Australian Granite Database: potential for future geoscience projects in a green world

by Elham Yousef Zadeh[1] and Katie Peters[1]

[1]Kenex Pty Ltd, Wellington, New Zealand

Introduction

Intrusive igneous rocks with more than 55% silica content are classified as felsic to intermediate. Common felsic and intermediate intrusive rocks are granite, pegmatite, granodiorite, and diorite. These rocks can be associated with many types of mineralisation and contain or are proximal to commodities that are used in modern technologies and industries such as copper, lithium, REE, and tin.

Geographic Information Systems (GIS) are an awesome technology for compiling, analysing, and presenting spatial data increasing usability of the data and saving time. GIS increases efficiency in all areas of geoscience including exploration and mining, assessing environmental impact, and geology mapping. And databases! They are important tools for integrity, safety, and standardisation of various data.

We have used the power of GIS to create a spatial granite database that maps all felsic and intermediate intrusive rocks over Australia and attributes them with important information for mineral exploration and other geoscience applications.

Discussion

Easy access to large amounts of data in one place is one of the most significant advantages of designing and using a database. Unfortunately, having easy access to good quality data over a large area is not always possible and geodata are no exception. Geo-databases nowadays are gradually improving and are widely used by governments, industries, and academic centres. By using available databases many companies, active in mining, oil exploration, engineering geology and environmental sectors have been able to gain a better understanding of their projects and therefore make more informed decisions.

Kenex have identified a need for a spatial database of felsic and intermediate intrusive rocks for Australia (Figure 1). The database will be critical for targeting granite related mineral systems including tin, REE and lithium. Currently the available granite mapping is variable between states and is not well attributed with information relevant to identifying these mineral systems. The create this database we have combined data from geology mapping undertaken by each state into a single country wide dataset (Figure 2). The database is attributed with information from the original survey mapping, the Australian Stratigraphic Database, and other spatial and non-spatial sources including relevant geochemistry and mineral occurrence information.

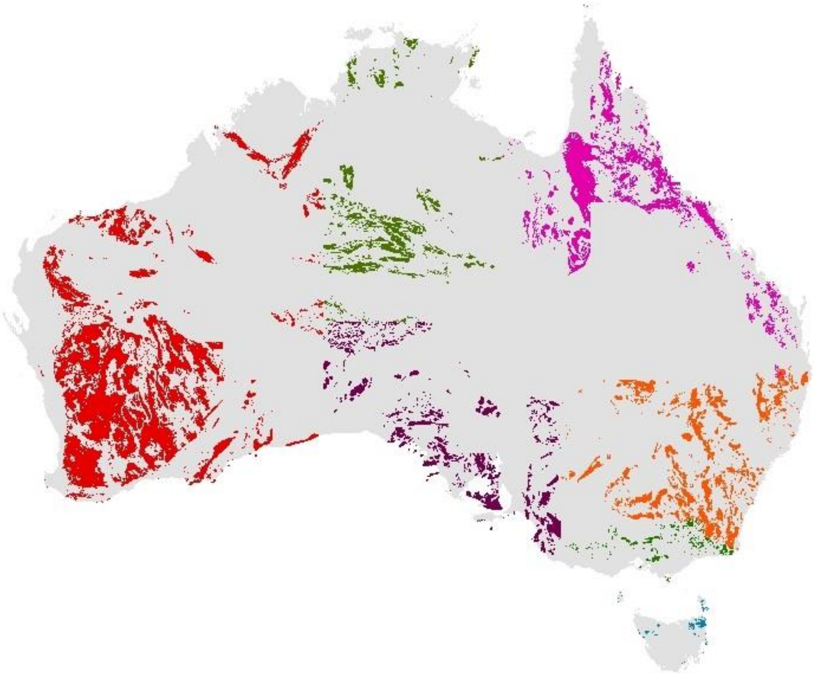

Figure 1: Distribution of felsic and intermediate intrusive rocks in Australia coloured by State.

