



Flash talk:
Earth's Th/U value
= 3.90 ± 0.15



TOHOKU
UNIVERSITY

William F McDonough

Department of Geology, University of Maryland, College Park, MD, USA
WPI - Advanced Institute for Marine Ecosystem Change
Earth Sciences and Research Center for Neutrino Science,
Tohoku University, Sendai, Miyagi, Japan





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Earth and Planetary Science Letters

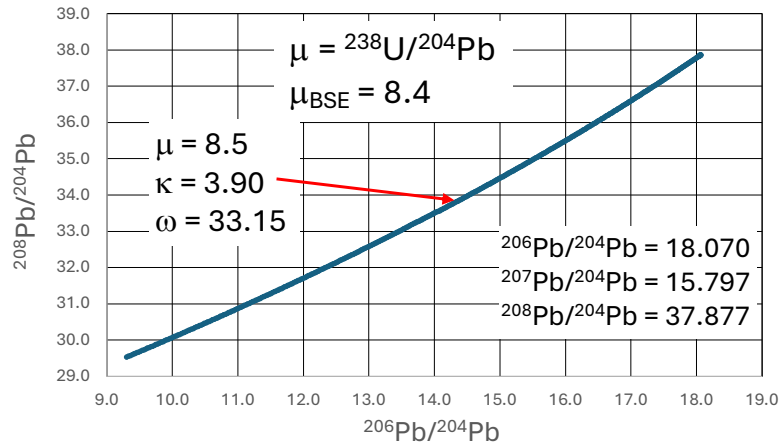
www.elsevier.com/locate/epsl

Frontiers paper

[Earth and Planetary Science Letters 498 \(2018\) 196–202](#)

Earth's chondritic Th/U: Negligible fractionation during accretion, core formation, and crust–mantle differentiation

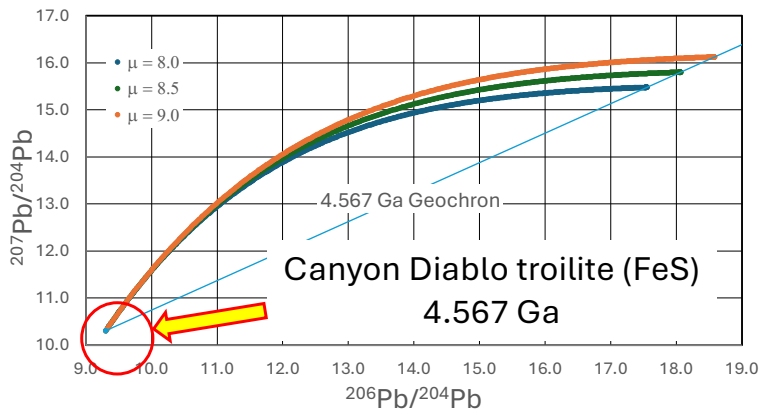
Scott A. Wipperfurth^{a,*}, Meng Guo^{a,b,1}, Ondřej Šrámek^c, William F. McDonough^{a,d,*}



$$\kappa = {}^{232}\text{Th}/{}^{238}\text{U}$$

$$\kappa_{\text{Pb}} = ({}^{232}\text{Th}/{}^{238}\text{U})_{\text{time-integrated}}$$

