Gondolatok aljzati repedezett tároló-kőzetek körül

Koherencia és más attributumok

Repedezett porozitás

„Damage” zóna

„Gouge” zóna

Breccsa - porozitás

Anizotró-pia

NosztalGEO 2018

Kiss Balázs
MOL NyRT

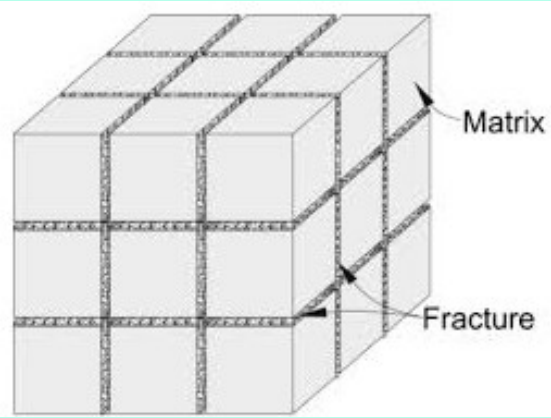
Algyő , 2018.11.16.

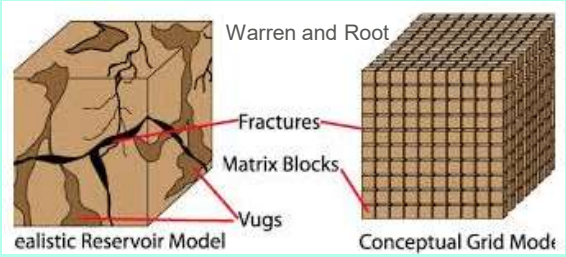
TARTALOM (GONDOLATOK SORRENDJE)

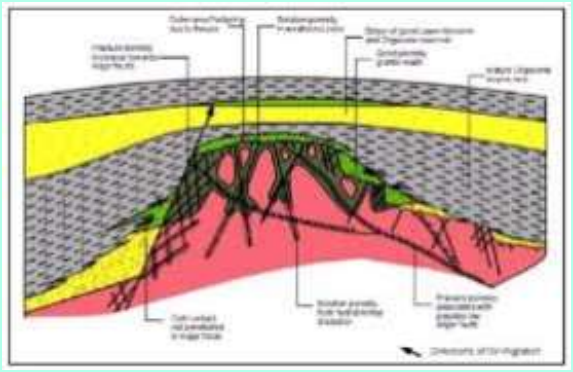
1. Definíciók, osztályozás
2. Mátrix - Repedezett
3. Repedezett tároló típusok
4. Anizotrópia
5. Attributum alkalmazás
6. Példák
7. Konklúziók

Definíciók, osztályozás

L.H. Reiss, 1980



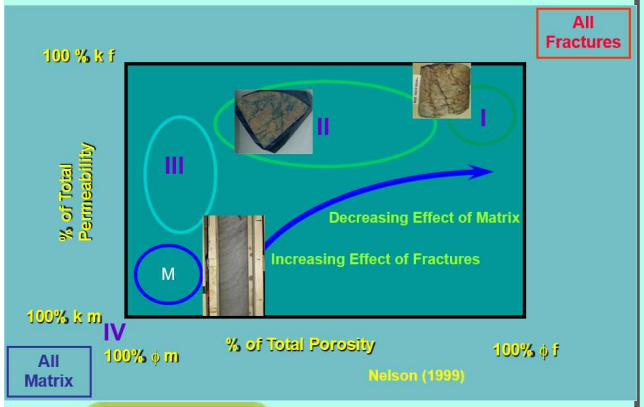




Genetikai osztályok

- Fault-Related Fractures
- Fold-Related Fractures
- Regional Fractures (Joints)
- Stylolite-Associated Fractures
- Diagenetic Fractures (Contractional)
- Surface-Related Fractures

Fractured Reservoir Classification



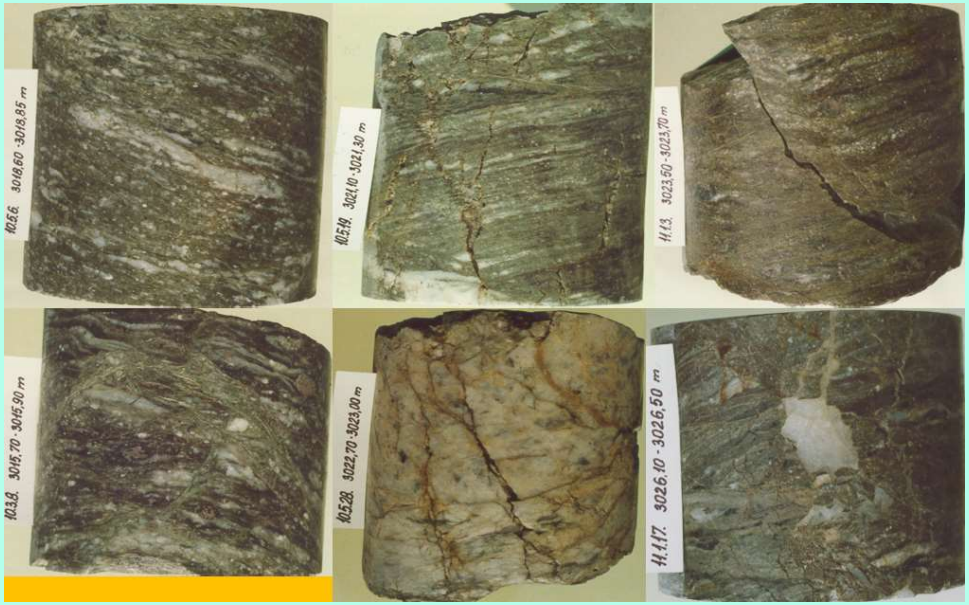
Type I: **Fractures provide the essential storage capacity and permeability** in a reservoir. The matrix has little porosity or permeability.

