An Overview Of Lithium Brine Exploration for Resource Estimation

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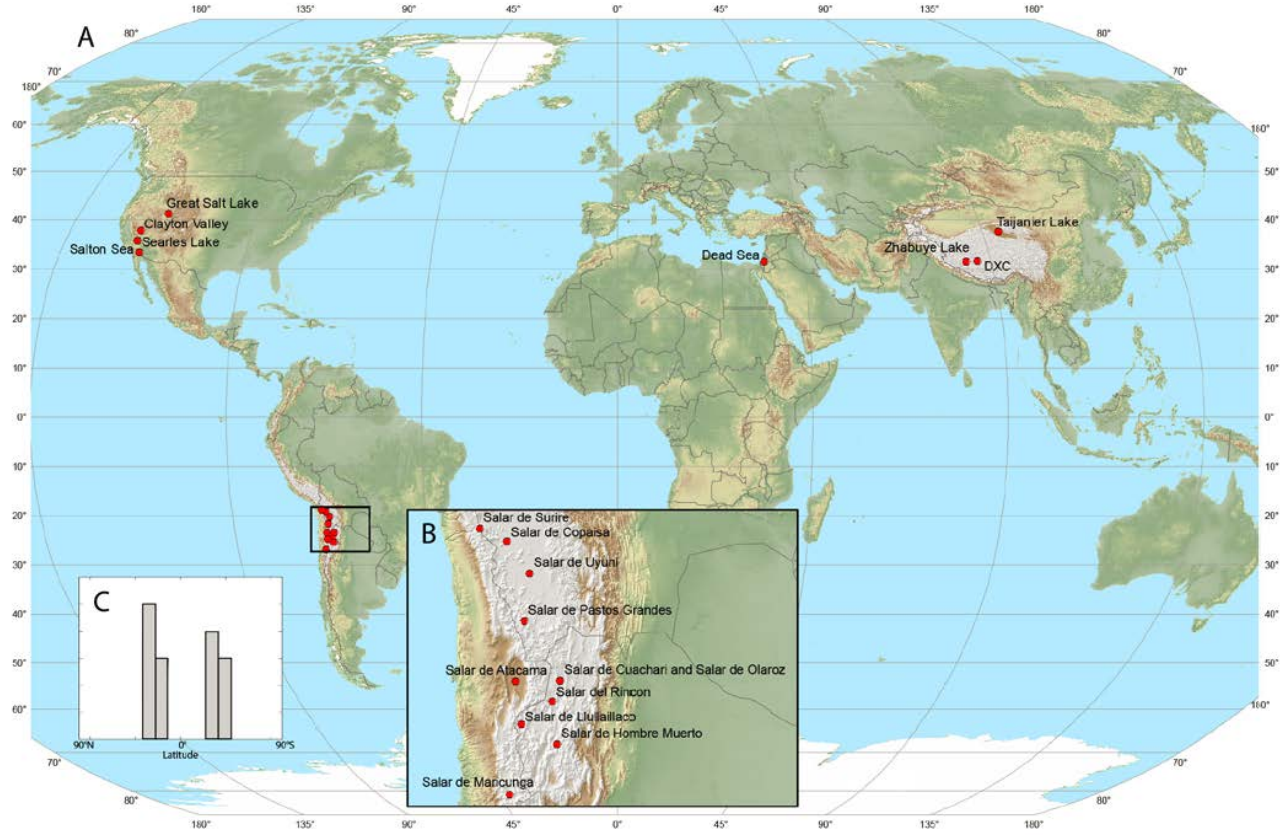
Lithium Brine Deposits