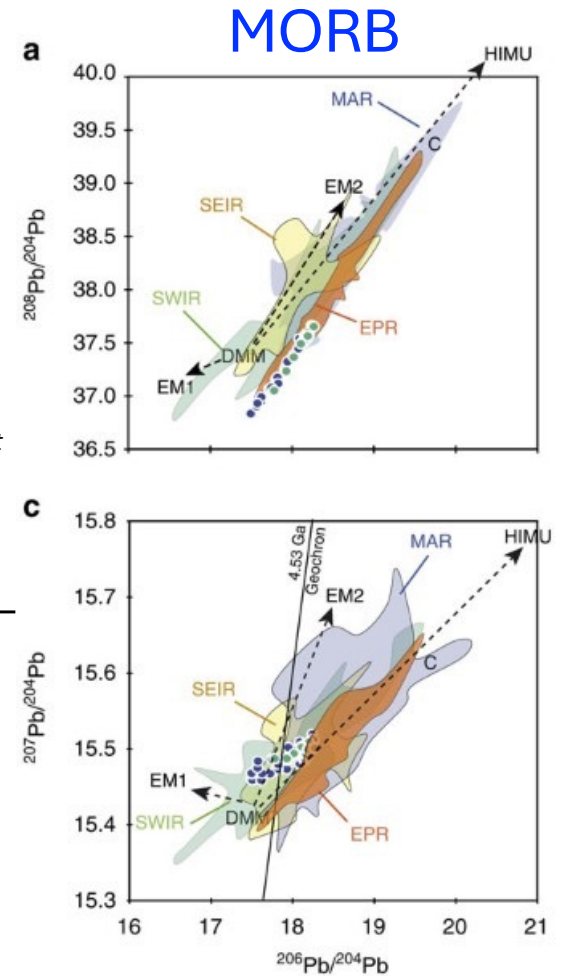
Calculating κ_{Pb}



$$\frac{{}^{208}\text{Pb}^*}{{}^{206}\text{Pb}^*} = \frac{\left(\frac{{}^{208}\text{Pb}}{204}\right)_{\text{meas}} - \left(\frac{{}^{208}\text{Pb}}{204}\right)_{\text{CD}}}{\left(\frac{{}^{206}\text{Pb}}{204}\right)_{\text{meas}} - \left(\frac{{}^{206}\text{Pb}}{204}\right)_{\text{CD}}}$$

Subtract initial

$$\kappa_{\text{Pb}} = \frac{\left(\frac{{}^{208}\text{Pb}^*}{{}^{206}\text{Pb}^*}\right) * (e^{\lambda_{238}T} - 1)}{e^{\lambda_{232}T} - 1}$$

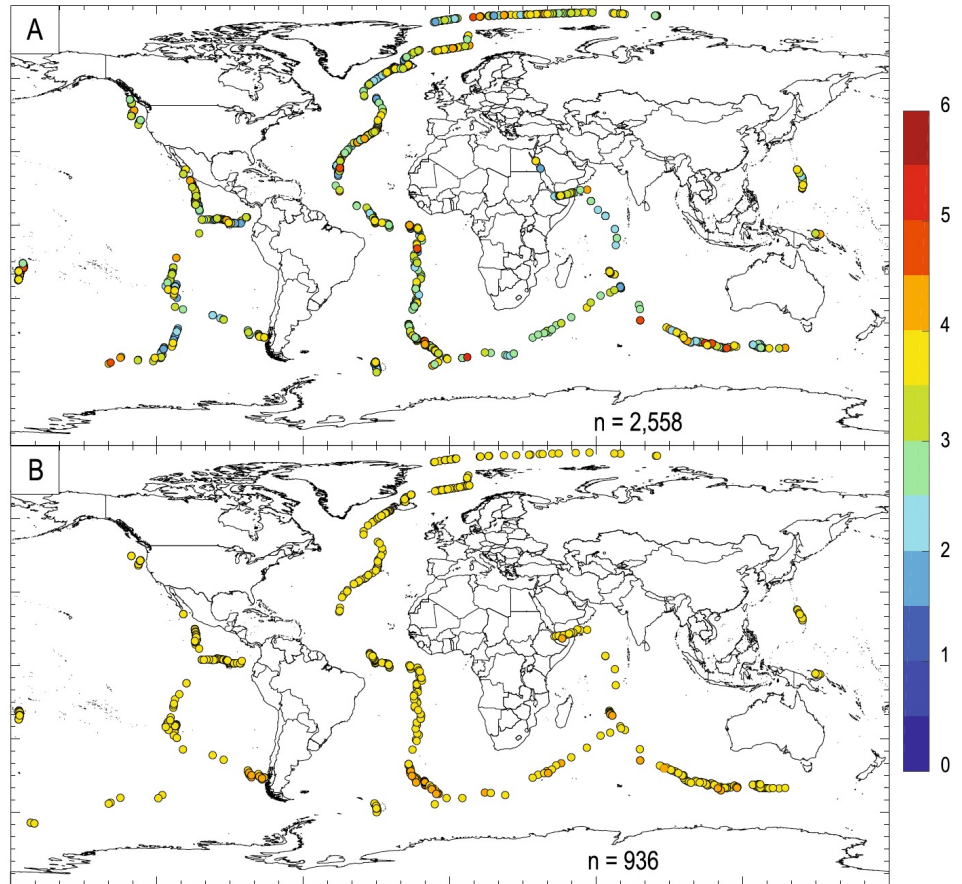


$\kappa = \text{Th}/\text{U}$

MORB
mid-ocean
ridge basalts

$\kappa_{\text{pb}} =$
 $(^{232}\text{Th}/^{238}\text{U})_{\text{time-integrated}}$

