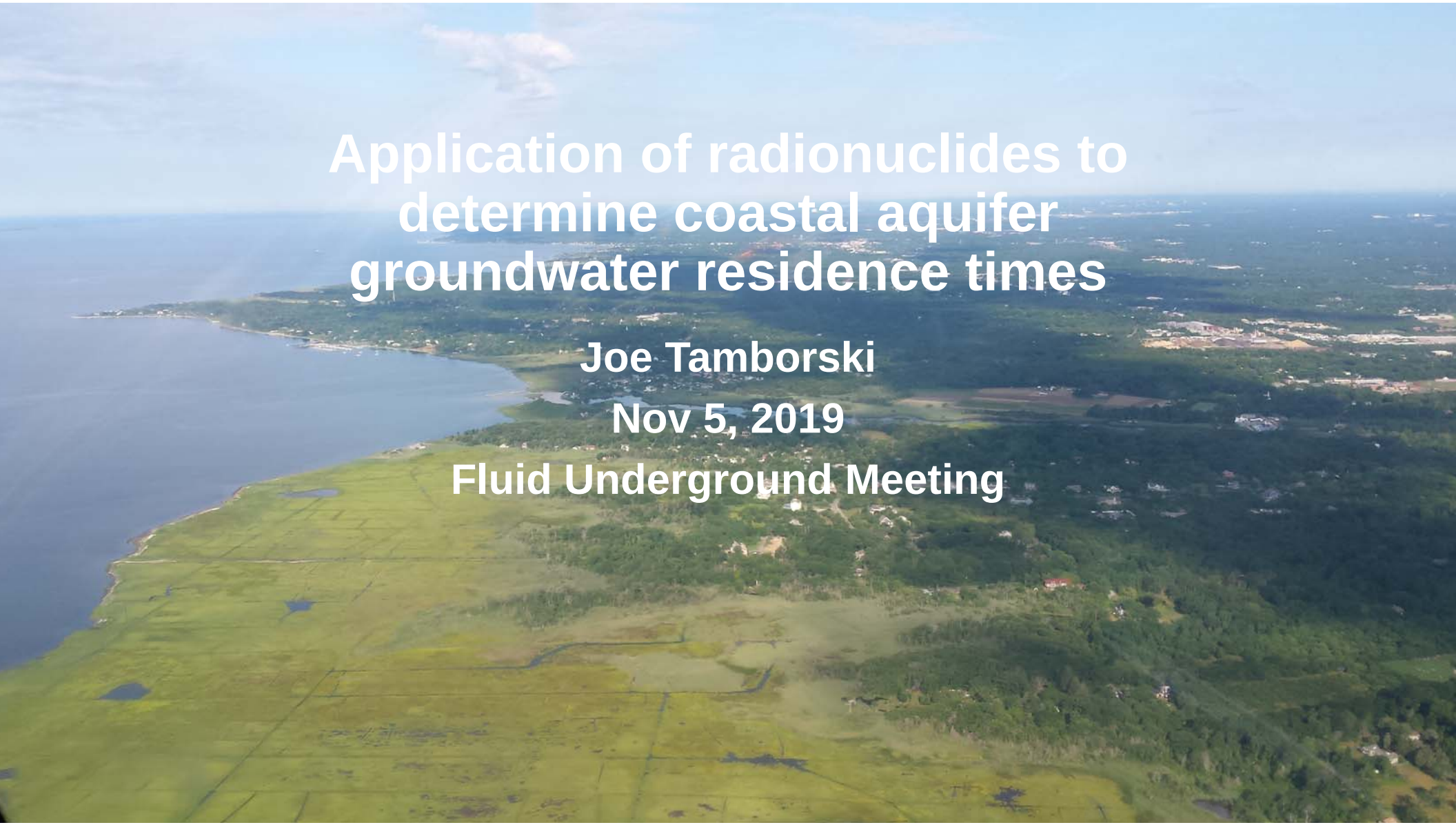


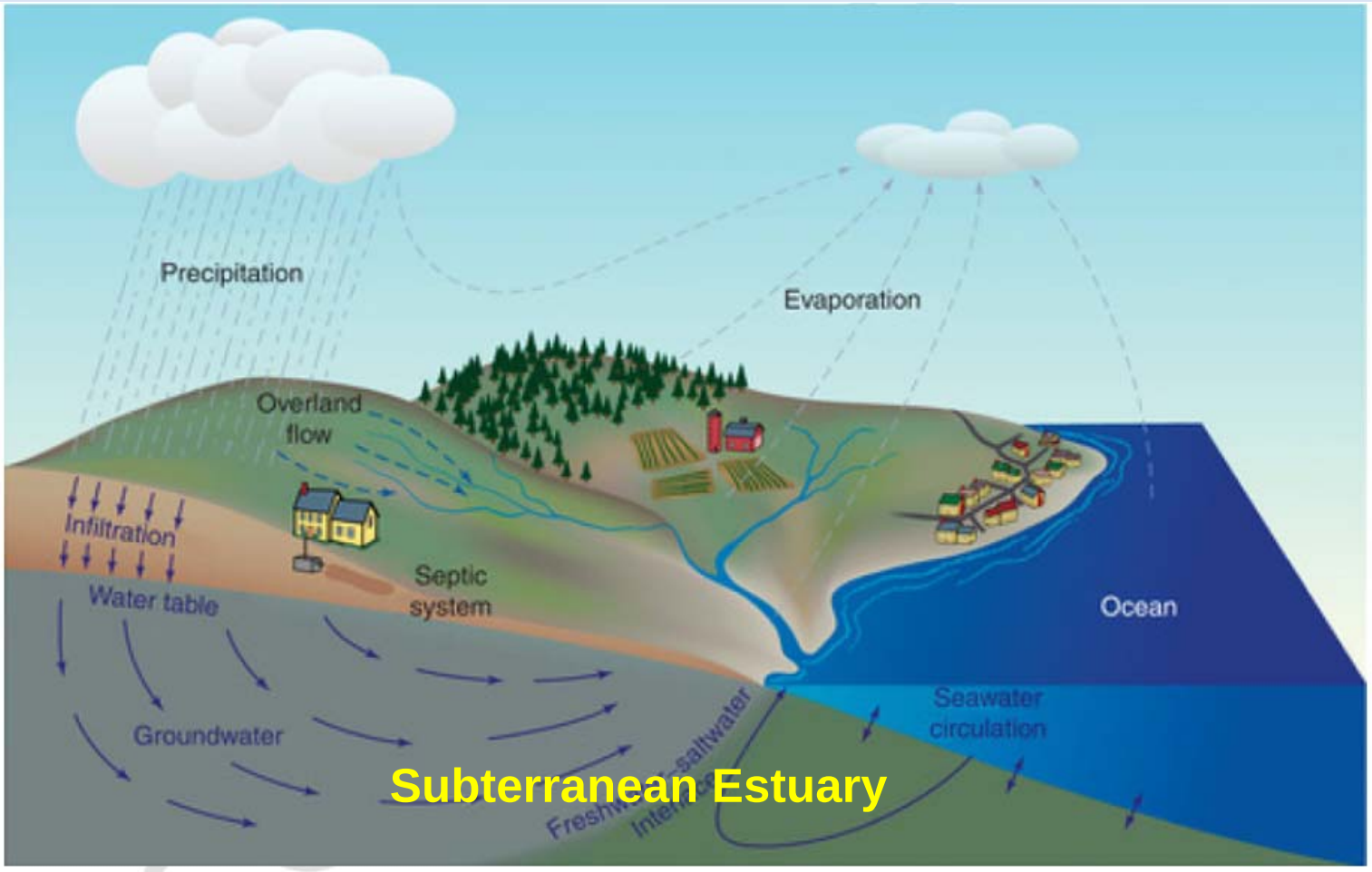
Application of radionuclides to determine coastal aquifer groundwater residence times

