



# QEC Forum 2020

Teaching Exploration in 2020

QUT

**QUT**

# QUT Exploration Teaching

- QUT currently offers:
  - Coursework degrees
    - 3 yr BSc degree
  - Research intensive degrees:
    - 1 yr Hons
    - 2 yr MSc/MPhil by Research
    - 4 yr PhD
- This presentation focuses on our undergraduate offerings and the academic preparation we do to produce industry-ready geologists
- We have traditionally had a high uptake of our BSc graduates into industry-positions

# QUT Earth Science Undergraduate Curriculum

Structure	Framework/Systems		Processes		Environments	
	YEAR 1		YEAR 2		YEAR 3	
	Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
Earth Science Major	SEB104 <b>Grand Challenges</b>	ERB101 <b>Earth Systems</b>	ERB201 <b>Natural Hazards</b>	<b>ERB203</b> <b>Sedimentology &amp; Stratigraphy</b>	ERB301 <b>Geochemistry</b>	<b>ERB303</b> <b>Energy Resources &amp; Basin Analysis</b>
	SEB116 <b>Experimental Science</b>	ERB102 <b>Evolving Earth</b>	ERB202 <b>Marine Geoscience</b>	<b>ERB204</b> <b>Structural Geology</b>	<b>ERB302</b> <b>Applied Geophysics</b>	<b>ERB304</b> <b>Plate Tectonics</b>
Geology Minor			ERB205 <b>Earth Materials</b>	<b>ERB206</b> <b>Petrology</b>	<b>ERB305</b> <b>Field Methods</b>	<b>ERB306</b> <b>Earth's Mineral Resources</b>

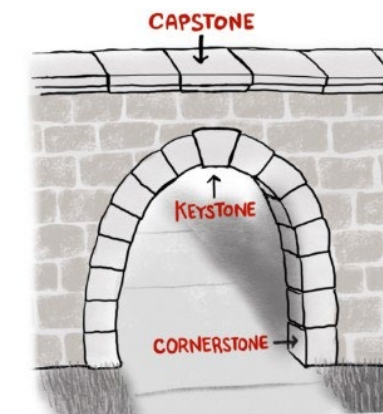
Students intending on entering the mining industry will complete the Earth Science major and Geology Minor. This is usually paired with a Spatial Science Minor (4 subjects).

Exploration-relevant subjects are delivered as advanced (3<sup>rd</sup> yr) units / capstone in our degree: **highlighted in red**  
Subjects with intensive field work: **highlighted in yellow**.

