The hydrodynamic entrapment model of the Tatárülés-Kunmadaras gas field

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Introduction

- Nowadays hydrocarbon exploration is more and more challenging
- Oil hydrogeology provides an opportunity for the research of new fields and for the more accurate delineation of existing ones
- Examination of hydrodinamic entrapment: UVZ method
- There were previous investigations in the area(Czauner, 2008; Czauner és Mádl-Szőnyi, 2011)

The **main aim** of the presenatation is the oil hydrogeological explanation of the location of the gas field and the examination of the applicability of the UVZ method

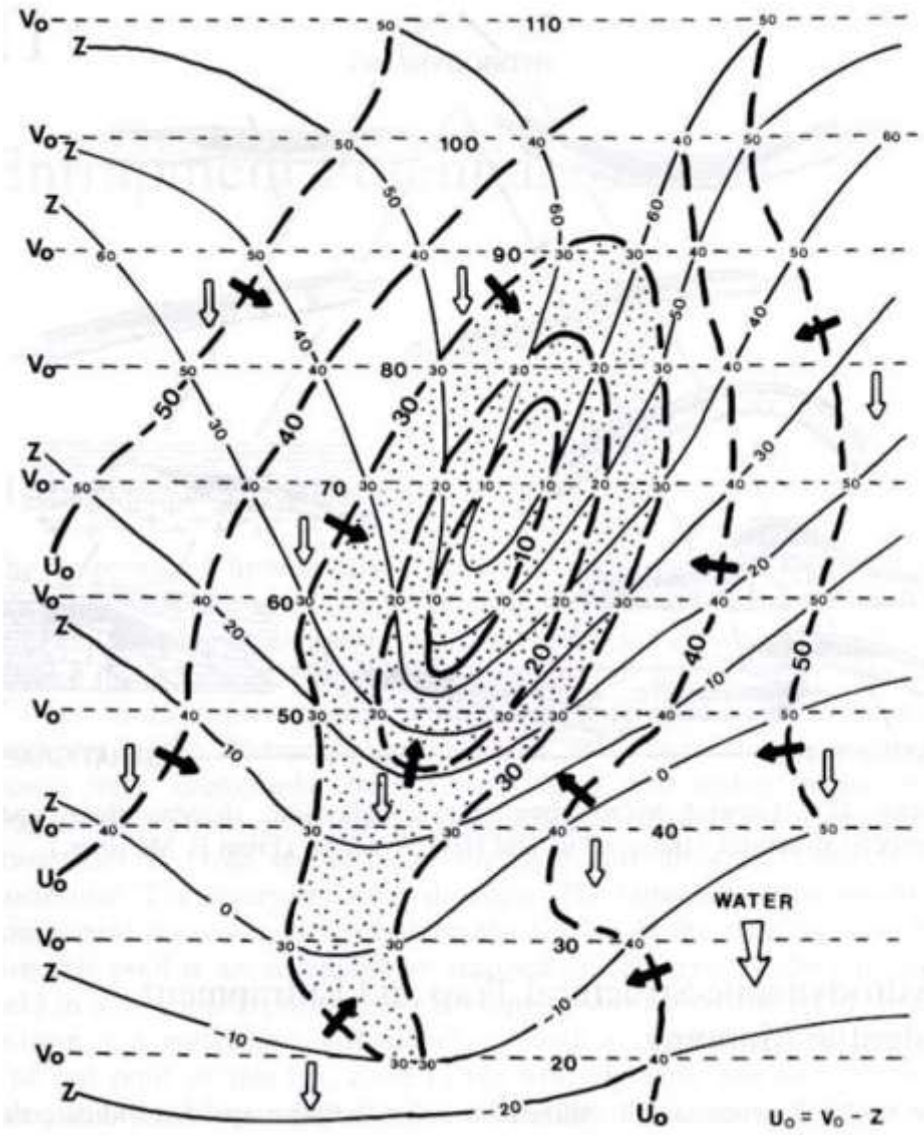
Oil hydrogeology

- The research of hydrocarbons with hydrogeological methods
- Examination of migration and entrapment
- $\phi_w = gz + \frac{p - p_o}{\rho}$
- $\phi_o = gz + \frac{p}{\rho_o} + \frac{p_c}{\rho_o}$
- $\phi_g = gz + \int_0^p \frac{dp}{\rho} + \int_p^{p+p_c} \frac{dp}{\rho}$

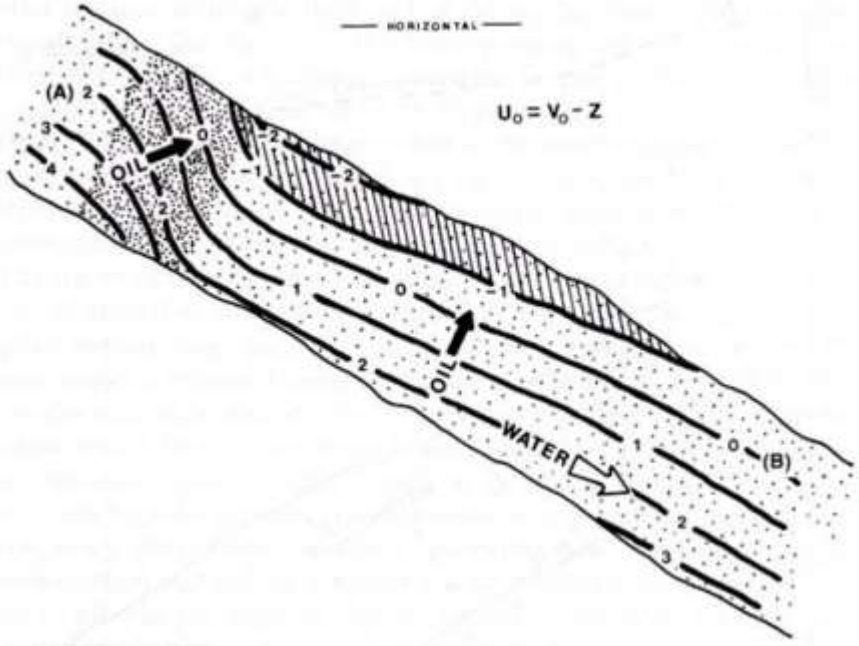
- $E_w = -grad\ \phi_w = g - (1/\rho)\, grad\ p$
- $E_o = -grad\ \phi_o = g - (1/\rho_o) grad\ p - (1/\rho_o) grad\ p_c$
- $E_g = -grad\ \phi_g = g - (1/\rho_g) grad\ p - (1/\rho_g) grad\ p_c$

The UVZ method

- Hubbert (1953)
- Litological changes
- Hydrogeological environment
- Trap structure
- $\frac{\rho_w}{\rho_w - \rho_o} h_w = v$
- $u = v - z$



