AGE ASSESSMENT AND REGIONAL COMPOSITION OF LUNAR GLASSES

Pham Nguyen
Michigan State University

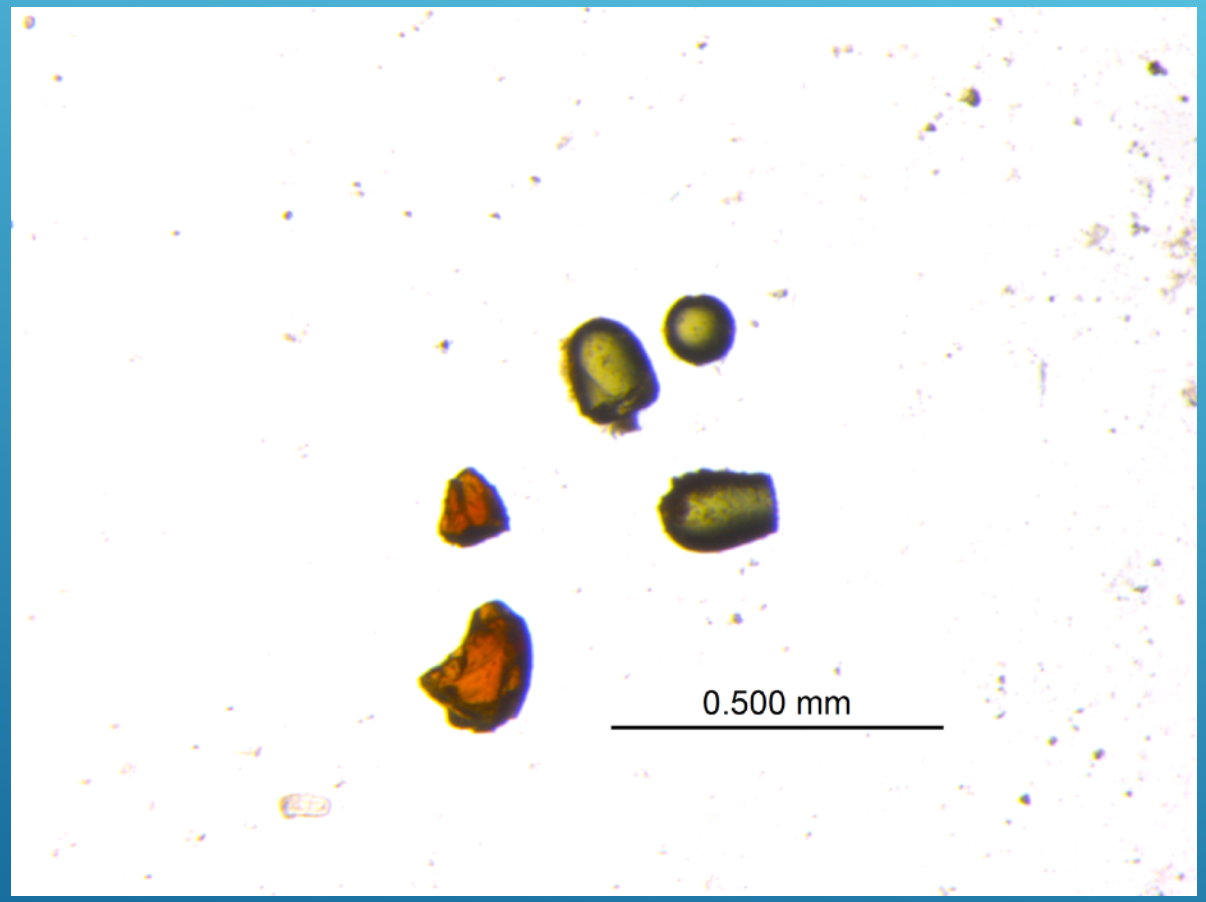
OVERVIEW

- Surface of the Moon
- Importance of Lunar Impact History
- Research project
- Future directions