Type II: Rock matrix provides the essential storage capacity and **fractures provide the essential permeability** in a reservoir. The rock matrix has low permeability, but may have low, moderate, or even high porosity.

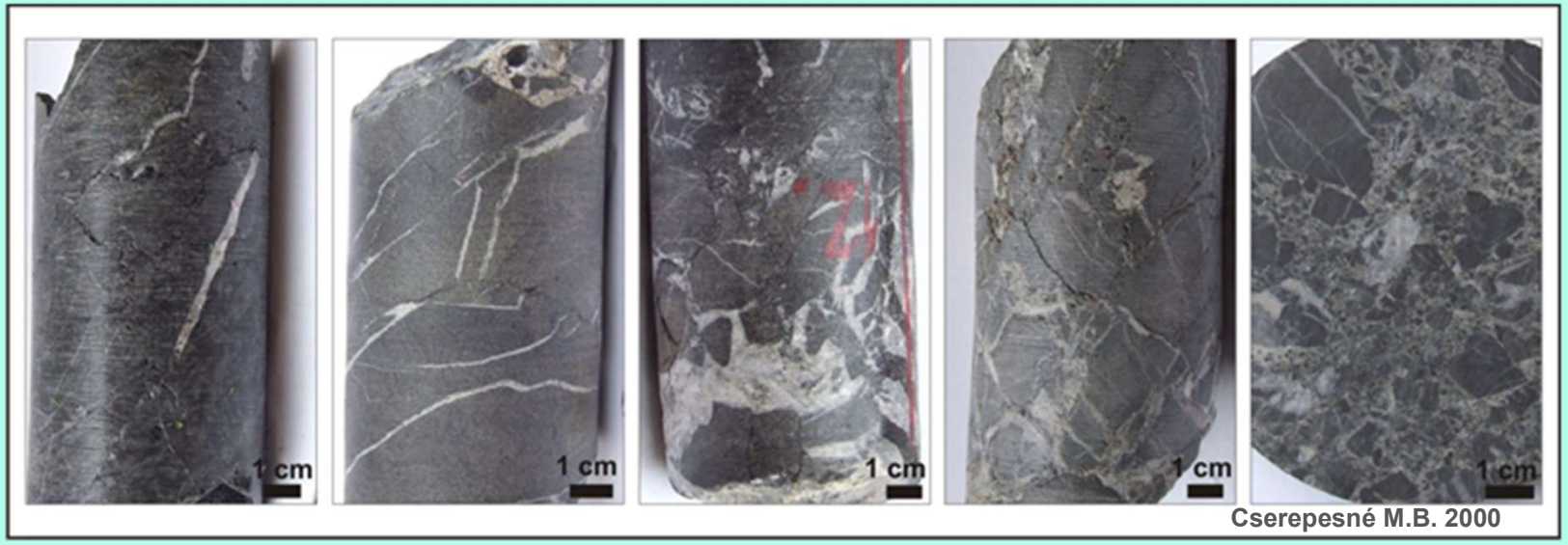
Type III: **Fractures provide a permeability assist** in an already economically producible reservoir that has good matrix porosity and permeability.

Type IV: **Fractures do not provide significant additional storage capacity or permeability** in an already producible reservoir, but instead create anisotropy. **(Barriers to Flow)**

R.A. Nelson, 1999



Mátrix – Breccsa
Repedés (hálózat)