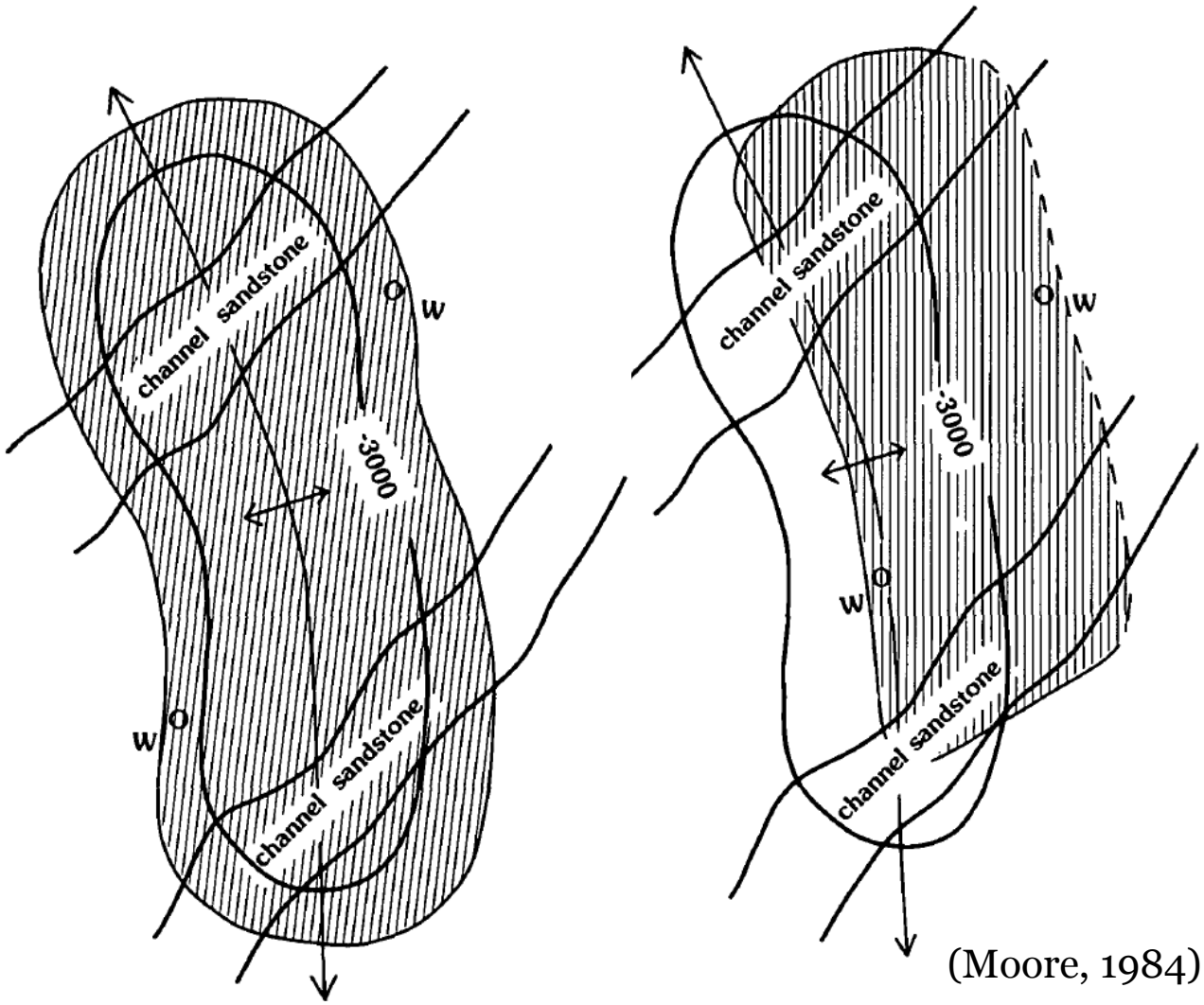
(Dahlberg, 1995)



(Dahlberg, 1995)

Case study I.

