The background image is an aerial photograph of a coastal landscape. On the left, a large body of water meets a shoreline. The land is a mix of green fields, some with small bodies of water, and areas of dense green vegetation. In the distance, a city or town is visible with numerous buildings. The sky is blue with a few wispy clouds.

Application of radionuclides to determine coastal aquifer groundwater residence times

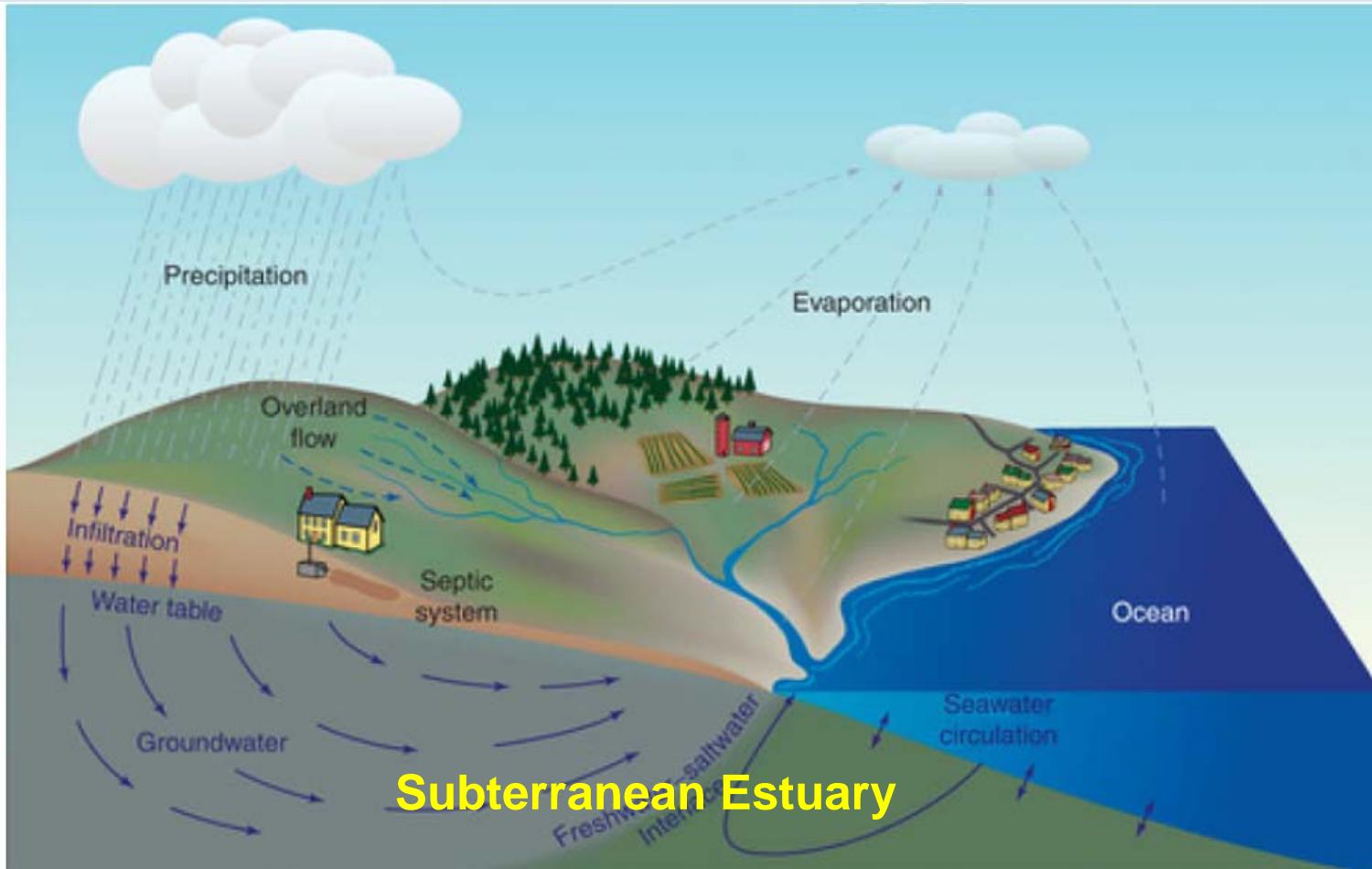
Joe Tamborski

Nov 5, 2019

Fluid Underground Meeting

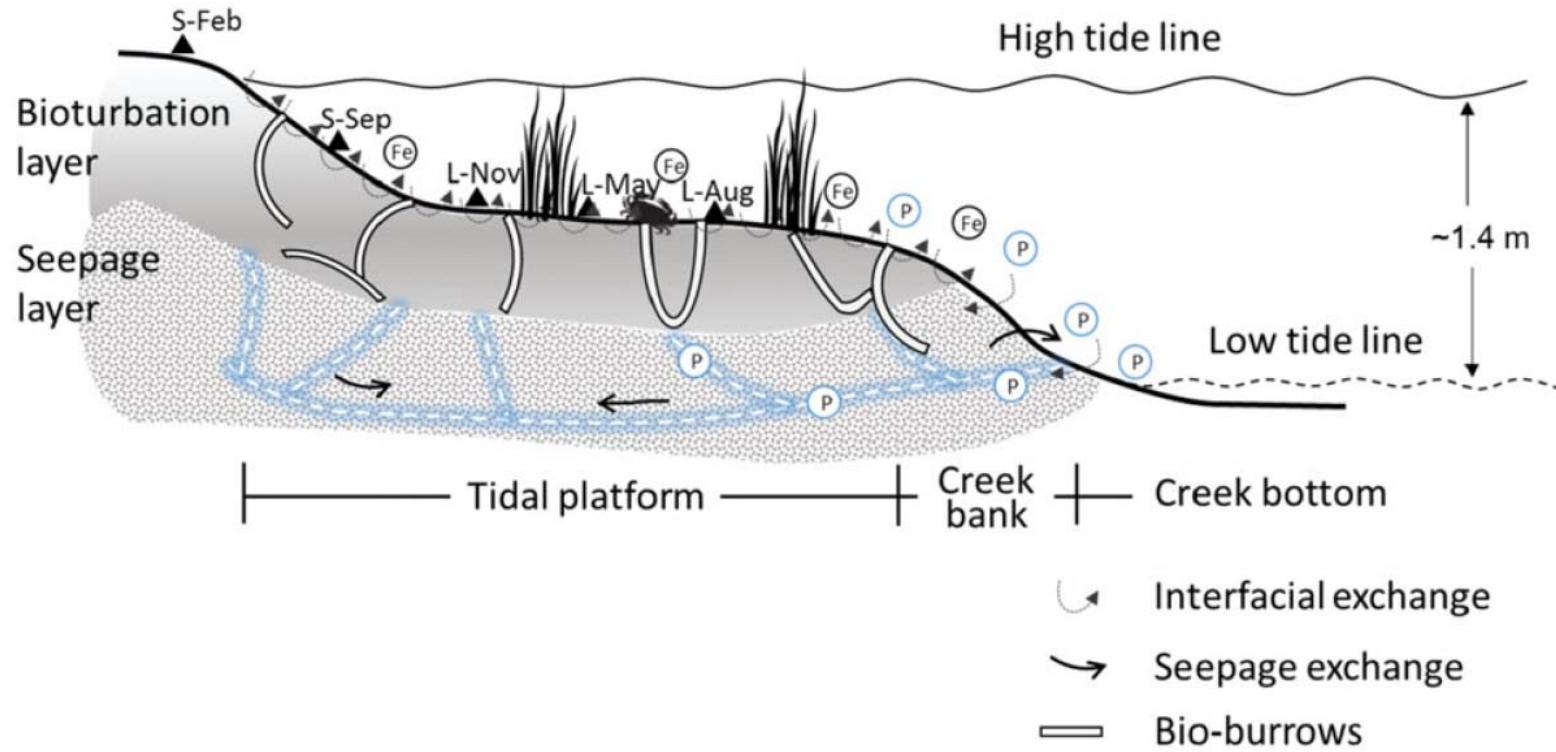


Submarine Groundwater Discharge (SGD)