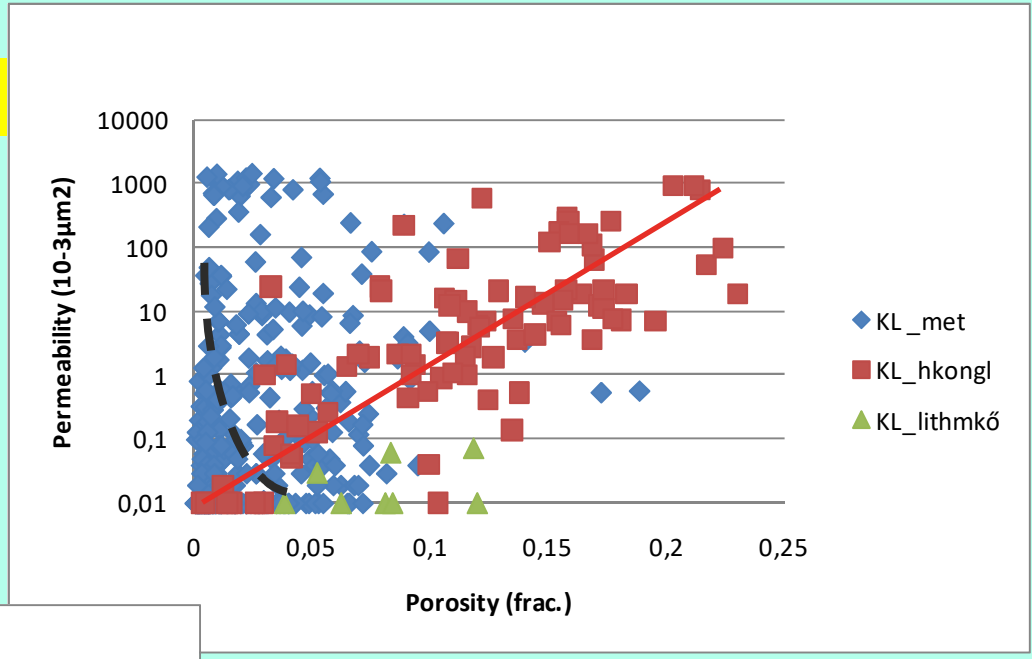
Cserepesné M.B. 2000

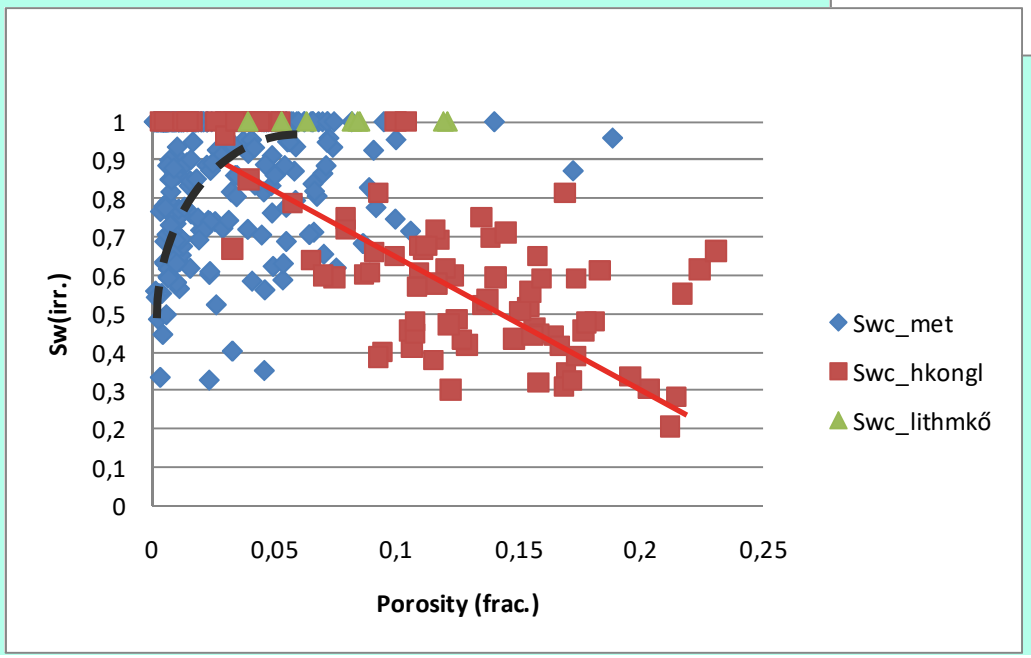
Mátrix – Repedezett (mag lépték)

Áteresztőképesség

Porozitás

Víztelítettség

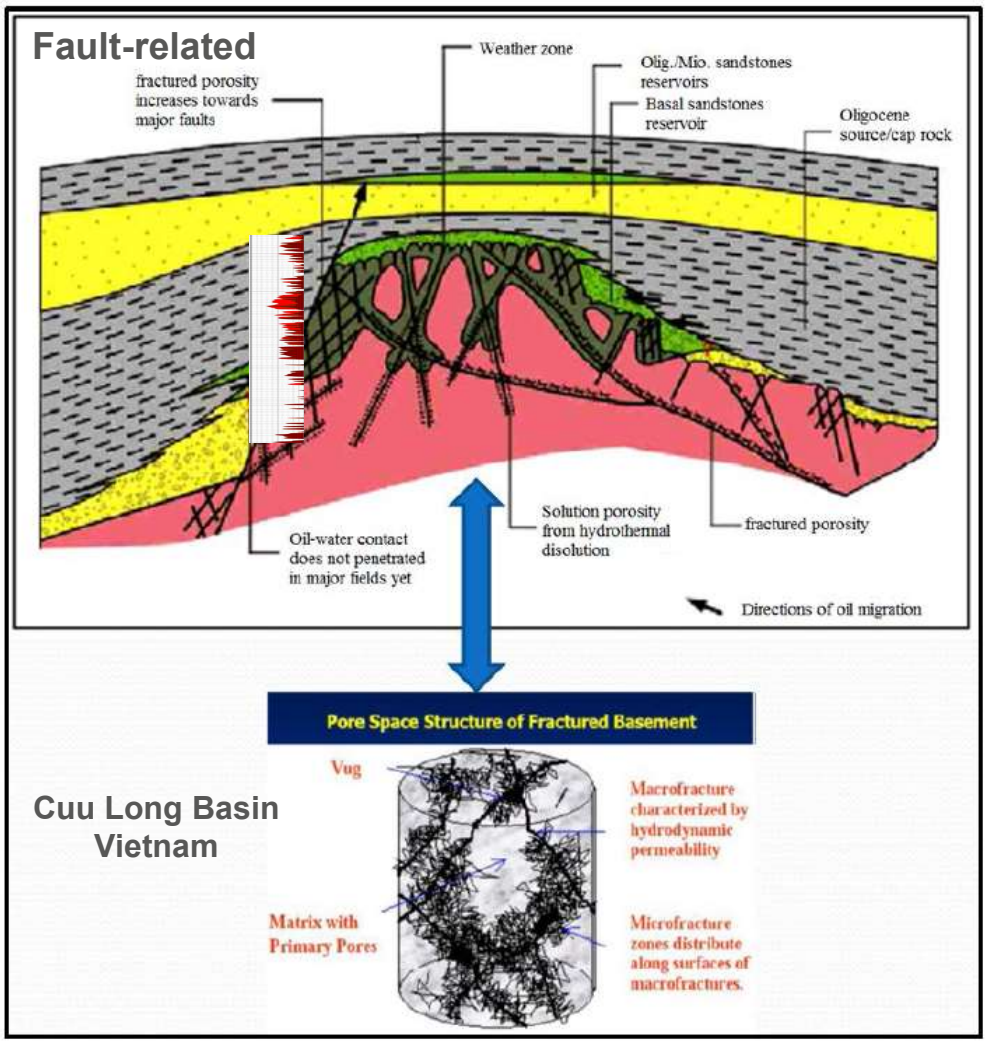




Miocén – mátrix porozitás

Metamorf – „repedezett”