South Cole Creek Field, Wyoming

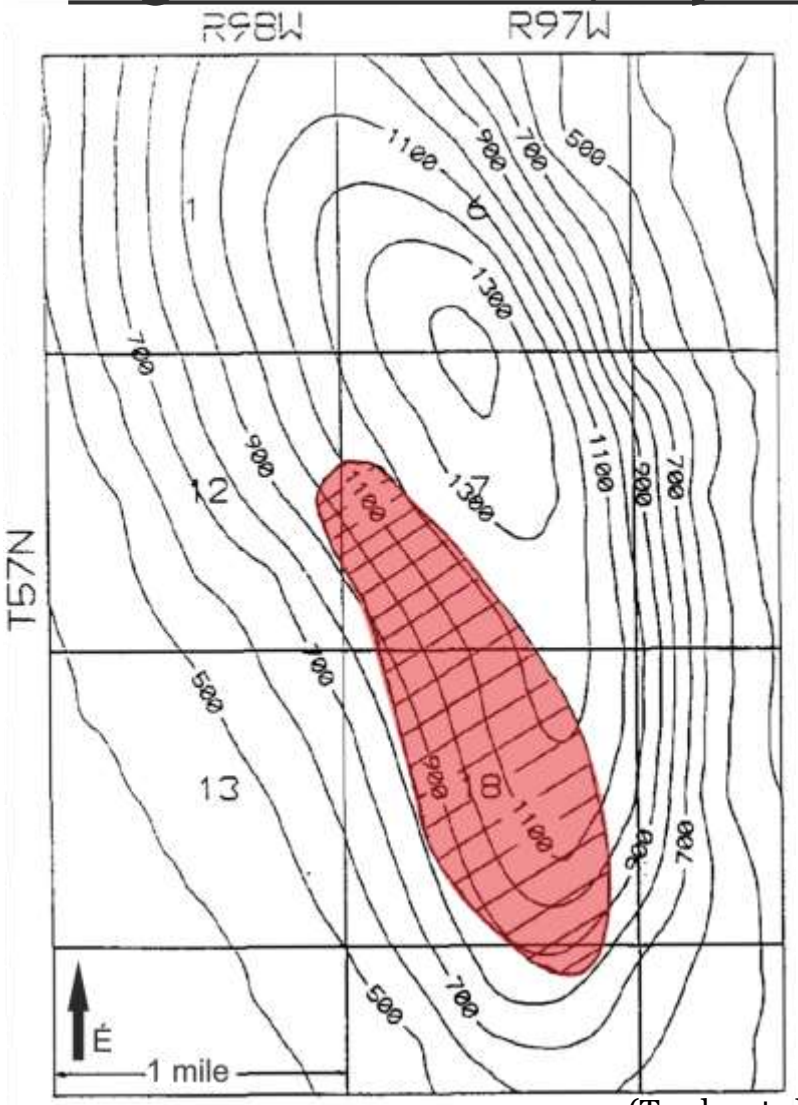


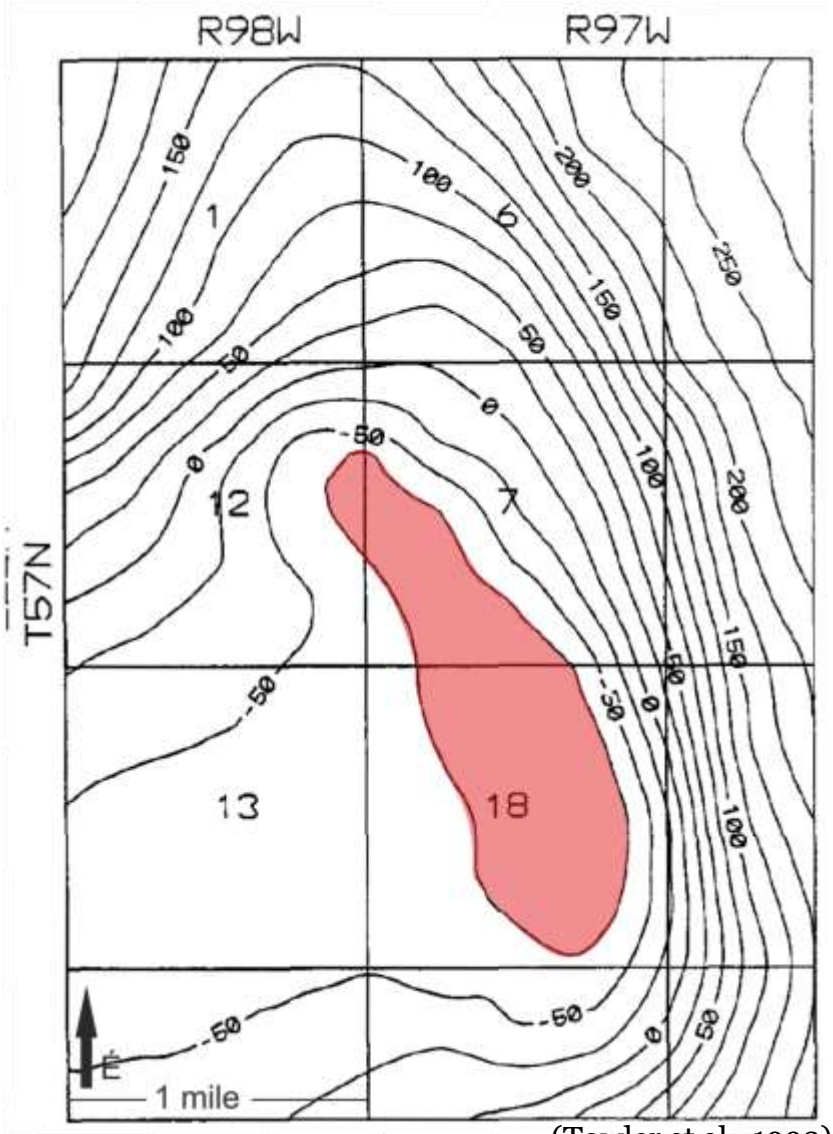
- Litological changes
- Hydrogeological environment
- Trap structure

(Moore, 1984)

Case study II.

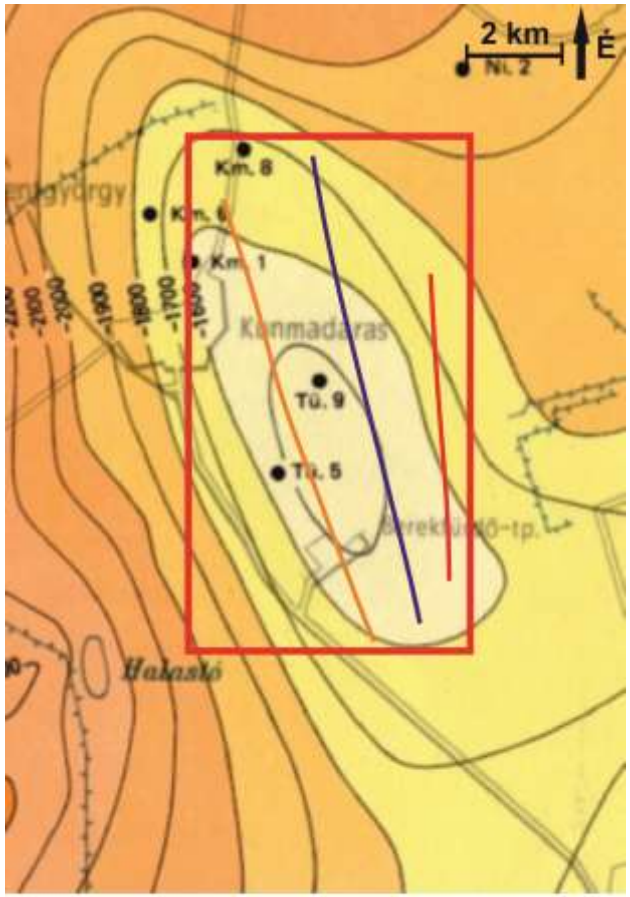
Sage Creek Field, Wyoming





Study area

(After Zentai, 2000)