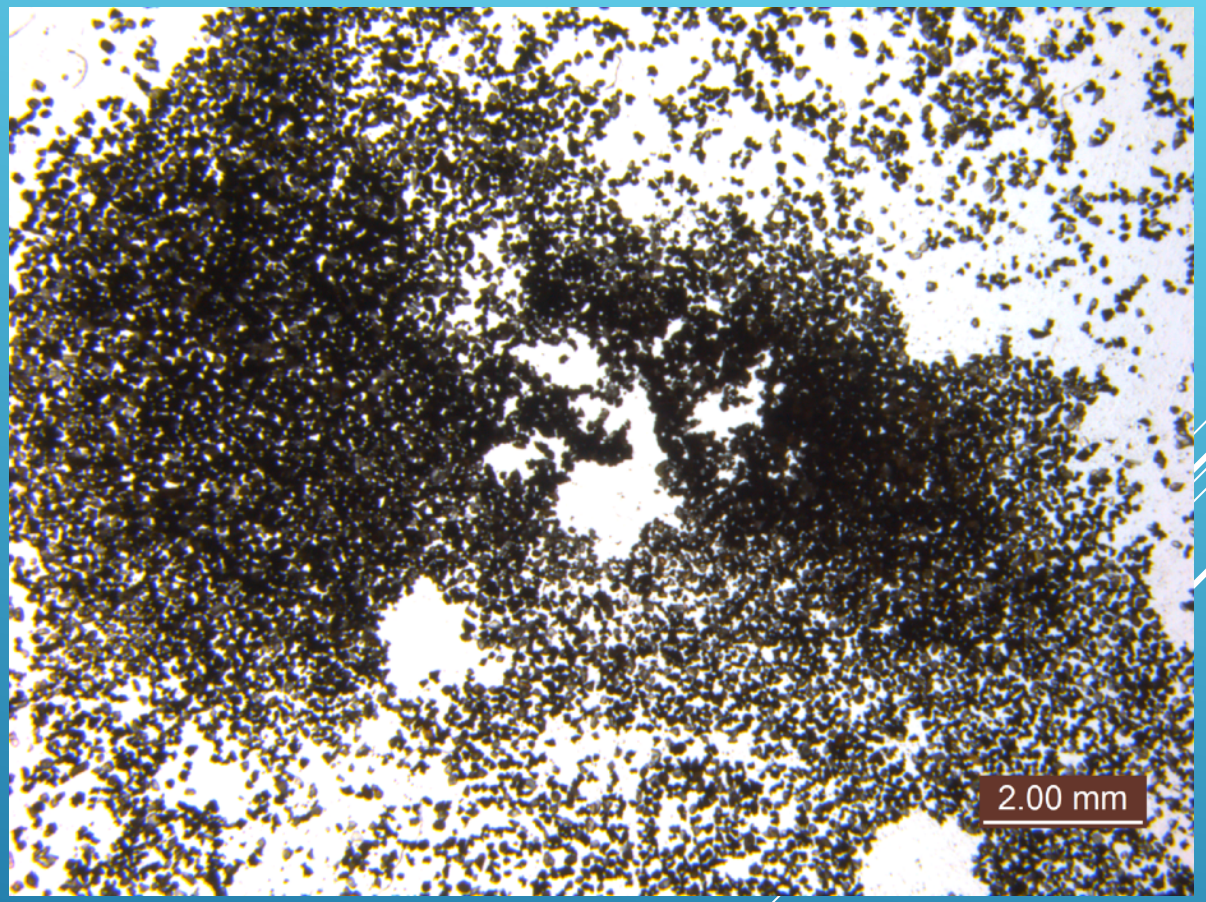
Credit: Dustin Scriven (MSU)