Joe Tamborski

Nov 5, 2019

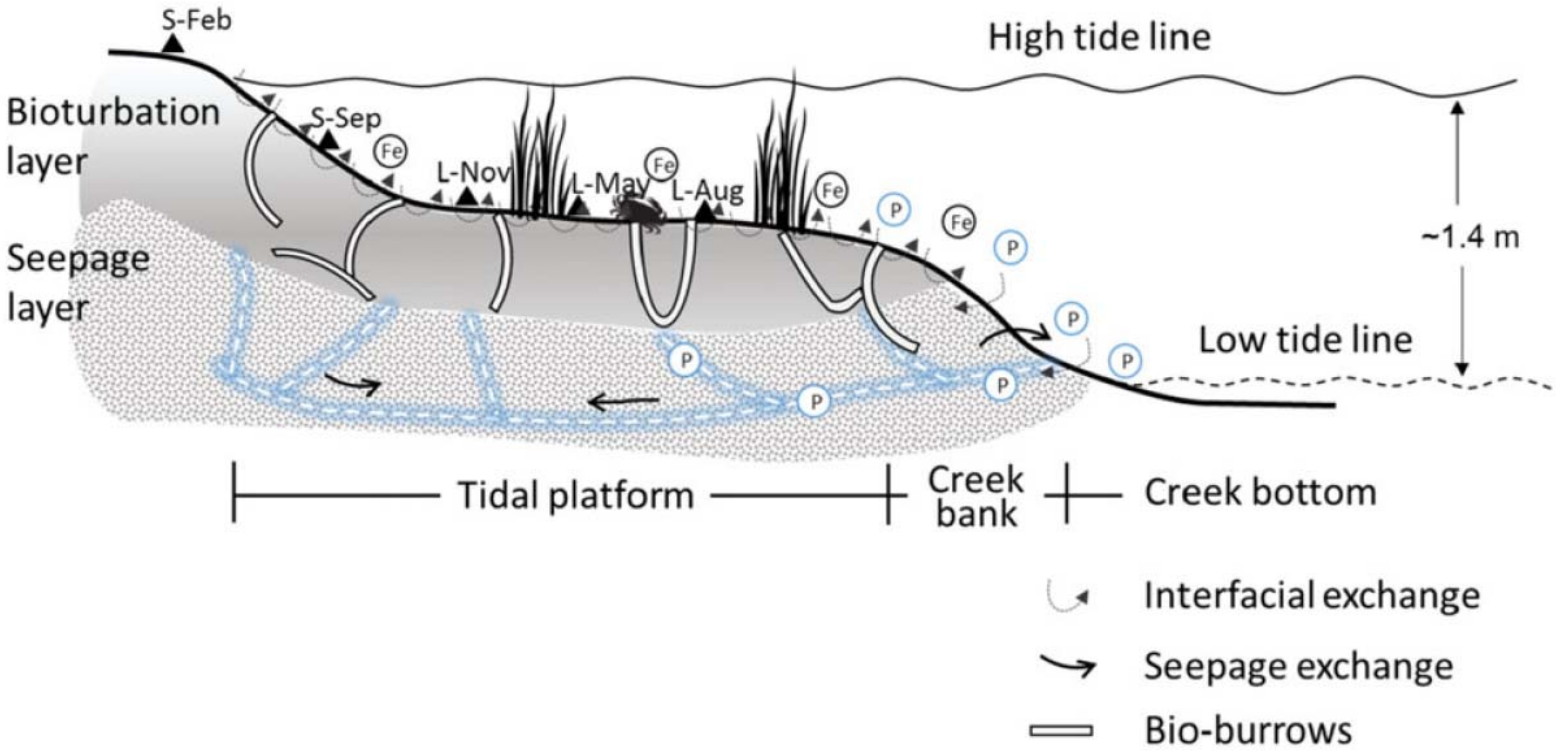
Fluid Underground Meeting

Submarine Groundwater Discharge (SGD)