main structural elements

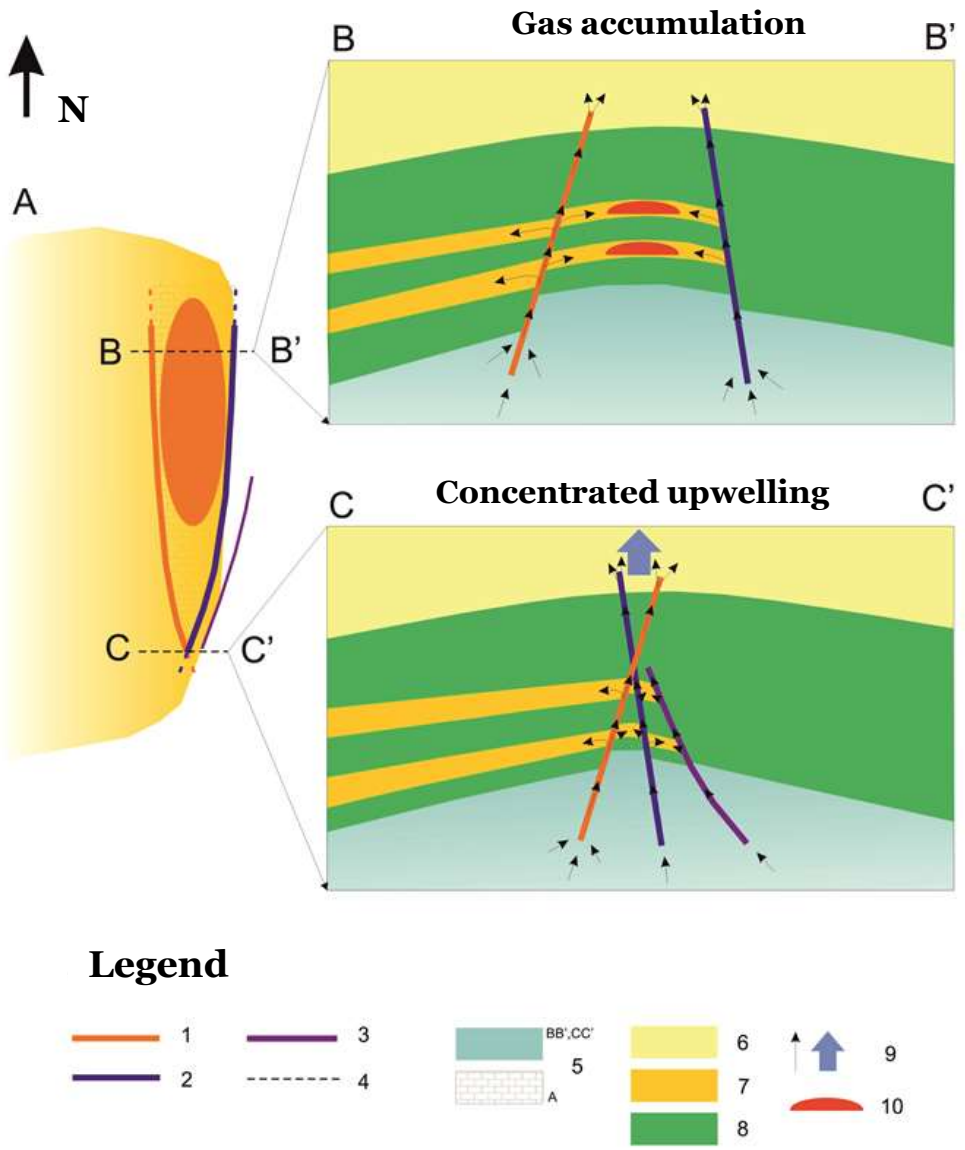
study area

(Rónai et al., 1975; Czauner és Mádl-Szőnyi, 2011)

- Important structural and hydrogeological characteristics
- Two potential reservoir layers

Study area

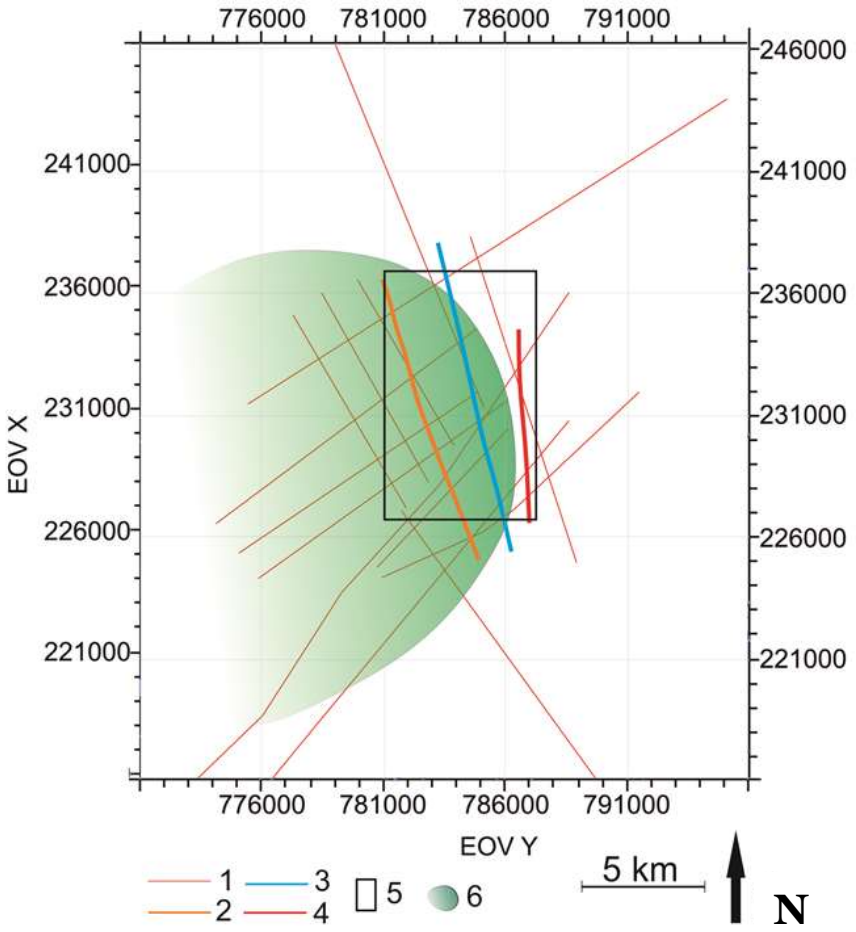
- The two main fault zones act vertically as conduit and transversely as barrier avenues for fluids
- These fault zones bound the gas field



(Czauner, 2008)

