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Earth and Planetary Science Letters

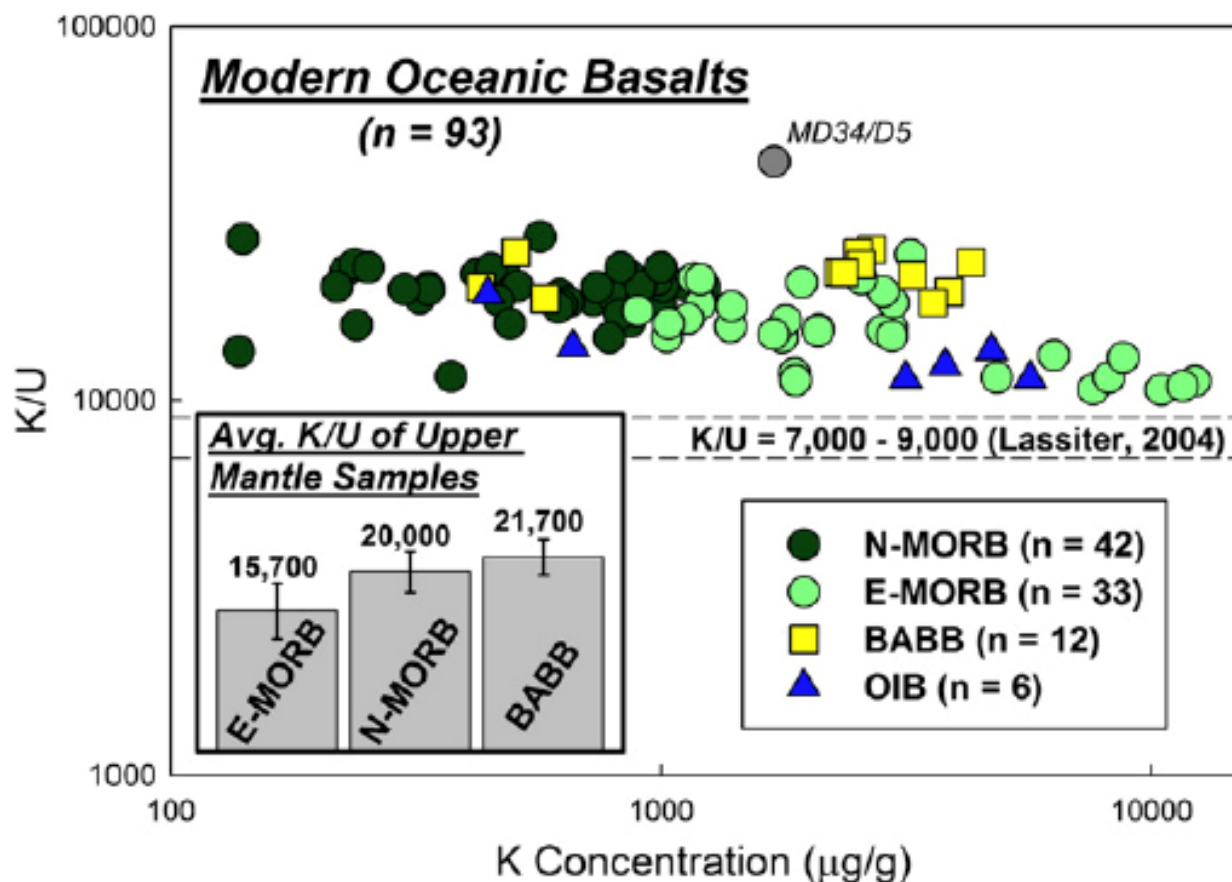
journal homepage: www.elsevier.com/locate/epsl



