Differences between carbonate and siliciclastic reservoirs

Felicitász Velledits

Origin

- **90% organic**

  (produced mainly by biological activity of creatures +chemical precipitates):

„Carbonates are born, not made”

- **Autochton**
- **Made up of**: skeletal remains, cements, chemical constituents (ooids, pisoids). Lime mud

- **Inorganic**
- Parent rock
- Erosion
- Transportation
- Sedimentation

- **Allochton**
- **Made up of**: sand (SiO_2), clay

Diagenesis

- **Carbonates**

Consists of instable minerals (calcite, aragonite, dolomite)

Rapid dissolution, cementation, recrystallisation

Cementation: rapid on seafloor or in near-surface environments

Diagenesis happens in many diagenetic environment, through many diagenetic events: from shallow marine until deep burial

- **Siliciclastic sediments**

Consists of stabil minerals (sand (SiO_2) clay

Resistant

Cementation: remain unconsolidated on seafloor or in shallow burial environment

Diagenesis happens only in deep burial

Texture

(the size, shape, and arrangement of detrital grains in a sedimentary rock.)

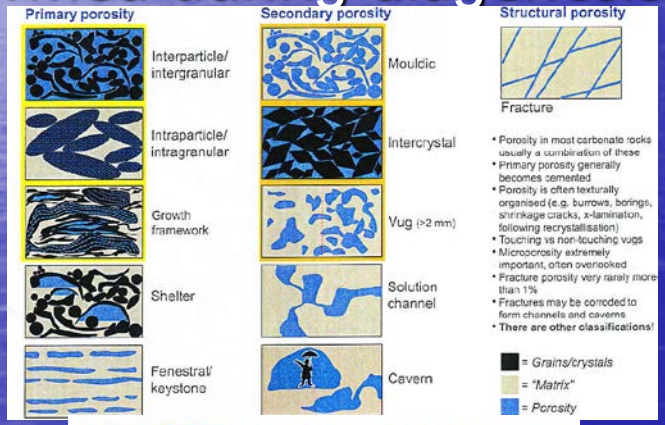
- Alters considerably during diagenesis
- Depositional texture and fabric alter considerably
- Alters only during deep burial diagenesis
- Depositional texture and fabric

Porosity

Primary porosity: 40-70%

5-15% of the original porosity remain intact

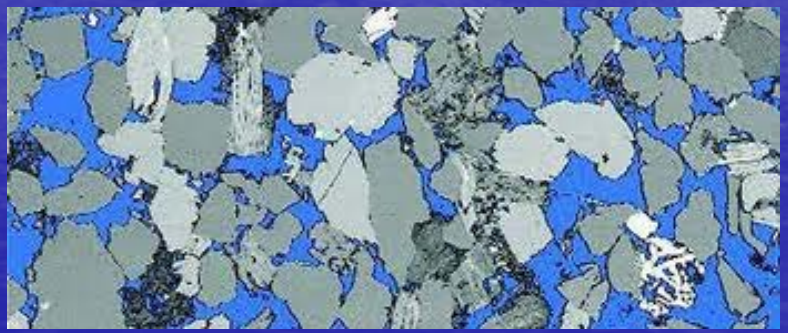
Different pore types, pore size and shape are formed during diagenesis





- Primary porosity: 25-40%

  15-30% of the primary porosity remain intact
- Mainly interparticle porosity



Pore system

Heterogenous:

