0. Dataset

Year of events, if they are historic

Radiometric age determinations

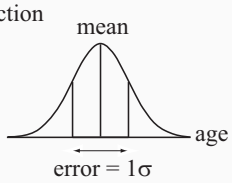
Geologic estimation of age

Stratigraphy
Paleomagnetism
} Use at Step 3

1. Random sampling of age

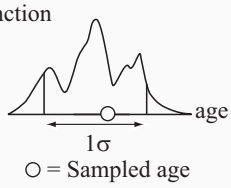
^{14}C method

Original probability density function

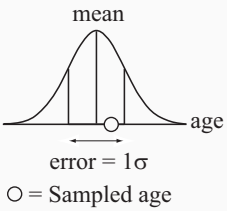


Calibration

Calibrated probability density function



Others (K-Ar, Ar-Ar, etc.)



2. Age assignment to each unit

Dated units

Only 1 date for the unit ⇨ Using sampled age from the single date

If there are several dates on one unit ⇨ Randomly select one of the sampled ages

Other units

If ages of overlying and underlying units are dated ⇨ Sample age from uniform probability density function between those ages

If ages of only underlying units are dated ⇨ Sample age from uniform probability density function between the age and present

Geologic estimation

Sample age from uniform probability density function between estimated two ages

3. Check stratigraphic order

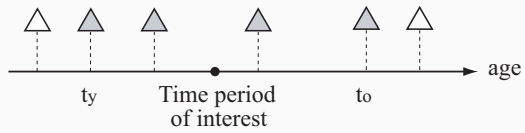
If there are stratigraphic and paleomagnetic contradictions between assigned unit ages ⇨ Returen to step 1

If there are no contradictions ⇨ 4. Continue to recurrence rate estimate

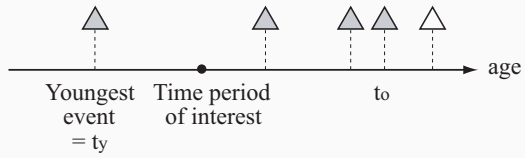
4. Recurrence rate calculation

$$\text{Recurrence rate of an interested time period} = \frac{n - 1}{t_o - t_y}$$

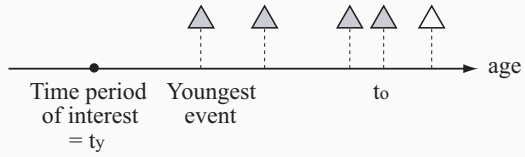
For example, when n = 4,



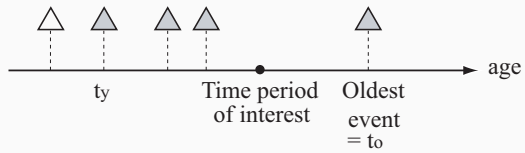
If time period of interest is close to the youngest event,



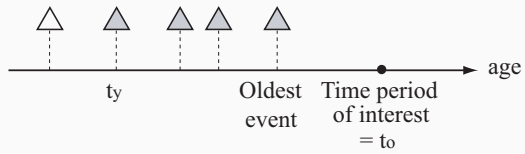
If time period of interest is younger than the youngest event,



If interested time period is close to the oldest event,



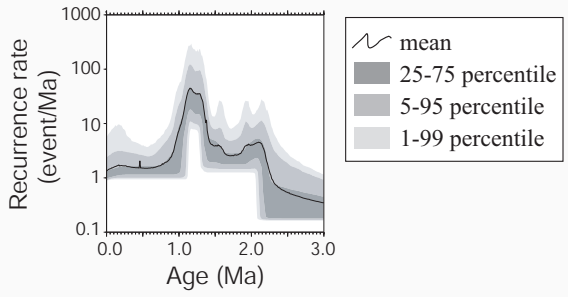
If interested time period is older than the oldest event,



5. Monte Carlo method

Repeat steps 1 ~ 4 many times (~ 10000 times)

6. Take mean and percentile

Calculating mean and percentiles of recurrence rate for each time period of interest using results of step 5.

7. Output