Bradley et al., 2013

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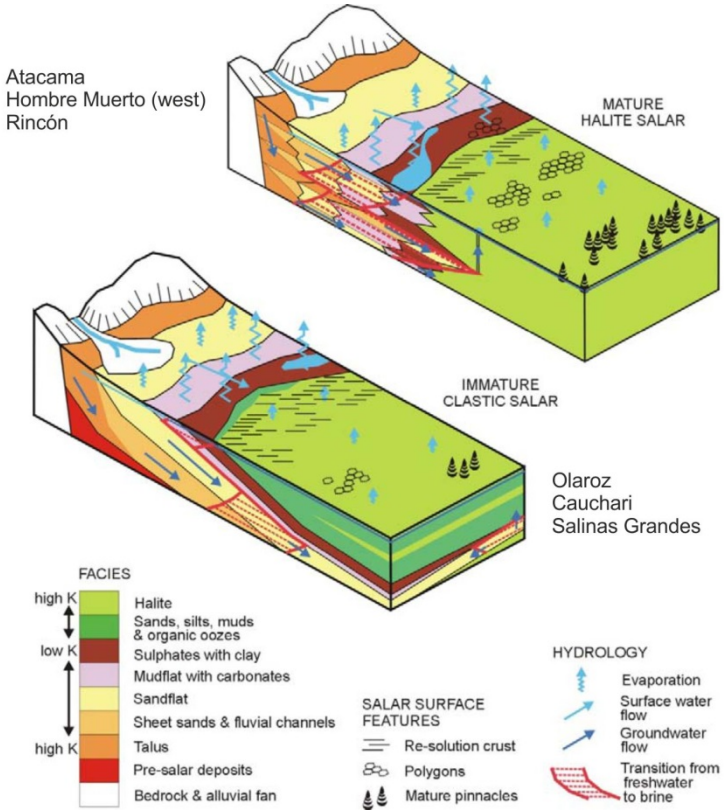
Geology Of Salars: Mature and Immature



Houston et al. (2011)

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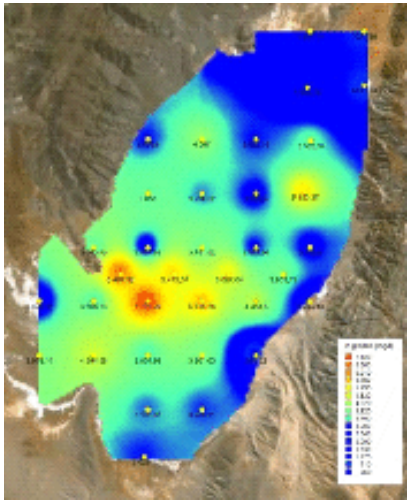
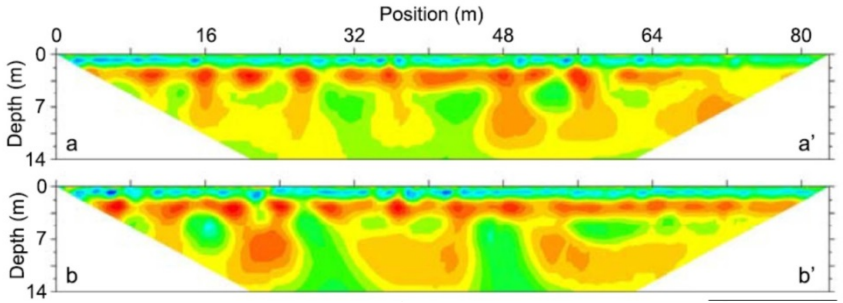
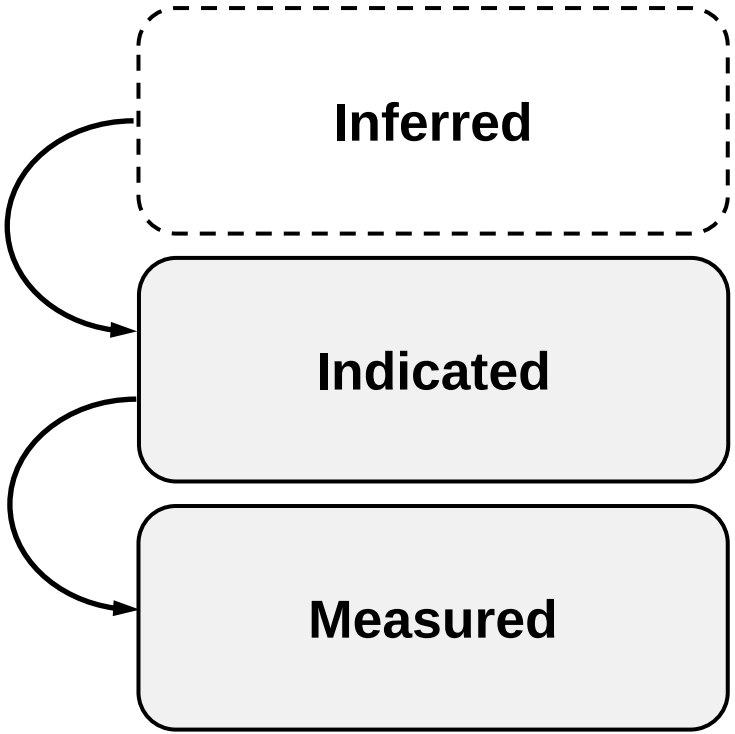
Brine Resource: Challenges

