— University of Mosul —
College of Petroleum & Mining Engineering

General Geology2

Lecture 5

Prof. Dr. Majid Majdi Al-Mutwali

Petroleum and Refining Engineering Department

Email: majidmutwaly@uomosul.edu.iq

Application of Stratigraphic Principles

These principles are crucial for constructing the geologic time scale, which divides Earth's history into different periods based on significant geological and paleontological events.

Stratigraphy also helps in oil and gas exploration, paleontology, and understanding the geological history of a region.

By applying these principles, geologists can determine the relative age of rock layers, reconstruct past environments, and make predictions about where valuable resources might be located.

Biostratigraphic unit

is a body of rock defined and characterized by its fossil content.

in biostratigraphy, zones (or biozones) are intervals of rock strata that are defined by their distinctive fossil content. These biozones represent a specific period in geologic time and are identified based on the presence, absence, or abundance of particular fossil species. The primary goal of establishing biozones is to provide a framework for correlating and dating rock layers across different geographic locations. Here are some common types of biostratigraphic zones:

1. Taxon Range Zone: Defined by the first and last appearances of a particular fossil species or taxon within the rock record. This type of zone represents the entire time range during which the species was present.

2. Concurrent Range Zone: Defined by the overlapping range of two or more species. This zone is particularly useful for correlation because it pinpoints a time interval when multiple species coexisted.

3. Interval Zone: Defined by the first or last appearance of one fossil species and the first or last appearance of another. This type of zone is often used when specific fossils are absent, but a relative time interval can still be identified based on adjacent biozones.

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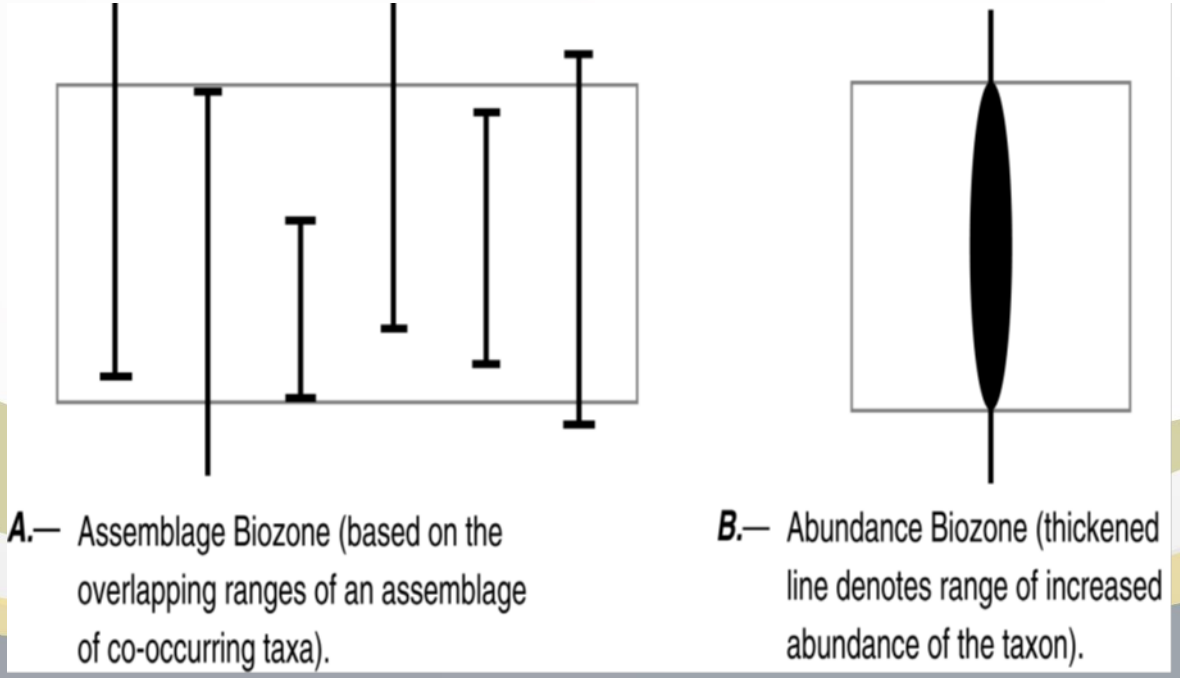
4. Assemblage Zone: Characterized by a specific assemblage, or group, of fossil species that appear together in a particular rock layer. Assemblage zones are helpful for recognizing environments and time intervals that share a unique set of ecological characteristics.

