

How clean is our laundry: Can we deliver the quantitative thermal histories that we promise?

Peter Zeitler
Lehigh University

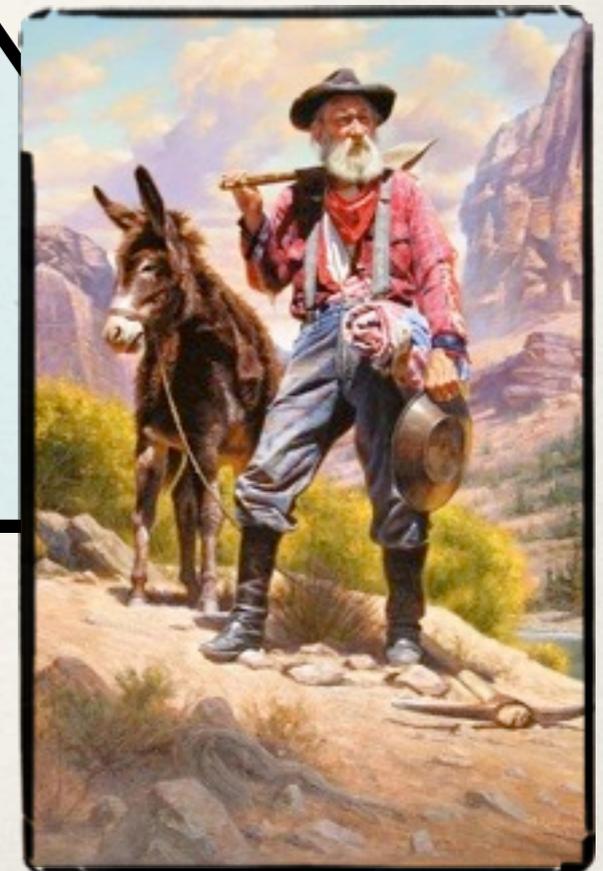
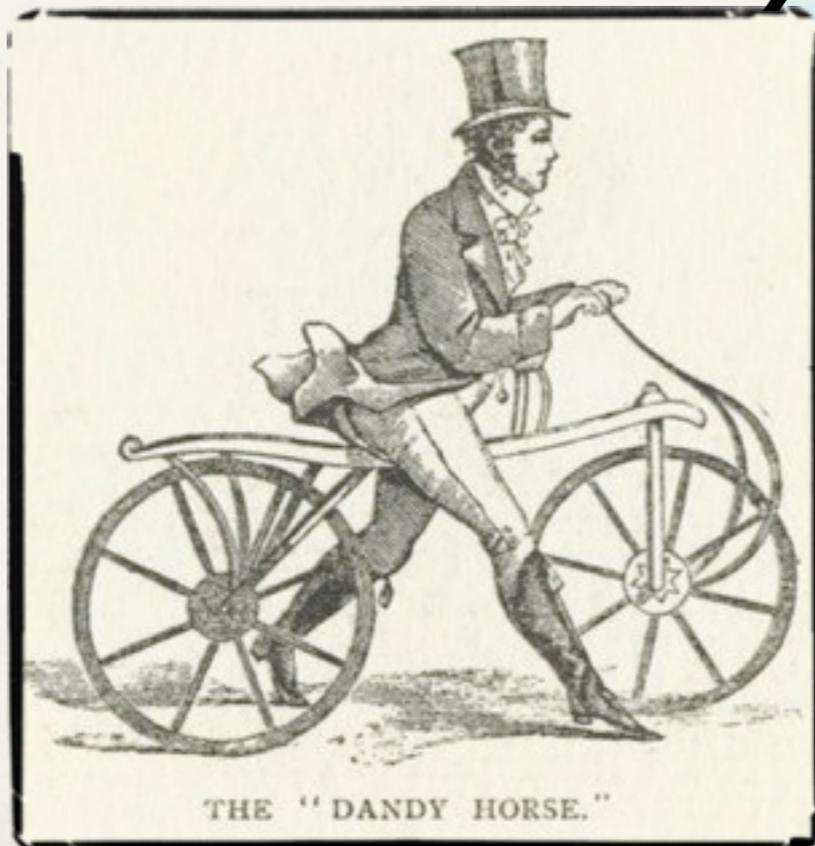
*The state
of our
thermochron
is strong!*



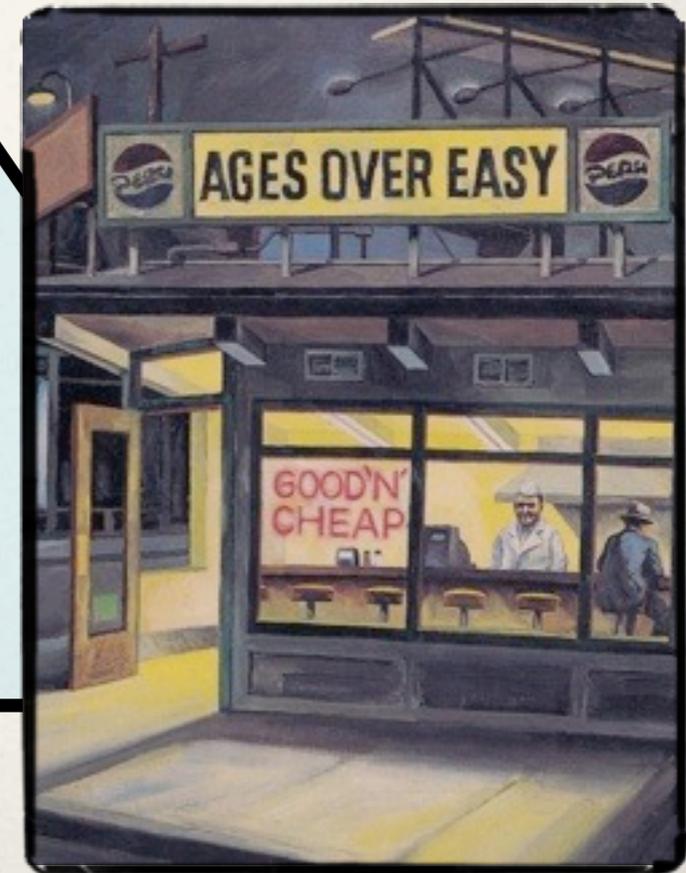
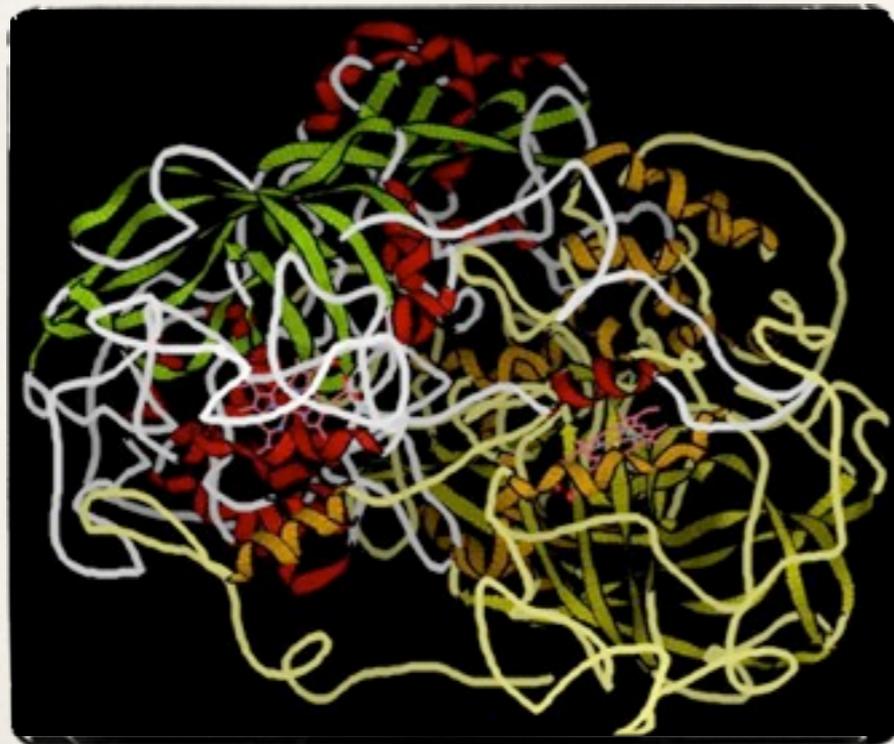
*How strong is
the state
of our
thermochron?*