SURFACE FEATURES OF THE MOON

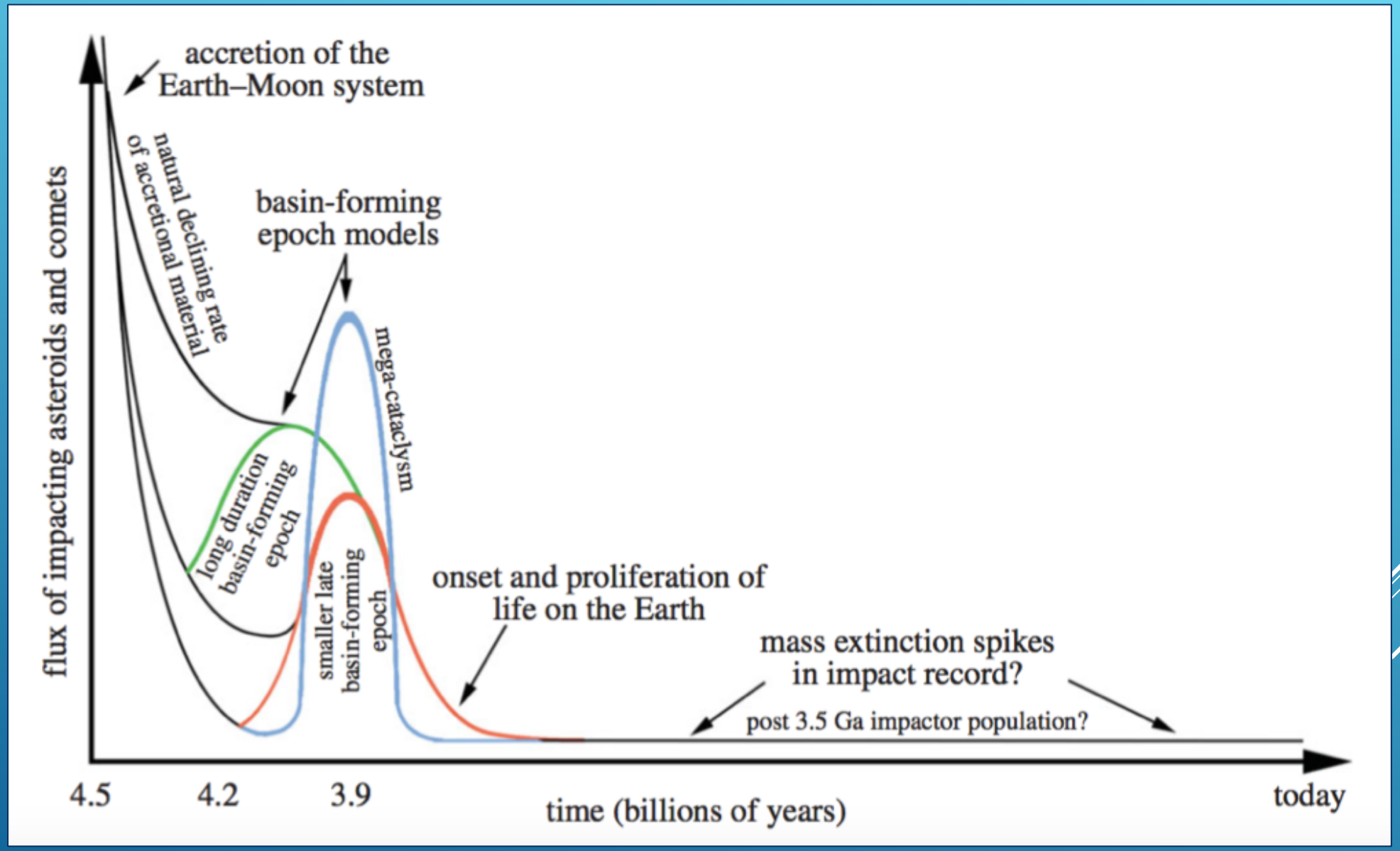
- Heavily cratered
- Highlands and Maria
- Regolith: layer of fine-grained material
  - Lunar glass