# Capstone Units

**Curriculum aim:** academic majors “culminate with a capstone”

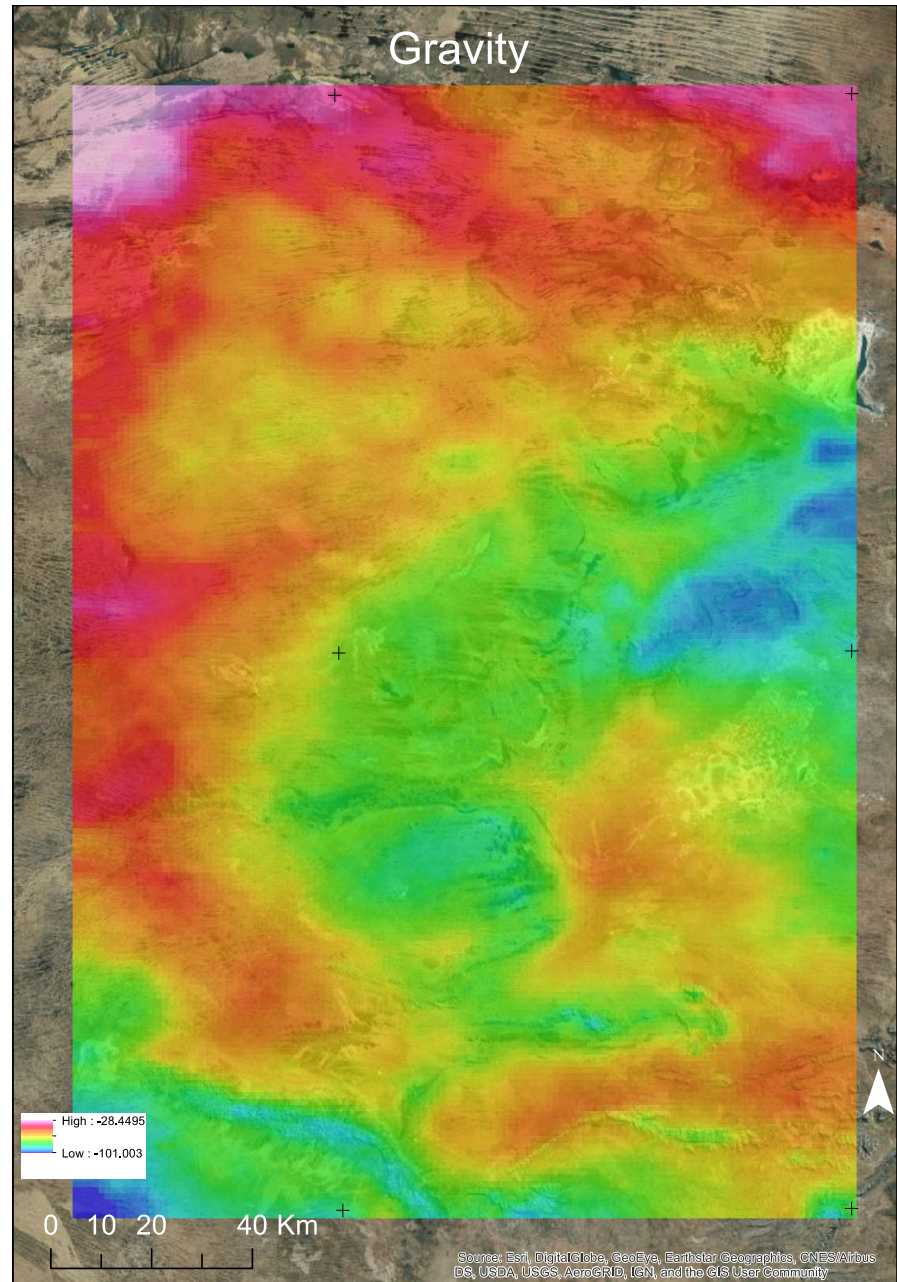
1. Bring together your learnings and to demonstrate the learning goals
2. A “bridge” to the next learning phase (eg, Honours/postgraduate, industry)
3. Extend your knowledge, independent study
4. Most capstones require students to complete a *serious intellectual project*
5. ERB303, ERB304 and ERB306



# ERB302 Applied Geophysics

- Every assessment is based on real world data
- Students work from larger to smaller scales in terms of survey size and resolution

- ↪ Potential Field Methods
- ↪ Wave Field Methods
- ↪ Wireline Methods



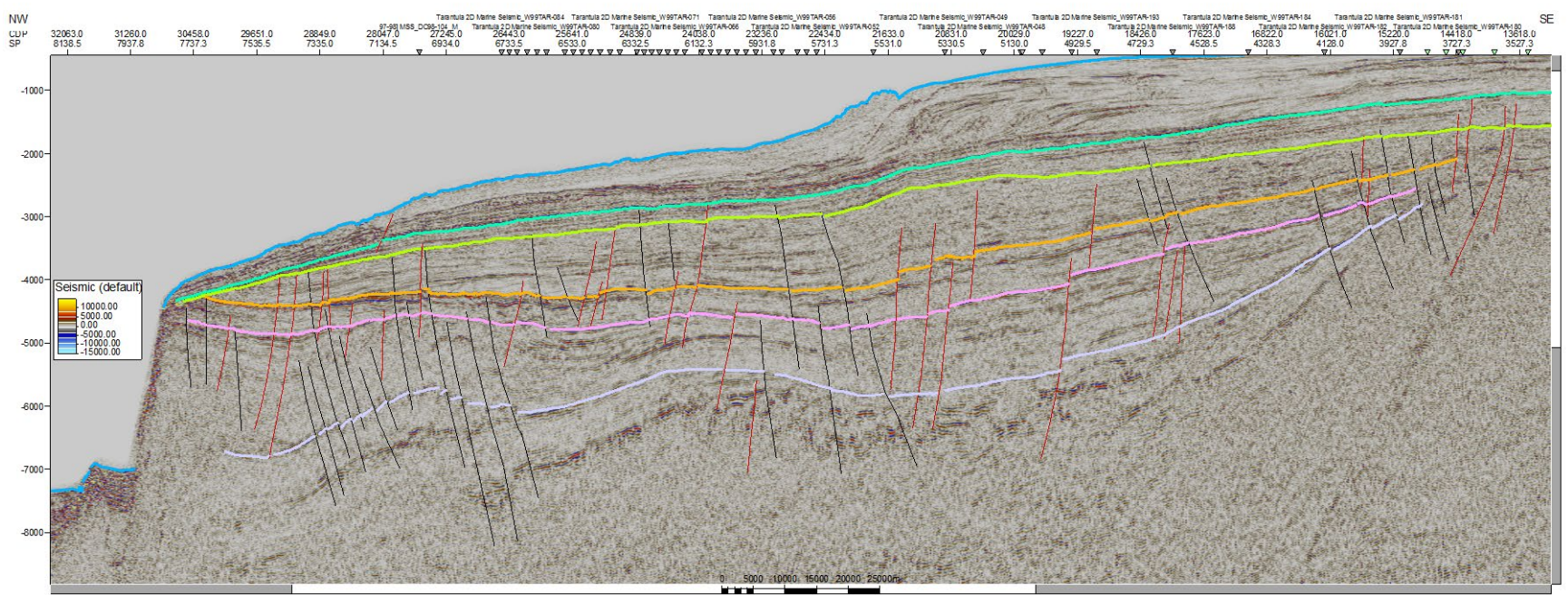
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