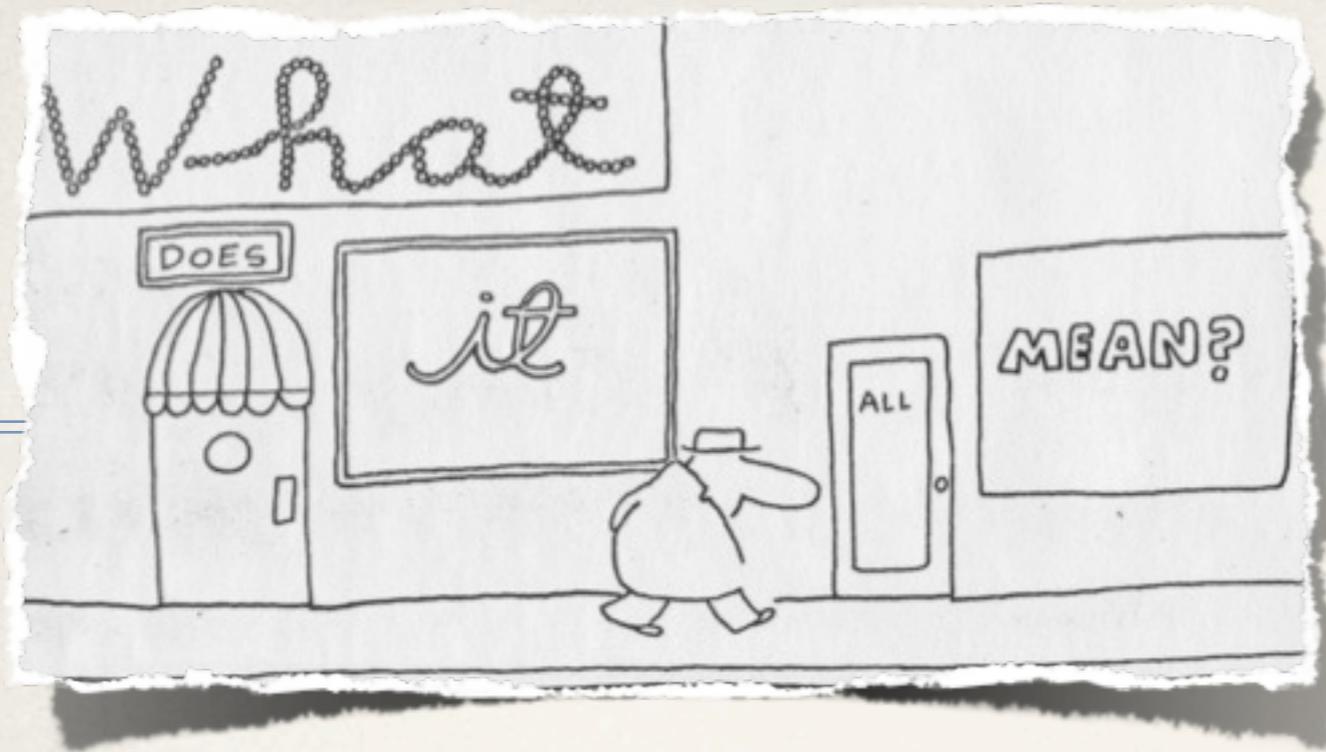


The ternary system
thermochronologists-
geologists -
mineralogists



The ternary
worldviews,
thermochronologists-
geologists -
mineralogists





h

Basic development

Clever problem-solving



\$

Applications

obsessing
over rates