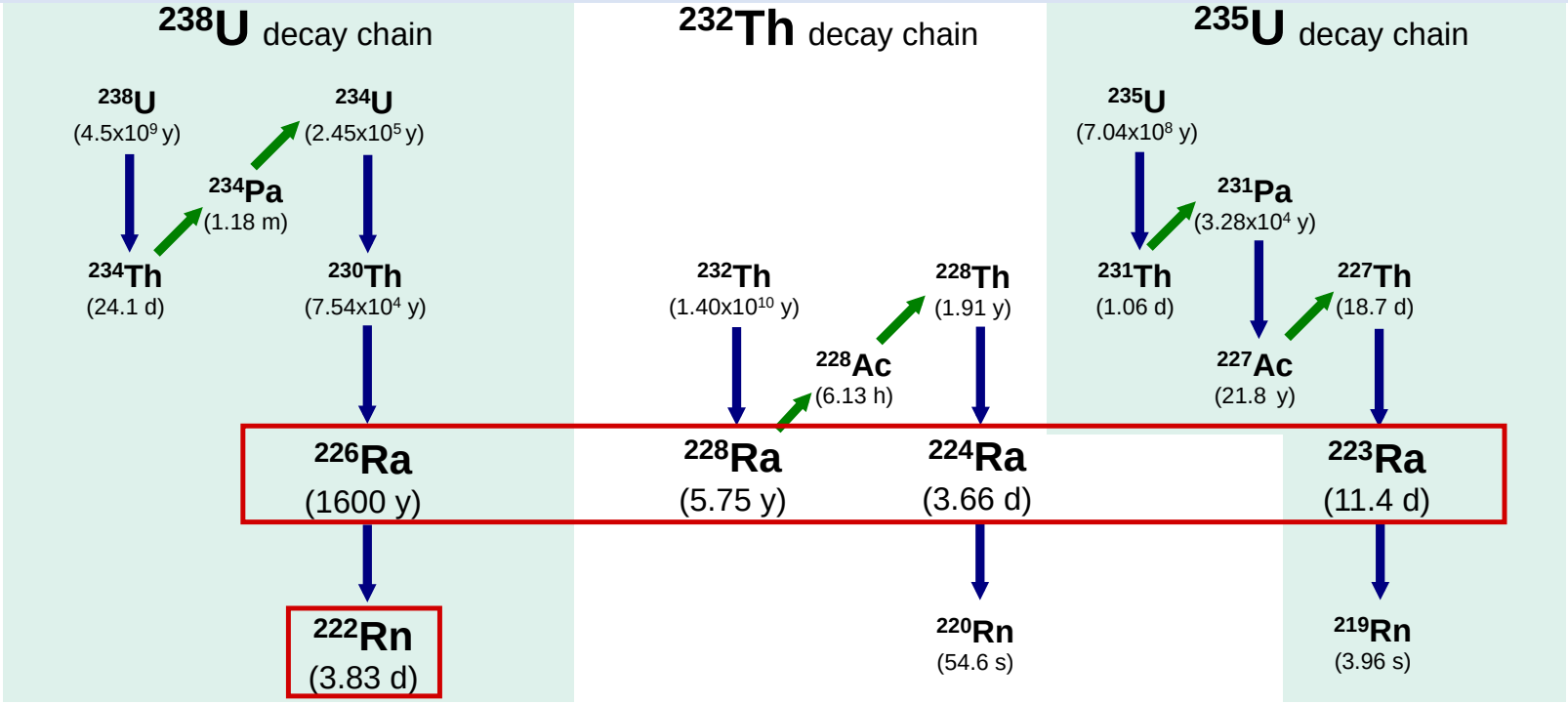
Heath (1998) USGS

Pore Water Exchange (PEX)