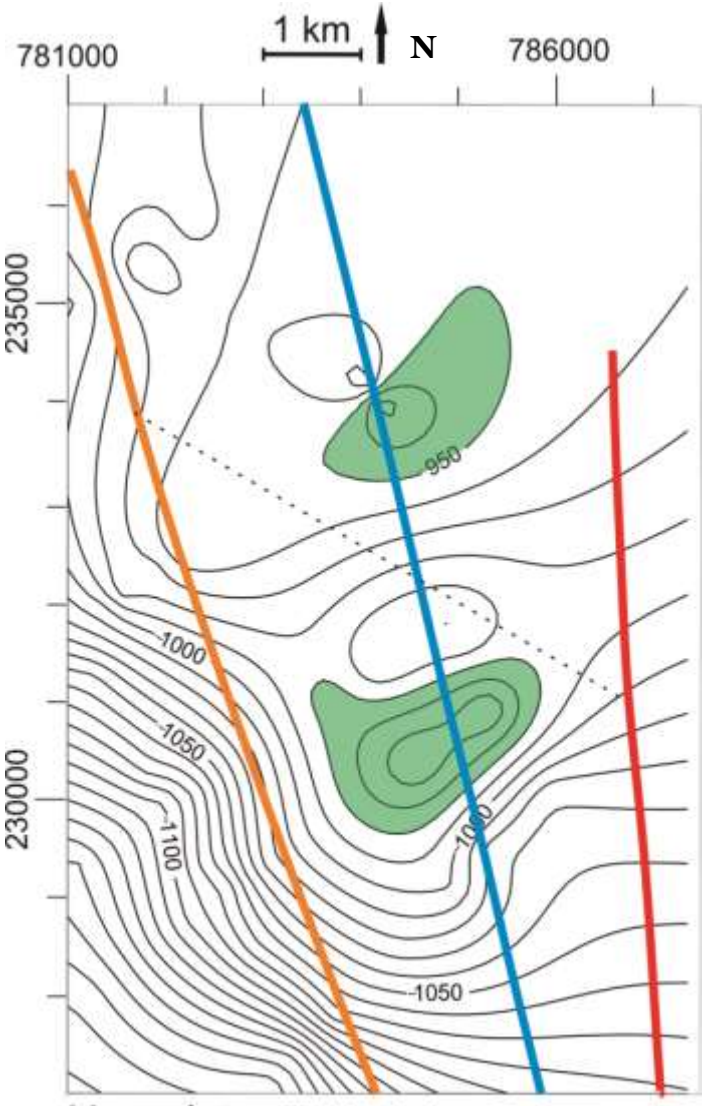
Processing of data

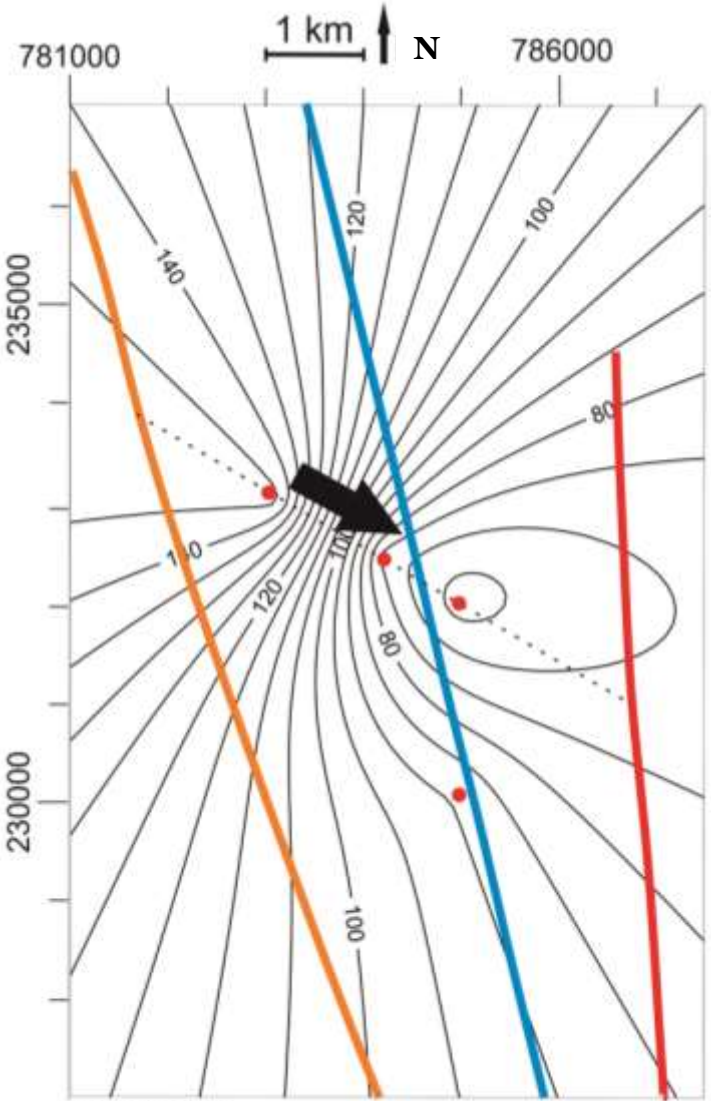
- Reservoir top map (Z)
- Water potential map and hydraulic cross section (H_w)
- Water potential maps and cross sections with respect to gas (V)
- Gas potential maps and cross sections (U)



(Czauner, 2008)

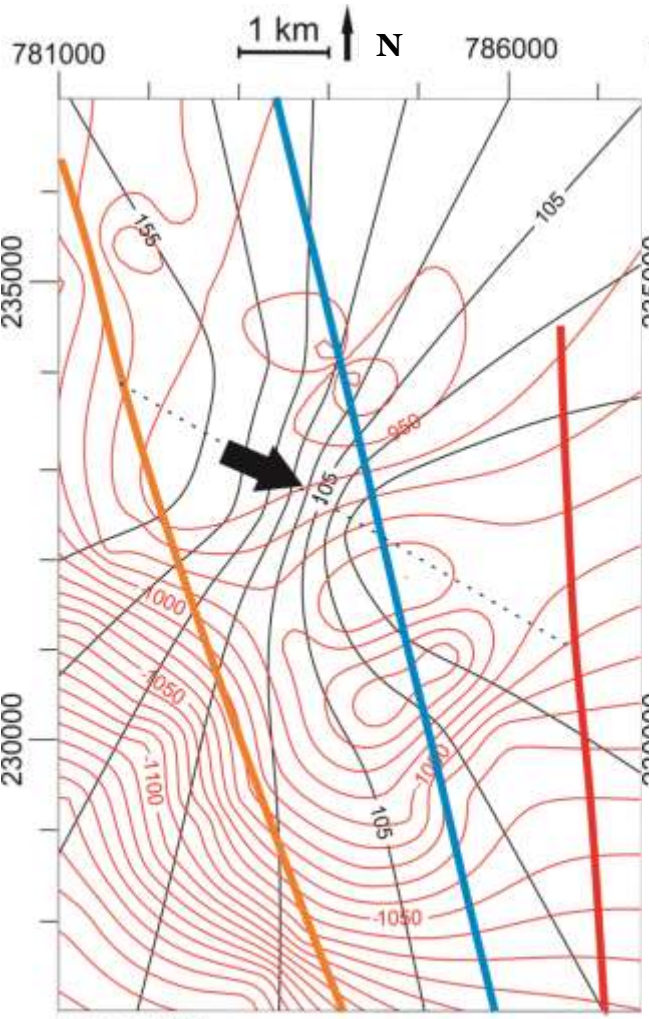
Reservoir top (Z) and water potential (H_w) map