Repedezett tároló típusok



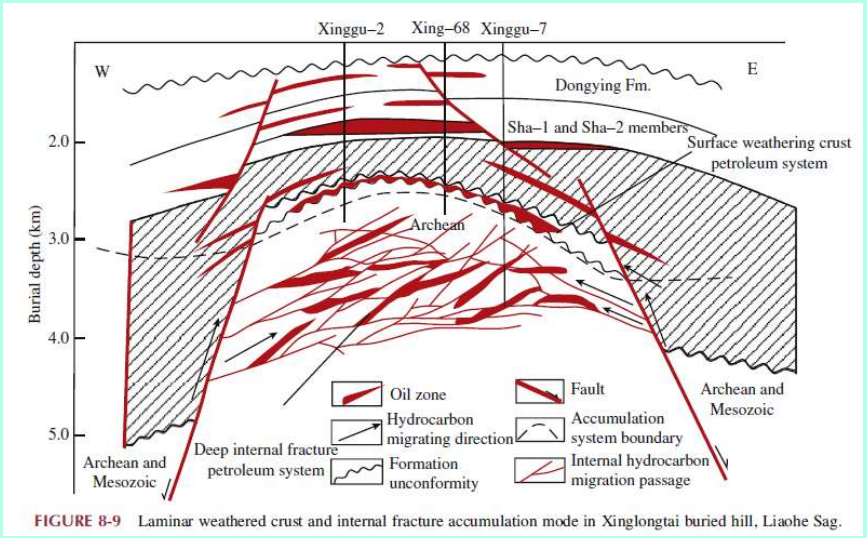
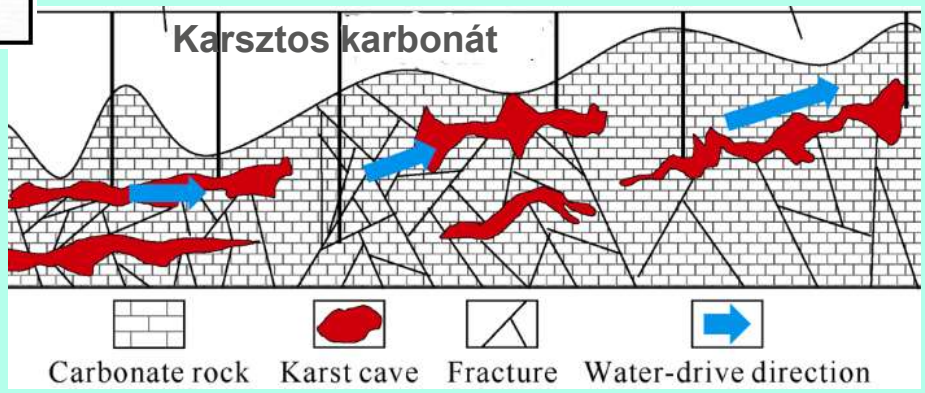


FIGURE 8-9 Laminar weathered crust and internal fracture accumulation mode in Xinglongtai buried hill, Liaohe Sag.

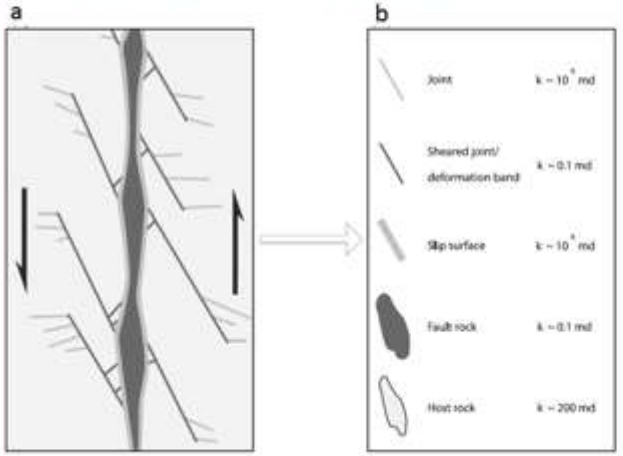


- Felső, mállott zóna
- Tetőig felérő tektonikus zóna
- Aljzaton belüli repedés rendszer

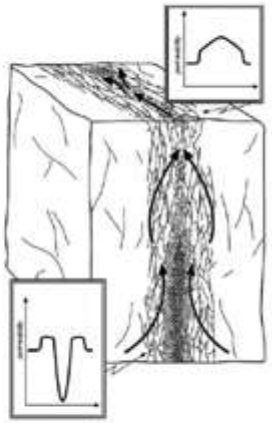
General Fault Models

ANIZOTRÓPIA

Fault permeabilities: a field characterisation of the fault element geometry and b laboratory analysis for the fault element permeability; after Jourde et. Al (2002) reprinted by permission of AAPG

