



Energetické suroviny

- uran
- ropa, zemní plyn
- uhlí
- hydráty CH_4
- geotermální energie

Energie - spotřeba

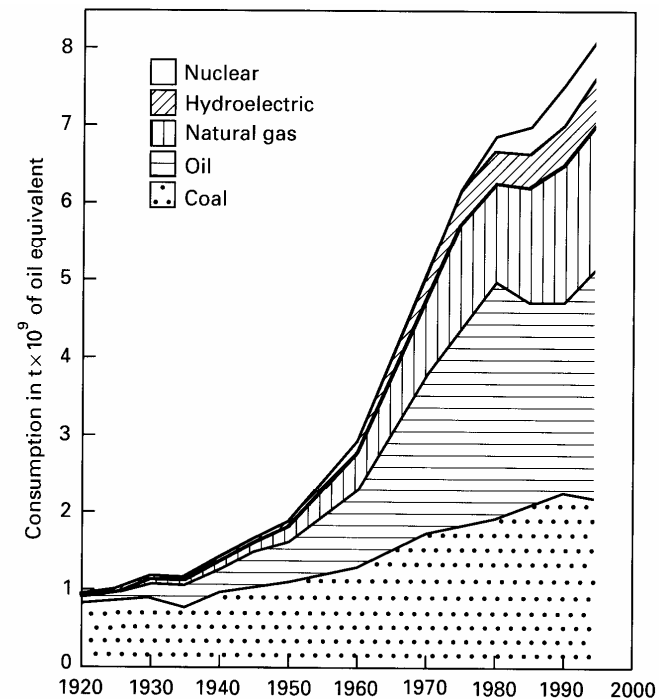


Fig. 23.1 Total world energy consumption since 1920.

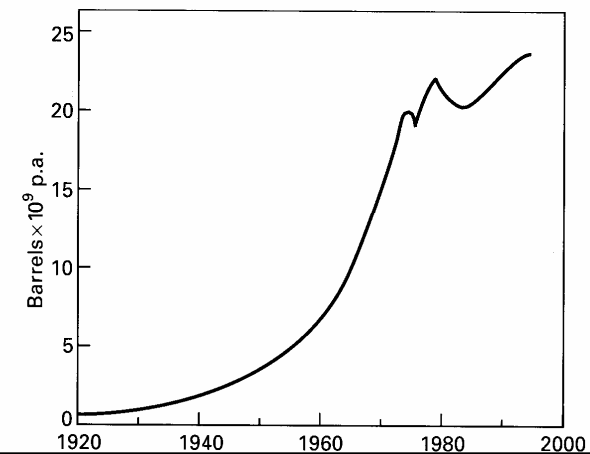


Fig. 23.2 World production of oil since 1920. Note the sharp rise in the 1950s and 1960s and the effects of the oil embargoes in the 1970s.

