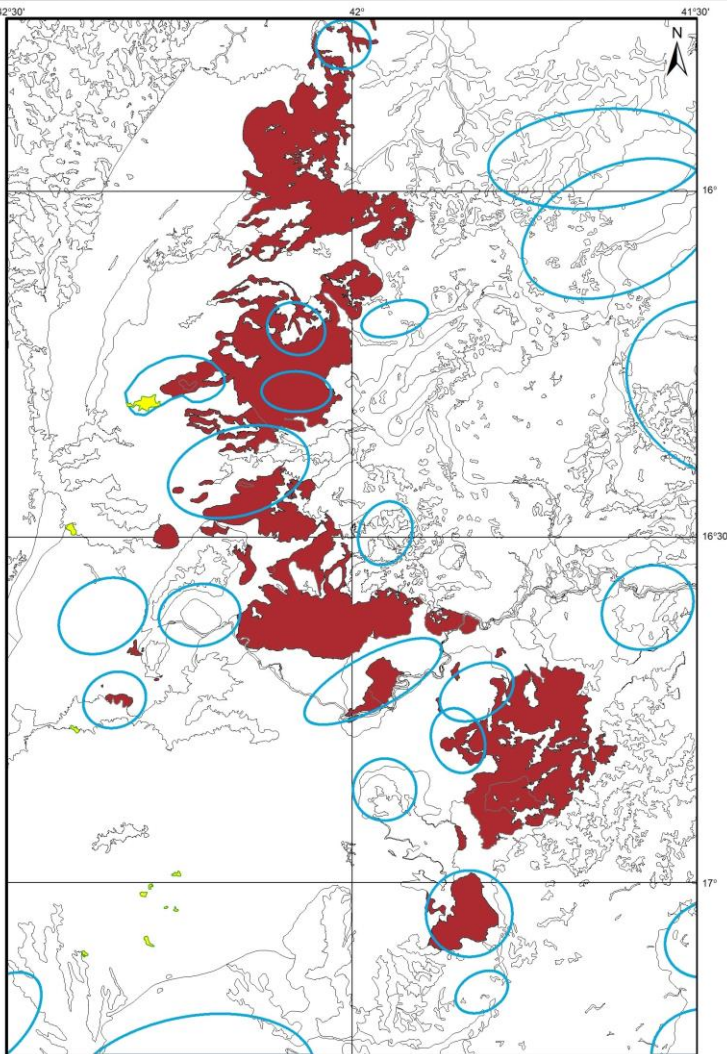
Extended potential area of Itinga Pegmatitic Field




Exploratory Model

Fertile granites
Shallow crustal level
Stratigraphic control
Structural control
Typological zoning
Typology
Mobility



Geophysics and Reflectance Spectroscopy



-  Eyr4S Suite Magmatism
-  Potential areas defined by spectral study
-  Supposed granite bodies below the surface and subsurface extensions of exposed granites defined by magnetic anomalies (projections)



Zué/Dim Artisanal Mining - Curralinho Pegmatitic Field



Cachoeira Mine (CBL) - Itinga Pegmatitic Field



Fazenda Bananal Artisanal Mining - Itinga Pegmatitic Field

Severino Artisanal Mining - Itinga Pegmatitic Field





Meio Mine - Itinga Pegmatitic Field



Tesoura Mine - Itinga Pegmatitic Field



Generosa Mine - Itinga Pegmatitic Field



Nequinha Artisanal Mining - Coronel Murta Pegmatitic Field



Cordierite and andalusite (arrows) poikiloblastic porphyroblasts in biotite schist

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Acknowledgment

- Companhia Brasileira de Lítio - CBL;
- Sigma Mineração;
- Professor Alexandre Martins Campos de Lima;
- Professor Antônio Carlos Pedrosa Soares;
- Geologist Júlio Cezar Pimenta Romeiro;
- Artisanal miners and local residents.



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