Apollo 15 glasses



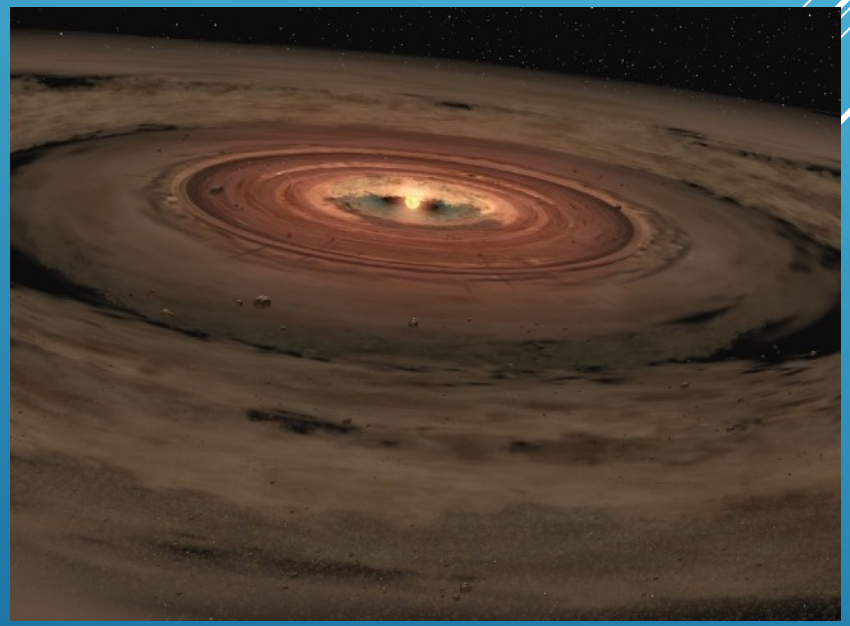
Apollo 15 regolith



Various scenarios of the Moon's impact history (Crawford and Joy 2014)

WHY STUDY THE IMPACT HISTORY OF THE MOON?

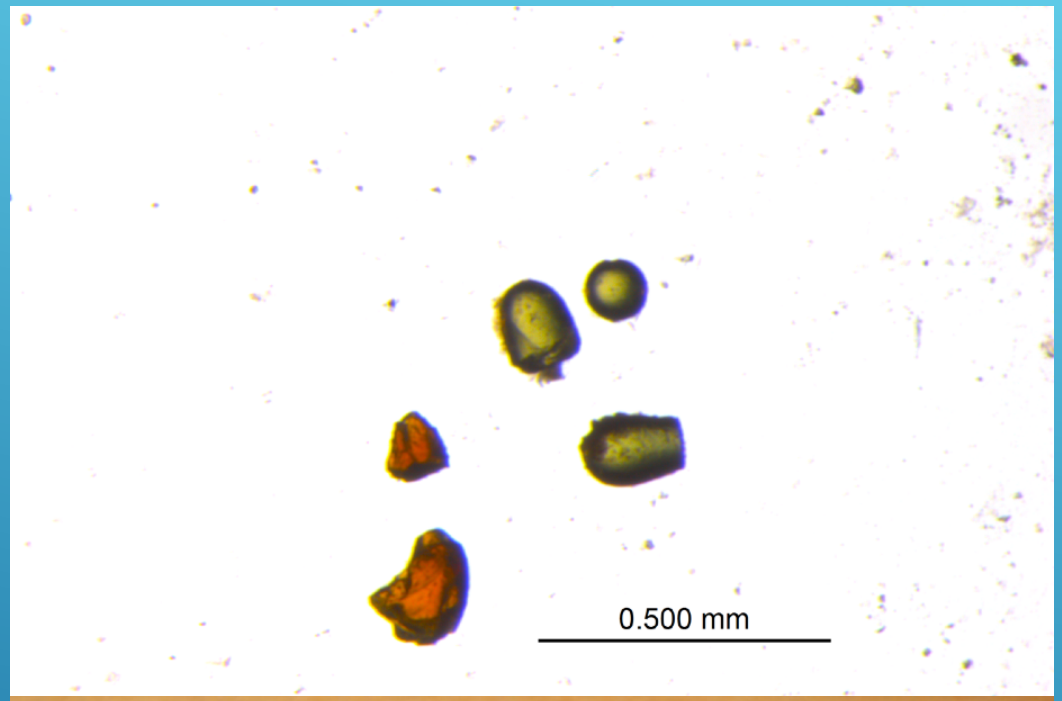
- Well preserved impact record
- Informs models of Solar System evolution
- Gives clues of impact history of Earth
  - Delivery of organics to early Earth
  - Evolution of life