The K/U ratio of the silicate thermal evolution

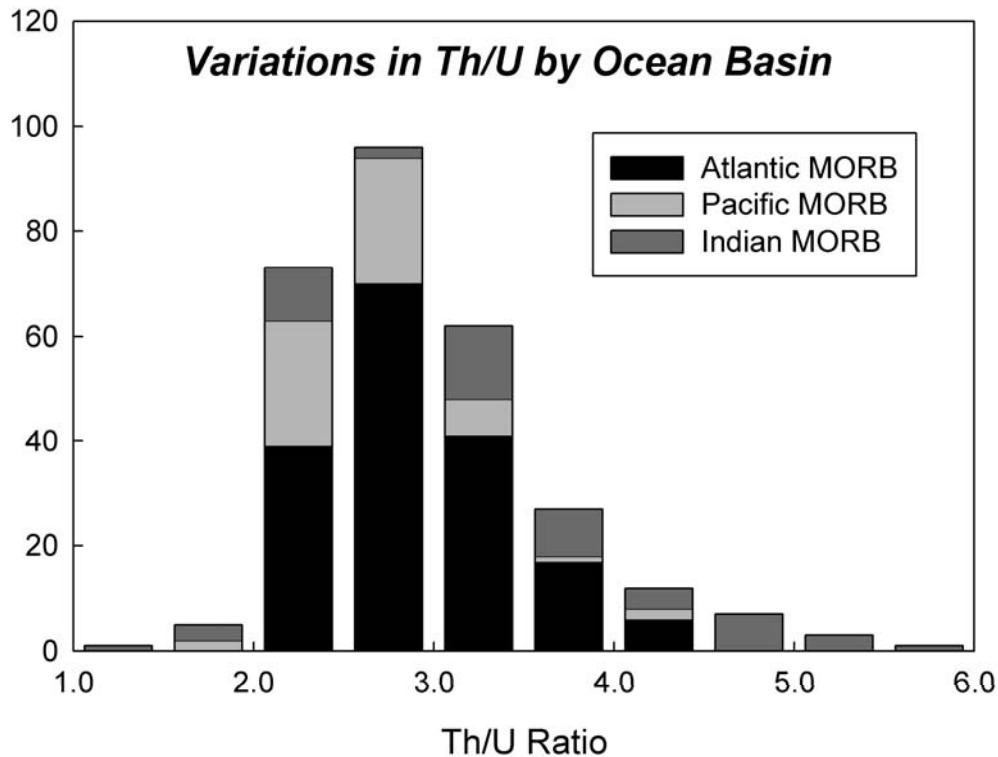
Ricardo Arevalo Jr. *, William F. M

Indeed, value based K/U ratio - more un
 understood). From K/U crustal estimat
 Based also on subse
 by x10 (i.e., 15%). R