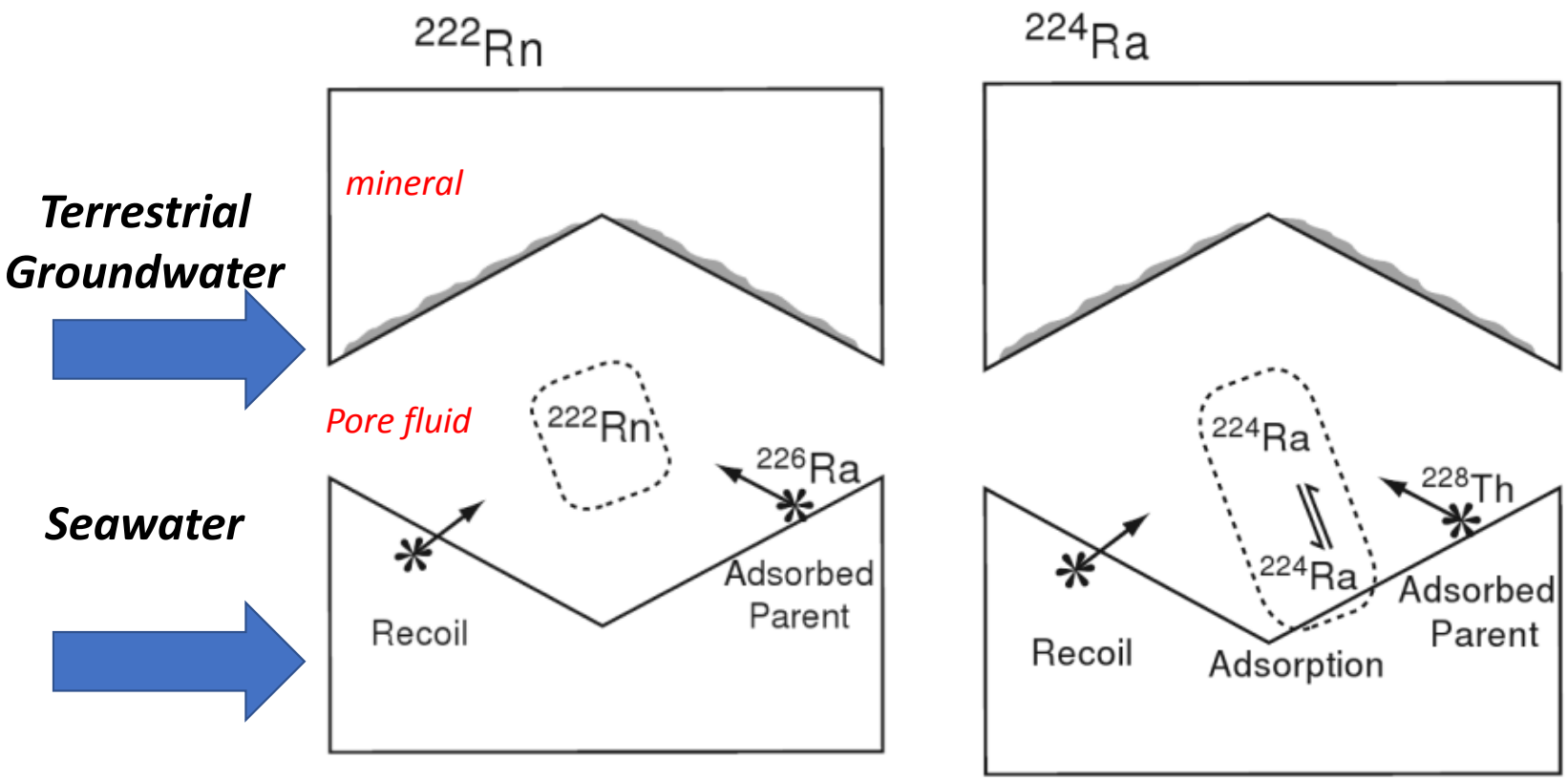
Shi et al. (2019)
L&O

Quantification: Ra isotopes & Radon



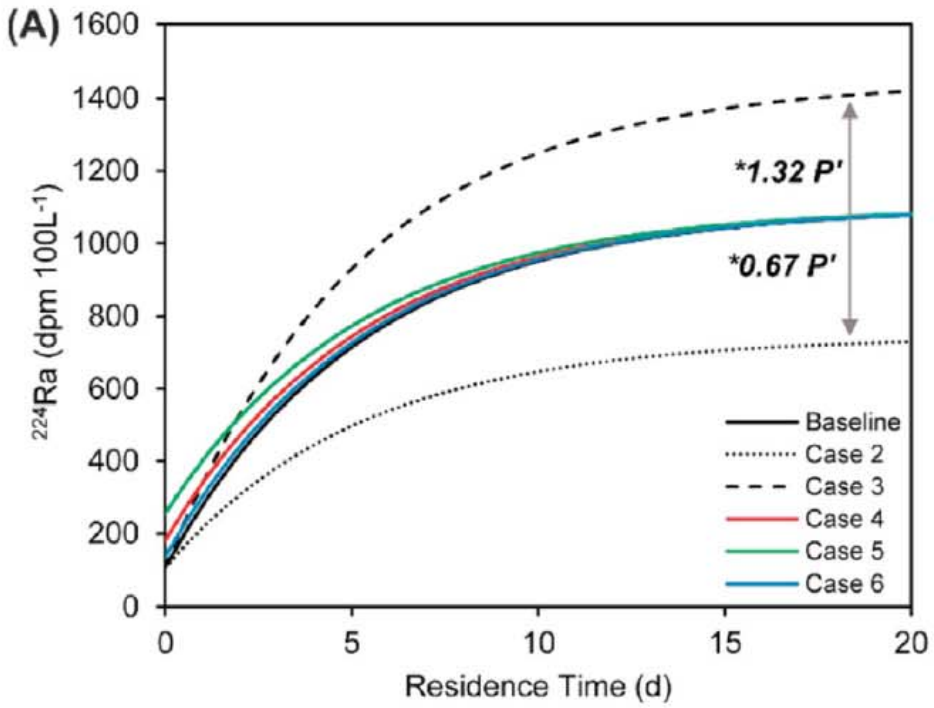
- Highly enriched in pore water relative to surface water