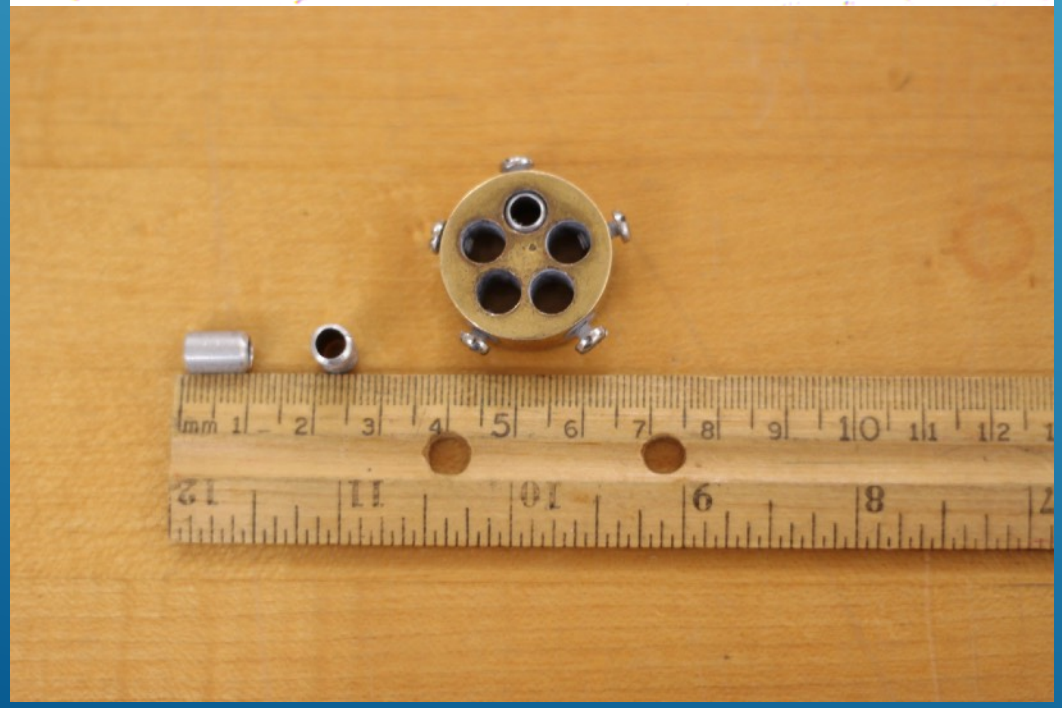


Credit: NASA/JPL-Caltech

RESEARCH PROJECT

- Picking and preparing glasses for chemical analysis
- Data analysis:
  - Determine what characteristics of a glass yield accurate ages
  - Determine if glasses are local or exotic





PREPARING GLASSES

- Bond glasses in aluminum cylinders
- Polish surface
- Analysis by electron microprobe

DATA ANALYSIS I: GLASS PROPERTIES

What characteristics of a glass yield good age assessments?

