

University of Anbar

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4<sup>th</sup> Stage

Quaternary

Lecture 10 : Quaternary Dating – Part 2

## Forth : Fission tracks dating

Most recent methods , the idea when the Uranium splitting that leave tracks with size  $10\ \mu$  on the internal structure of the material and effect badly to weak this material . This effected part may dissolve easily and that tracks change to deep trenches , we can count them by microscope .

U 238 1 fission for every 2230000  $\alpha$  decay



This fission stay stable at all temperature but if it increase to ( annealing temperature ) the fission begin to disappear .

The number of tracks per unit area can give the amount of Uranium and then by half life we can know the amount of old and new to calculate the Age .

### Fifth : Amino Acids

The Amino Acids exist at organic , with characteristic optically active to rotation .

The optically active mean polarized light enter the media ( Amino Acids ) and the polarizing plan will rotate by the effect of that media .

The rotation may be to right or left ,

if the rotate to left called Levo ( ccw ) symbol L

if the rotate to right called Dextro ( cw ) symbol D

At Amino Acids there is atom of carbon surrounded by 4 of other atoms like Tetrahedron . If the unit rotate some of atoms will change their places

At nature when the organic die the changing of Amino Acids begin and the L with D change each other by ratio D / L this operation Time dependent .

So if we know the ratio of changing and measure the D / L suppose we can know when the animal died

D / L equilibrium  $\approx 1.3$

The negative points of that methods :

1- That rate depend on time and also temperature so if we want to get accurate rate the temperature must be fix .the samples from ocean bottom good for measuring because of stable temperature there .

2 – the rate D / L different from species or place to another .

Because of that points we must make calibration for rate D / L . And another supporting methods like Uranium or C14

The general accuracy for the methods

D / L = 0.002 /1000 year

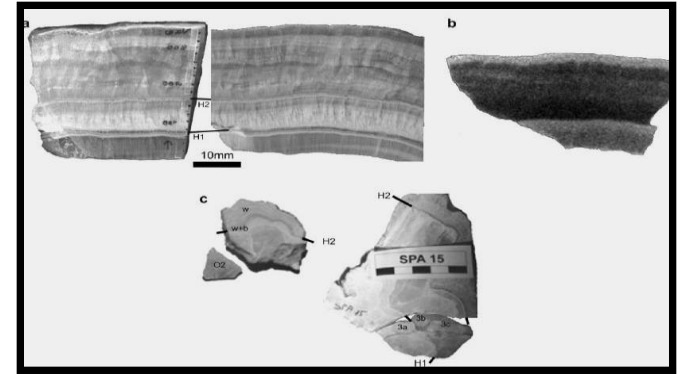


## Sixth : Varves

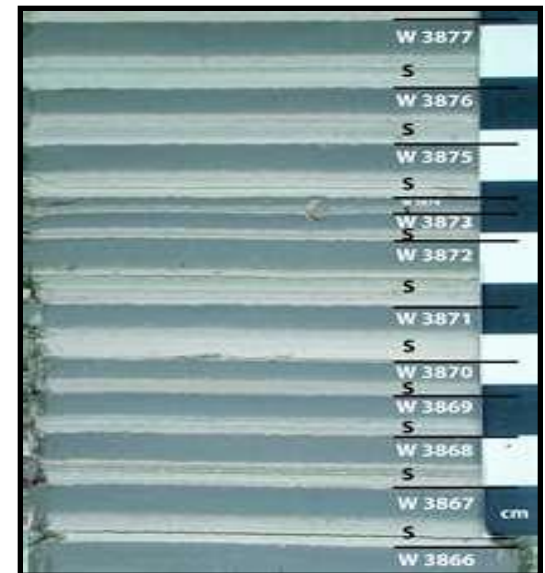
alternate Sediments of different thickness and color at same place ,

Summer = light and thick

Winter = dark and thin



By calculating the thickness and alternating of varves with the rate to sedimentation / year we can know the ages of features , Pleistocene about 10107 year and the real age about 10000 year .