Unitname	Lith_desc	Lith_desc2	Complex	Lith_group	Supersuite	Suite	Geo_prov	Form_event	Geoage	Ga_min	Ga_N	Ga_max	Ga_m	Age_meth	Grantype
Nagha Granite	Red, felsic, equigranular,	Previously known as I		Igneous felsic i		Gabo Suite	Lachlan Oro		Devonian	358.9		419.2		Inferred	A-Ty
Howe Range Gı	Medium- to fine-grained			Igneous felsic i		Gabo Suite	Lachlan Oro		Devonian	358.9		419.2		Inferred	A-Ty
Nagha Granite	Red, felsic, equigranular,	Previously known as I		Igneous felsic i		Gabo Suite	Lachlan Oro		Devonian	358.9		419.2		Inferred	A-Ty
Howe Range Gı	Medium- to fine-grained			Igneous felsic i		Gabo Suite	Lachlan Oro		Devonian	358.9		419.2		Inferred	A-Ty
Naghi Monzogı	Biotite monzogranite.	Previously known as I		Igneous felsic i		Gabo Suite	Lachlan Oro		Devonian	358.9		419.2		Inferred	U
Xmas Quartz M	Coarse-grained quartz-r	Previously known as)		Igneous interm	Moruya Supei	Xmas Suite	Lachlan Oro		Late Silurian- I	393.3		427.4		Inferred	U
Nagha Granite	Red, felsic, equigranular,	Previously known as I		Igneous felsic i		Gabo Suite	Lachlan Oro		Devonian	358.9		419.2		Inferred	A-Ty
Stringy Road Gı	Medium- to coarse-grai			Igneous interm	Moruya Supei	Xmas Suite	Lachlan Oro		Late Silurian- I	393.3		423		Inferred	U
Croajingalong (	Coarse porphyritic grapl	Previously known as (		Igneous felsic i	Kameruka Sup	Wallagaraugh	Lachlan Oro		Early Devoniar	393.3		419.2		Inferred	I-Ty
Maramingo Grε	Pink granite.	Previously known as I		Igneous felsic i			Mallacoota		Early Devoniar	393.3		419.2		Inferred	U
Waalima Grano	Medium- to coarse-grai	Previously known as \		Igneous felsic i			Lachlan Oro		Late Silurian- I	393.3		427.4		Inferred	U
				us felsic i	Kameruka Sup	Wallagaraugh	Lachlan Oro		Early Devoniar	393.3		419.2		Inferred	I-Ty

GranTinHardRock	Char(2)	36
GranBisHardRock	Char(2)	37
GranMolyHardRock	Char(2)	38
GranTungHardRock	Char(2)	39
Sio2_min	Float	40
Sio2_max	Float	41
Sio2_mean	Float	42
K2o_min	Float	43
K2o_max	Float	44
K2o_mean	Float	45
Na2o_min	Float	46
Na2o_max	Float	47
Na2o_mean	Float	48
Rb_min	Float	49
Rb_max	Float	50
Rb_mean	Float	51
Sr_min	Float	52
Sr_max	Float	53
Sr_mean	Float	54
Au_min	Float	55
Au_max	Float	56
Au_mean	Float	57
Bi_min	Float	58
Bi_max	Float	59
Bi_mean	Float	60
Mo_min	Float	61
Mo_max	Float	62
Mo_mean	Float	63
Sn_min	Float	64
Sn_max	Float	65
Sn_mean	Float	66
W_min	Float	67
W_max	Float	68
W_mean	Float	69

The project has included different stages.

1- Data compilation: gathering existing data of felsic and intermediate intrusive rocks, reviewing, comparing, and editing data.
2- Spatial data: selecting features, integrating datasets, and cleaning polygons.
3- Database creation: designing database, formatting granite data, and adding attributes.
4- Data verification: QA/QC data, final edits, and populating database.

The last stage is using the granite database for 2D and 3D modelling and exploration targeting.

Conclusion

The development of the Australian Granite Database is an example of how we can improve geospatial data on a large scale to aid project generation for critical mineral deposits needed for green technologies.

Additionally, GIS-based databases are an important tool to add value and improve decision making and management of projects in all areas of geoscience.

Figure2: Two views of the various data fields present in the Australian Granite Database.