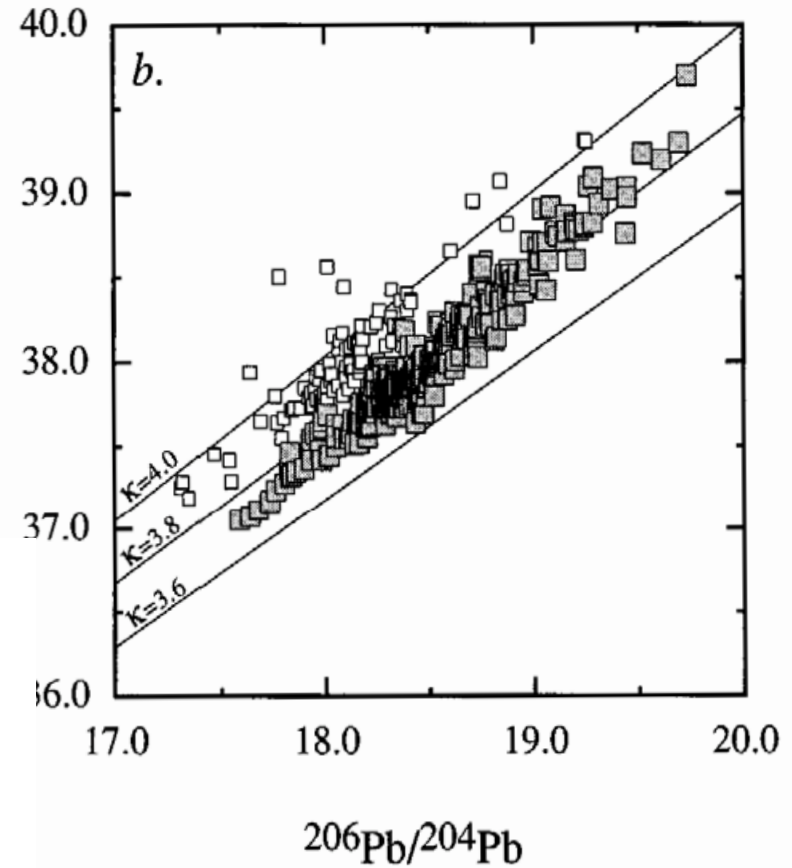


Th/U in the Earth

$\text{Th}/\text{U}_{\text{chondrites}} = 3.9 \pm 0.3$



$^{208}\text{Pb}/^{204}\text{Pb}$



$\text{Th}/\text{U}_{\text{continental crust}} \sim 4.5$

$\text{Th}/\text{U}_{\text{mantle}} \sim 3$

The U/Th production ratio and the age of the Milky Way from meteorites and Galactic halo stars

Nicolas Dauphas¹

Galactic Chemical Evolution
(closed box model)