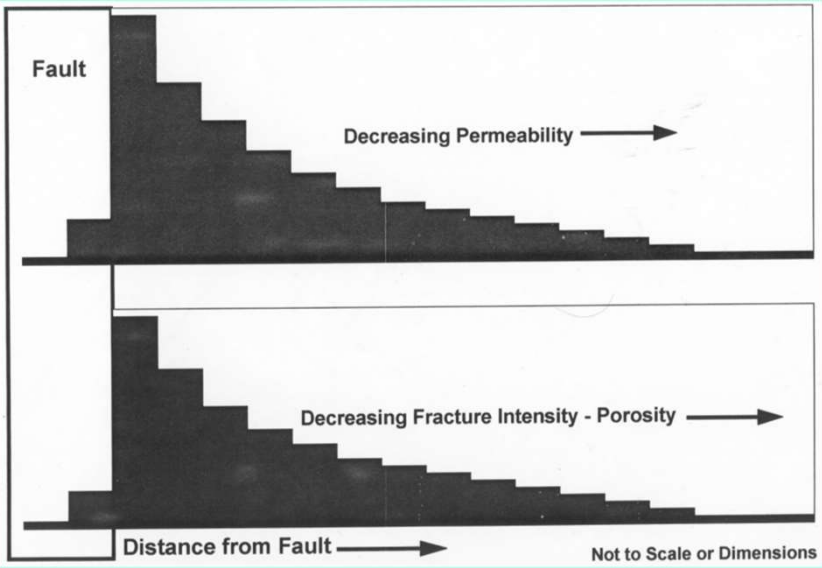


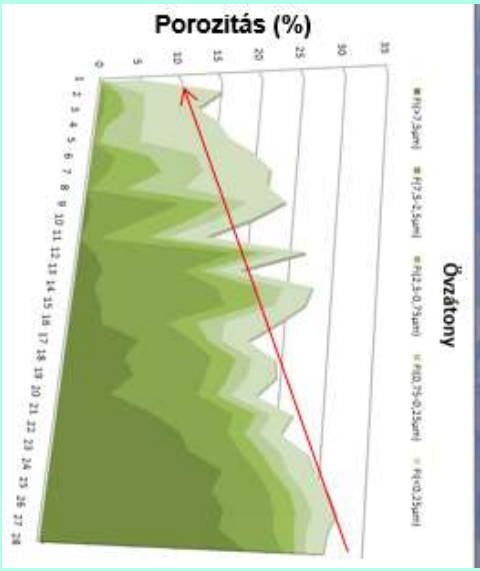
D. Biryukov, F.J. Kuchuk: Transient Pressure Behavior of Reservoirs with Discrete Conductive Faults and Fractures (2012 Springer)

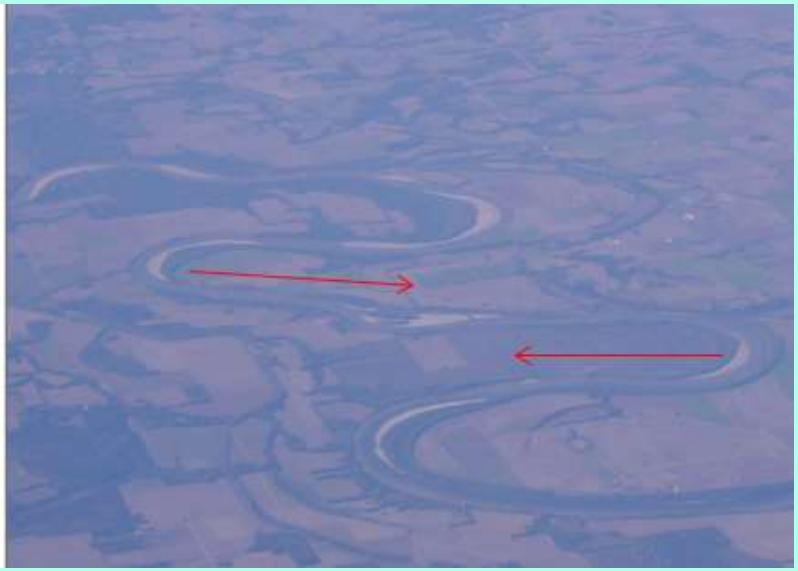


General Fault Model (based Storti et. al. 2007) Different hydrodinamic properties in the gouge and damage zone

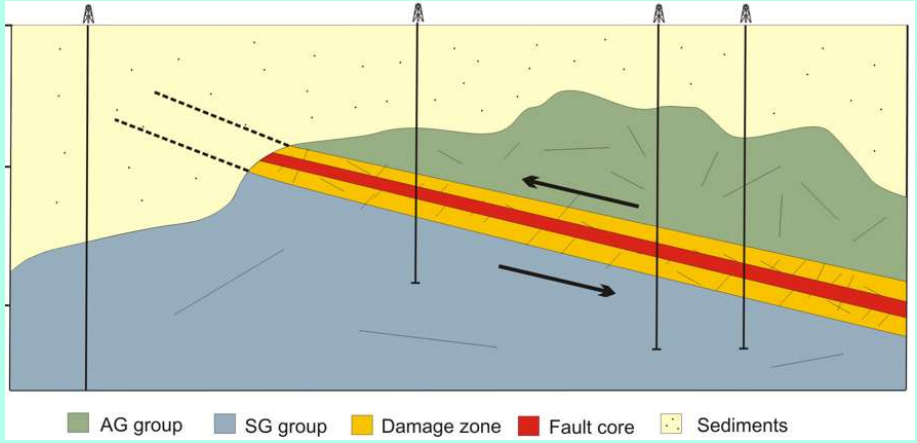
Tulajdonság változás, térbeli irányoktól függése