n = number of samples measured

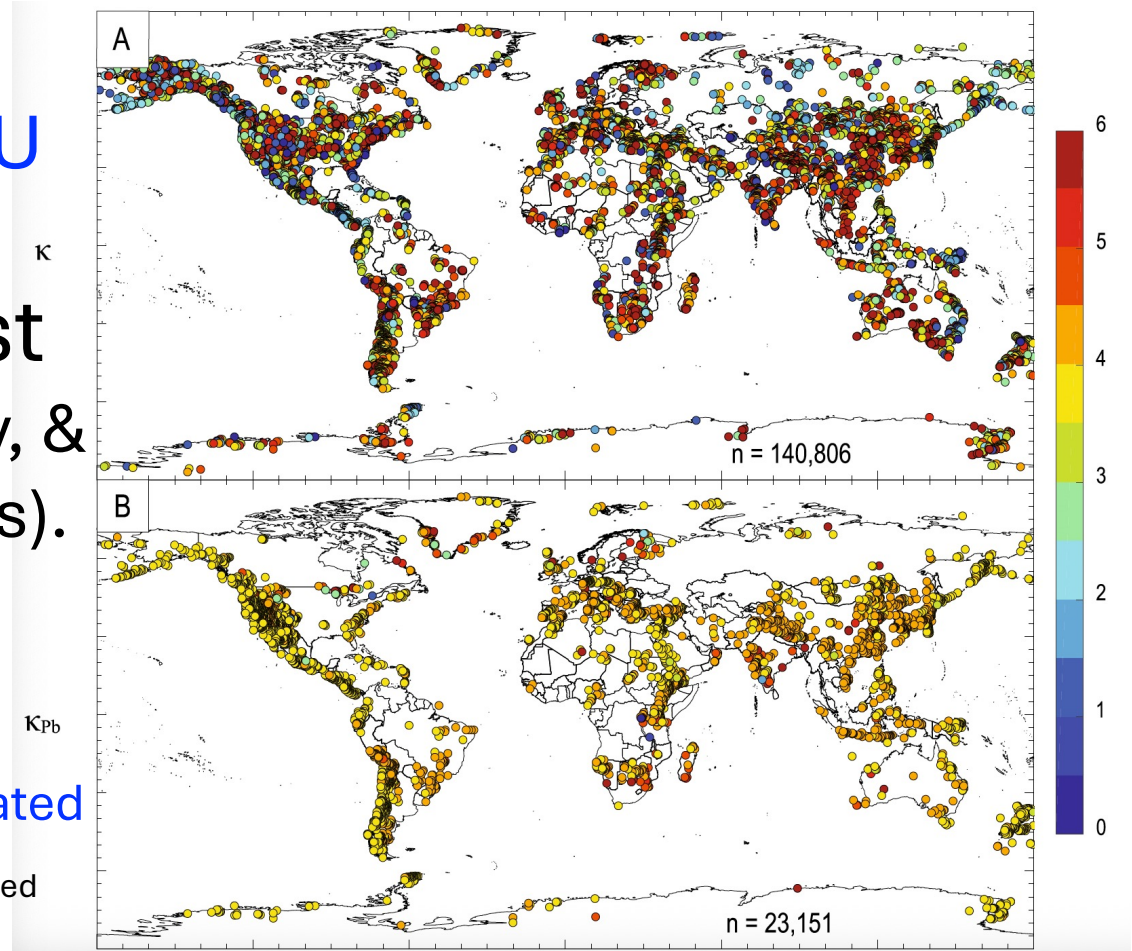


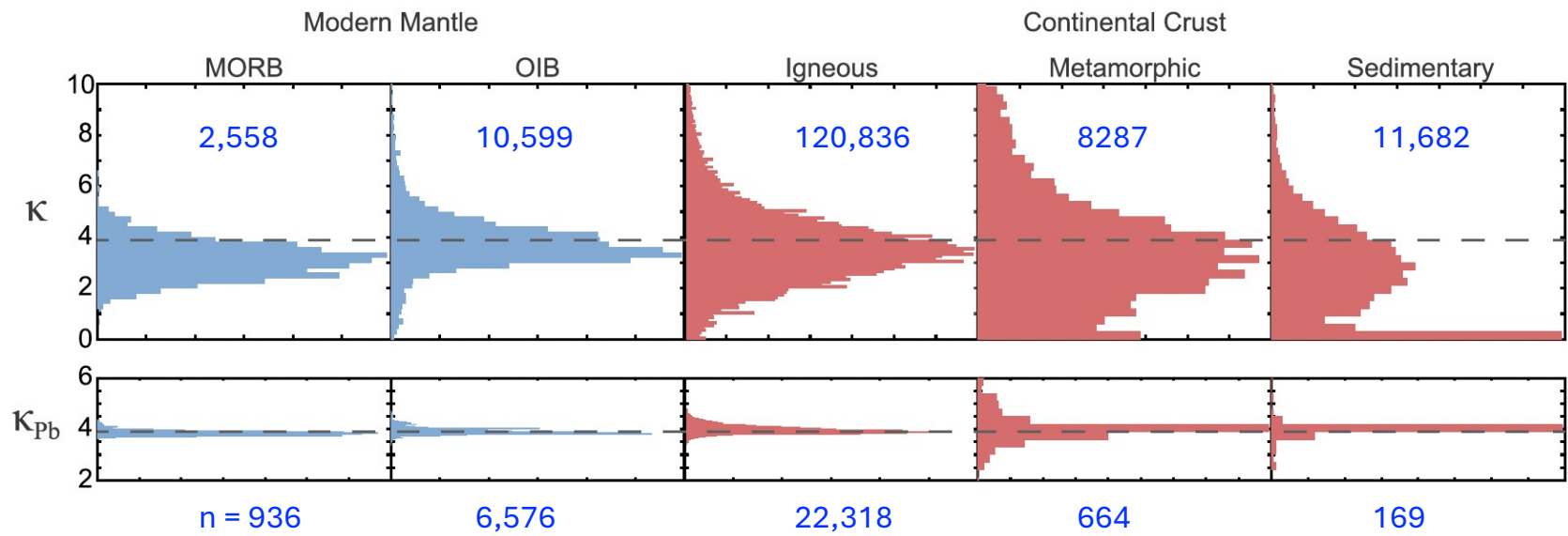
$$\kappa = \text{Th}/\text{U}$$

Continental crust
(igneous, sedimentary, &
metamorphic datasets).

$$\kappa_{\text{pb}} = \left(\frac{^{232}\text{Th}}{^{238}\text{U}} \right)_{\text{time-integrated}}$$