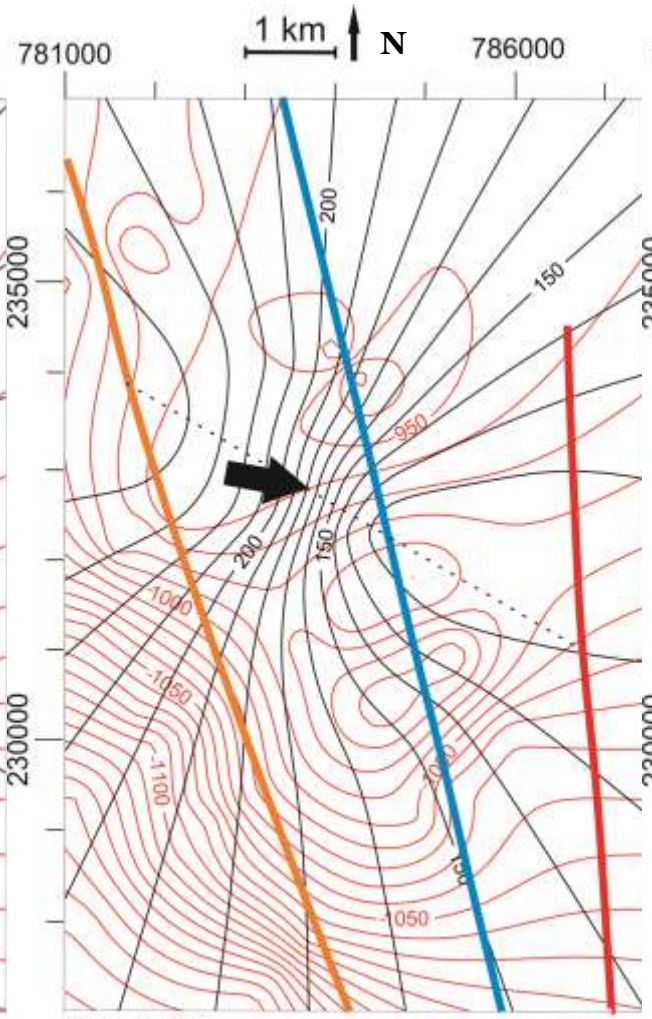


Water potential maps with respect to gas(V)

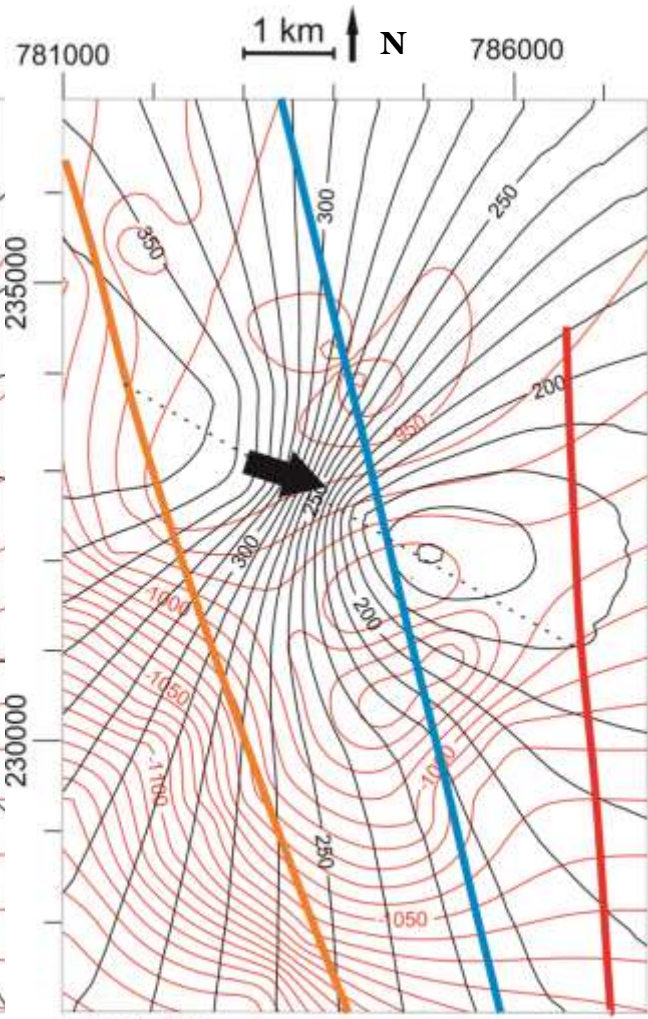
0,1 g/cm^3



0,4 g/cm^3



0,6 g/cm^3

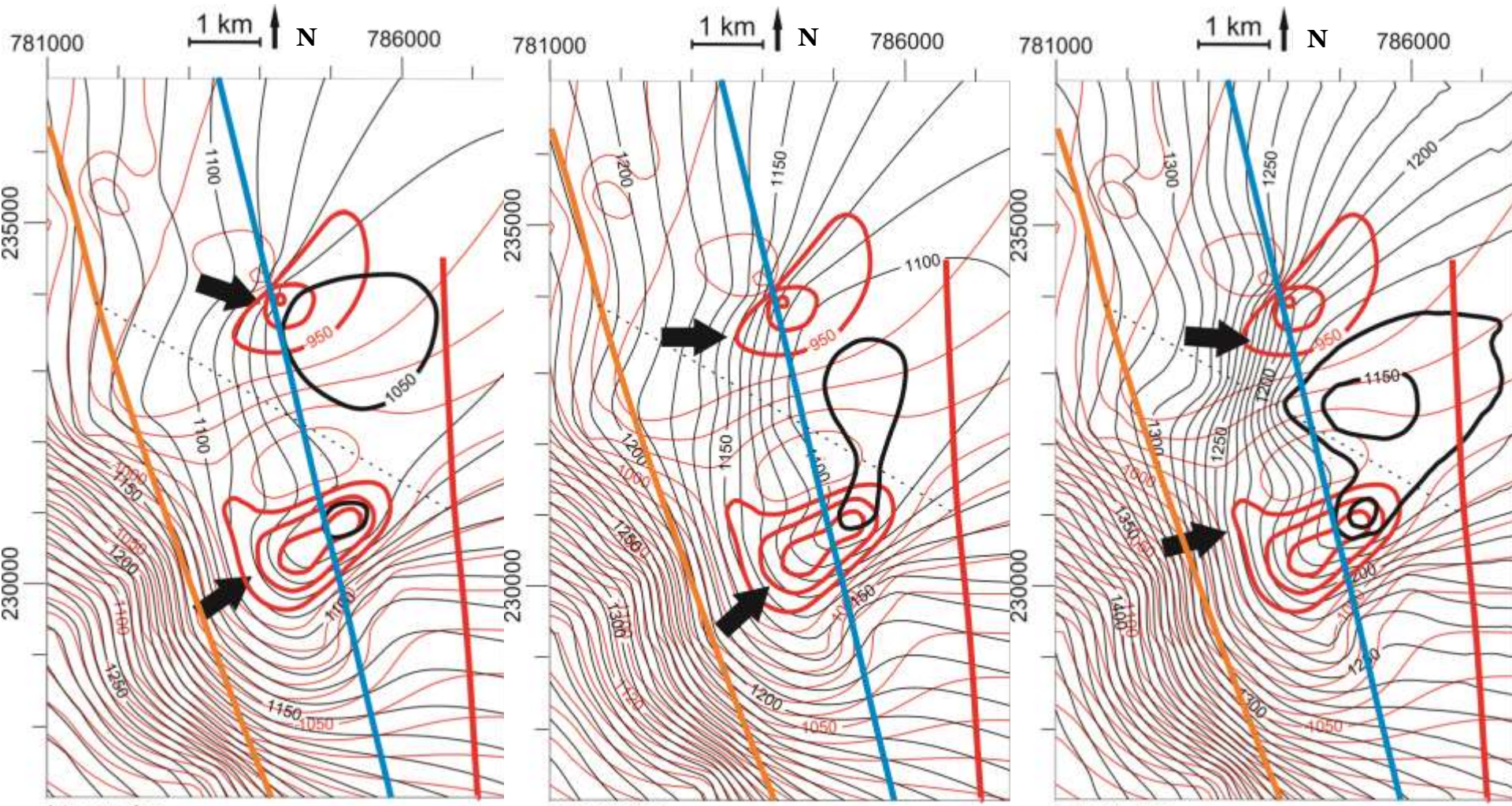


Gas potential maps(U)