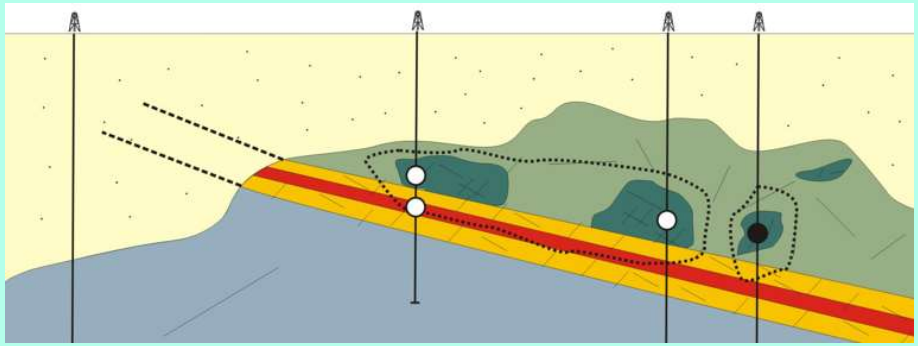






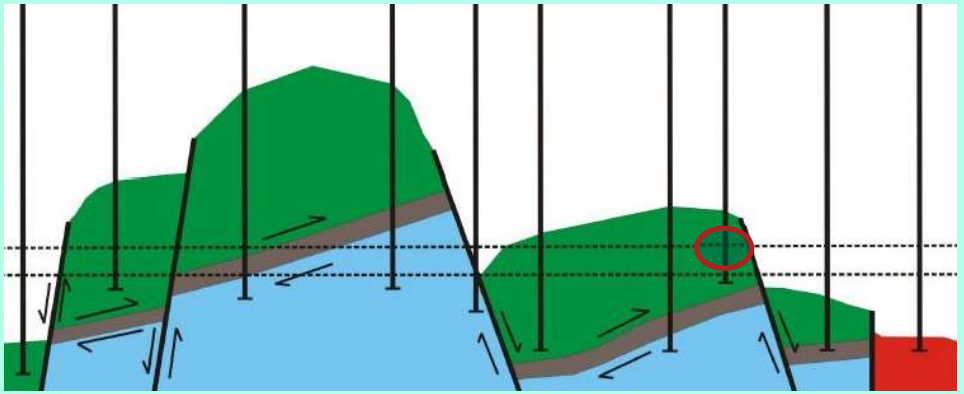
Litológiai inhomogenitás



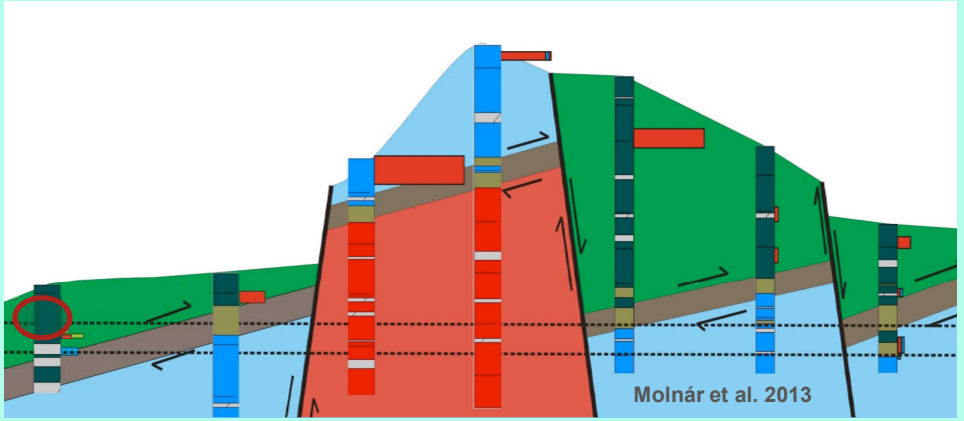


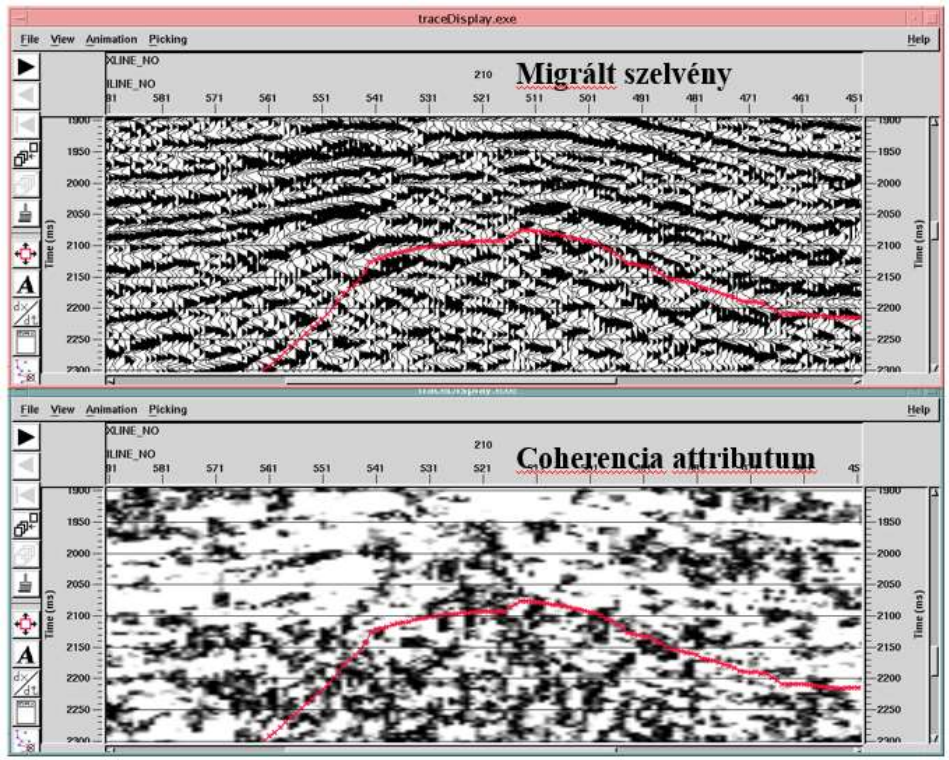
Repedezettséget befolyásoló tényezők:

- **Litológia**
- **Tektonikai elemek**
  - **Feltolódási zónák**
  - **Normál vetők**