- Conservative behavior in surface waters
- Decay at a know rate
- Integrate the signal from different pathways

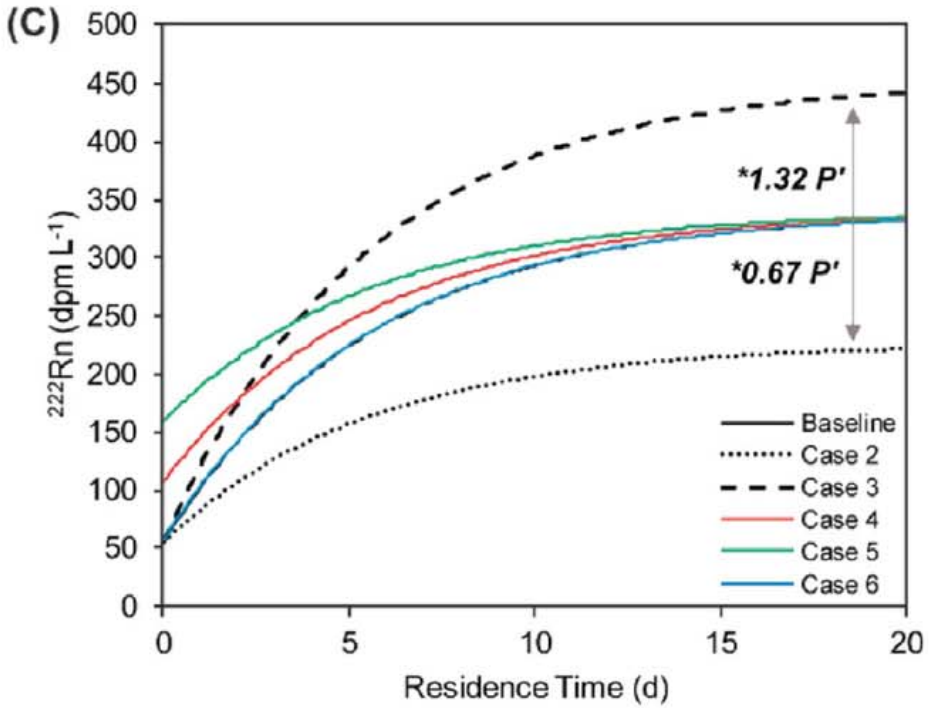
Quantification: Ra isotopes & Radon



Porcelli (2008)