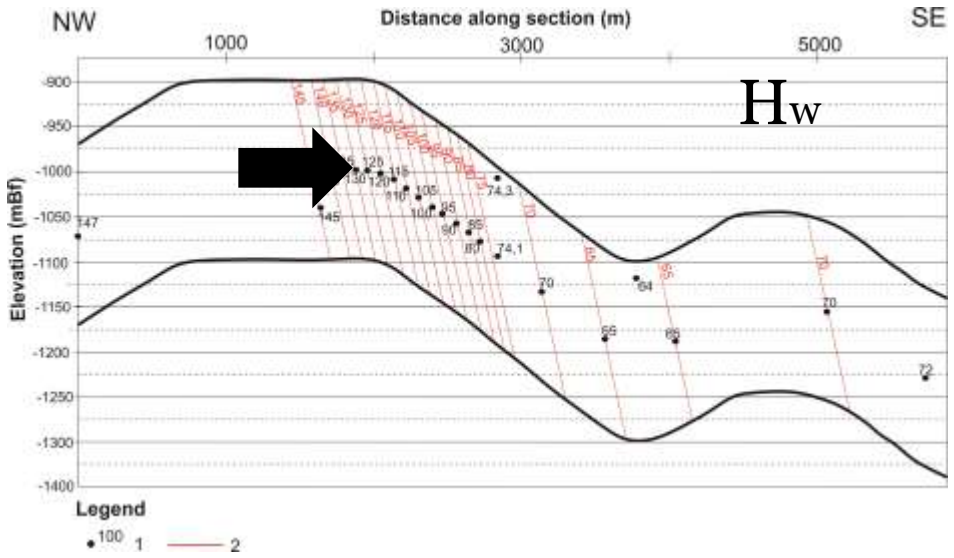
0,1 g/cm^3

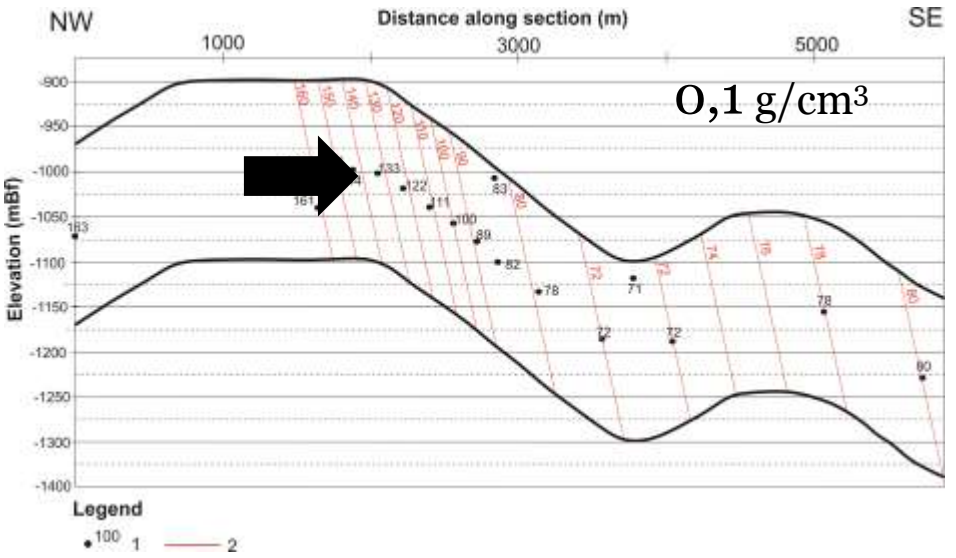
0,4 g/cm^3

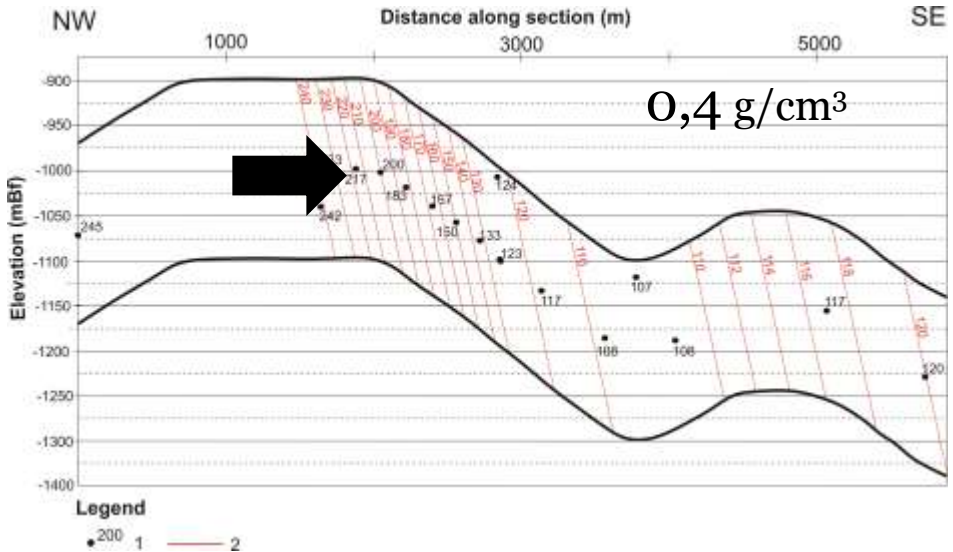
0,6 g/cm^3

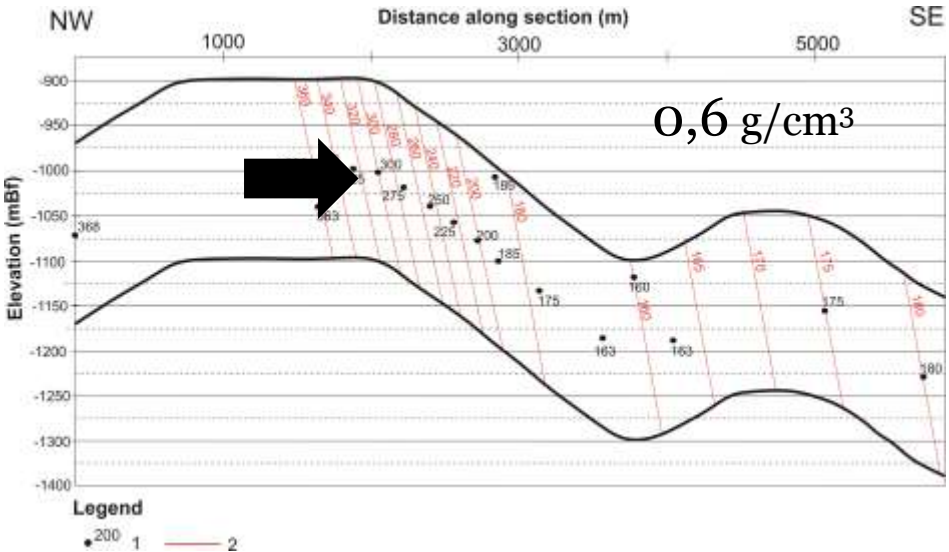


Hydraulic cross section(H_w) and water potential cross sections with respect to gas(V)

