Paleomagnetic Secular Variation (PSV), ^{137}Cs, and Hg dating techniques

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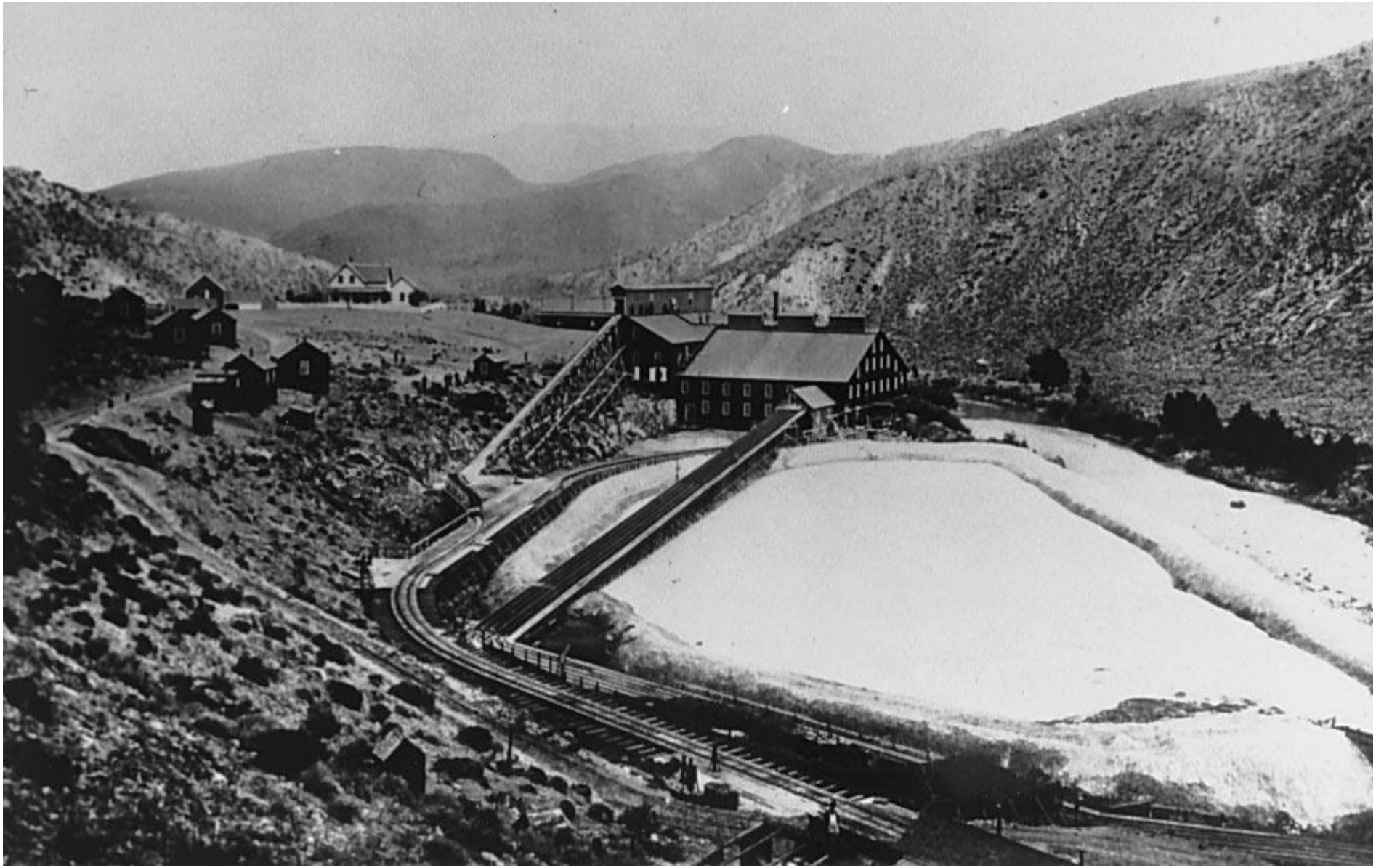
Hg-Mercury contamination dating