5. Abundance Zone (or Acme Zone): Defined by the peak abundance or maximum population of a particular fossil species within a rock layer. These zones often mark periods when the environmental conditions were highly favorable for that species.

These biostratigraphic zones allow geologists to correlate rock layers over large areas and provide a relative dating framework that enhances the understanding of Earth's geological history



A.— Assemblage Biozone (based on the overlapping ranges of an assemblage of co-occurring taxa).

B.— Abundance Biozone (thickened line denotes range of increased abundance of the taxon).

Chronostratigraphic unit

. Chronostratigraphic units are bodies of rocks, that were formed during a specified interval of geologic time. The units of geologic time during which chronostratigraphic units were formed are called geochronologic units. Chronostratigraphic units are bounded by isochronous horizons which mark specific moments of geological time.The rank and relative magnitude of the units in the chronostratigraphic hierarchy are a function of the durations they represent. Each boundary of a chronostratigraphic unit is synchronous..

Chronostratigraphic	Geochronologic
Eonothem	Eon
Erathem	Era
System	Period
Series	Epoch
Subseries	Subepoch
Stage	Age
Substage	Subage

Chronostratigraphic units are geological units that represent specific intervals of geological time. They help geologists place rock formations, fossils, and events within the context of Earth's history. These units are globally standardized and provide a way to understand the timing and duration of events like volcanic eruptions, extinctions, and climatic changes. The main units of chronostratigraphy are as follows:

1. Eonothem
2. Erathem
3. System
4. Series
5. Stage

Importance

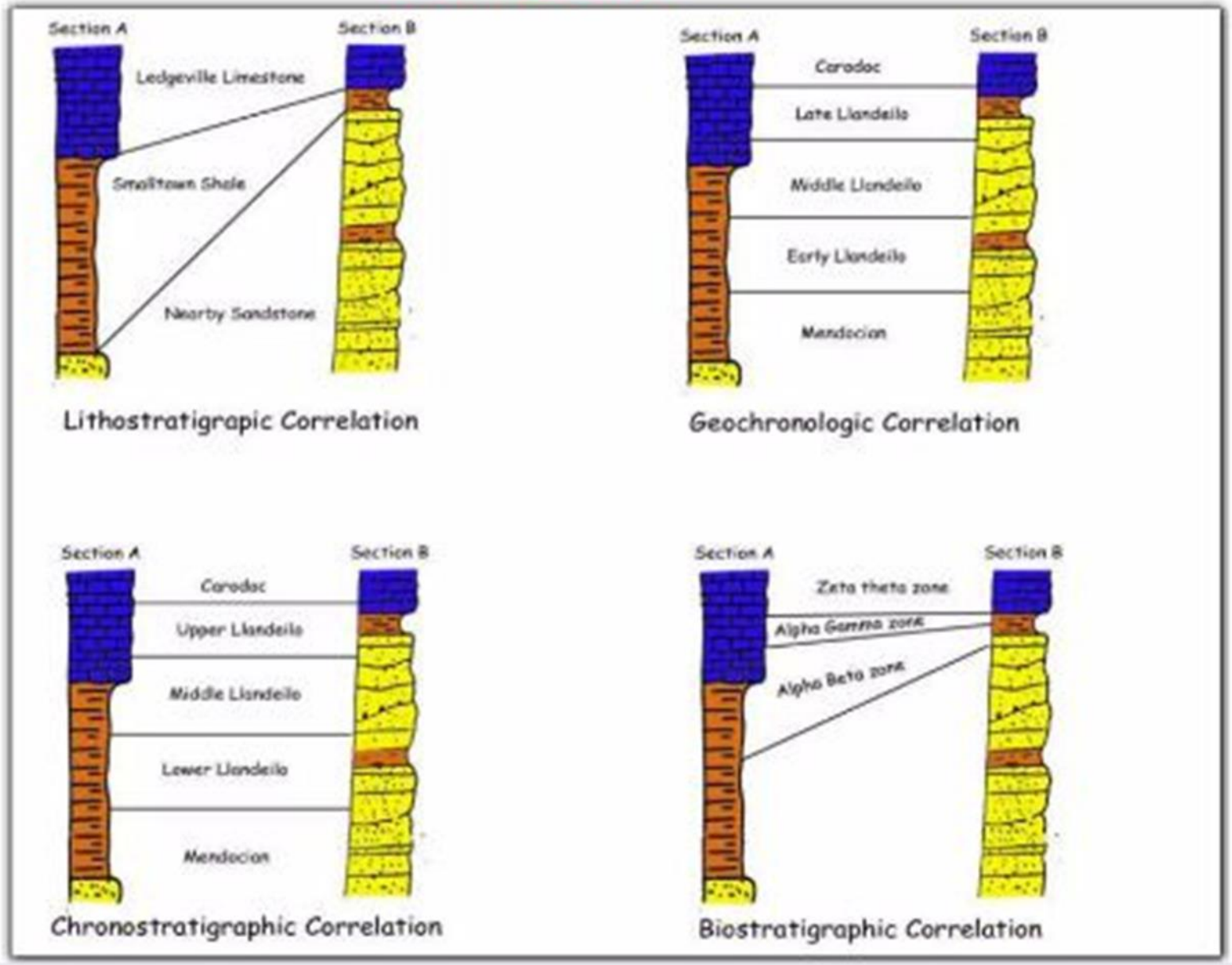
Chronostratigraphic units are essential for
correlating geological formations across different regions,
reconstructing past environments, and
understanding Earth’s history, including the evolution of life and climate.
These units are defined based on the fossil record, radiometric dating, and other stratigraphic evidence that helps establish precise time boundaries.

Correlation is a procedure for demonstrating correspondence between geographically separated parts of a geologic unit. The term is a general one having diverse meanings in different disciplines

Correlation is the demonstration of correspondence between two geologic units in both some defined property and relative stratigraphic position.
Because correspondence may be based on various properties, three kinds of correlation are best distinguished by more specific terms:

Lithocorrelation links units of similar lithology and stratigraphic position.
Biocorrelation expresses similarity of fossil content and biostratigraphic position.
Chronocorrelation expresses correspondence in age and in chronostratigraphic position.

Correlation



UNCONFORMITIES

- Layers of sedimentary rocks are conformable if they were deposited without interruption.
- An **unconformity** represents an interruption in deposition, usually of long duration.
- During the interval when no sediment was deposited, some rock layers may have been eroded
- Thus, an unconformity represents a long time interval for which no geologic record exists in that place. The lost record may involve hundreds of millions of years