# ERB303 Energy Resources & Basin Analysis

## Basin Project

Students use pre-competitive data to analyse a potential petroleum system in an Australian Basin

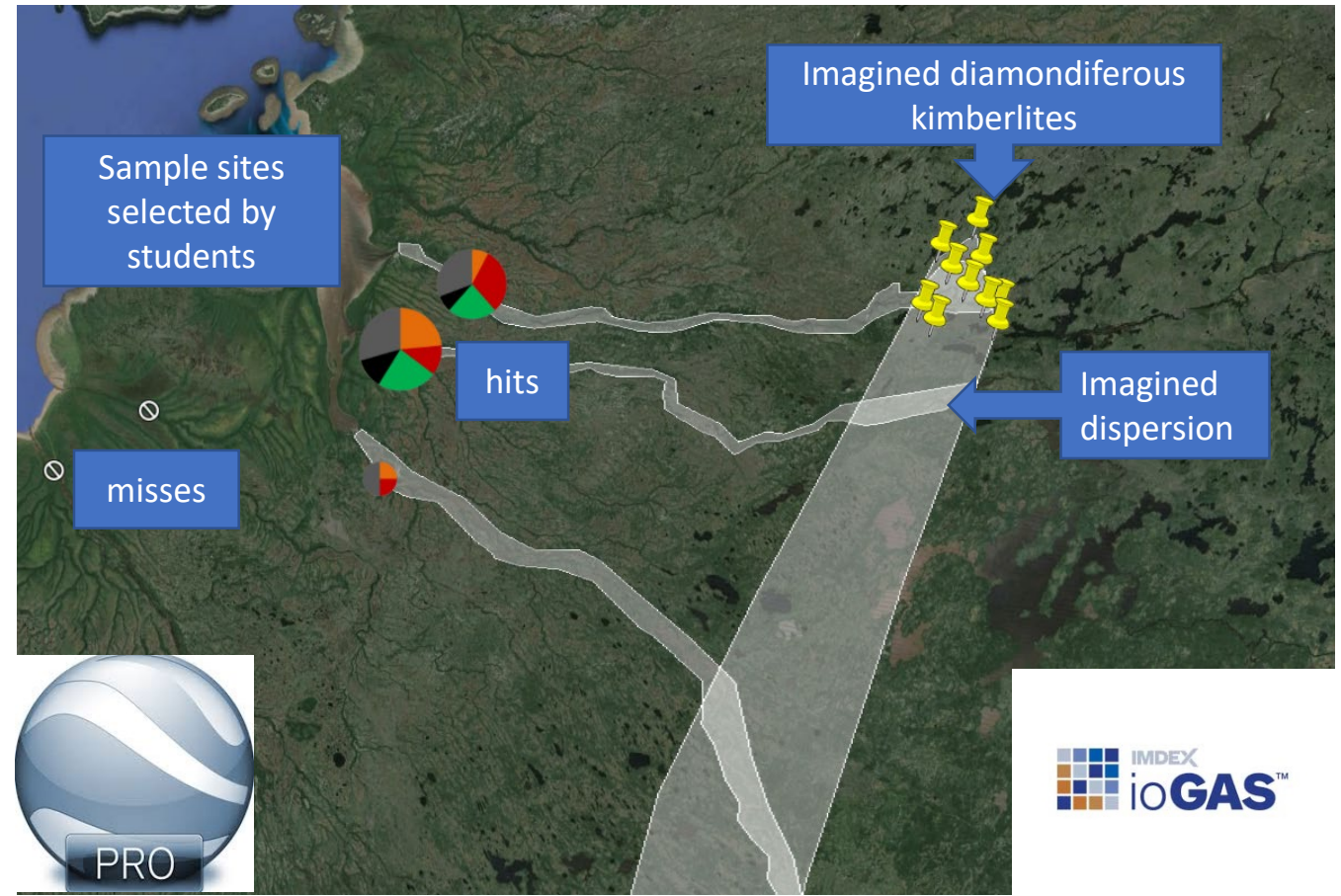
Seismic Sections / Well Completion Reports / Core Data