Jelmagyarázat:
AG: Amfibolos gneisz
SG: Szillimanitos gneisz
OG: Ortogneisz





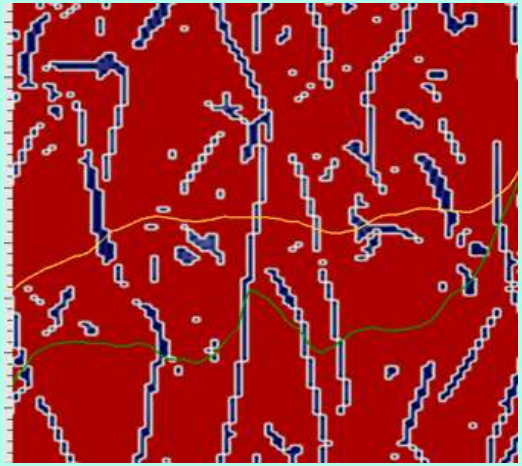
Attributum értelmezés

- Koherencia
- Ant attributum
- Fault Likelihood attr.
- …

Alkalmazás

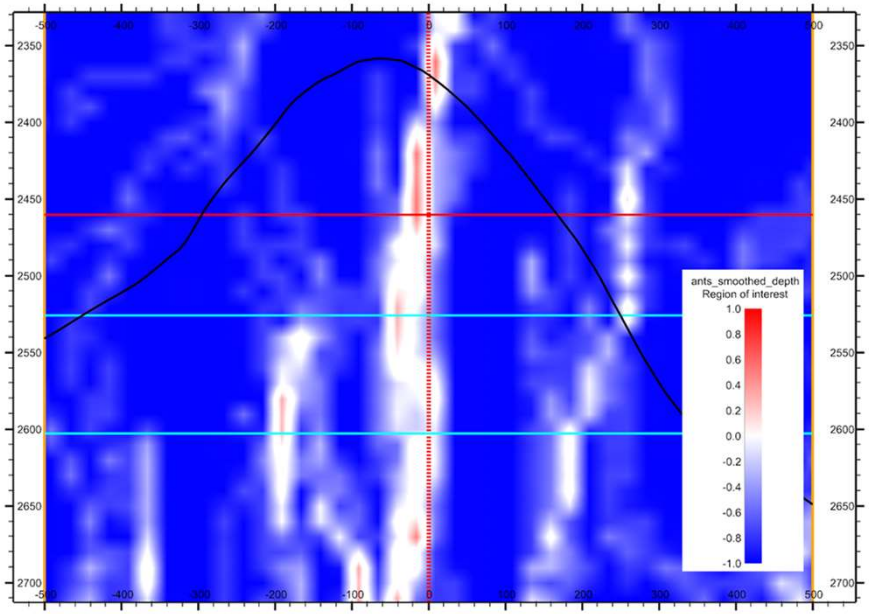
- Tektonika
- Rezervoár modellezés
- Kúttervezés

