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The Upper Pressure Stability Field of Marialite

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The Upper Pressure Stability Field of Marialite

PRESENTER:

Alexander Kerstanski

BACKGROUND:

- Economic mineral deposits of hydrothermal origin are an important source of metals, such as gold, copper, silver, zinc, etc.
- The production of economic minerals typically occurs due to plate tectonics releasing chlorine-bearing fluids many kilometers deep within the Earth. This results in the formation of deposits on the surface of Earth near igneous intrusions and volcanoes
- Sodium chloride helps flux economic mineral production, and marialite ($\text{Na}_3\text{Al}_3\text{Si}_9\text{O}_{24}\cdot\text{NaCl}$) may transport NaCl to great depths

PURPOSE: Investigate marialite breakdown to jadeite+quartz+halite

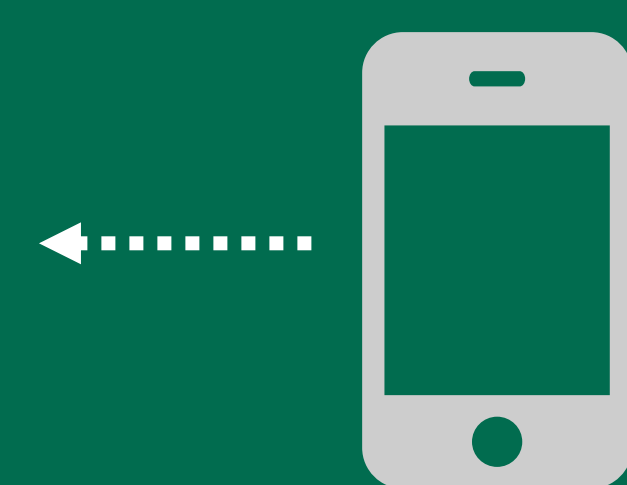
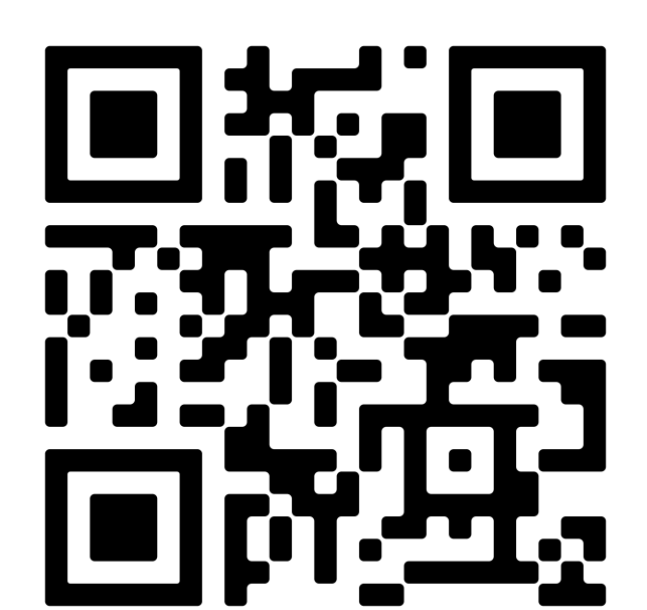
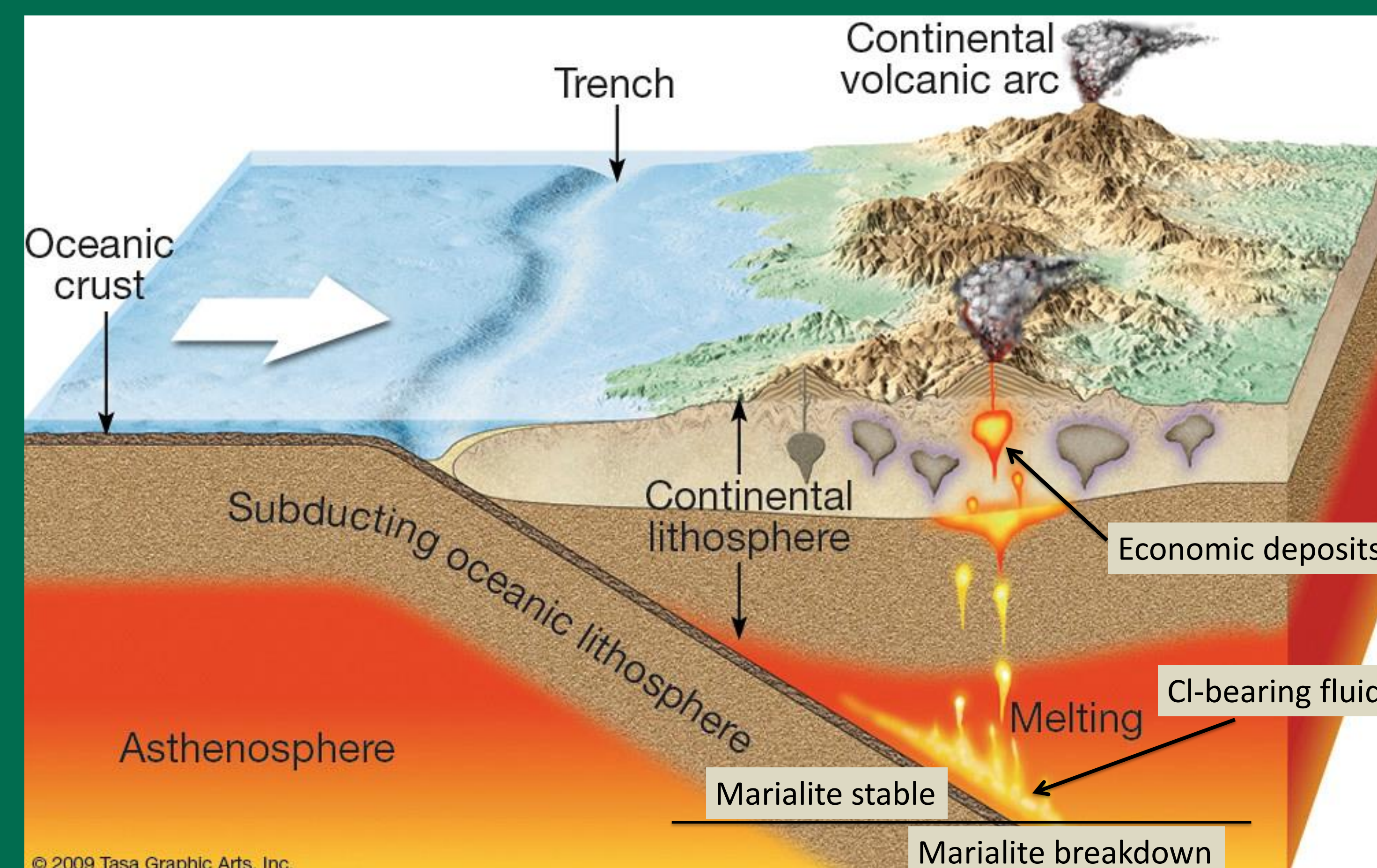
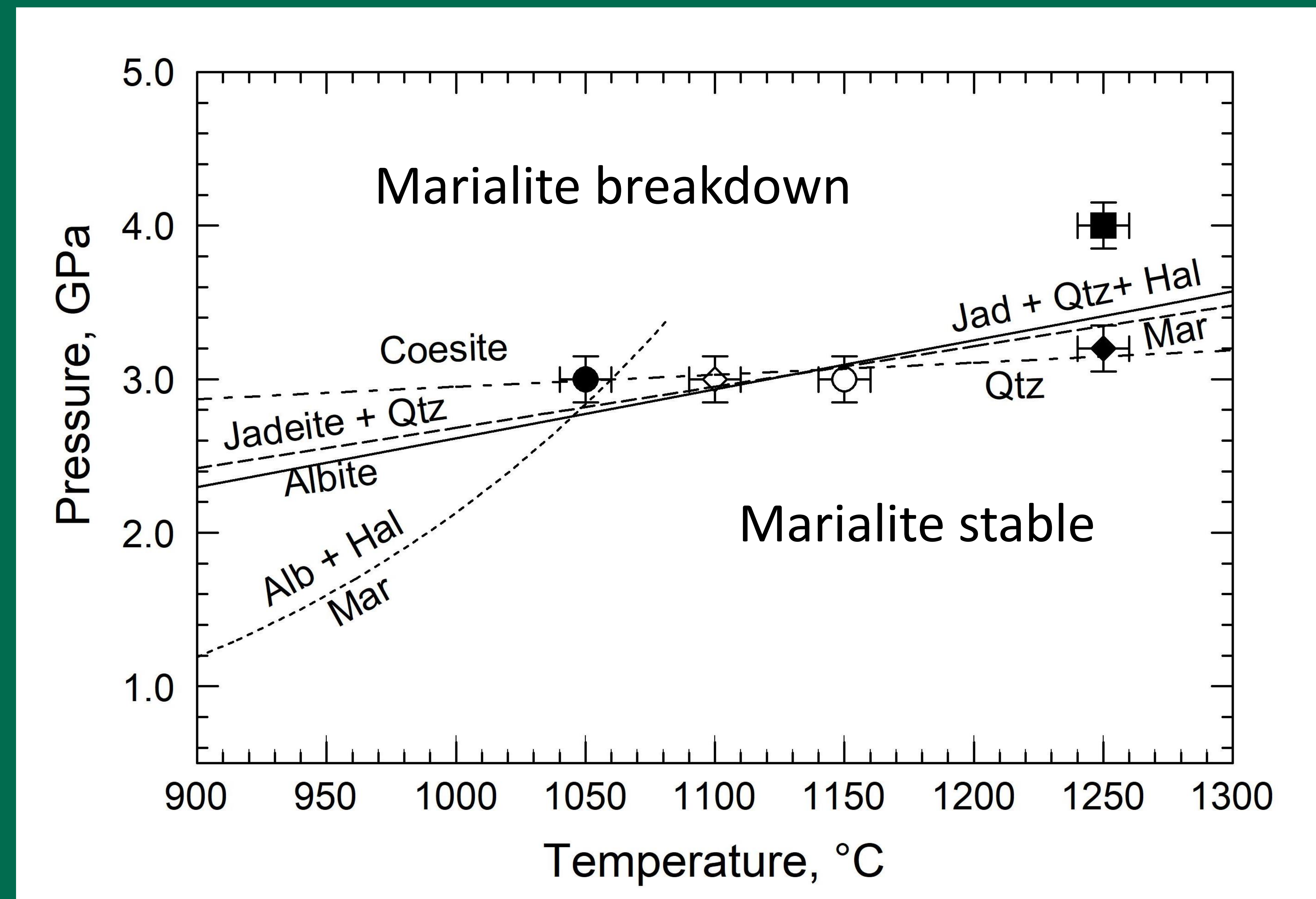
METHODS:

- Synthesized minerals for a reaction-reversal mixture using a piston-cylinder press
- Experiments conducted in a multi-anvil press to determine position of the boundary
- X-Ray diffractometer used to verify results of experiments

RESULTS:

- The stability field of marialite appears to be approximately 2.8 – 3.6 GPa at 1060 – 1300°C
- 2.8 – 3.6 GPa is the equivalent to depths of 85 – 110 kilometers deep into the Earth

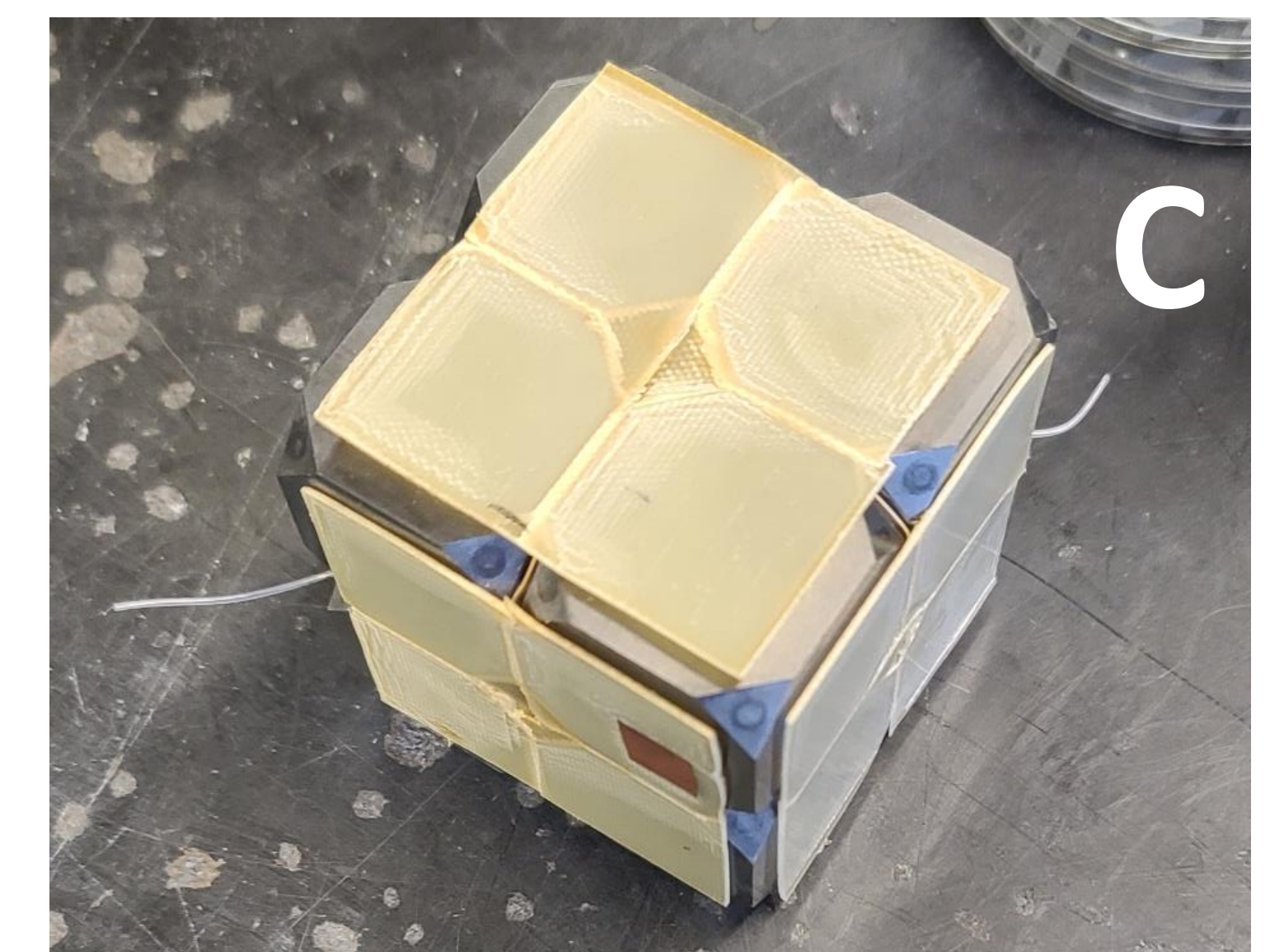
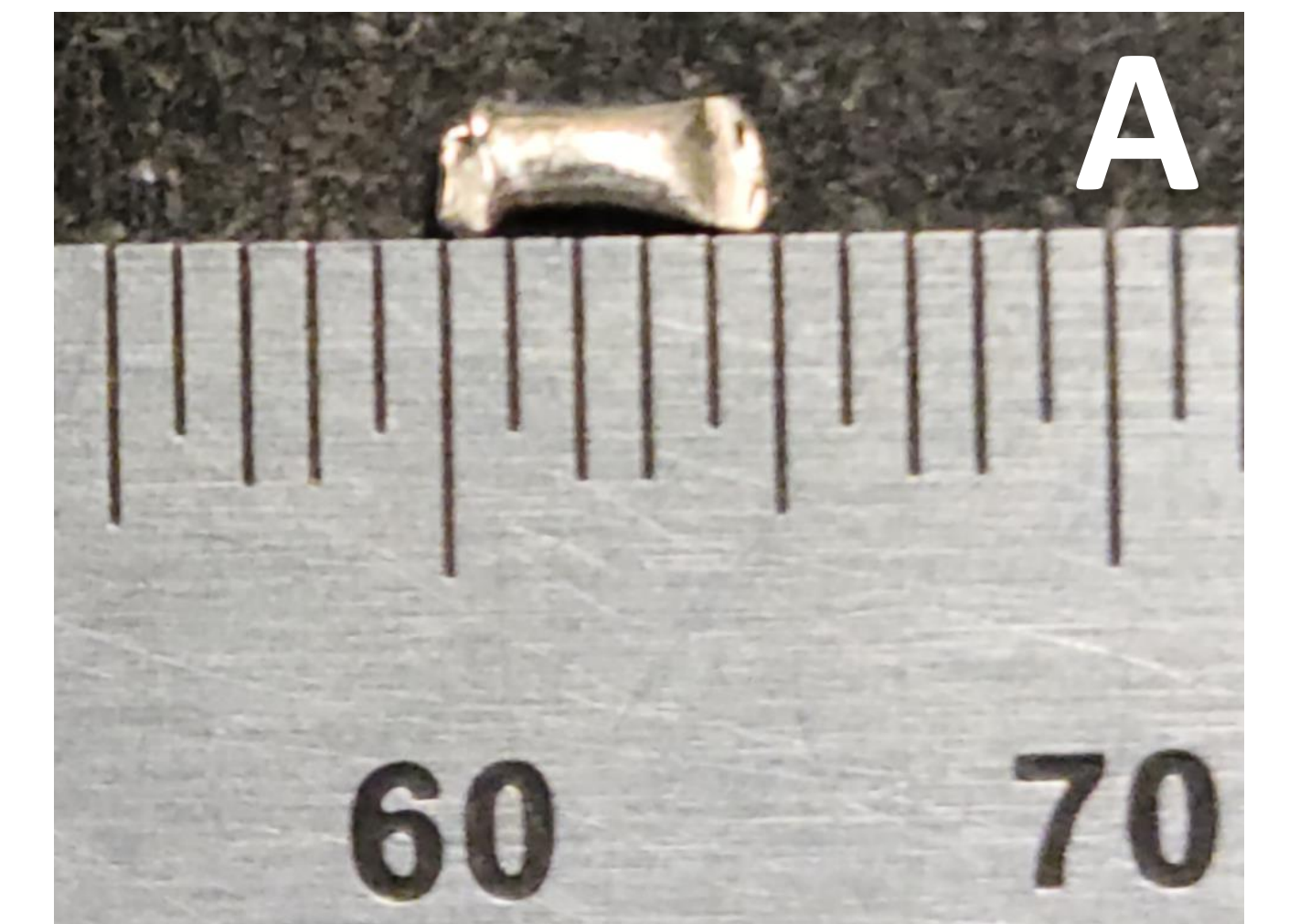
The growth of marialite occurs at depths of 85 – 110 kilometers and temperatures between 1060 – 1300°C, most likely fluxing economic mineral production.



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Materials:

- A = Capsule containing sample
- B = Sample inside octahedral pressure medium of MgO
- C = Carbide-cube pressure assemblage with insulator plates
- D = Multi-anvil press in operation



REFERENCES

<https://www.flickr.com/photos/64320116@N08/15828380529>