- Dynamic resource: it flows either naturally or by pumping
- Weather: precipitation can affect grade distribution
- Resource volume
  1. How to define resource lateral limits?
  2. How to link aquifer lithology with brine grade?
  3. Effective porosity, Sy or Ss?
- Dilution: fresh water lateral inflow (recharge)





Brine Resource: Classification



Increasing level of hydrogeological knowledge and confidence

Secondary permeability, low confidence in hydraulic connectivity and/or grade

Physical evidence of sufficient hydraulic conductivity and transmissivity, statistical confidence in grade

Technical and consistent support resulting in 3D model of hydro-lithology and grade

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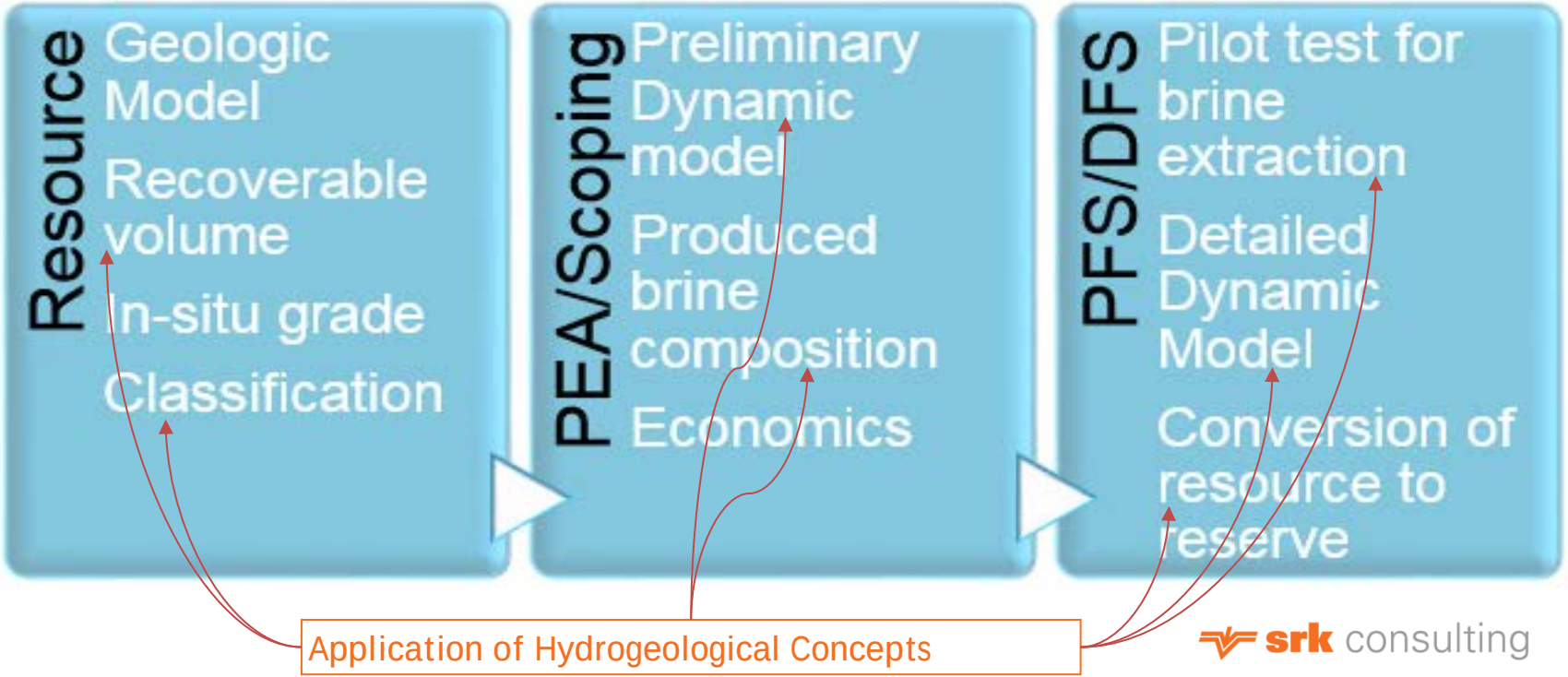
Mineral Resource and Reserve Reporting For Brine Deposits