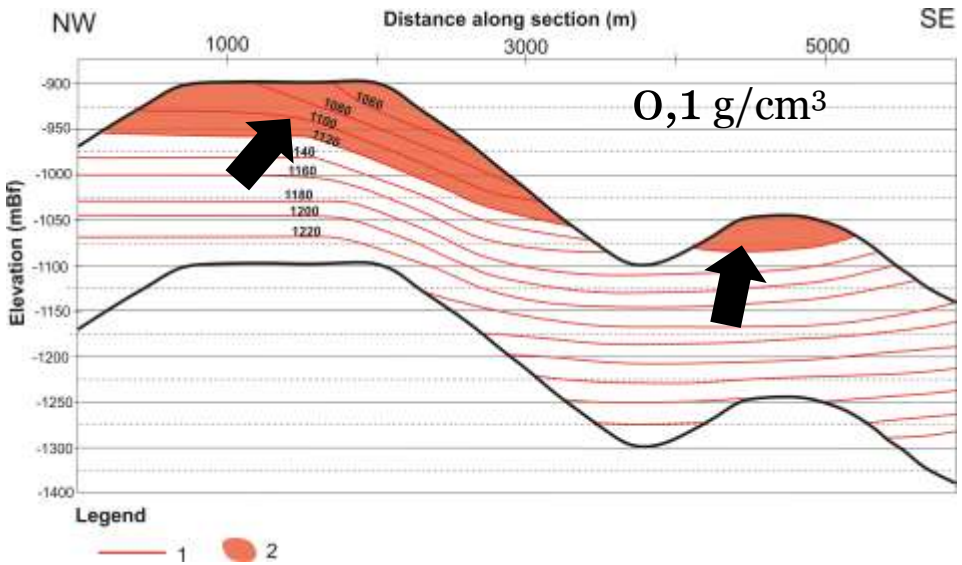


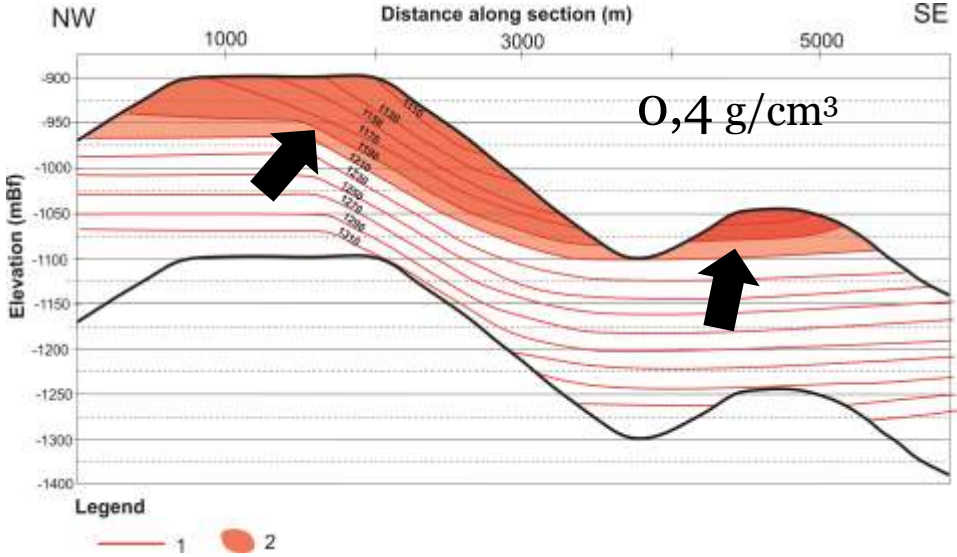


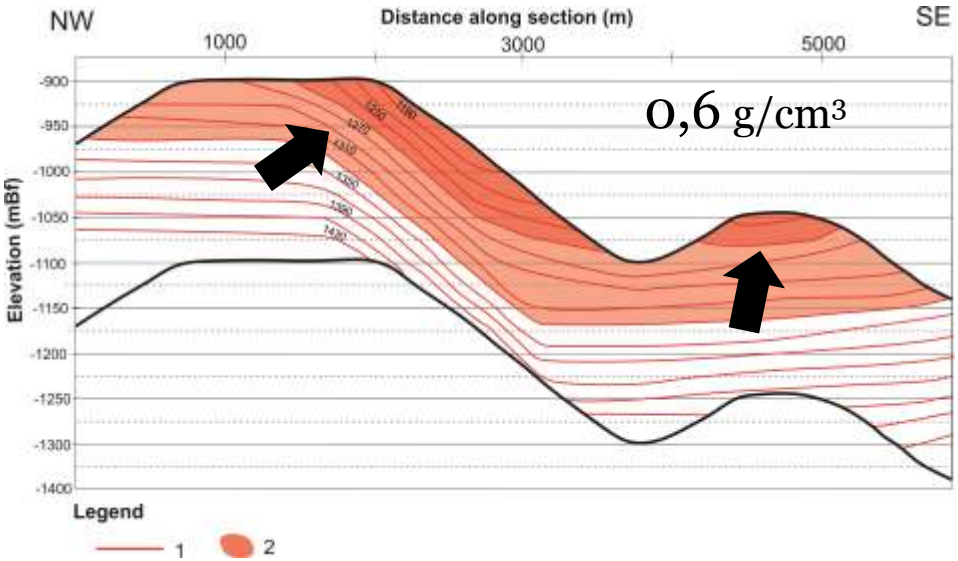




Gas potential cross sections(U)







Summary

- Examination of hydrodynamic trapping possibilities with the UVZ method
- The west-east water flow has a great impact on the hydrocarbon migration and pushes the main accumulation places eastward
- The effect of the water flow can clearly observed in the cross sections
- Places which can characterized by a potential minimum or with big gradient are the most favourable for hydrocarbon entrapment
- The UVZ method provides the resarch and more accurate delineation of hydrocarbon accumulation places in hydrodinamic environment

Thank you for your kind attention!