# ERB306 Earth's Mineral Resources

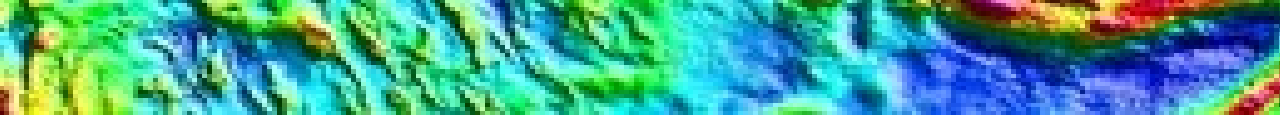
## Authentic Assessment

- Group project assessment
- Teams explore for fictional mineral deposits using GoogleEarth platform
- Gain experience with:
  - Vectoring techniques
  - Interpreting geology from geophysics
  - Assessing large geochemical datasets using ioGAS
  - Applying the mineral systems approach
  - Presenting results in front of a panel industry geologists



“The most engaging subject and assessment”

“I appreciate the effort to make the assessment in this subject applicable to industry geology”



# ERB305 Field Methods

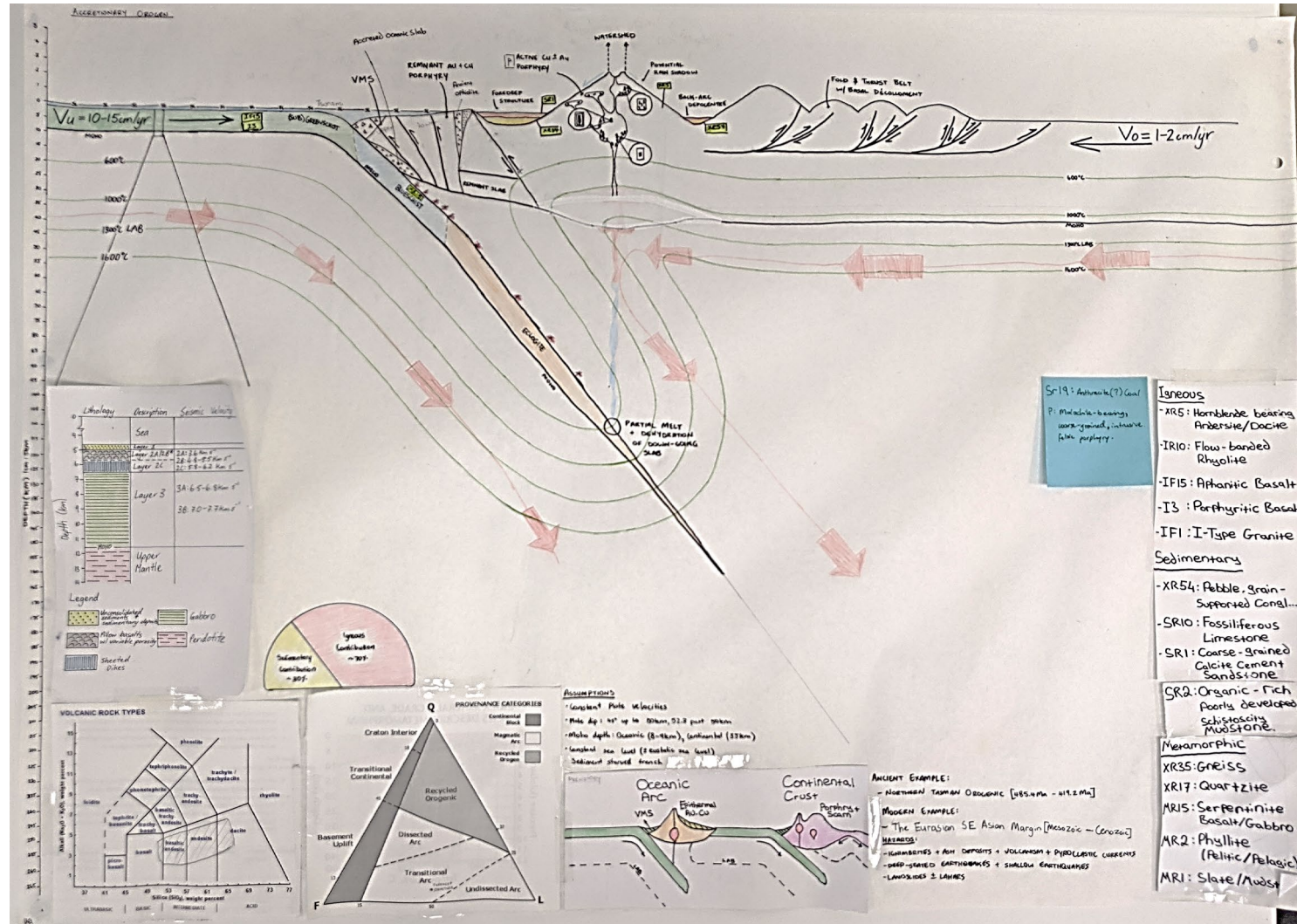
- Unit taught in third year as part of the Geology extension minor
- This unit is considered by many students as a highlight to their degree
- Ten days field mapping in Arkaroola, South Australia
- Students gain experience in
  - Field mapping techniques and generating geological maps
  - Rock and mineral identification
  - Recording and interpreting structural data
  - Geology of multi-deformed terranes
  - Working independently in remote environments (2 weeks)