- First use: Roman era
- Developed industrially in 1554 to remove gold and silver from ore bearing bodies
- Amalgam = Crushed ore, water, salts, and Hg
- Combines with metalic elements to form compounds (except Fe and Pt)
  - w/ gold: $AuHg_2$, Au_2Hg and Au_3Hg
- Washoe Lake/Steamboat Creek
  - 1860

http://sierranevadaairstreams.org/destinations/washoe/washoelake/index.html

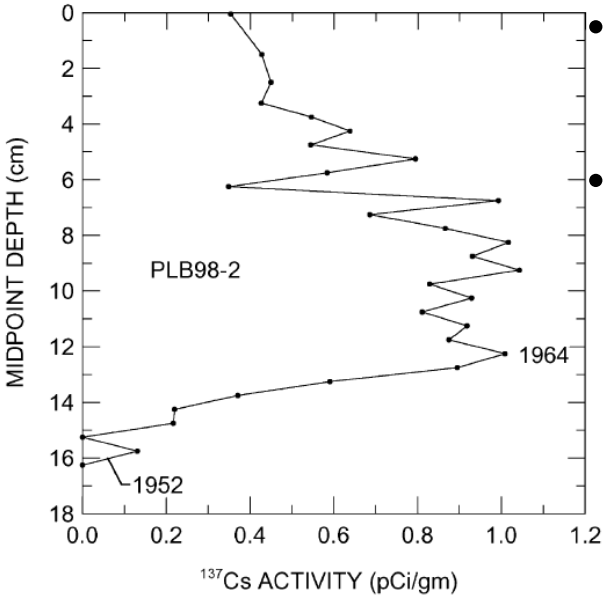
Mercury Amalgamation



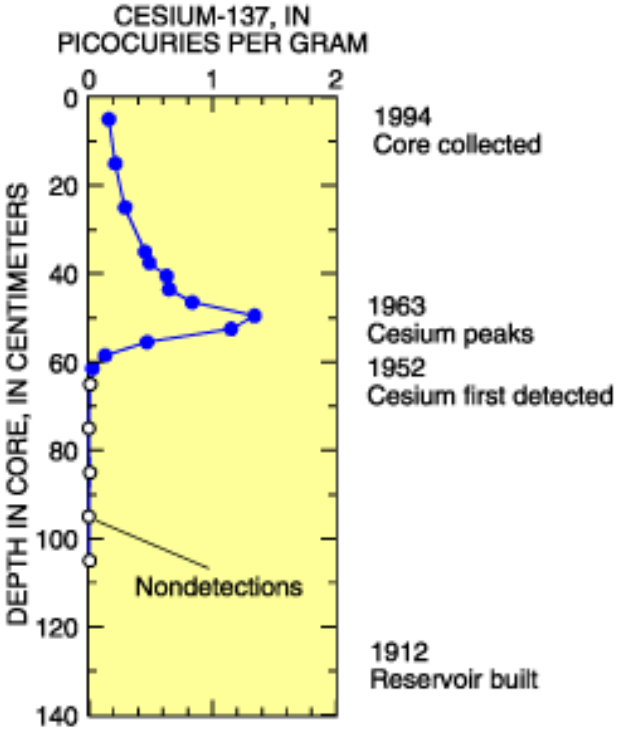
(Miller et al., 1998)

^{137}Cs

- Formed from nuclear fission of Uranium-235
- Due to nuclear weapons testing
- Highly water soluble (spreads quickly)
- Half life = 30.17 yrs