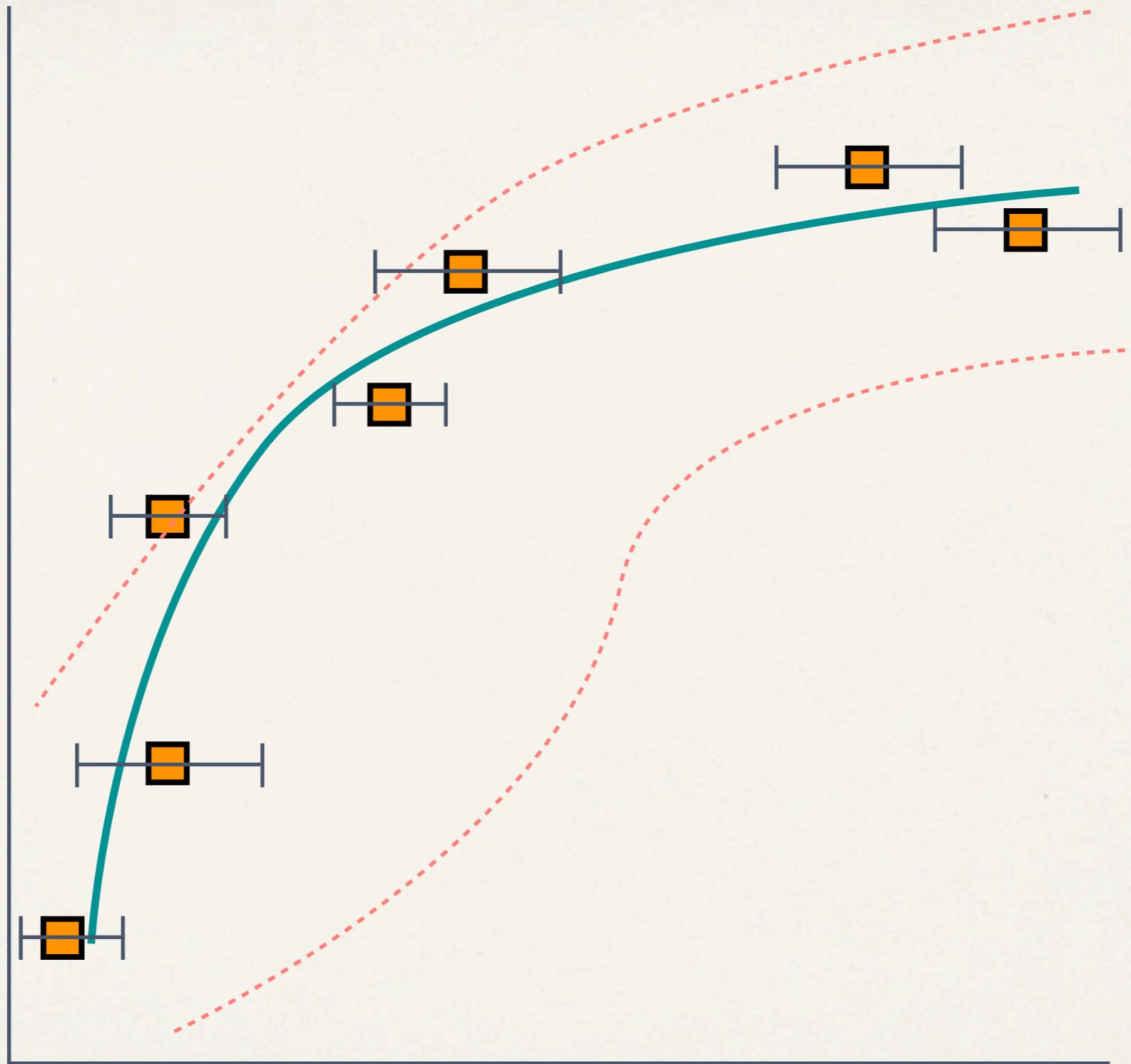


Temperature
or
Position



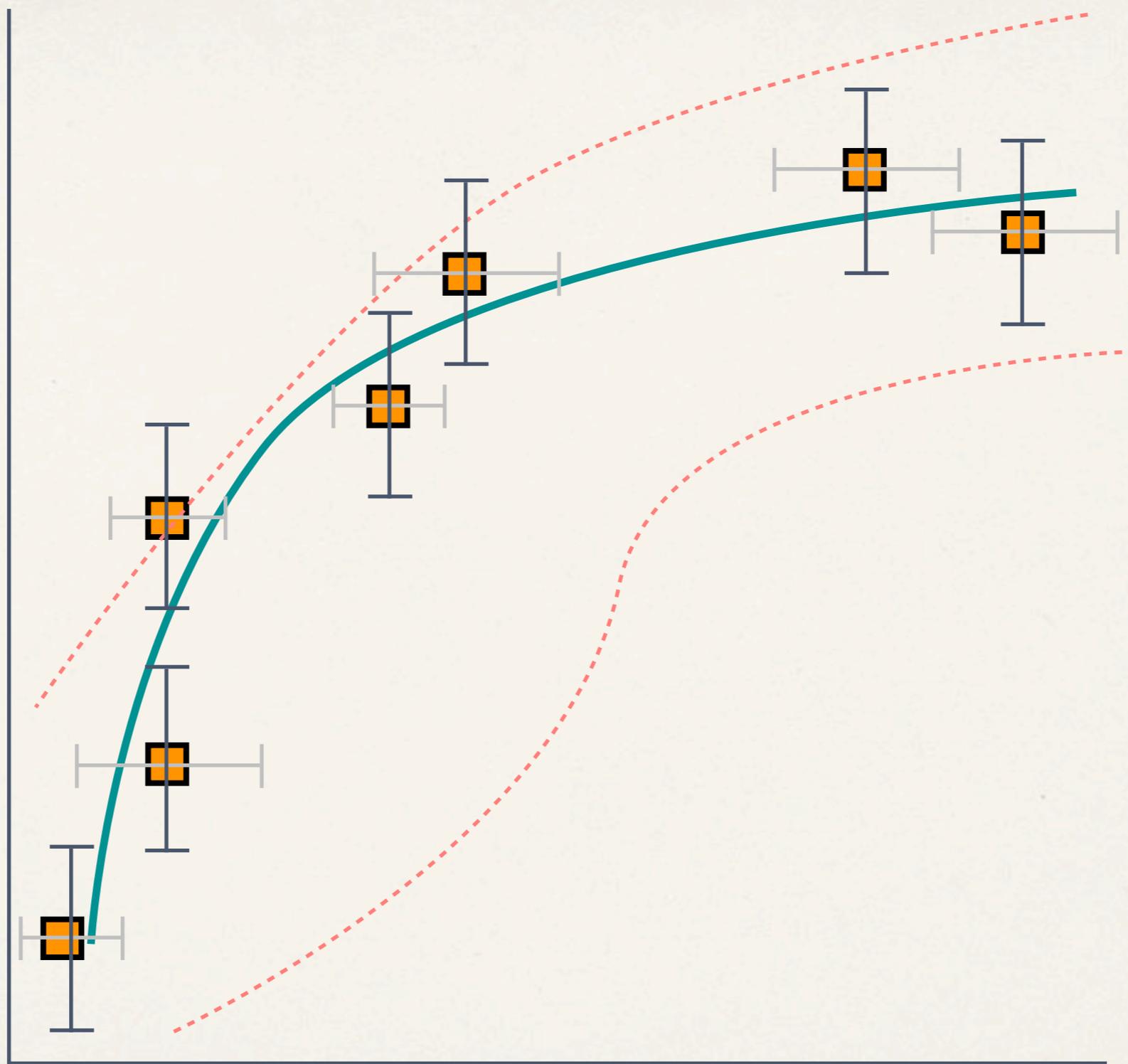
Time *or* Age(T)

Temperature
or
Position



Time *or* Age(T)

Temperature
or
Position



Time *or* Age (T)

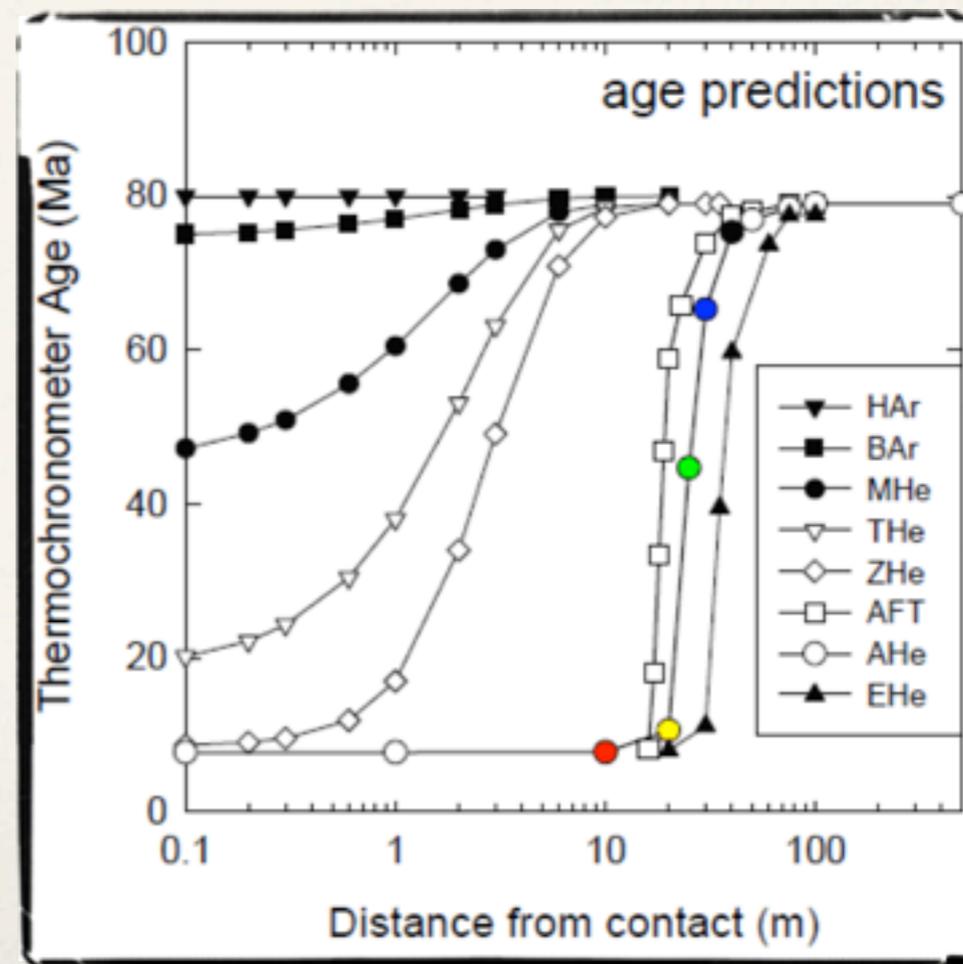
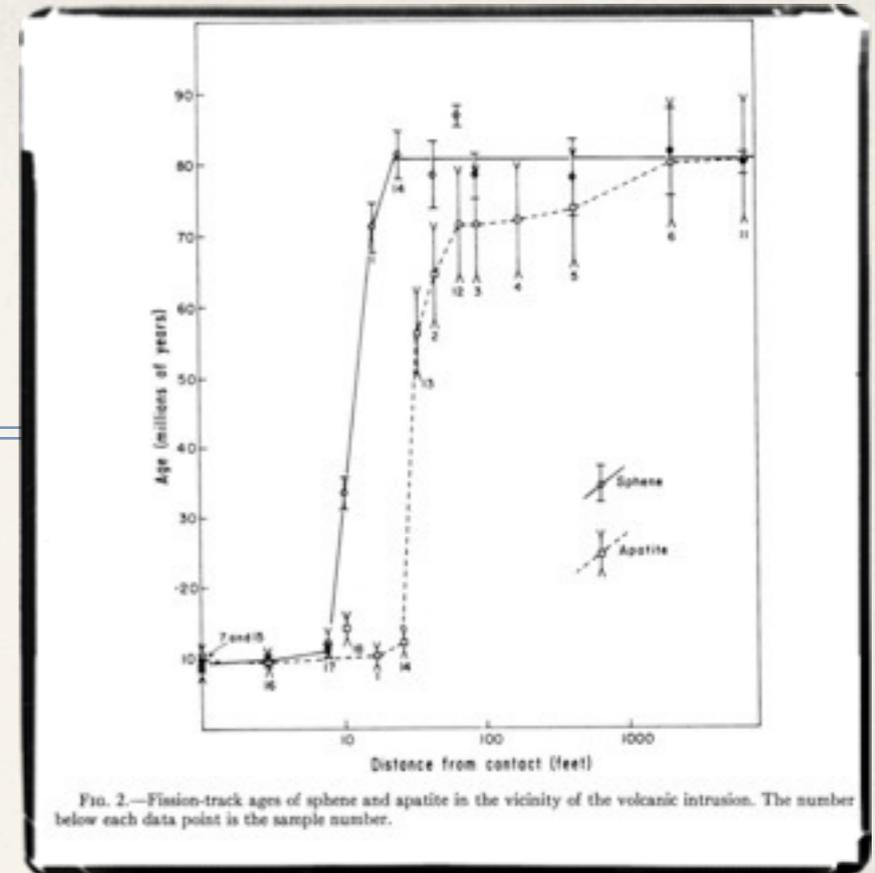
Some Issues

