



Extending In-Situ Dating to New Geochronometers: Pb-Pb, Sm-Nd, Re-Os, and Lu-Hf

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Target: Mars, the Moon, asteroids or other bodies in the solar system with rocky surfaces.

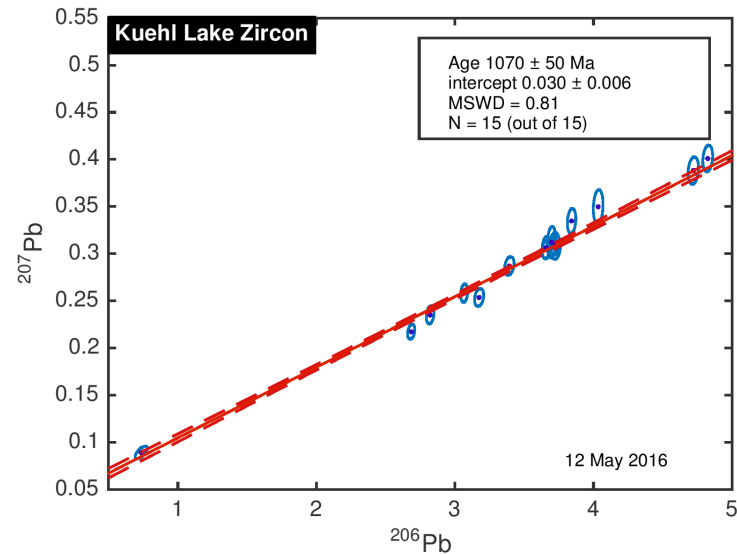
Science:

- Improve our understanding of the history of the inner solar system
- Enable improved triage for sample return missions

Objectives:

- Develop and test in-situ dating methods and test concordance using laser ablation resonance ionization mass spectrometry (LARIMS) measurements for the Sm-Nd, U-Pb or Th-Pb, and Re-Os geochronology systems.
- Assure compatibility of the LARIMS laser wavelengths with compact, robust fiber lasers, suitable for flight.
- Improve the reliability of a miniature backup laser system for the primary fiber laser system.

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LARIMS Pb-Pb Isochron of Zircon (no initial Pb). Actual age is 1.067 Ga. Proposed work will extend LARIMS capability to other geochronology systems, permitting in-situ concordance dating on planetary surfaces.

Key Milestones:

- Year 1 - Achieve long-term stability of backup solid-state laser system (7/2018)
- Year 1 - Demonstrate U-Pb or Th-Pb LARIMS dating (7/2018)
- Year 2 - Demonstrate Sm-Nd LARIMS dating (8/2019)
- Year 3 - Demonstrate Re-Os LARIMS dating (8/2020)

TRL 2 to 3