Types of unconformities

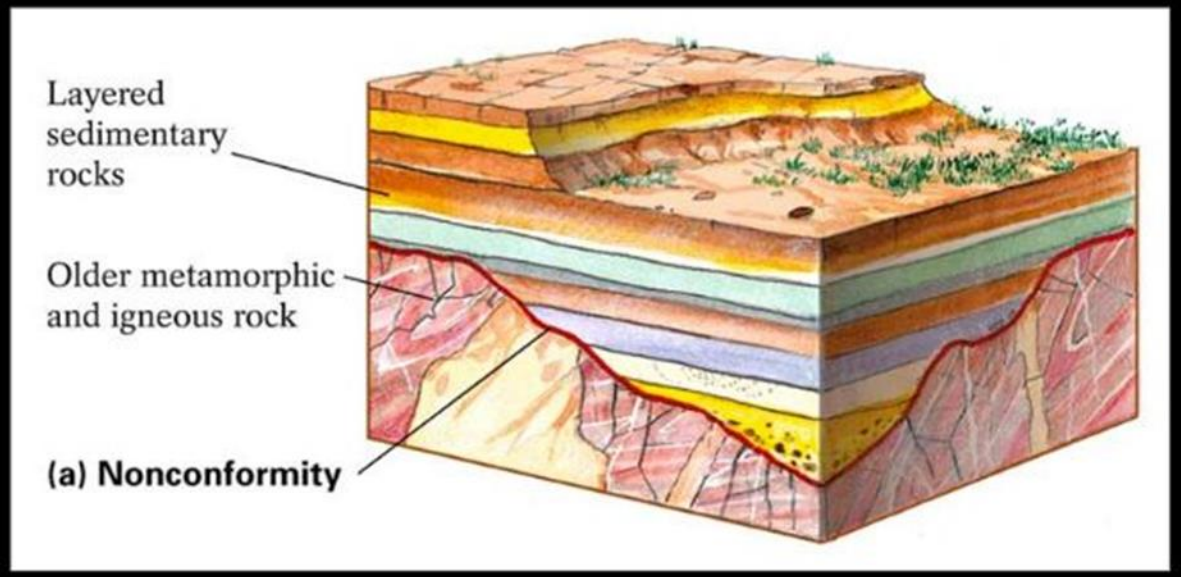
1- Nonconformity

2-Angular unconformity

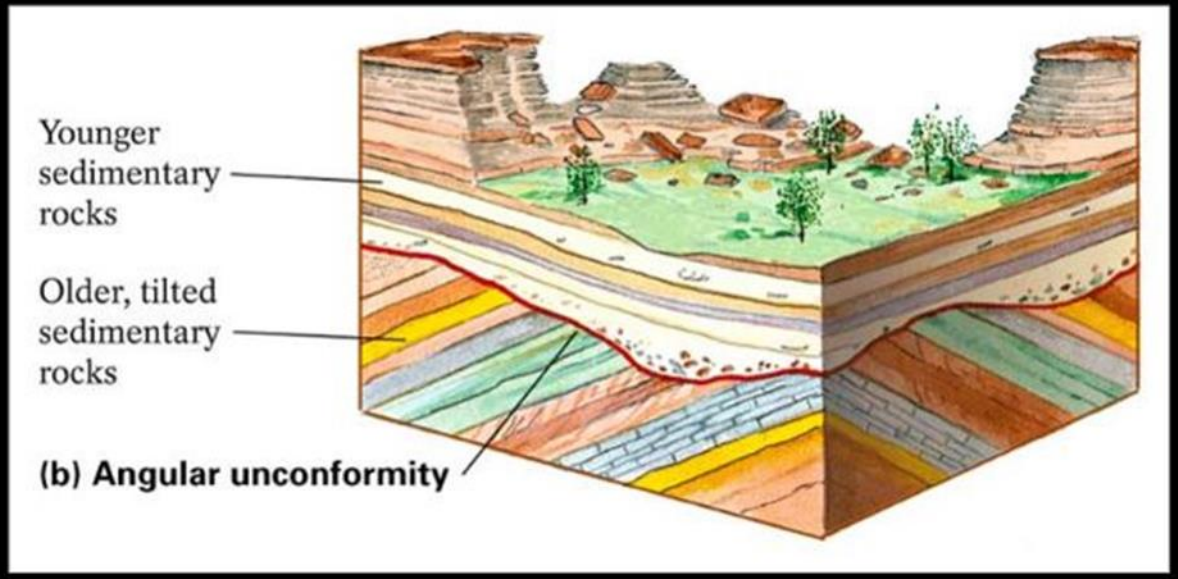
3- Disconformity

4- Paraconformity

Types of Unconformities: Nonconformity



Types of Unconformities: Angular Unconformity



Types of Unconformities: Disconformity