- ❖ Intercomparison among systems
- ❖ Kinetics
- ❖ Success rate & skeletons



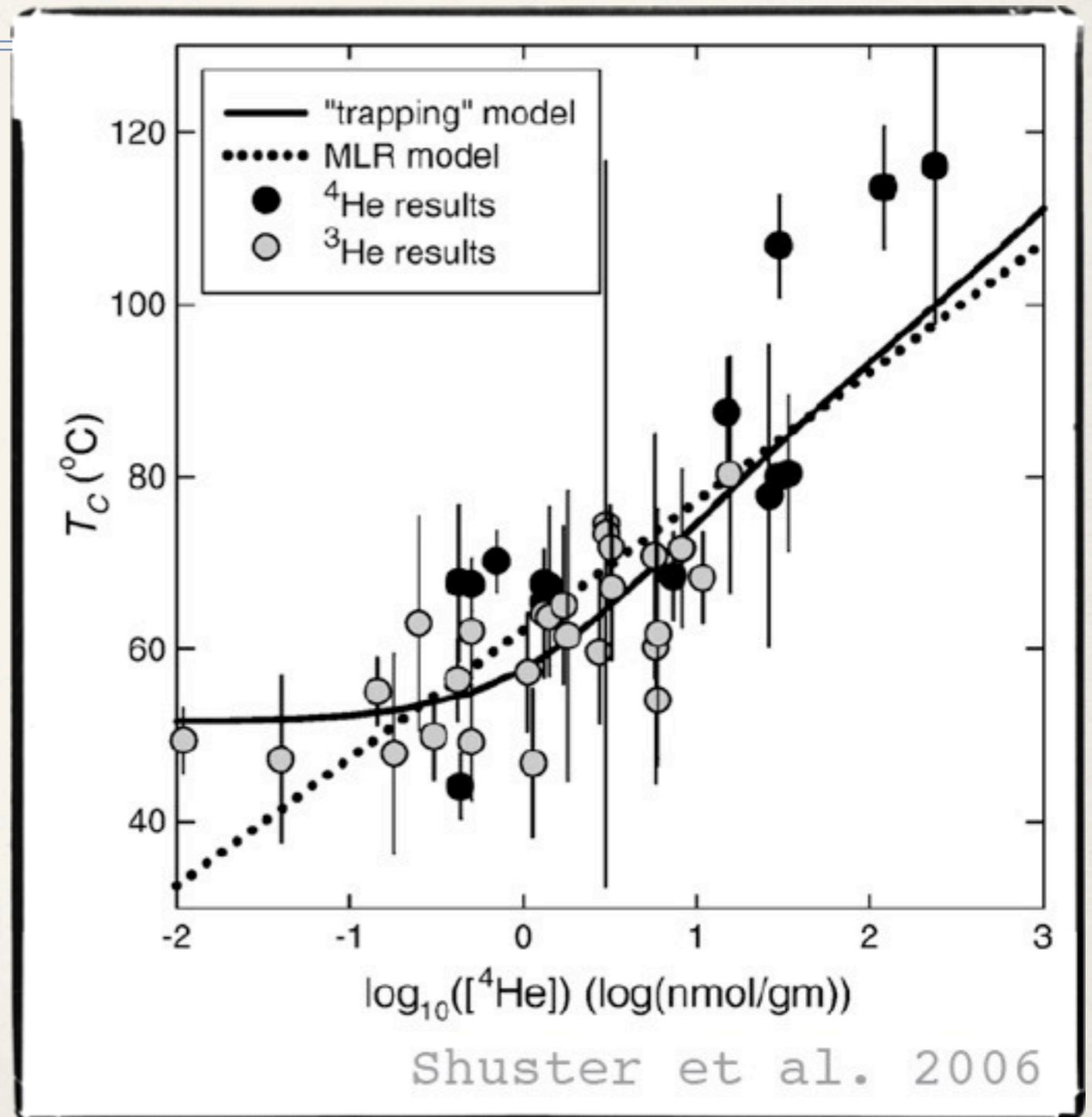
Intercomparison

- ❖ Multi-system approach is often best, but...
- ❖ Systematic comparisons are
few
older
mostly anecdotal
haphazard



Kinetics

- ❖ Our database is spotty at best
- ❖ Practice in applied studies is uneven in...
 - error propagation
 - sample characterization
 - use of blanket parameters
- ❖ Sample-specific kinetics are...
 - time consuming, expensive
 - often hard to realize
 - essential



Success rate

- Glass half full:

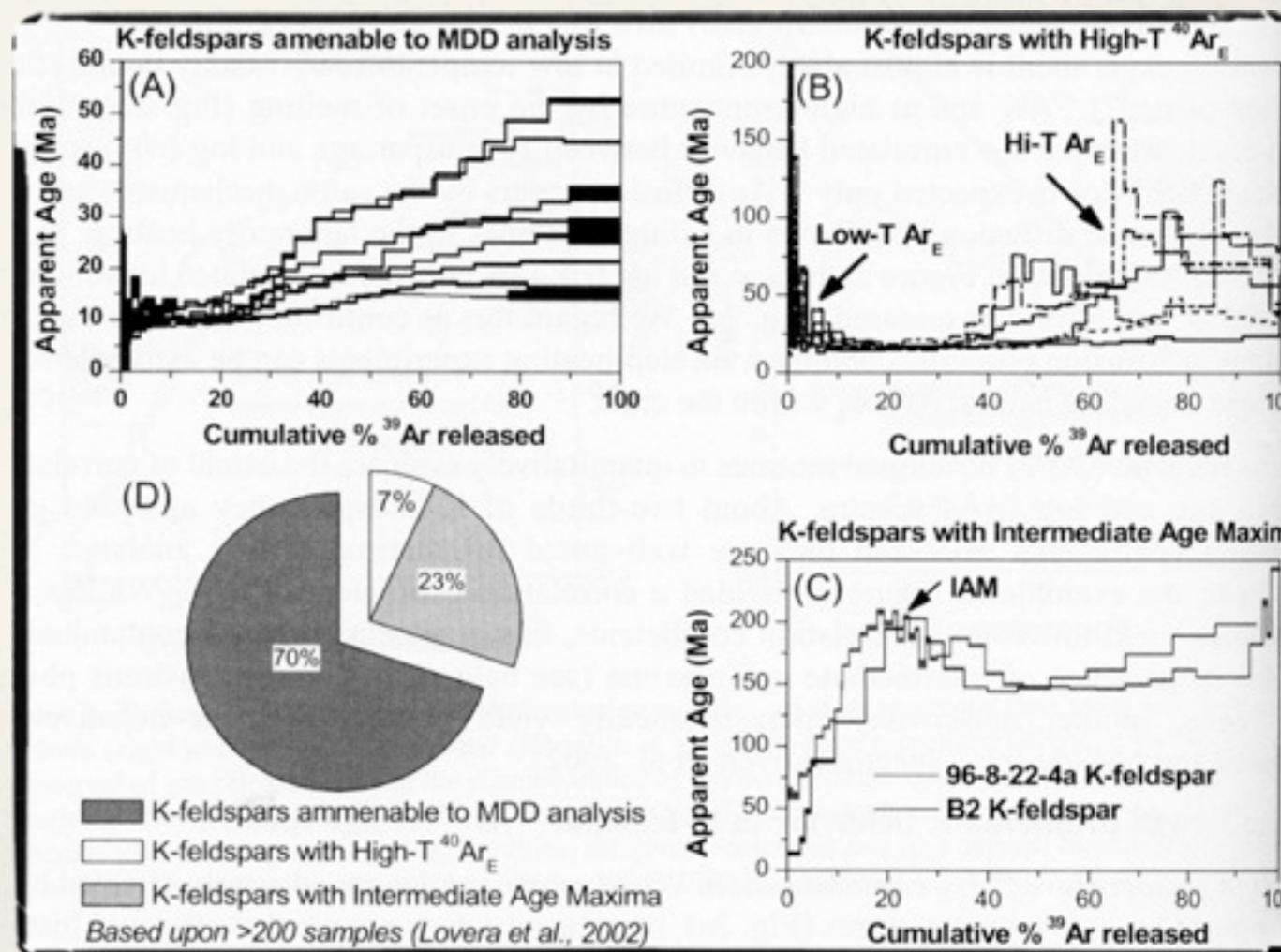
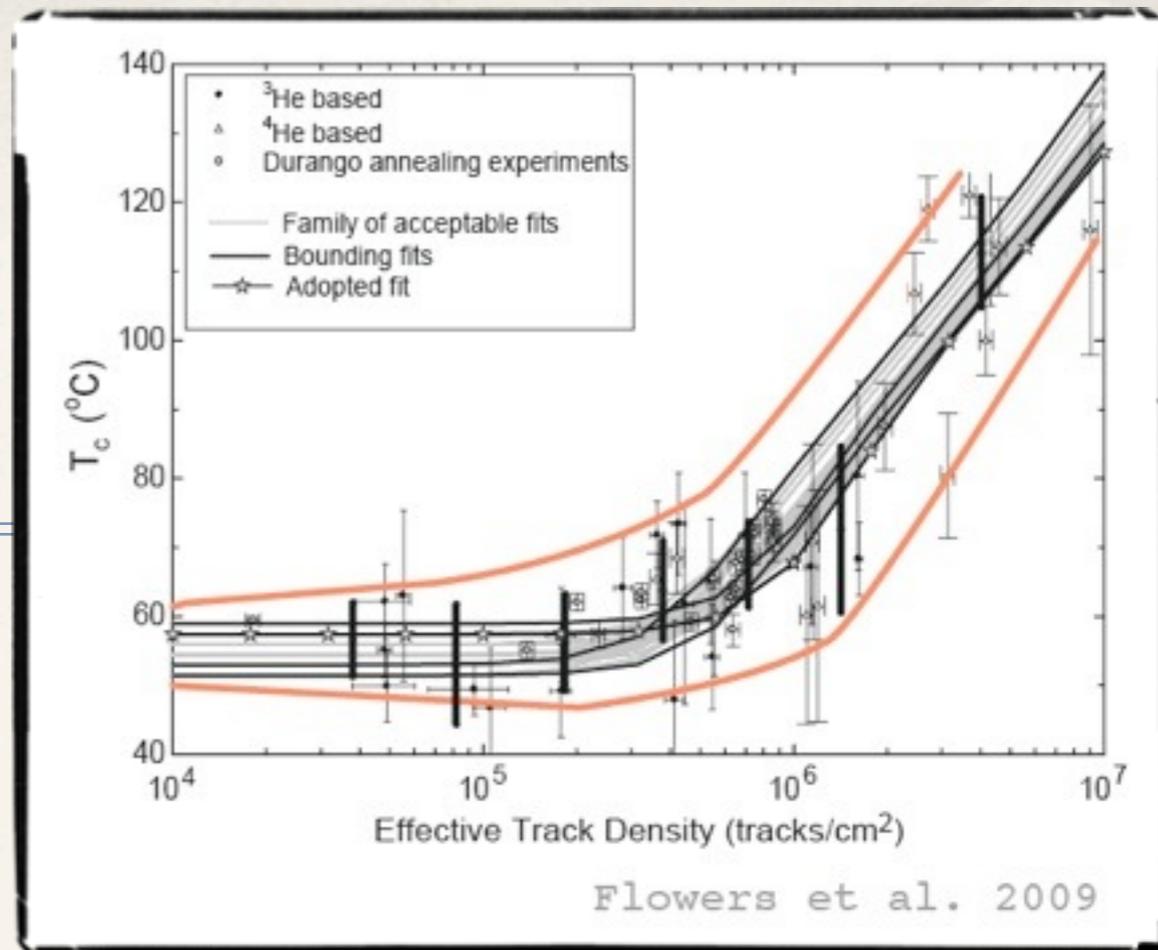
AFTA

