# Sediment Coring, Testing, and Dating

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# Methods to be described...

- Typical coring equipment
- Methods of dating layers

# Vibra-Coring Equipment

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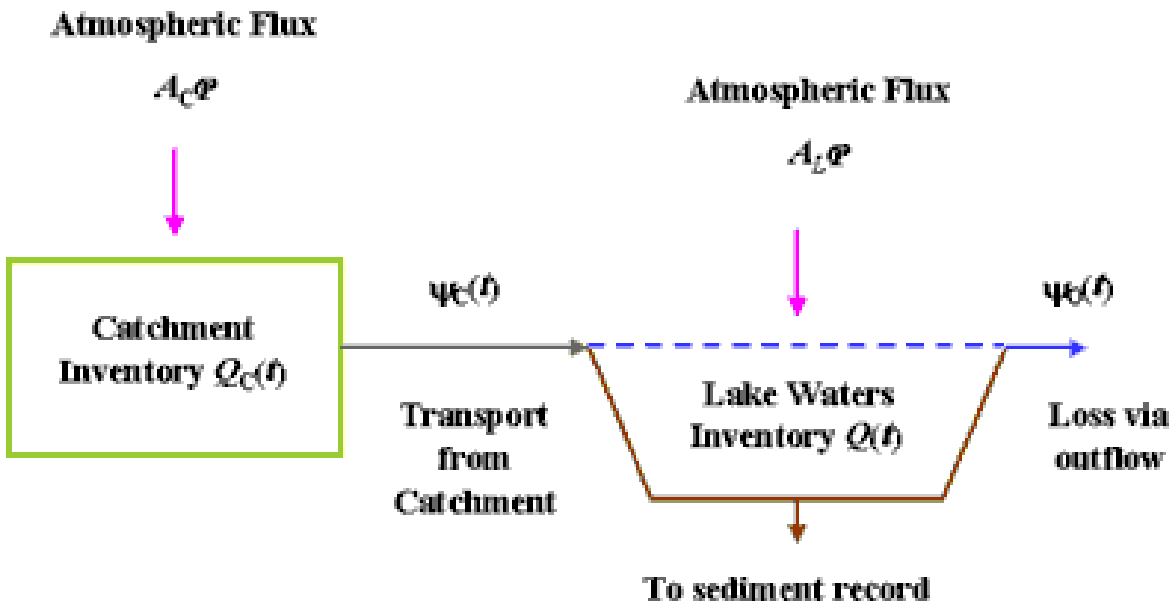
# Dating Sediment Core Segments