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Brine Volume

Brine volume / grade distribution

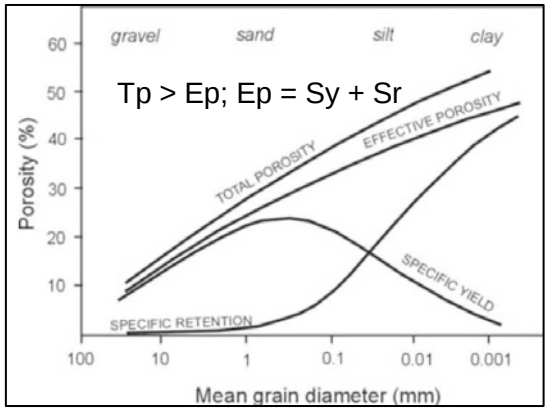
- Geological mapping
- Surface brine sampling: pitting
- Geophysics (e.g. geoelectrics, CSAMT)
- Diamond drilling: core and brine sampling
- Downhole lithology / geophysics

Aquifer Characterisation

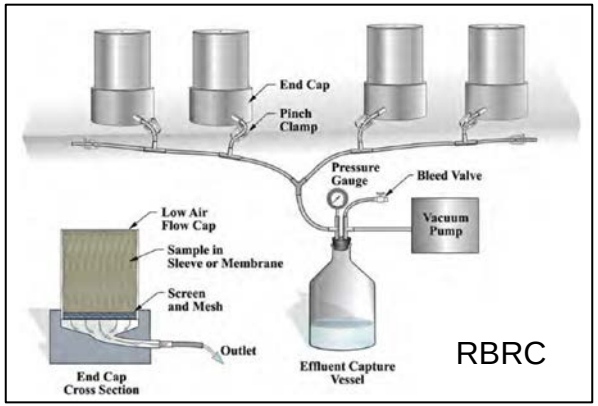
Brine aquifer characterisation

- Sy: ex-situ lab testing on cores (e.g. Relative Brine Release Capacity, RBRC)
- Hydraulic conductivity, Ss, anisotropy: field hydraulic testing
- Dispersivity: field tracer tests
- Dilution potential: fresh water balance