Vliv na produkci (i ceny) surovin

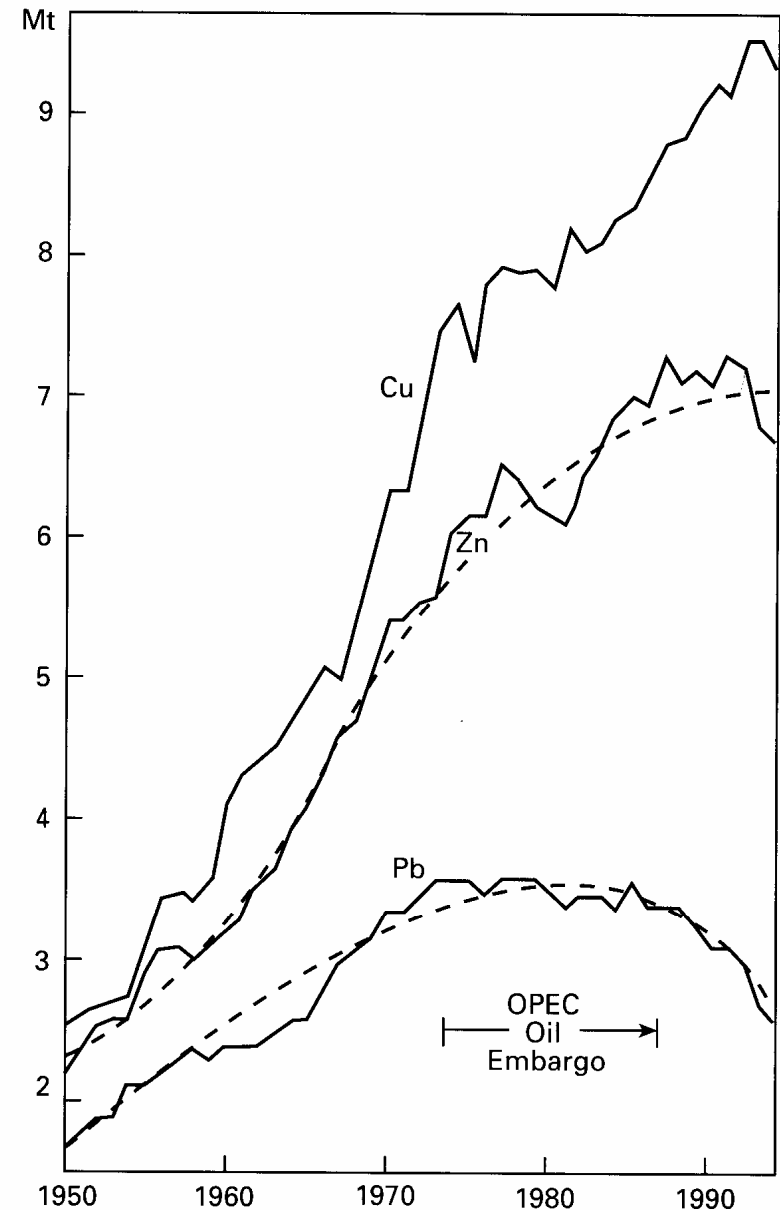
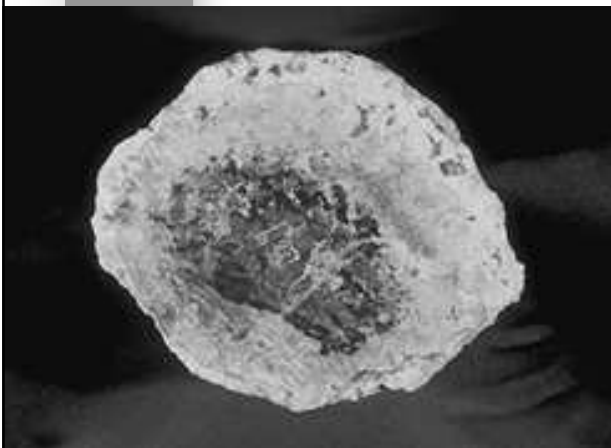
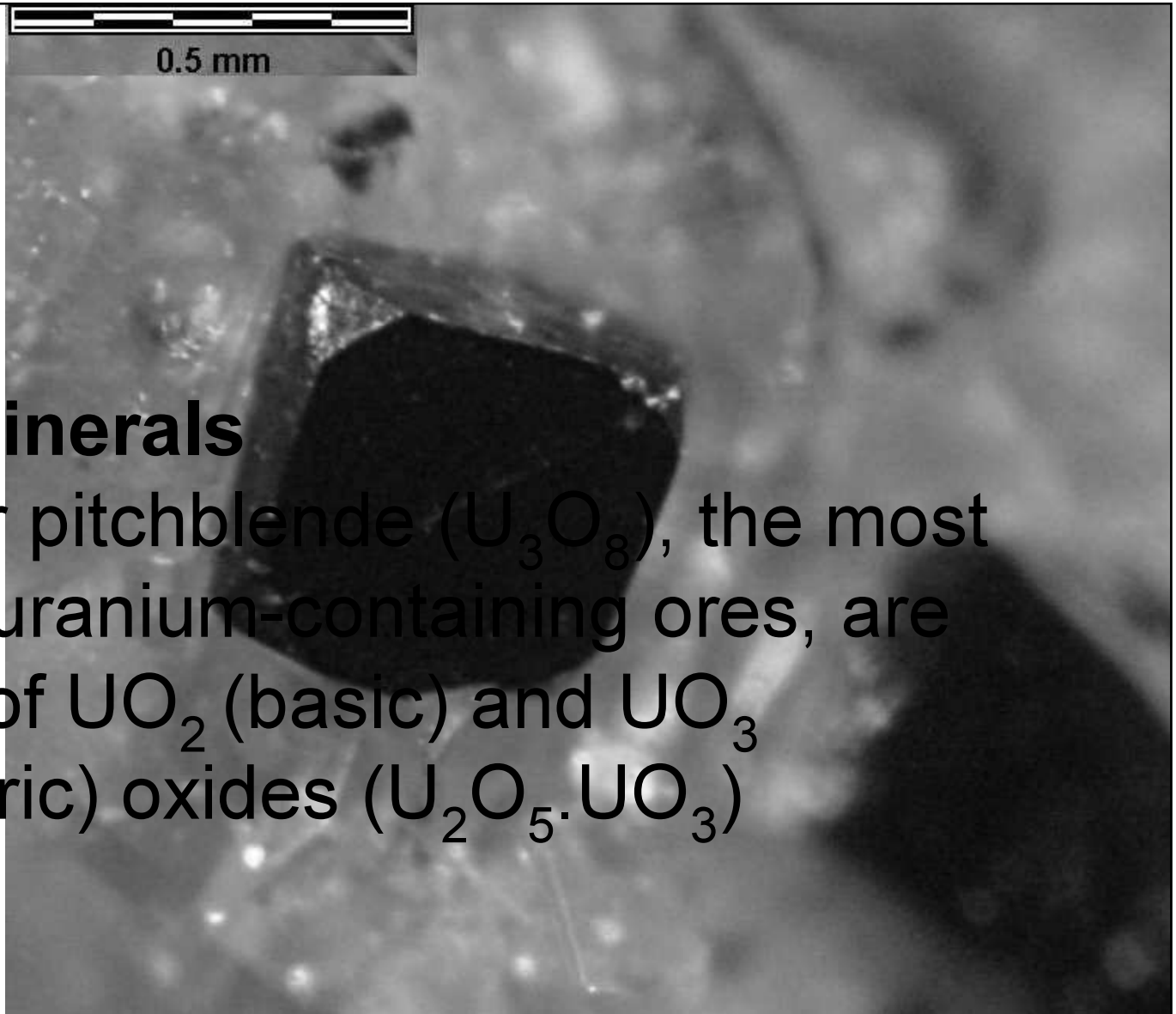