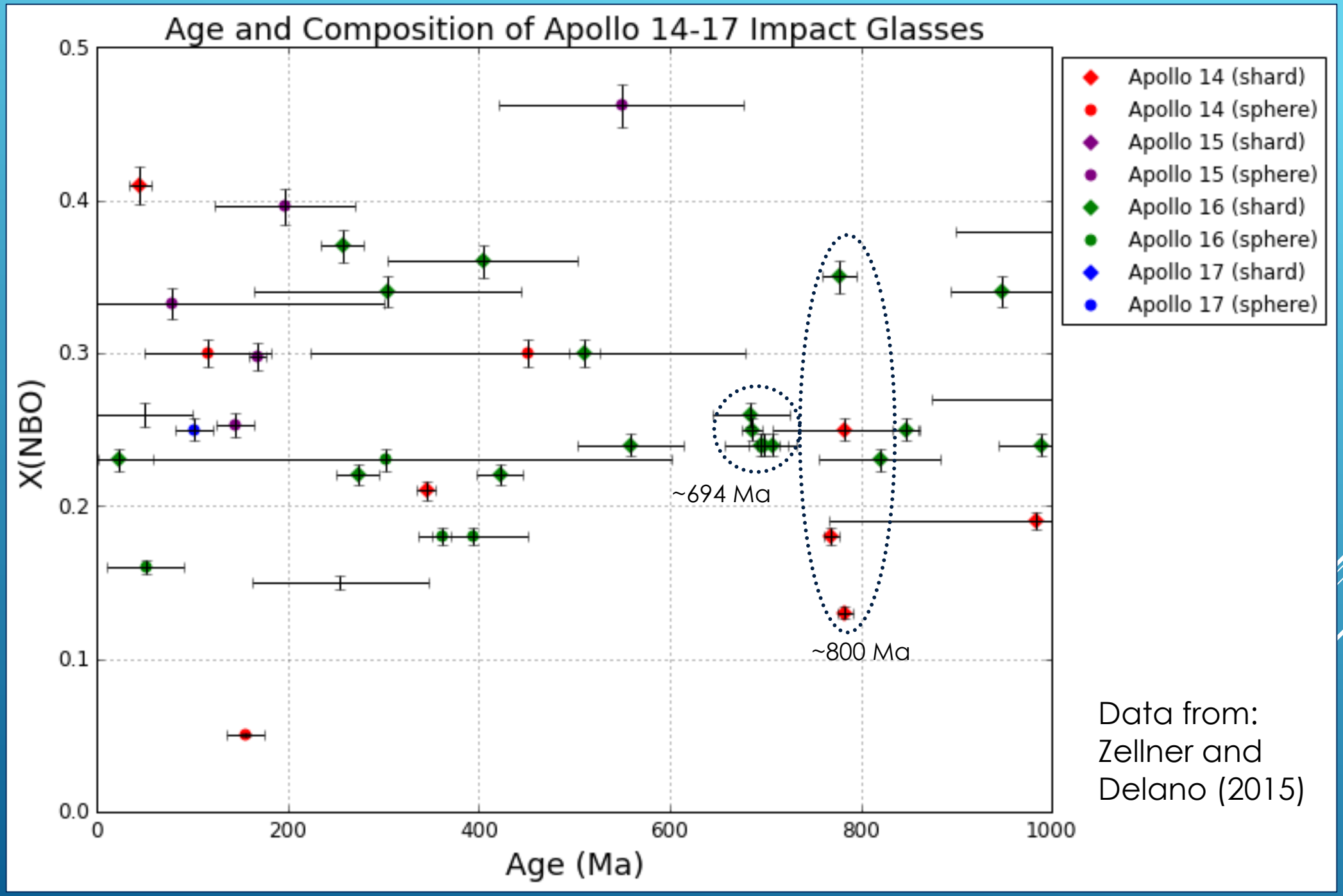
- Size: Large vs Small
- Shape: Shard vs Sphere
- Composition (Si, Fe, Al, Ti, etc.)
- X(NBO): High vs Low

Data from: Zellner and Delano (2015)