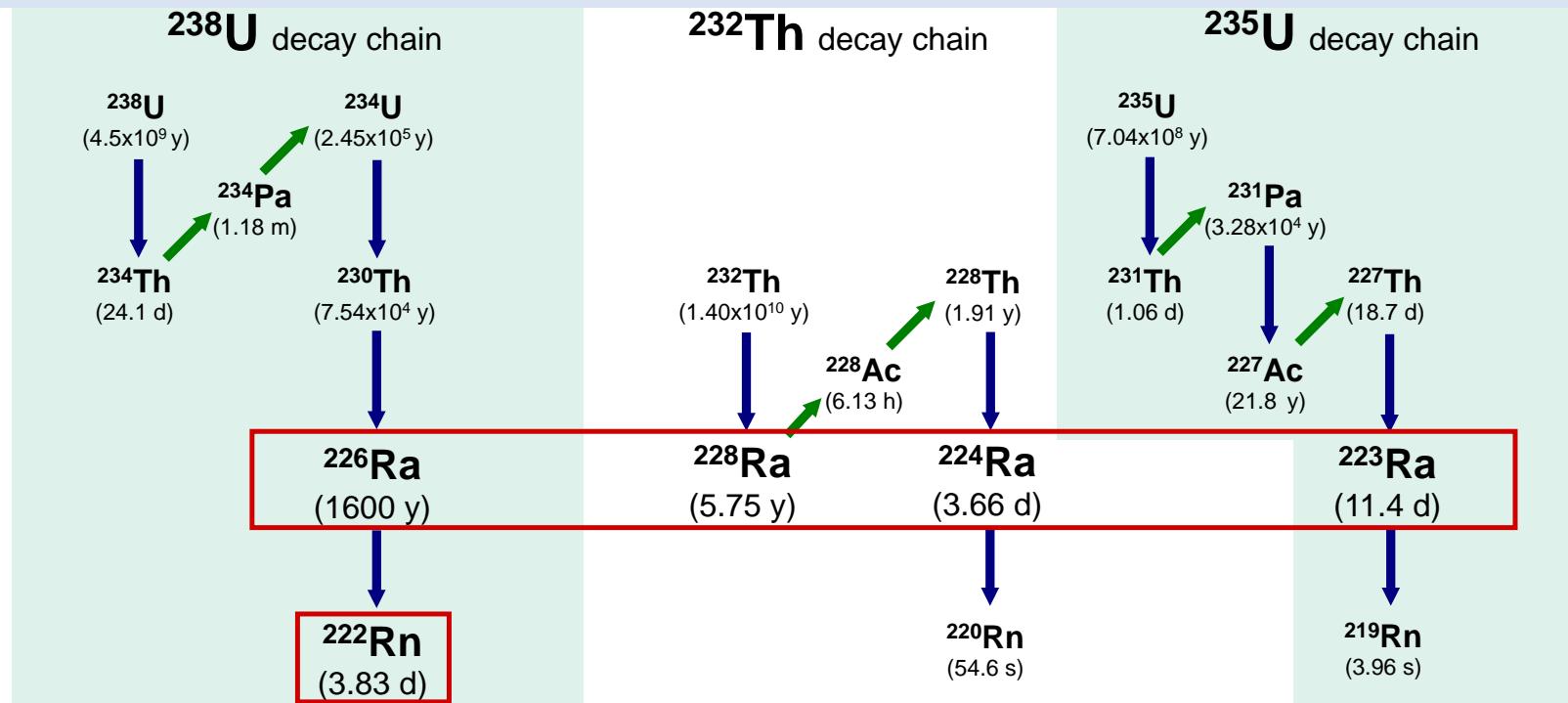
Heath (1998) USGS

Pore Water Exchange (PEX)