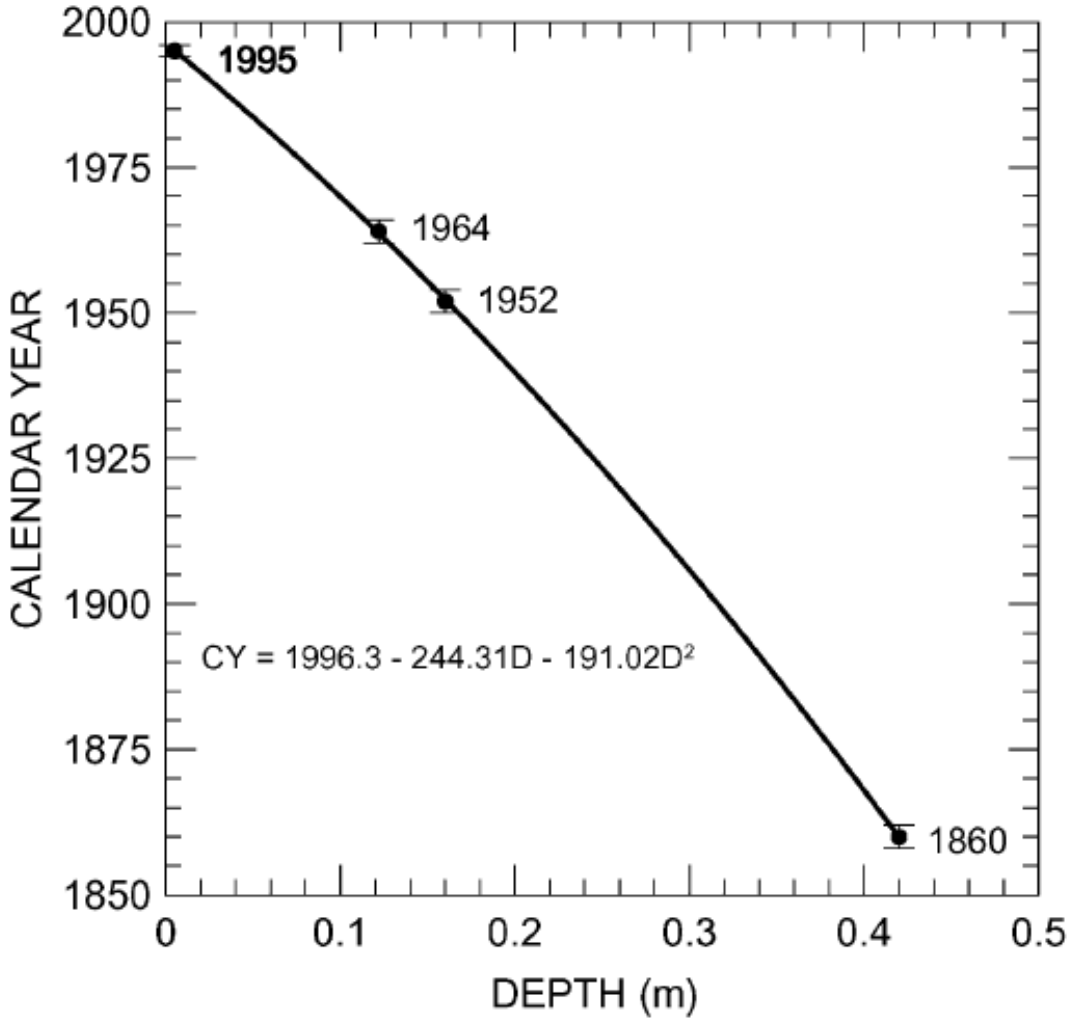
- First occurred in atmosphere
  - 1952
- Peak occurrence
  - 1963-64



(Benson et al., 2002)