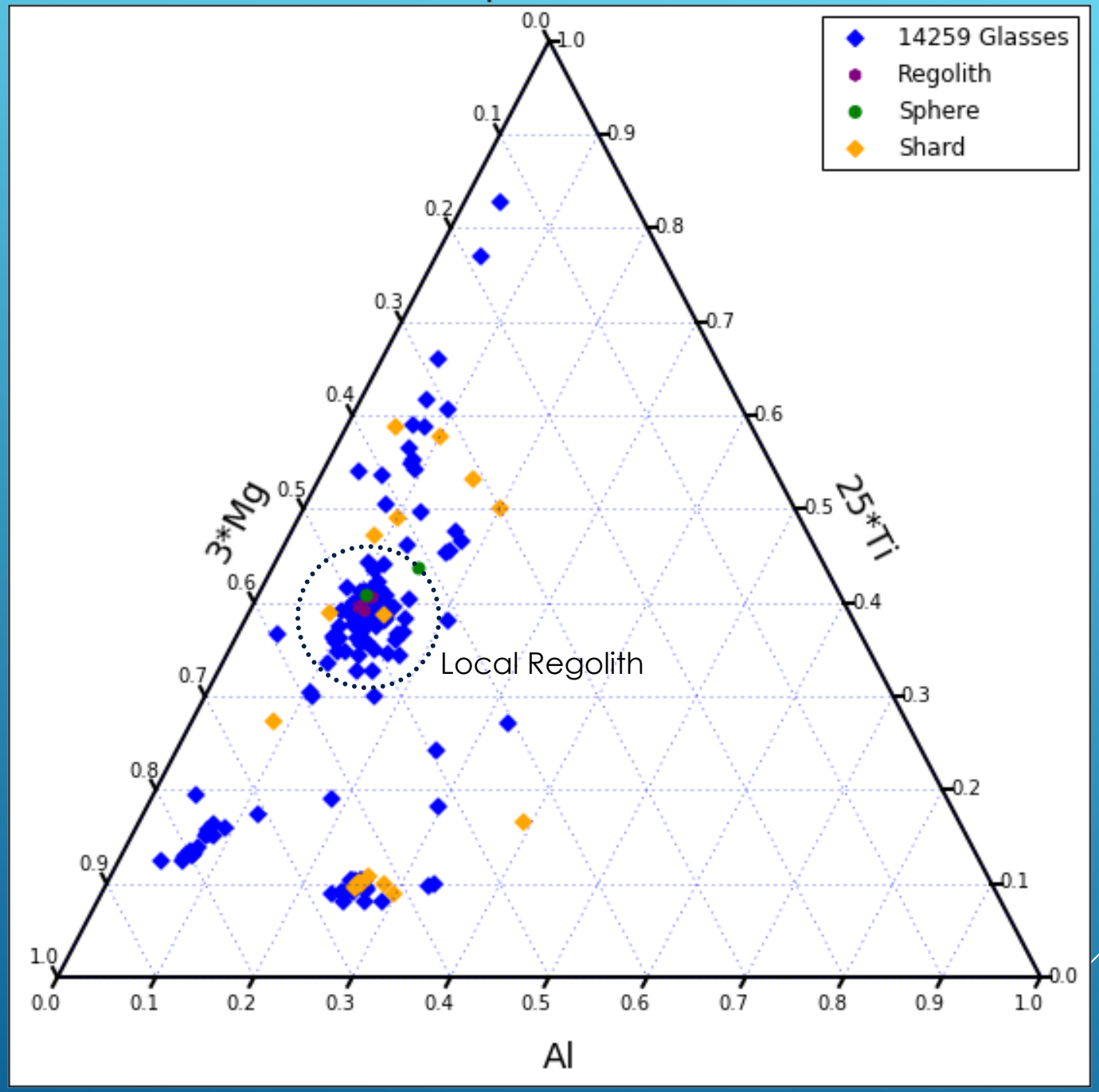
DATA ANALYSIS II: REGIONAL COMPOSITION

Do all glasses share a similar composition at the same Apollo site?

- Global vs Local events
- Age and composition comparisons
- Glasses with exotic compositions



Data from: Zellner and Delano (2015)



Data from:

Zellner and Delano (2015)

Laul et al. (1982)

Schnetzler and Nava (1971)

FUTURE DIRECTIONS

- Plot compositions for Apollo 15-17
- Complete sample preparations for chemical analysis
- Present results at a conference
- Senior thesis