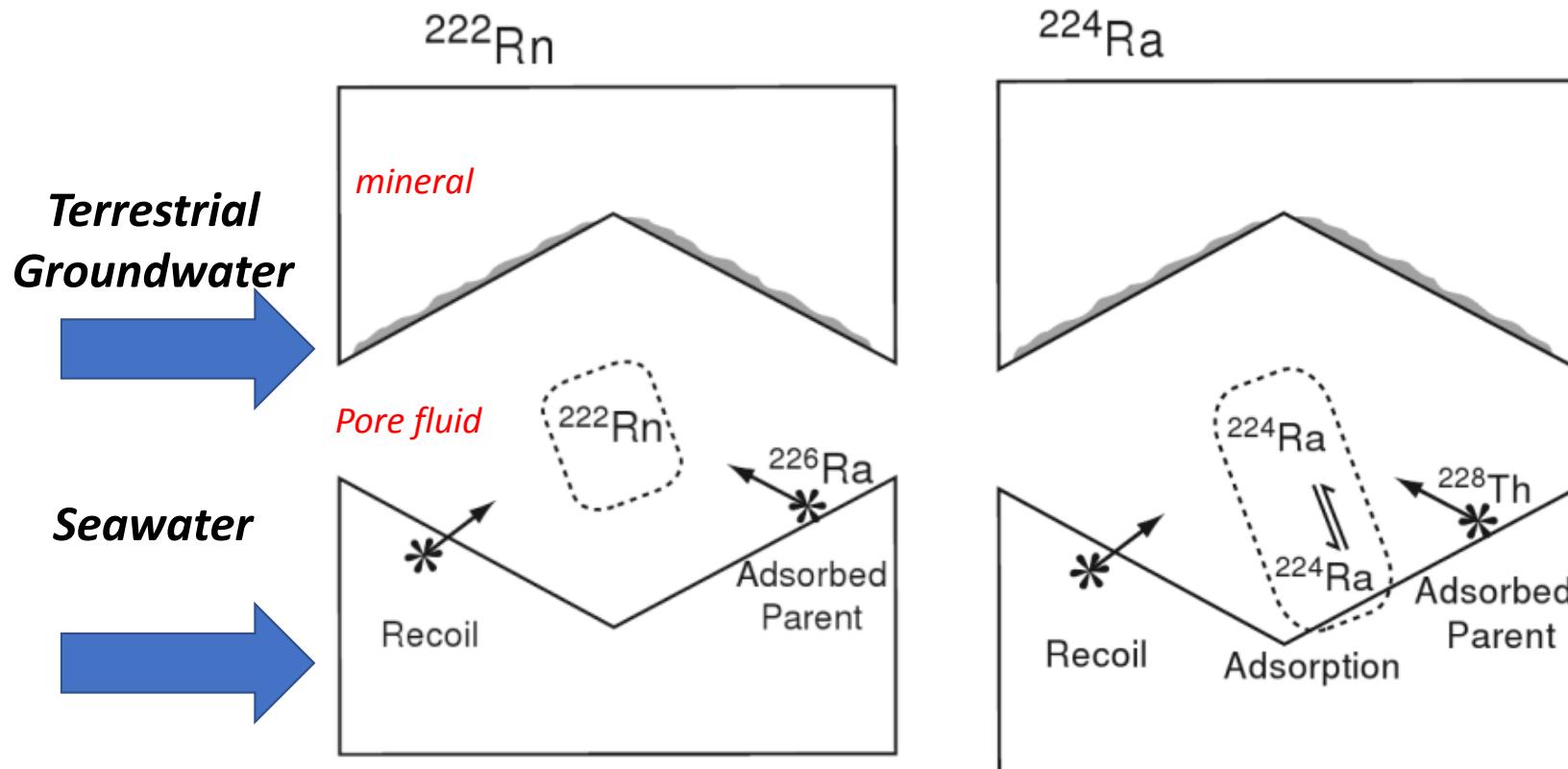
Shi et al. (2019)
L&O

Quantification: Ra isotopes & Radon



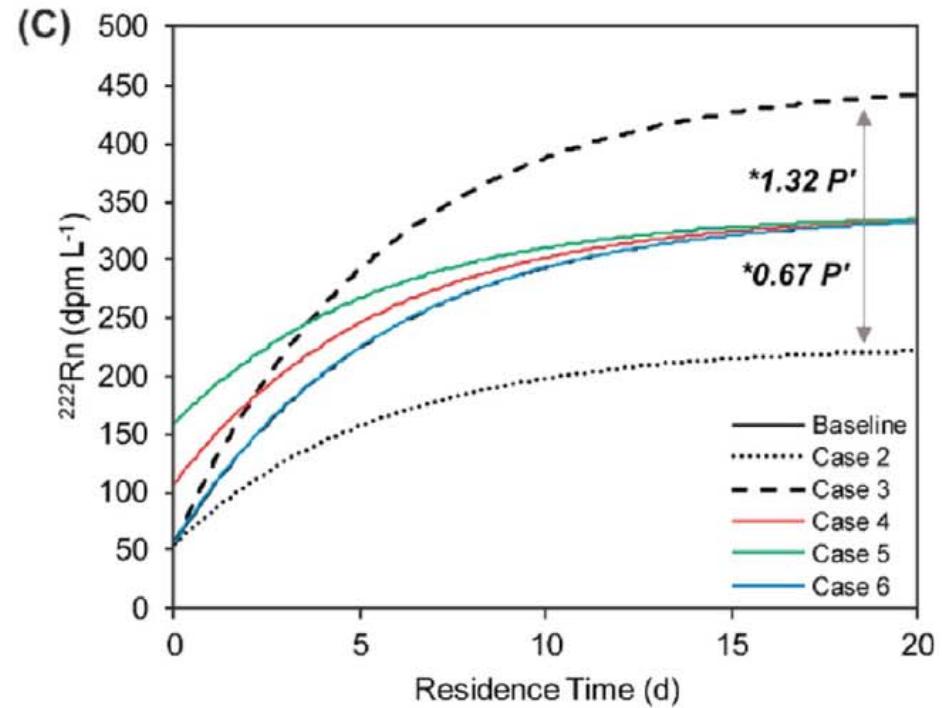
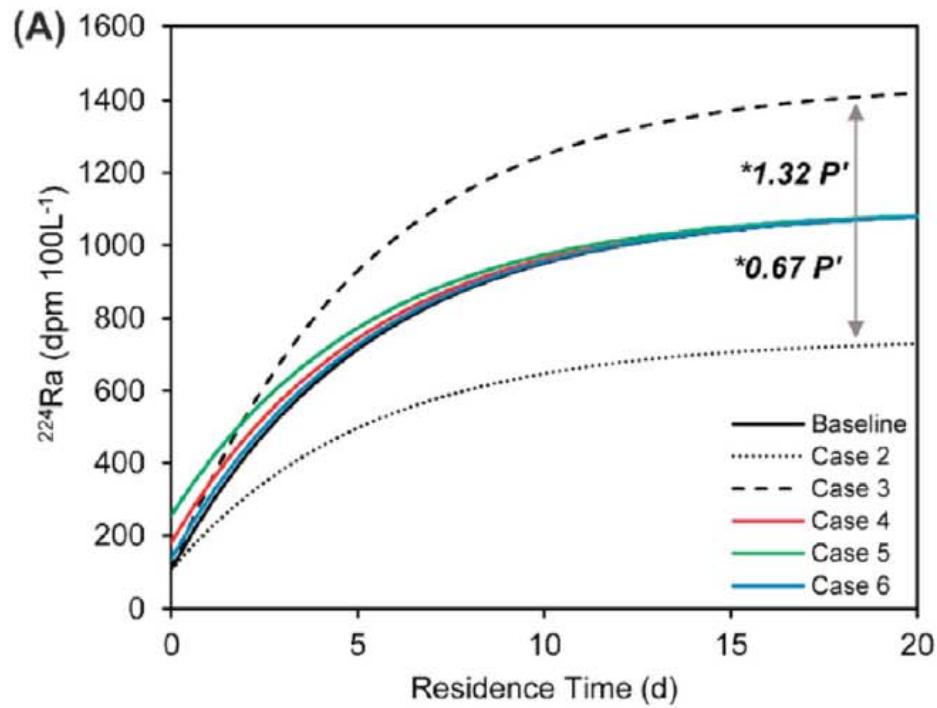
- * Highly enriched in pore water relative to surface water
- * Conservative behavior in surface waters
- * Decay at a known rate
- * Integrate the signal from different pathways