http://pubs.usgs.gov/circ/circ1171/html/cores.htm

Calendar-year depth model for PLB98-2



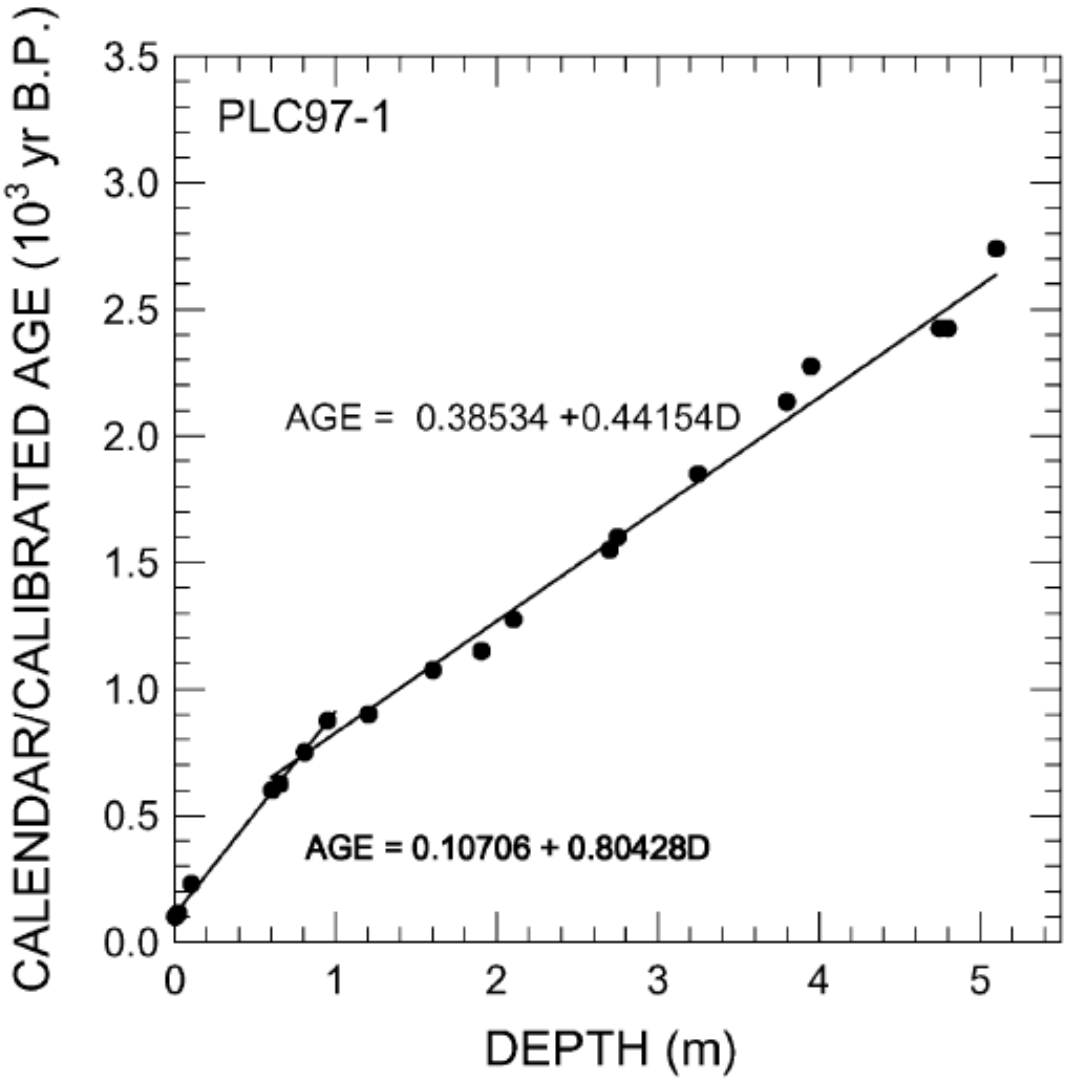
Paleomagnetic Secular Variation (PSV)

- Refers to small scale (yearly) changes in magnetic field
- Sediments retain record of past magnetic field variability
  - Depositional or post-depositional remanent magnetization (magnetic field direction)
    - Sediment water interface
      - 5-20cm depth
        - » Field must remain constant during this “lock in” phase other wise true record not preserve
        - » Higher rates of deposition = higher accuracy

Paleomagnetic Secular Variation (PSV)

- (Lund, 1996) determined no significant change in PSV pattern across western USA
- PSV correlated to a well dated PSV sample from proximal region
- Residence time (sed rate of ^{14}C in lake)
  - Can be used to correct for residence time if dating is based on other dating methods (i.e. tree rings)
  - ~600 yrs difference between ^{14}C and PSV

Calendar-year depth model for PLC97-1



- Correlated from well dated record from Western USA
  - PSV calendar-year ages assigned to same features