# QUT Exploration Teaching ERB304 Plate Tectonics

- Formal Capstone unit
- Highlighting one of the summative assessment tasks:
- Draw a scaled cross-section of a continental convergent margin
- 3 Different tectonic modes
  - Contractional
  - Extensional
  - Neutral stress states
- Need to determine:
  - Slab dips and geothermal structure
  - Upper plate architecture
    - basins, structure, volcanism
  - *Types and locations of energy & mineral resources and how these vary with tectonic mode (and climate)*



# Summary

- Exploration-focused units delivered at back-end of degree as advanced units once students have gained solid foundations in Geology (yrs 1-2)
- Strong field-based preparation of our students (Eden, Arkaroola) with ~4 weeks field experiences;
- Students also gain significant experience in drill core logging
- QUT students gain experience across the resources sector - Minerals and Energy
- Students gain more integrated learning combining field and analytical methods underpinned by QUT's Central Analytical Research Facility
- QUT has traditionally had high rates of graduate employment in industry and this is the main destination of our students

# QUT Earth Science Undergraduate Curriculum

Structure	Framework/Systems		Processes		Environments	
	YEAR 1		YEAR 2		YEAR 3	
	Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
Earth Science Major	SEB104 <b>Grand Challenges</b>	ERB101 <b>Earth Systems</b>	ERB201 <b>Natural Hazards</b>	<b>ERB203</b> <b>Sedimentology &amp; Stratigraphy</b>	ERB301 <b>Geochemistry</b>	<b>ERB303</b> <b>Energy Resources &amp; Basin Analysis</b>
	SEB116 <b>Experimental Science</b>	ERB102 <b>Evolving Earth</b>	ERB202 <b>Marine Geoscience</b>	<b>ERB204</b> <b>Structural Geology</b>	<b>ERB302</b> <b>Applied Geophysics</b>	<b>ERB304</b> <b>Plate Tectonics</b>
Geology Minor			ERB205 <b>Earth Materials</b>	<b>ERB206</b> <b>Petrology</b>	<b>ERB305</b> <b>Field Methods</b>	<b>ERB306</b> <b>Earth's Mineral Resources</b>

Students intending on entering the mining industry will complete the Earth Science major and Geology Minor. This is usually paired with a Spatial Science Minor (4 subjects).

Exploration-relevant subjects are delivered as advanced (3<sup>rd</sup> yr) units in our degree: **highlighted in red**  
Subjects with intensive field work: **highlighted in yellow**.