Houston et al., 2011



Stormont et al., 2011



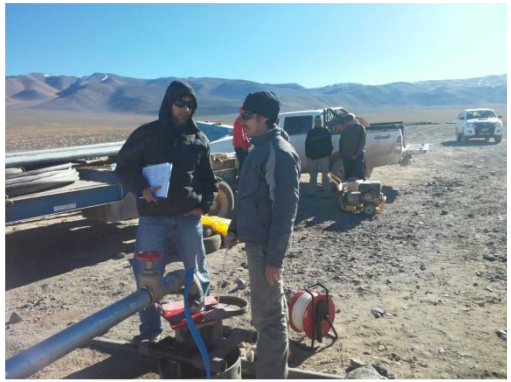
RBRC

Ex-situ Sy by RBRC: Typical values

	P_t site lab		P_t BGS lab		P_e BGS lab		S_y BGS lab	
	mean	SD	mean	SD	mean	SD	mean	SD
Sand dominant	0.31	±0.06	0.32	±0.08	0.26	±0.07	0.13	±0.07
Silt & sand-clay mixes	0.37	±0.08	0.38	±0.11	0.32	±0.09	0.06	±0.04
Clay dominant	0.42	±0.07	0.44	±0.06	0.37	±0.06	0.02	±0.02
Halite dominant	0.27	±0.14	0.29	±0.10	nd	nd	0.04	±0.02

Source: Hydrominex Geoscience Consulting

In-situ Aquifer Characterisation



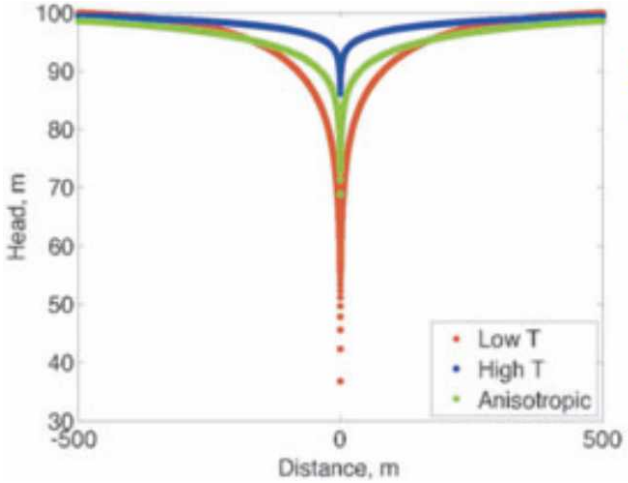
Constant rate pumping test

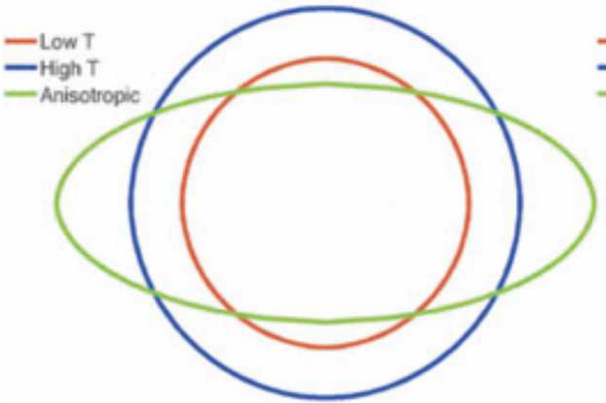
- Transmissivity / hydraulic conductivity
- *In-situ* Sy, Ss

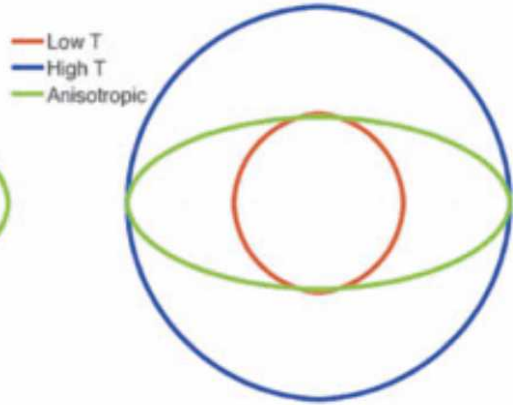
Step-drawdown pumping test

- Well eficiency
- Predictive analysis

Aquifer Anisotropy







Directionally controls drawdown propagation and brine movement

Please assess anisotropy and be a good neighbour!