Fault Likelihood



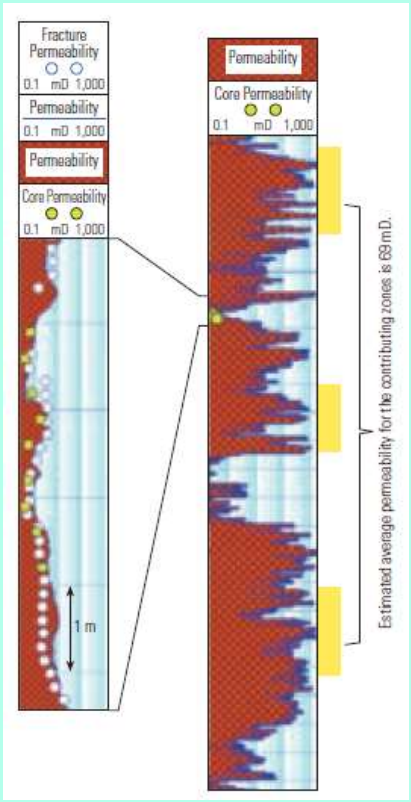
Not to Scale or Dimension

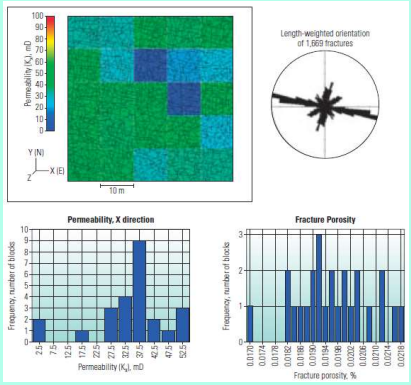
Ant Attribute

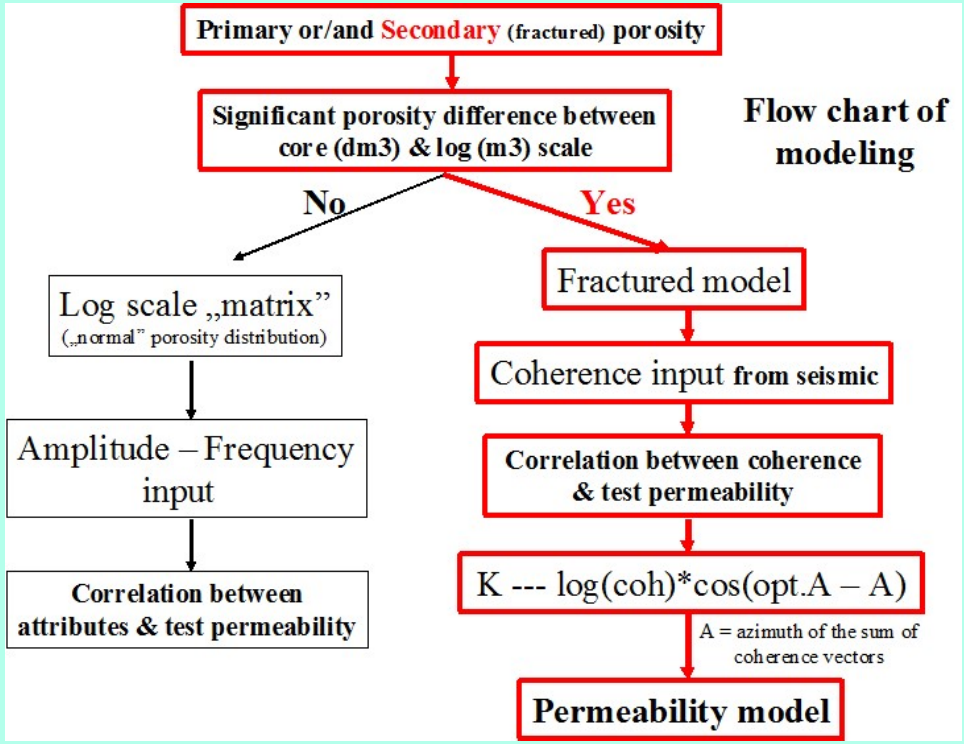


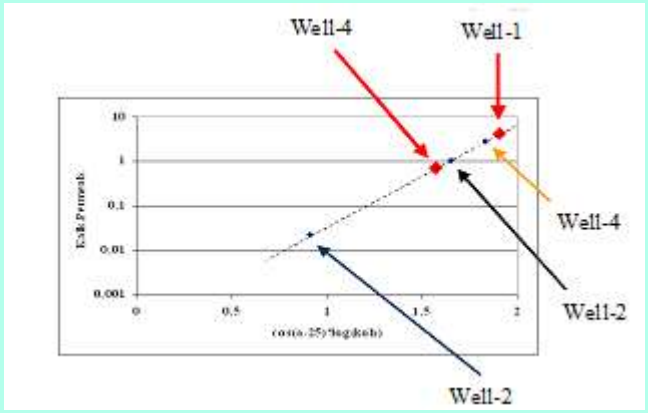
Not to Scale or Dimension

Paraméter becslés

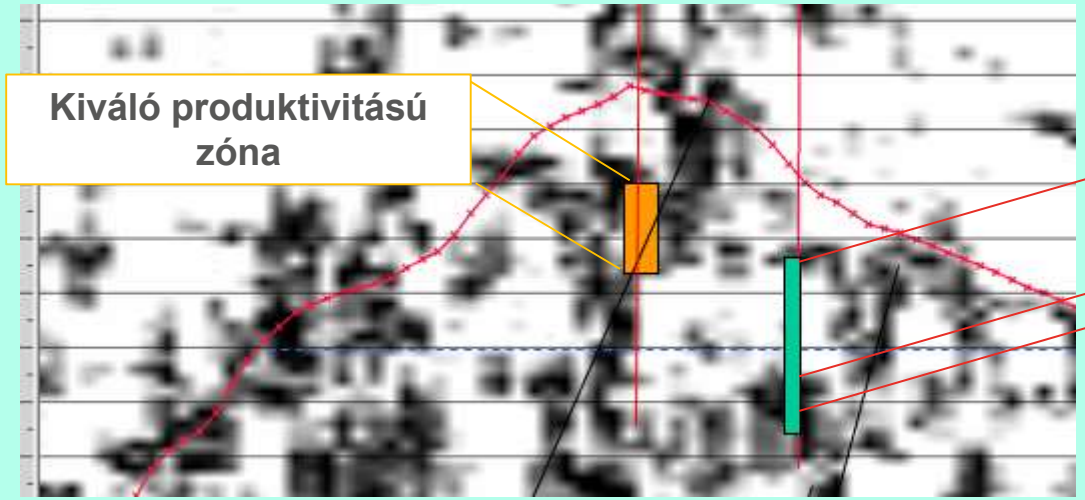




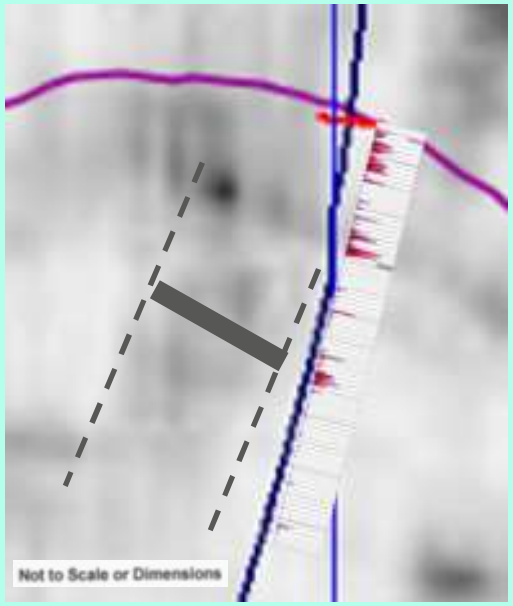




Attributum anomália – tektonika - produktivitás



Tényleg befolyásolhatja a vetőtől való távolság a **tároló tulajdonságokat**?



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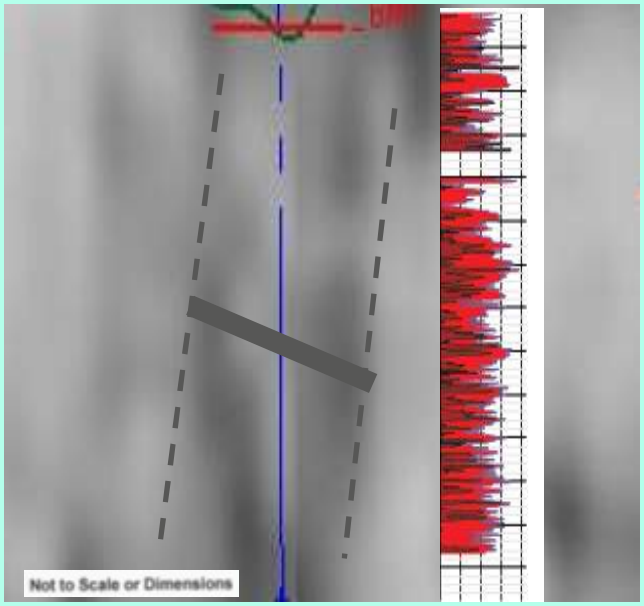
Hozam *10-50



Konklúziók

- **Minden repedezett tároló egyedi!**

Mind kutatási, mind mezőfejlesztési szempontból fontos:

- Tektonikai elemek azonosítása;
  - Záró/nem záró elemek (Shmax);
- Litológiai típusok meghatározása;
  - Különböző litológiai típusok mechanikai tulajdonságai (törési hajlandóság);
- Tároló tulajdonságok és azok heterogenitásának előrejelzése, modellezése;
  - Porozitás (repedezett/breccsia);
  - Áteresztőképesség (irányfüggés!);

Eszköz:

- Különböző szeizmikus attributumok alkalmazása.