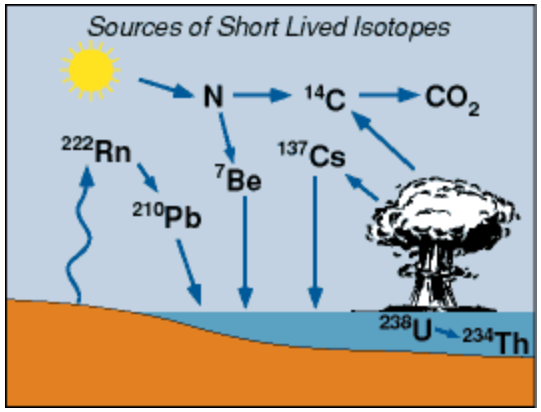


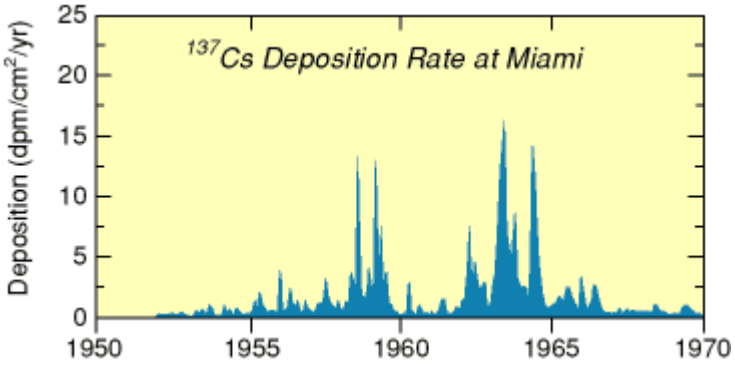
# Lead 210 Theory

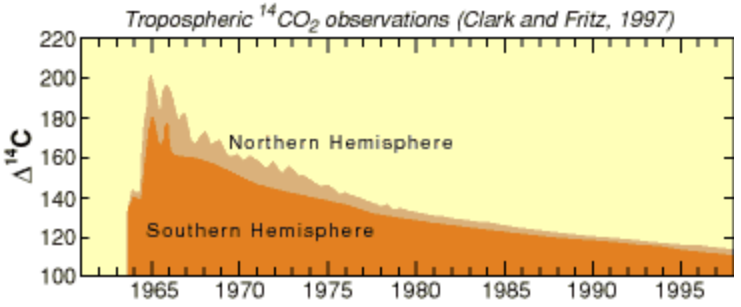
Geochronology with the naturally occurring Pb-**210** is based on the principle that the isotope has been continuously delivered to the earth's surface and undergoes continuous radioactive decav following incorporation into steadily accumulating sediments. The activity of Pb-**210** in sections from sediment cores taken from lakes is used to determine the rate of that sediment accumulation with time Anthea lake. In this method the activity of the Pb-**210** granddaughter, Po-**210**, is actually measured, as Pb-**210** is a weak beta emitter and is not readily detected. Po-**210** is the alpha emitting granddaughter of Pb-**210**, and can be used to represent the actual Pb-**210** concentration in each sample because the two isotopes are assumed to be in seqular equilibrium. The daughter is used because in an acidic solution it will spontaneously plate on to a copper disk, which can then be counted on a high resolution alpha spectrometry system. A yield monitor, Po-208, is added to each sample so that the exact activity of Po-**210** can be determined. Sediment cores are collected with a gravity or box corer. The samples are extruded at known intervals, usually 1-2 cm, and placed into preweighed bottles. The bottles are weighed again and placed in a 60EC oven and dried to constant weight. The difference in wet and dry weight is used to calculate the porosity of the sediment. The samples are then ground to a fine powder and stored until used.  Source: www.epa.gov/glnpo/

# Dated Depositions

Beryllium-7 | Carbon-14 | Cesium-137 | Lead-210

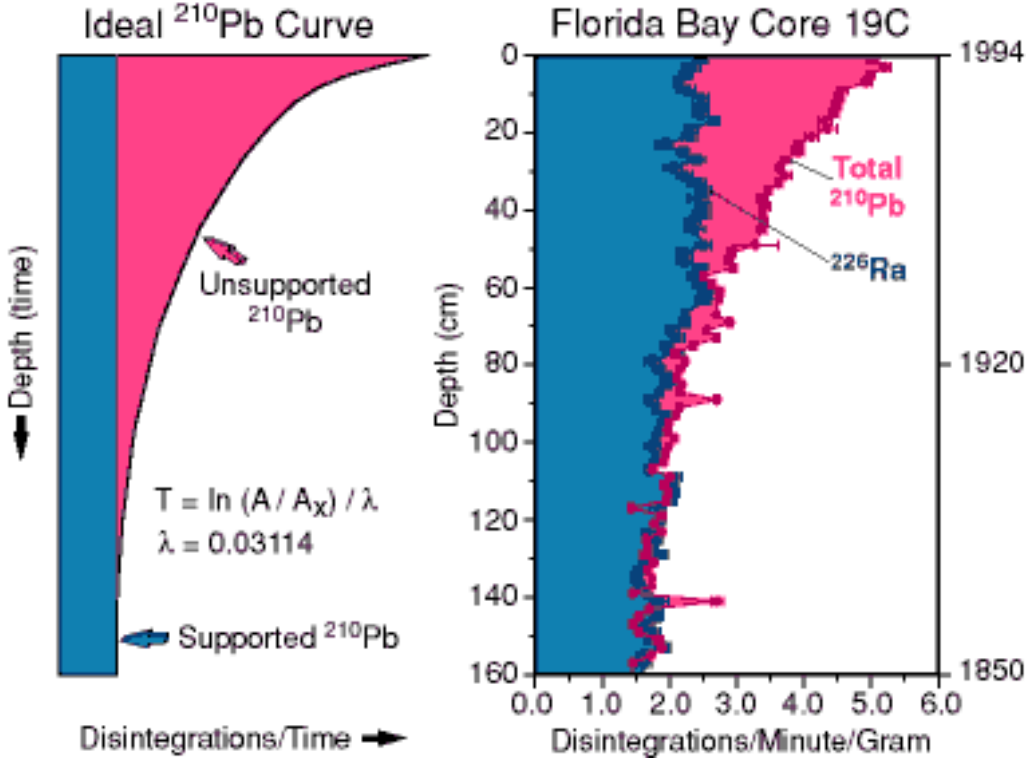



Source: http://sofia.usgs.gov/publications/fs/73-98/

# Lead 210 Ideal and Example

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# Questions to be answered…

- Significant Hg in these sediments?
  - If so, is there a profile? Horizons? Have these sediments been "blown out" regularly by floods, or have they accumulated steadily?
- If there are Hg horizons, can dating help determine when laid down?
- Is Hg distributed in sediment column in a manner likely to support methylation? Would scouring likely release Hg?

# Possible Steps

- Retrieve/retain several cores.
- Segment/test 1-2 cores for Hg horizons.
  - Save dollars by phased testing of segments
- If horizons, consider testing additional cores and dating those with best profiles.
- If shallow, tighter-spaced segments look interesting, study for methylation.