Meteorites

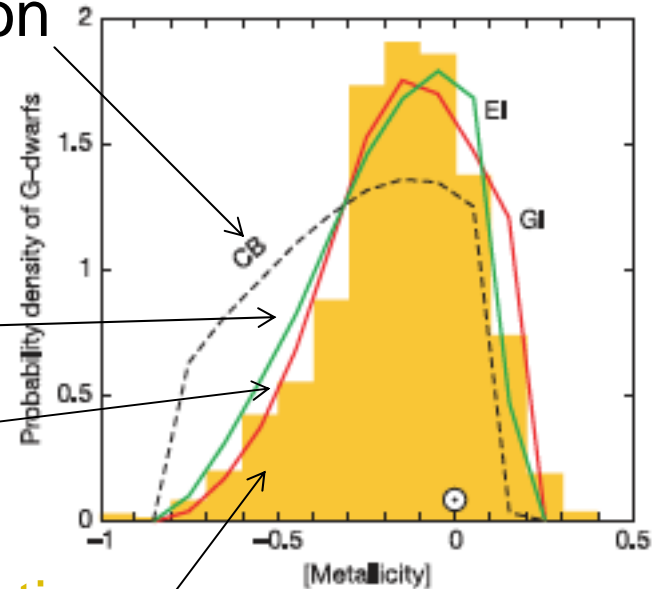
$R^{(Th/U)}$ 3.8 ± 0.2

$R_{\odot}^{(Th/U)}$ 2.3 ± 0.3

Exponential infall

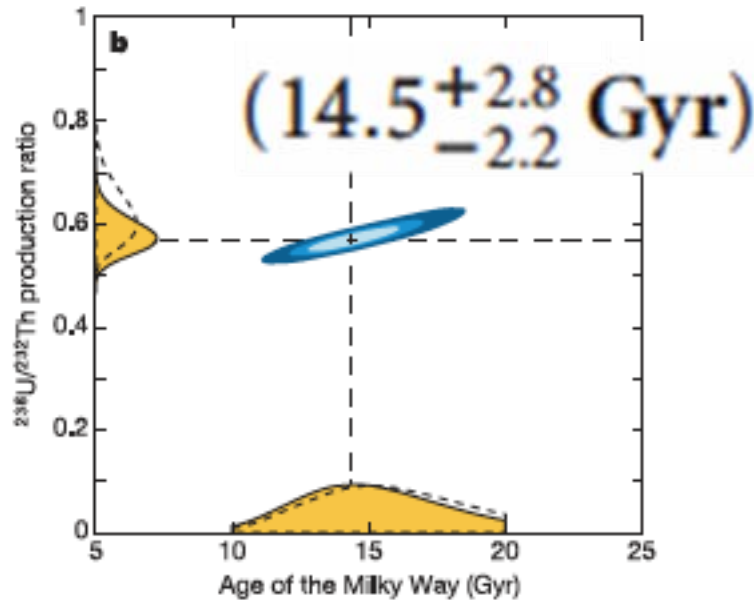
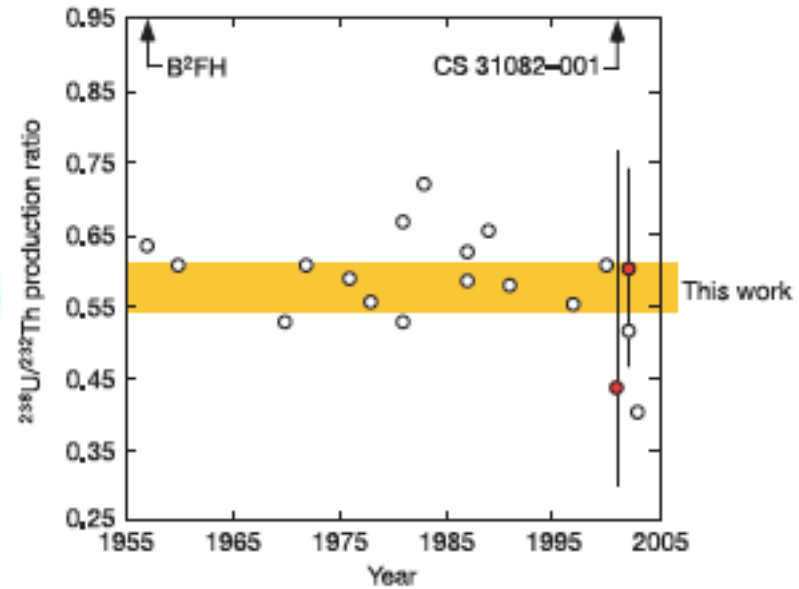
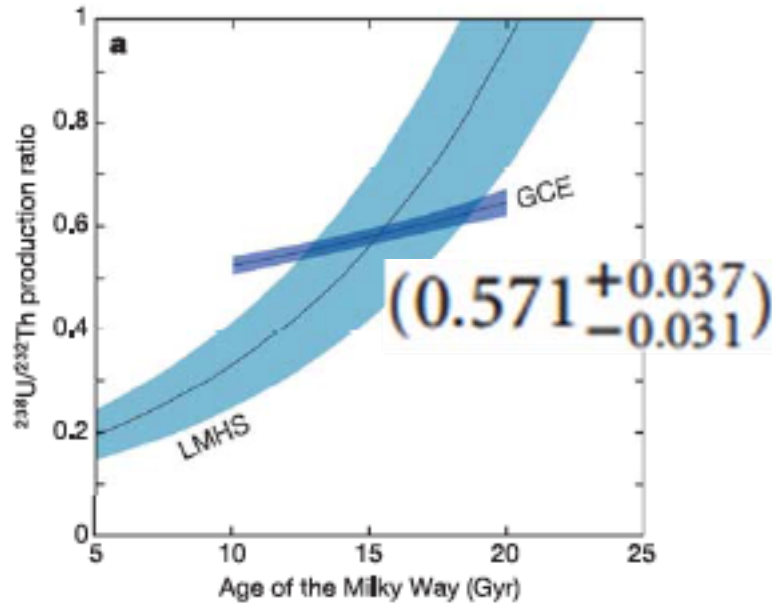
Gaussian infall

Astronomical Observations



low metallicity halo stars

$$\left[\frac{U}{Th} \right]_0$$



Age of Milky Way
(*c.f.* 13.7 ± 0.2)

5 Big Questions:

- What are earth's K/U & Th/U ratios?
planetary volatility curve
- Radiogenic contribution to heat flow?
secular cooling
- Distribution of reservoirs in mantle?
whole vs layered convection
- Radiogenic elements in the core??
Earth energy budget
- Nature of the Core-Mantle Boundary?
hidden reservoirs

Outstanding issues:

- Th & U abundance
- Th/U
- K neutrinos
- directionality

mutual understanding

funding

SHORT LIST OF BIG UNKNOWNNS

Energy budget of the Earth

Thermal evolution of Earth
(including cooling history)

Convection

Age of Continental Crust

Source and Energy of hotspots

Inner core growth, when? How?

Upper-Lower Mantle composition

Sources and origins of Noble gases

Vertical distribution of K, Th, and U

Volatile element budget of Earth

Road Map for Neutrino Geoscience:

Who are we:

- particle physics
- geology
- astrophysics
- national security/IAEA

What are our needs:

- mutual understanding of each others needs
- identified research targets
- equipment needs
- funding needs

Meetings, White Paper and Organization

- next meeting: 2-3 yrs
- white paper...
- International organization committee