## Seventh : Dendrochronology

Its rings at the cross sections at trees bole , at spring the cells become bigger with thick walls but at summer and autumn the cells become small, These lines (tree rings) allow the age of the tree to be established.

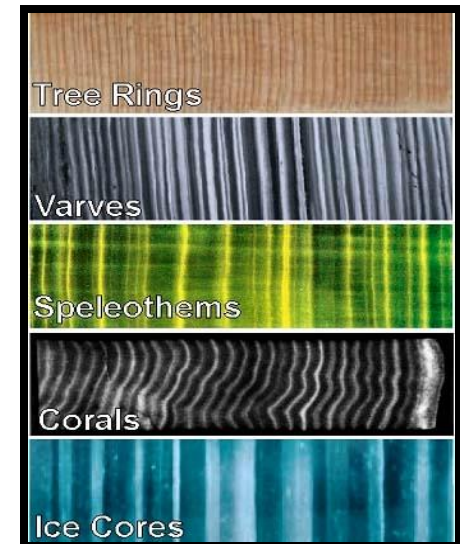
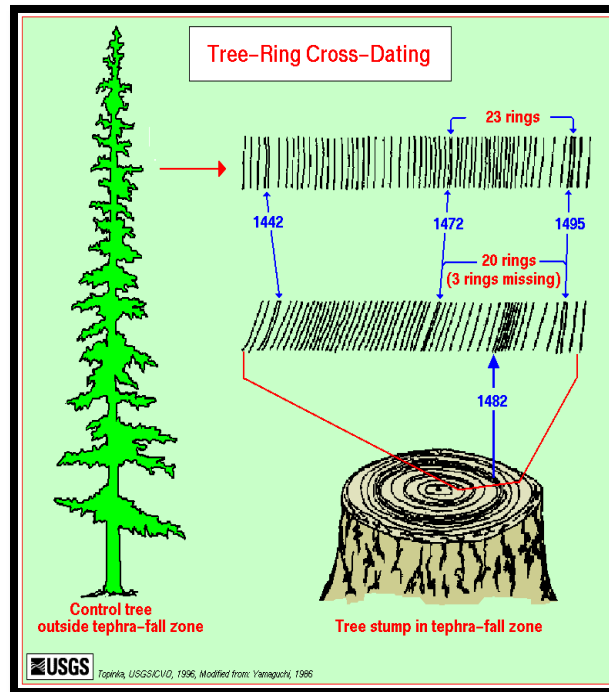
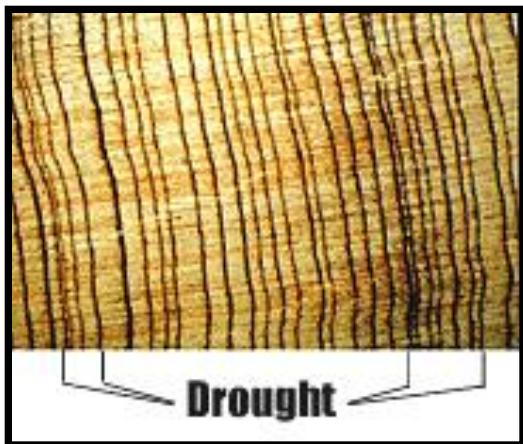


Early in the growth season there is more demand for water so the cells tend to be larger in spring than late summer. As the cells get smaller, their walls get larger and form a distinct line between annual growth of wood.

Crossdating : This is the technique of matching rings within trees from certain geographical areas

Distinctive rings, or groups of rings form markers which can be used to match trees with overlapping age ranges.

When rings are very close together it indicates that there was not much water available for the tree, i.e. Drought



# References

# Glacial and Quaternary Geology

[http://www.colby.edu/geology/GE354/Index\\_GE354.html](http://www.colby.edu/geology/GE354/Index_GE354.html)

# Internet Remote Sensing Lectures sites