Can be very variable even within one rock body

Many pore types

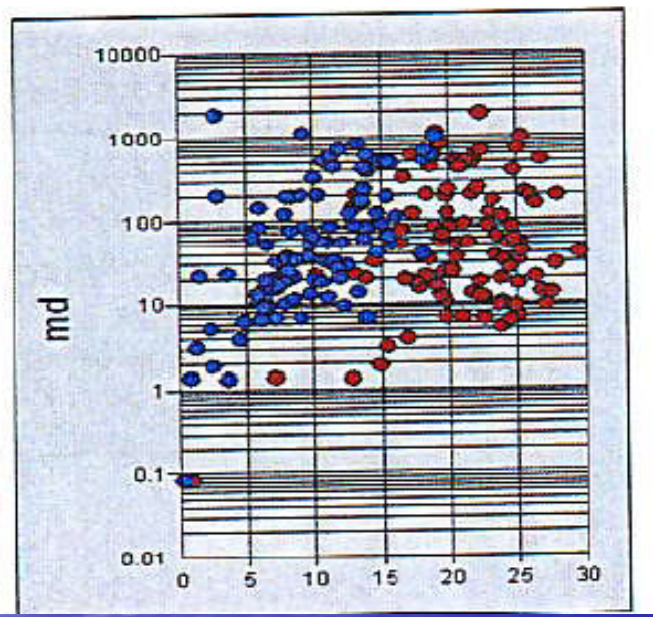
Are present

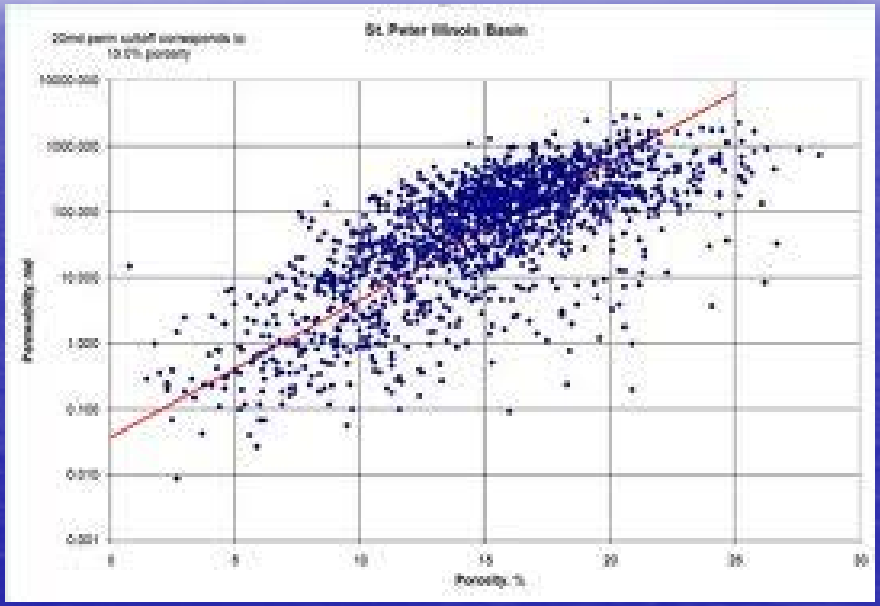
Homogeneous sand bodies

Only interparticle pores

- Porosity not always corresponds with permeability

Porosity and permeability are closely related





- Small plug are not representative, we need cores.

Small plugs are representative

Reservoir characteristics

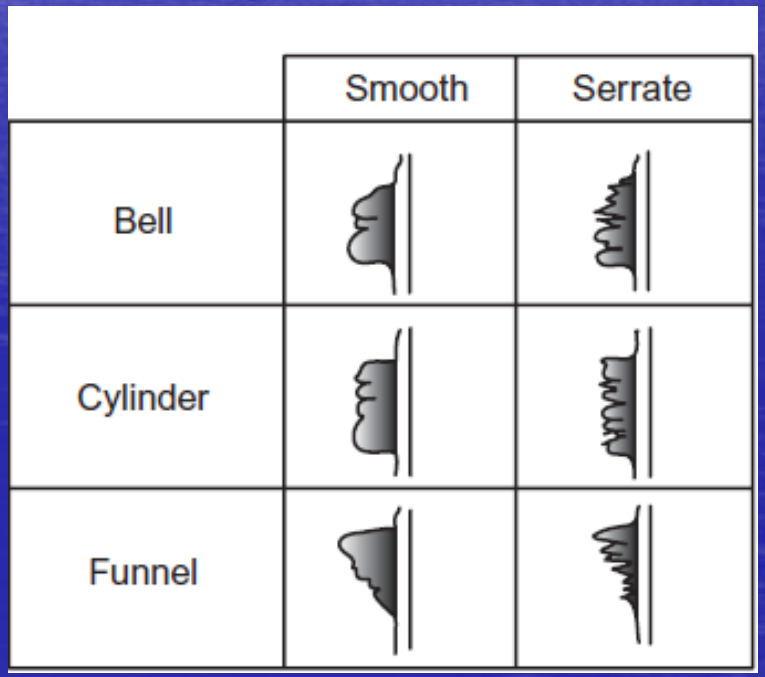
- Diagenesis can alter porosity, permeability considerable.
- Depositional facies determines reservoir characteristics
- (porosity and permeability is facies specific)

Fractures

- Very often,
- Major importance in reservoir properties if present
- Rare
- Not of major importance in reservoir properties

Electrofacies map from gamma-ray and resistivity logs

- Not indicative to depositional facies
- Indicative to depositional facies



In the case of siliciclastic sediments gamma ray refers to depositional environment