$^4\text{He}/^3\text{He}$ apatite

$^{40}\text{Ar}/^{39}\text{Ar}$ K-feldspar

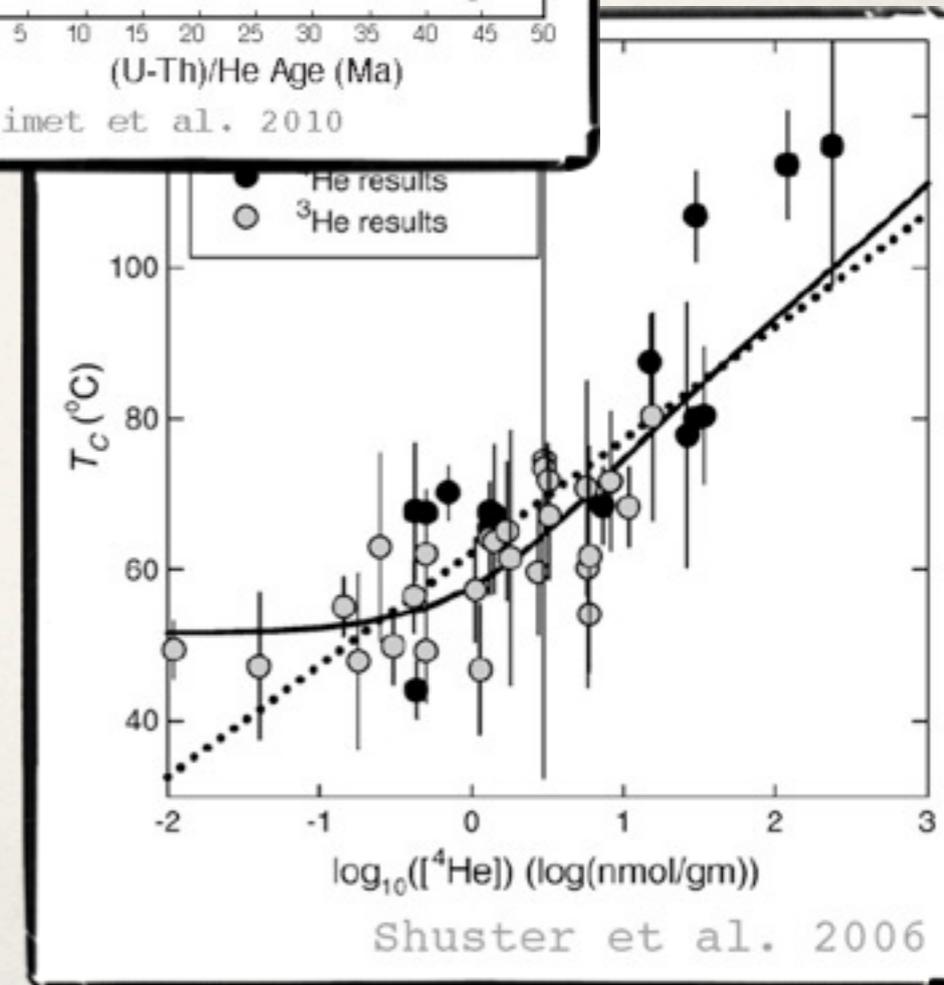
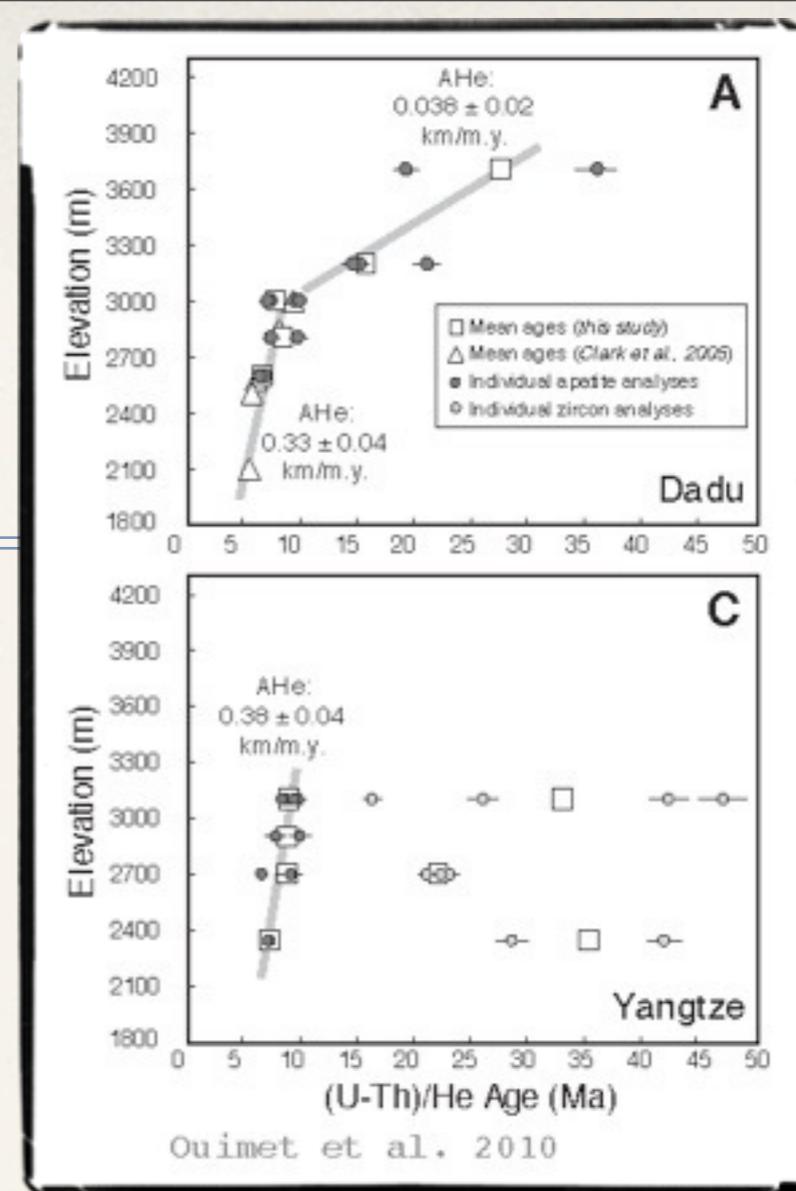
- Glass not-so-full:

all the other systems



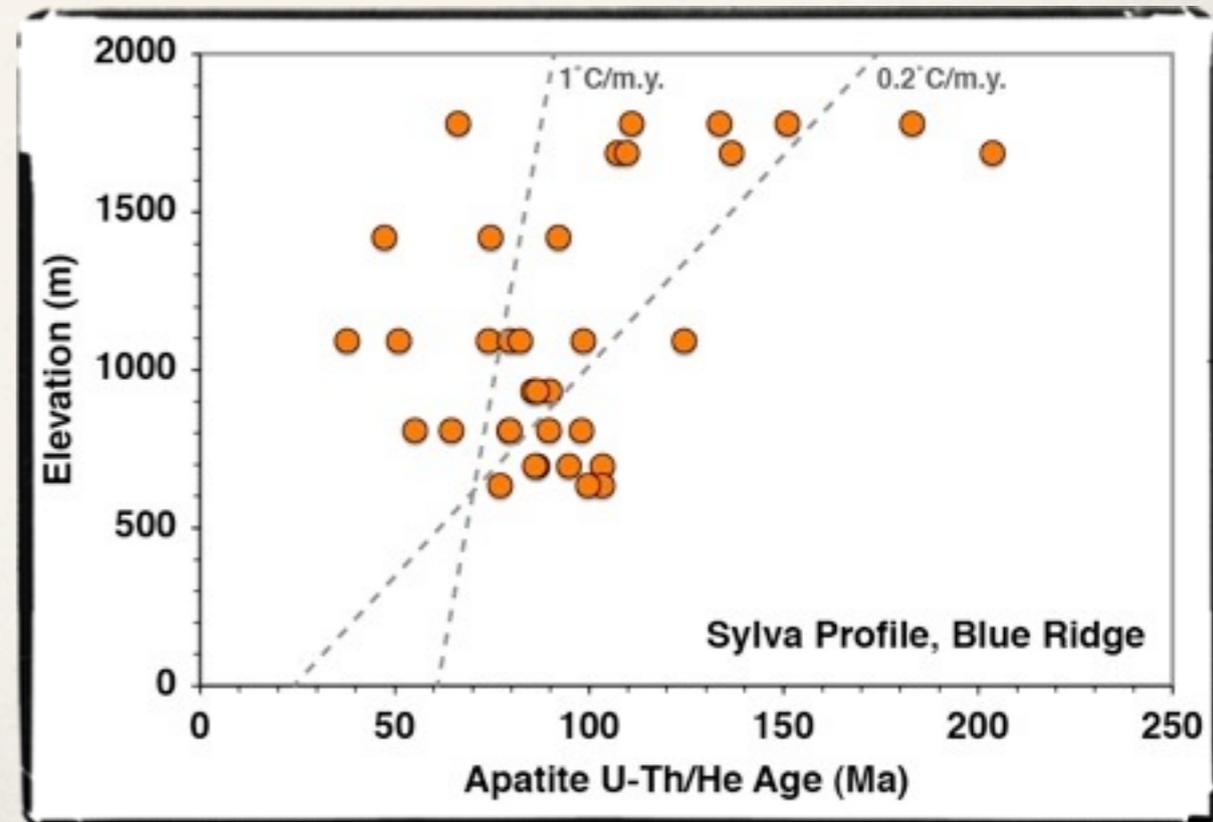
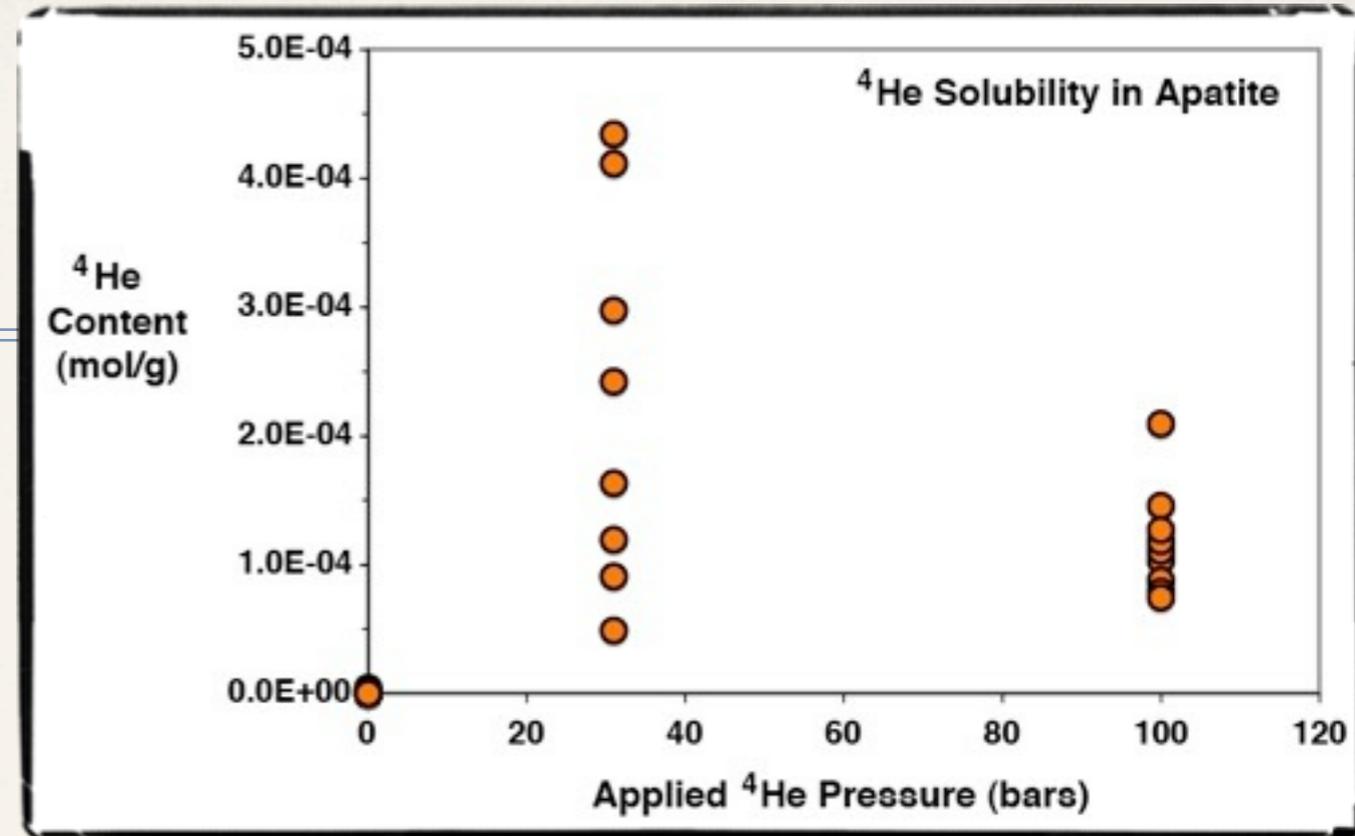
Unmentionables

- ❖ “Geologic” scatter
 - Excess Ar in micas
 - Bad-actor apatites
- ❖ Other laundry:
 - error handling in general
 - error handling for inversions
 - kinetic standards & lab techniques
 - your favorite here!*