ACKNOWLEDGEMENTS

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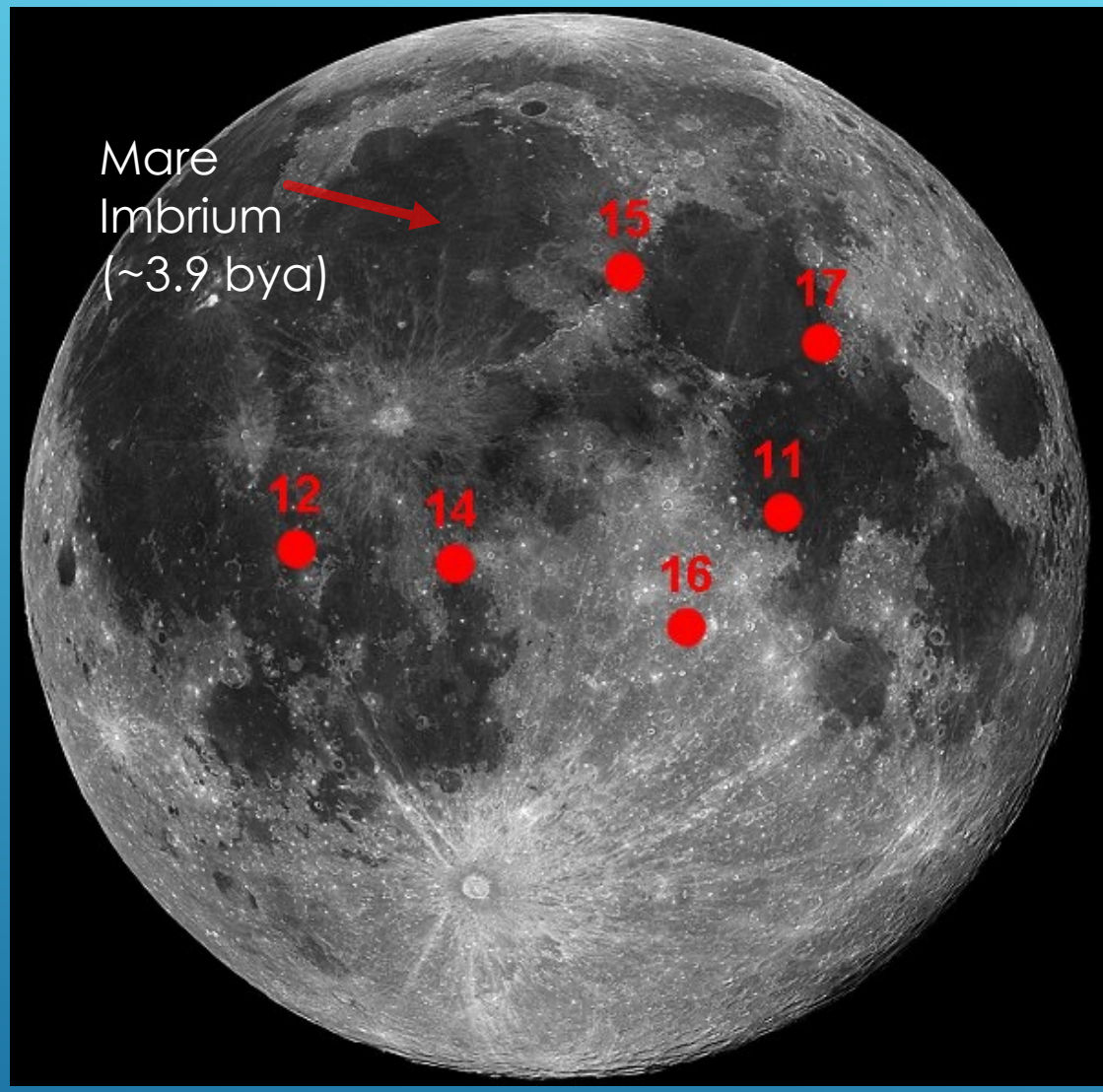
- NSF Astronomy and Astrophysics grant
- Albion College
- FURSCA

DIFFICULTIES OF INTERPRETING LUNAR IMPACT HISTORY

- Obtaining accurate ages
- Representative samples
  - Contamination by Mare Imbrium



Credit: NASA