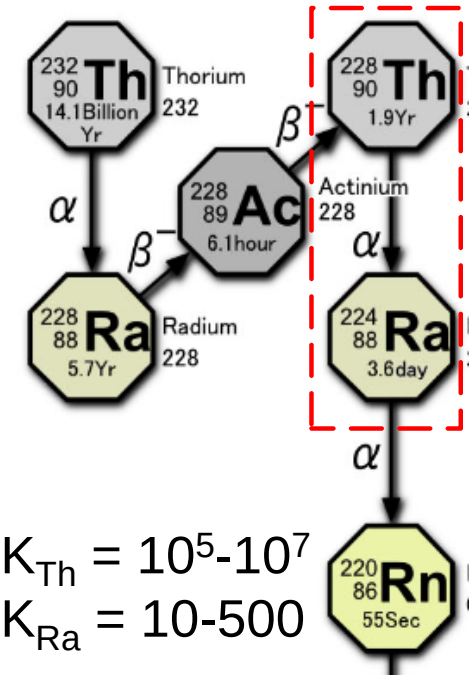
Quantification: Ra isotopes & Radon





Tamborski et al. (2017)
Mar Chem

$^{224}Ra/^{228}Th$ disequilibrium approach



$K_{Th} = 10^5\text{-}10^7$

$K_{Ra} = 10\text{-}500$

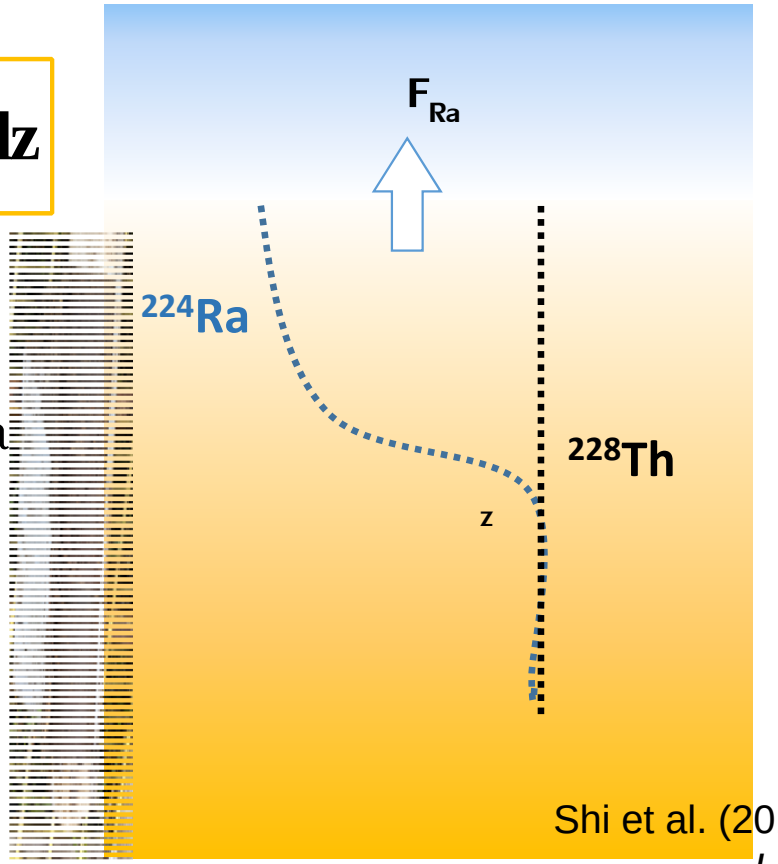
$$F_{Ra} = \int_0^z \lambda_{Ra}(A_{Th} - A_{Ra})dz$$

z: ^{224}Ra deficit depth

λ_{224}: decay constant of ^{224}Ra

A: activity of isotopes in bulk sediment

Time frame: 1-15 days.



Shi et al. (2019) *L&O*