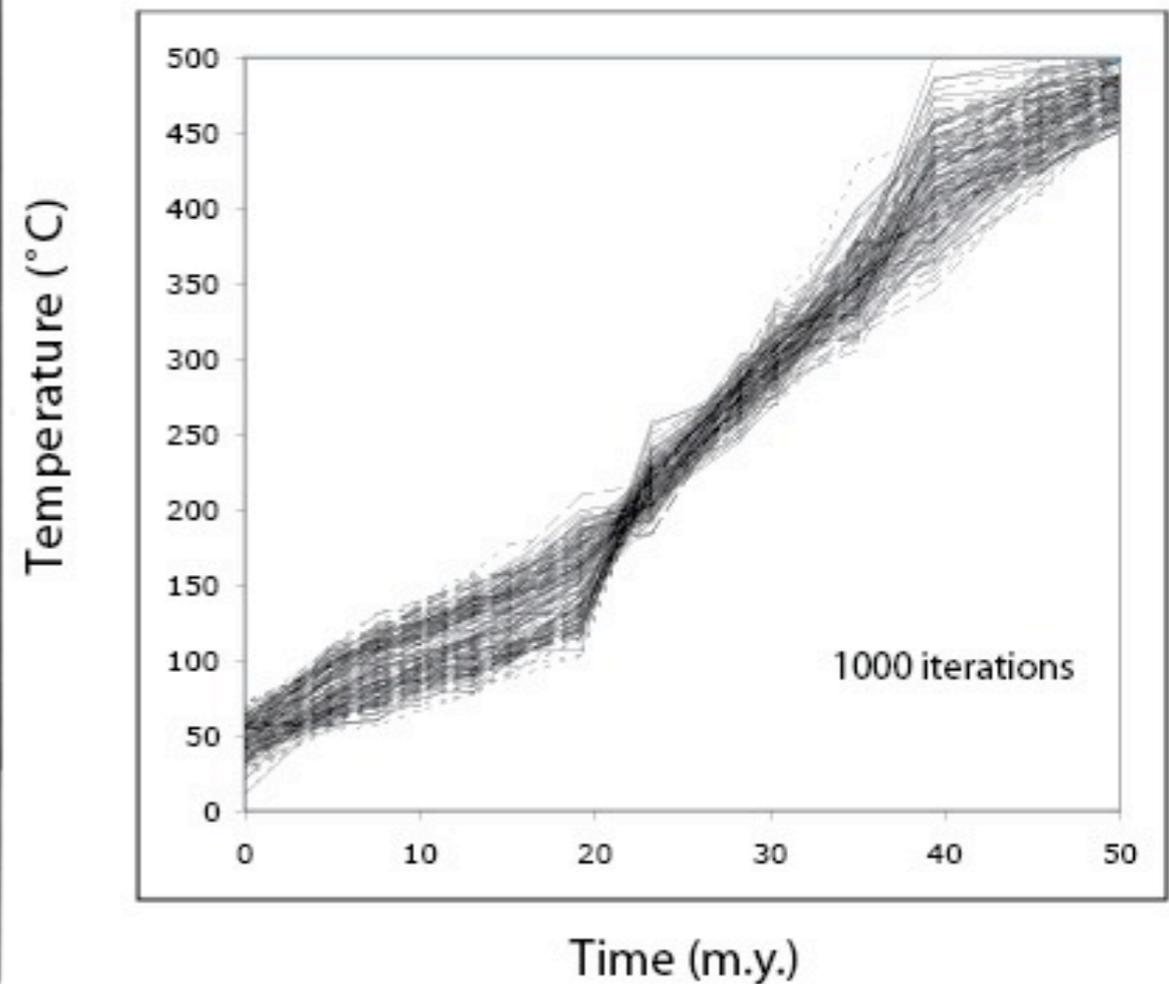
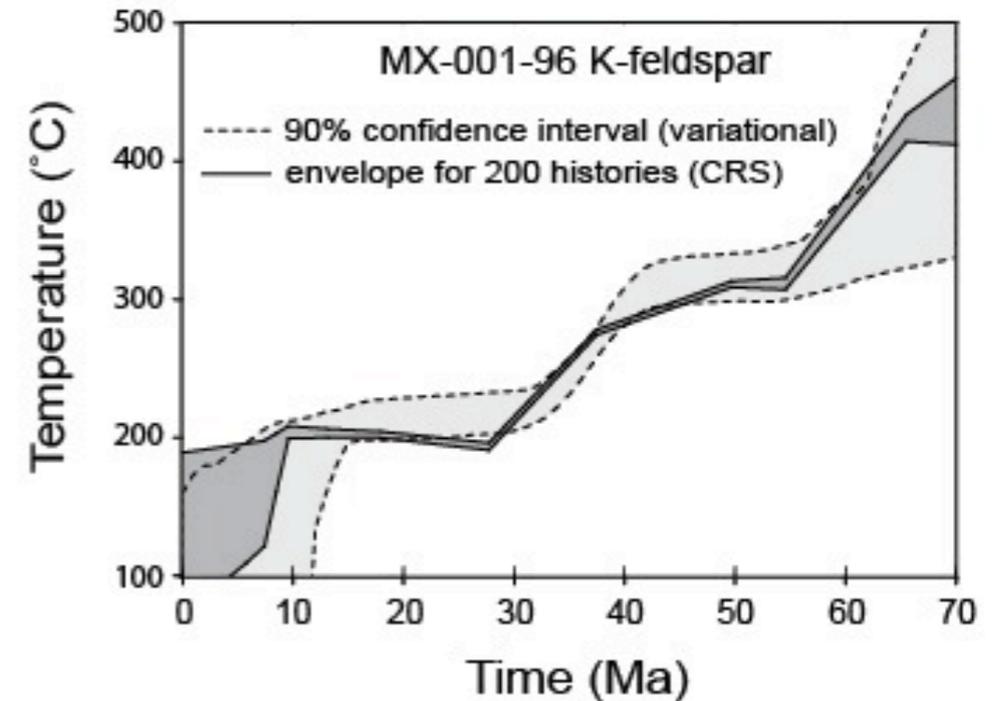
Unmentionables

- ❖ “Geologic” scatter, e.g.,
 - excess Ar in micas
 - bad-actor apatites (outliers)
- ❖ Other laundry:
 - error handling in general
 - error handling for inversions
 - kinetic standards & lab techniques
 - your favorite here!*