Quantification: Ra isotopes & Radon

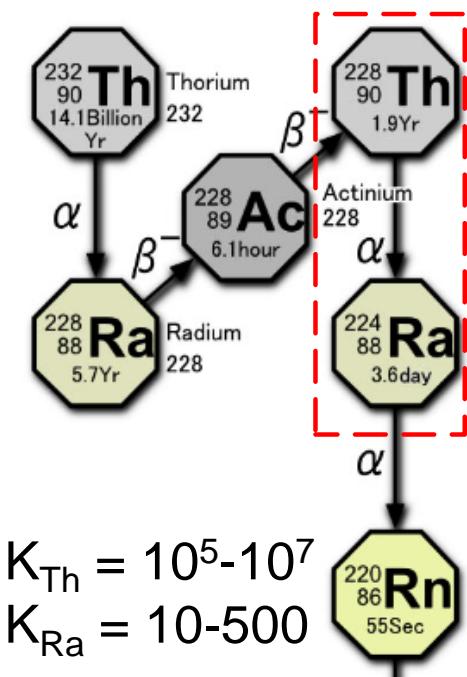


Porcelli (2008)

Quantification: Ra isotopes & Radon



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



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

z : ^{224}Ra deficit depth

λ_{224} : decay constant of ^{224}Ra

A: activity of isotopes in
bulk sediment

Time frame: 1-15 days.