n = number of samples measured



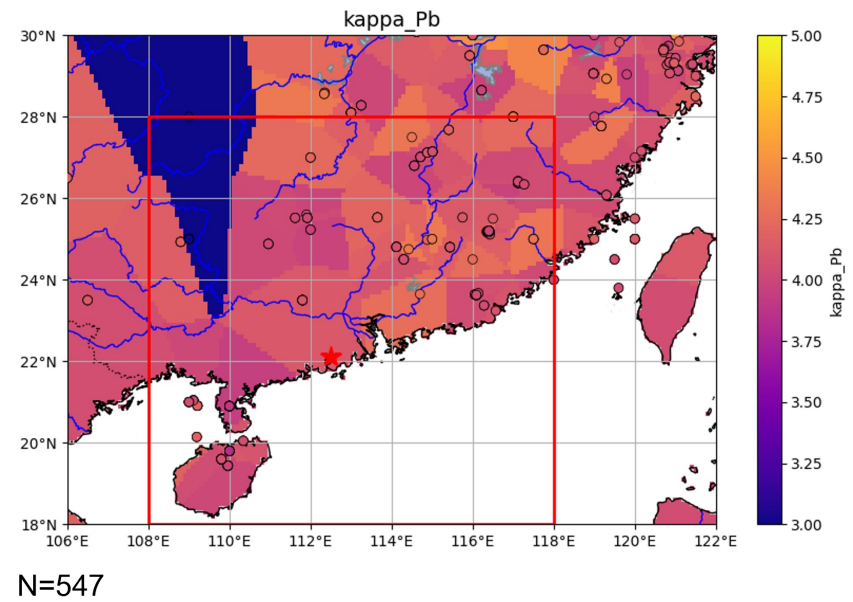
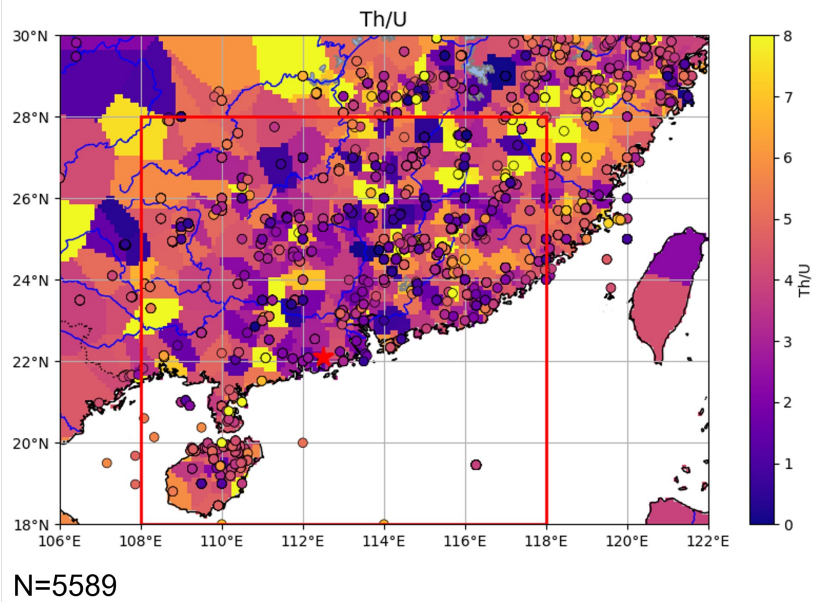


Histograms of κ and κ_{pb} values observed in this study

Table 1

Summary of κ and κ_{pb} for MORB, OIB, and continental crust (igneous, metamorphic, and sedimentary datasets). 68% confidence limits are reported alongside the median value for each dataset and method. Weighting by SiO₂ at 60 wt% is also reported for the continental crust (see text and supplementary materials for details).

Reservoir	# of data	κ				# of data	κ_{pb}			
		Mean	Geometric mean	Median	SiO ₂ at 60 wt%		Mean	Geometric mean	Median	SiO ₂ at 60 wt%
Modern mantle										
MORB	2,558	3.14	3.05	3.12 ^{+0.72} _{-0.71}		936	3.84	3.84	3.84 ^{+0.09} _{-0.09}	
OIB	10,599	4.07	3.66	3.67 ^{+0.99} _{-0.63}		6,576	3.91	3.90	3.87 ^{+0.16} _{-0.07}	
Continental crust										
igneous	120,836	4.73	3.42	3.56 ^{+1.60} _{-1.29}	3.61 ^{+1.0} _{-0.6}	22,318	3.99	3.97	3.95 ^{+0.19} _{-0.11}	3.95 ^{+0.07} _{-0.06}
metamorphic	8,287	5.37	3.10	3.61 ^{+3.26} _{-2.00}	3.57 ^{+1.8} _{-1.2}	664	4.12	4.05	3.99 ^{+0.40} _{-0.28}	3.99 ^{+0.3} _{-0.2}
sedimentary	11,682	3.09	1.52	2.61 ^{+1.87} _{-2.16}	2.60 ^{+0.9} _{-0.7}	169	3.99	3.97	4.00 ^{+0.11} _{-0.10}	4.00 ^{+0.08} _{-0.05}



y-axis scale differs between the plots.

Th/U from Kappa (Pb) $\sim 4.0 \pm 0.2$ for southern China