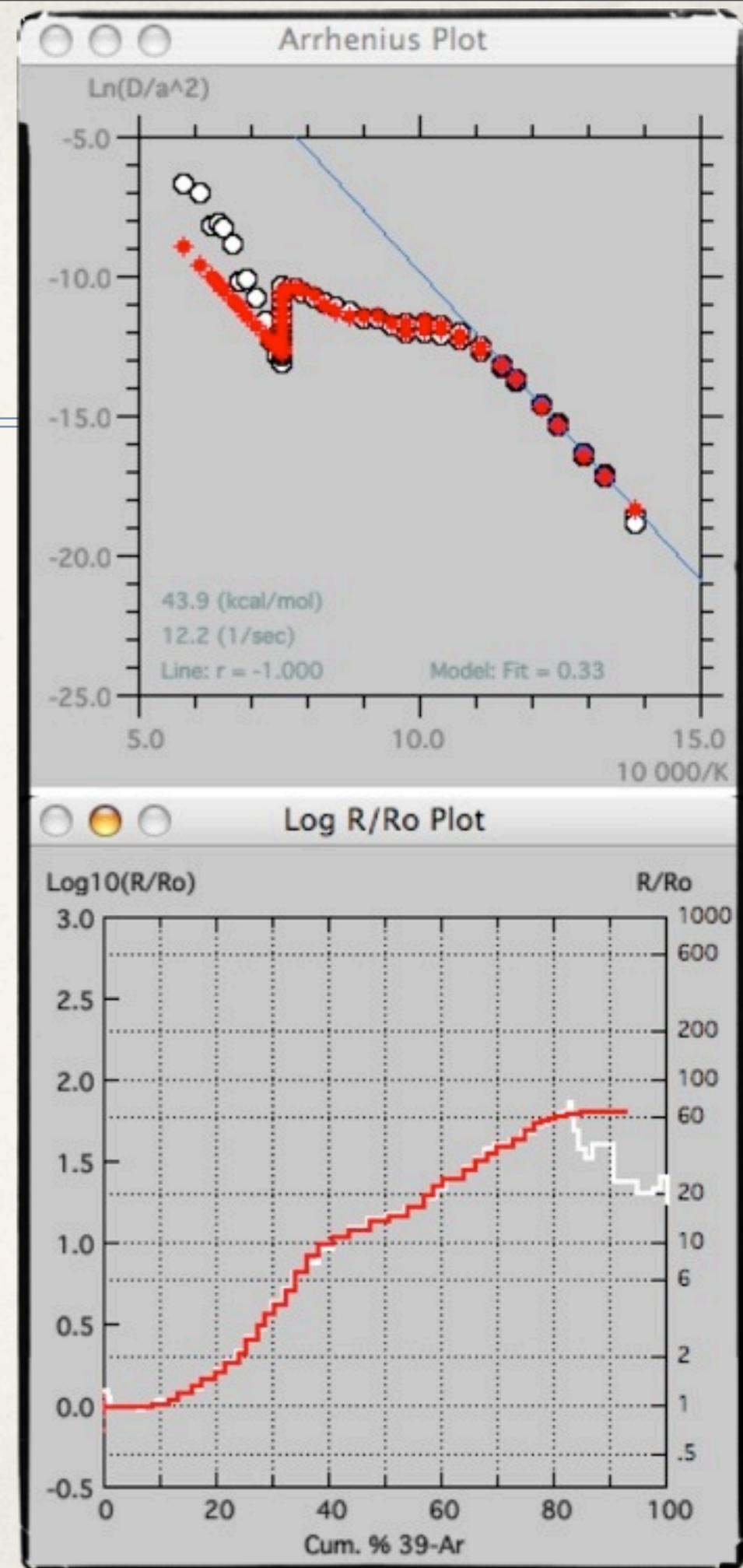
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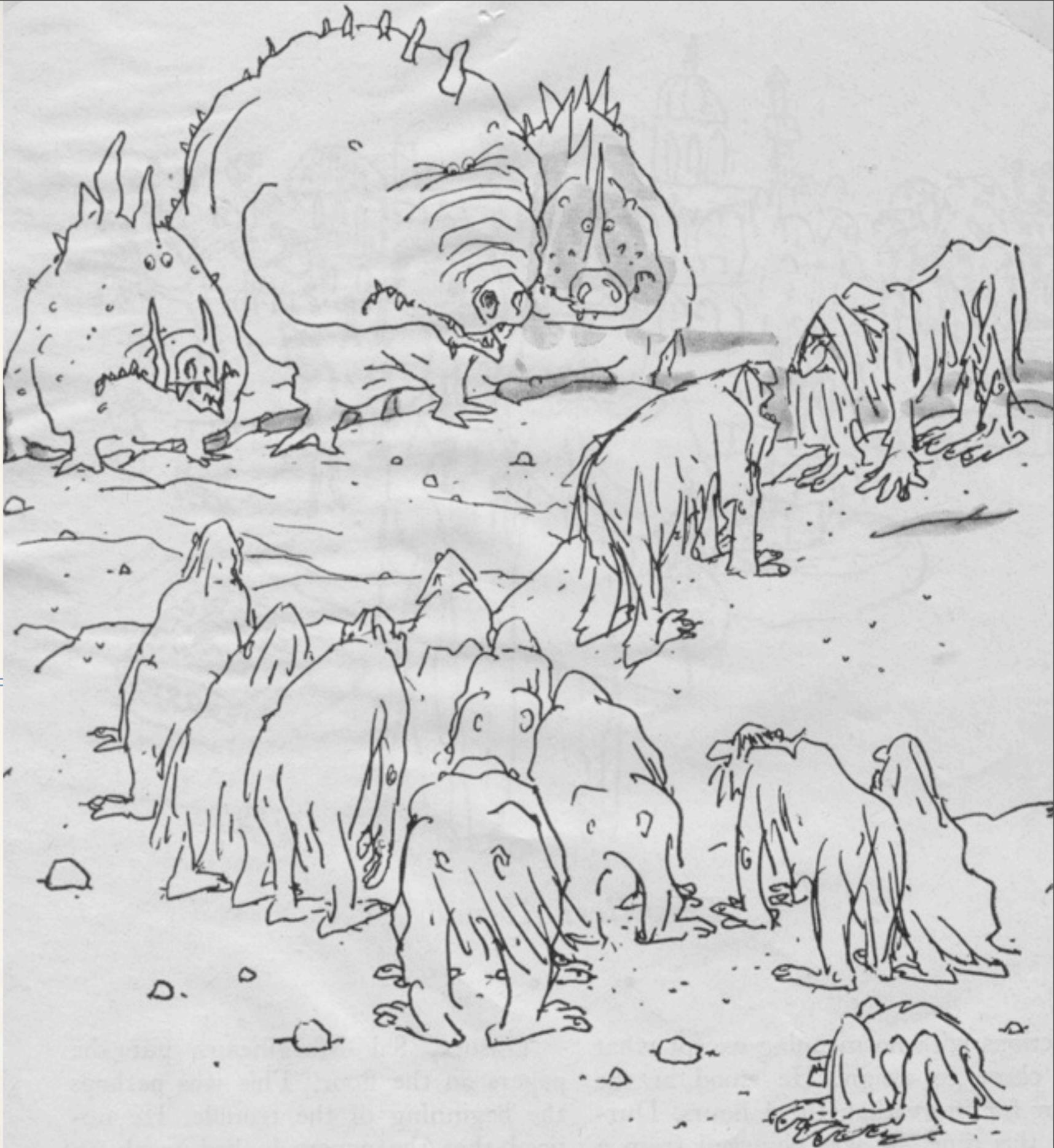


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Answers?



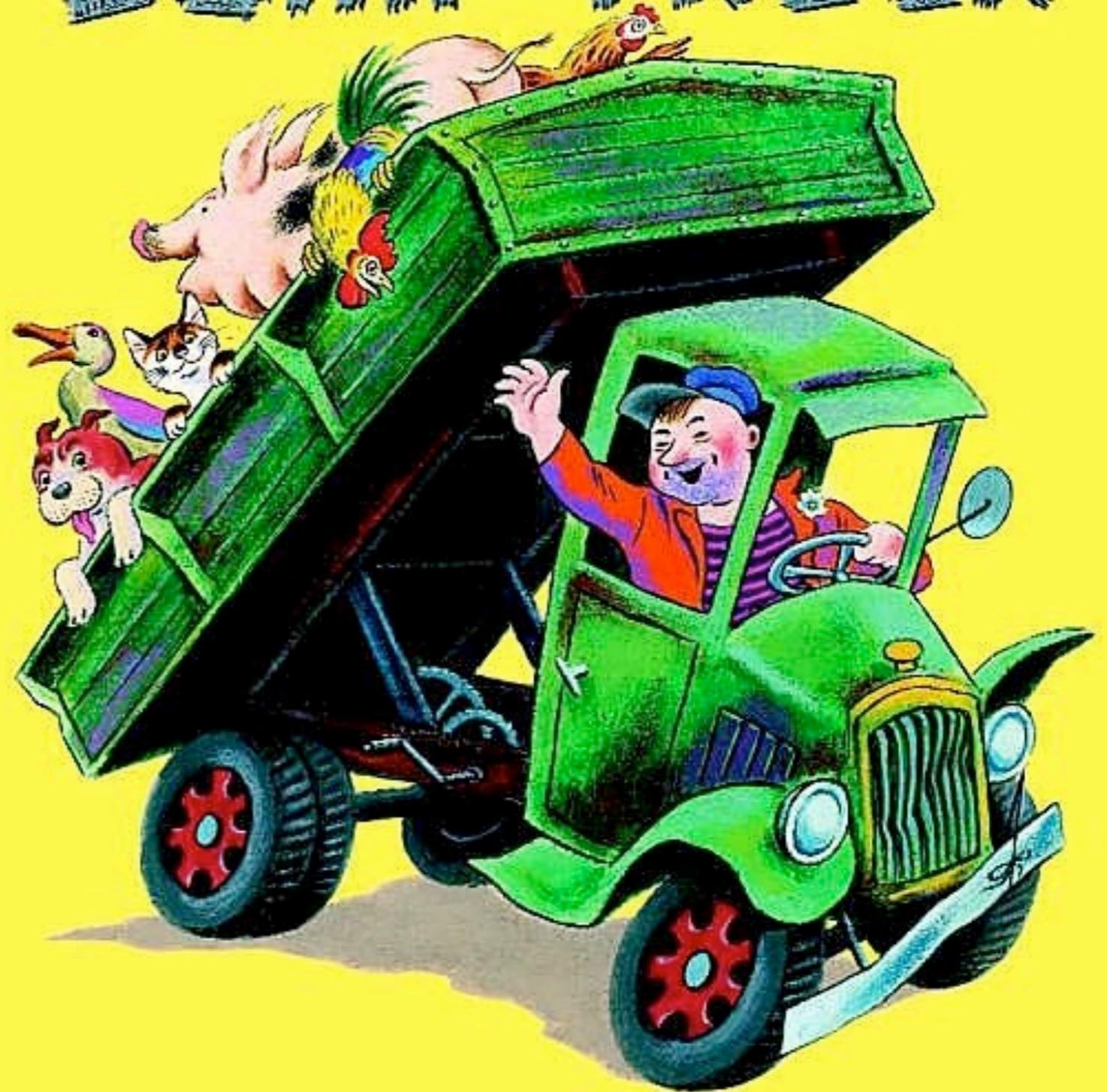
Booth

“Leader Maloop, the people yearn for real answers.”

Answers?

 a Little Golden Book®
CLASSIC

THE HAPPY MAN AND HIS DUMP TRUCK



Possible Steps

❖ A community effort to...

develop kinetic standards

maintain open kinetic database

streamline analytical techniques

systematize techniques, data handling, and models