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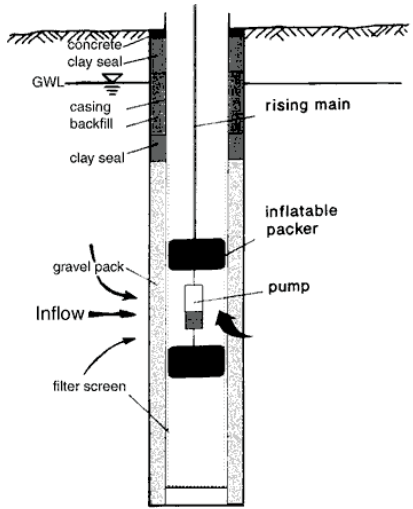
Brine Resource

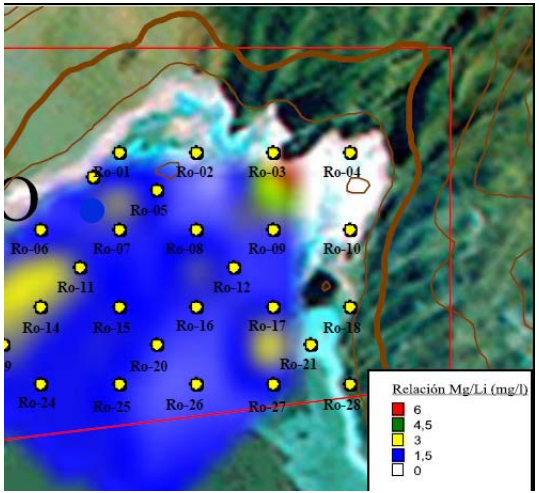
Brine chemistry / quality

3D grade distribution: Li, K, Mg, B; SO4, CO3 etc.

QA/QC program: representability, comparability, reproducibility, precision

Key chemical ratios: Mg/Li (<10), SO4/Li (<30), B/Li (<3)





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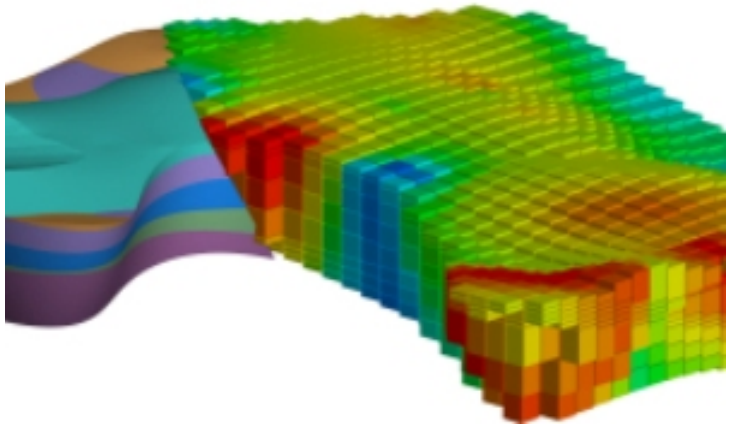
Brine Resource: Geological Model



In situ drainable resource model:

- Geology + geophysics
- Core lithology + hole geophysics
- Lab and field Sy, Ss
- Hydrostratigraphic units
- Brine chemistry
- Geostatistics

Lithium Brine: Key points

- Diamond drilling exploration: the expert is the geologist
- Classic hydrogeology applied to hyper-saline solutions
- Brine reservoir assessment based on petrophysics and aquifer hydraulics
- Continuous brine quality assessment
- Main extraction mining engineer: Hydrogeologist
- Main process mining engineer: Chemical Engineer
- Main mine planning tool: Groundwater / solute transport numerical model
- Dynamic modeling: update and calibration throughout the LoM

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Thank you for listening

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