Fig. 2.3 World production of copper, zinc and lead from 1950 to 1994. General trends for zinc and lead superimposed.

Uran

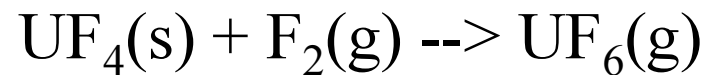
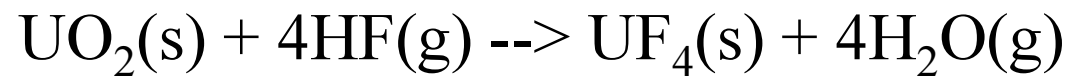
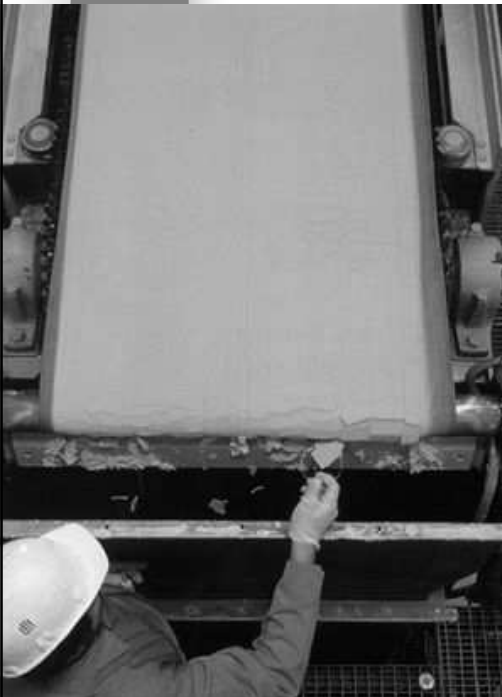
Uranium Minerals

Uranite or pitchblende (U_3O_8), the most common uranium-containing ores, are mixtures of UO_2 (basic) and UO_3 (amphoteric) oxides ($U_2O_5 \cdot UO_3$)

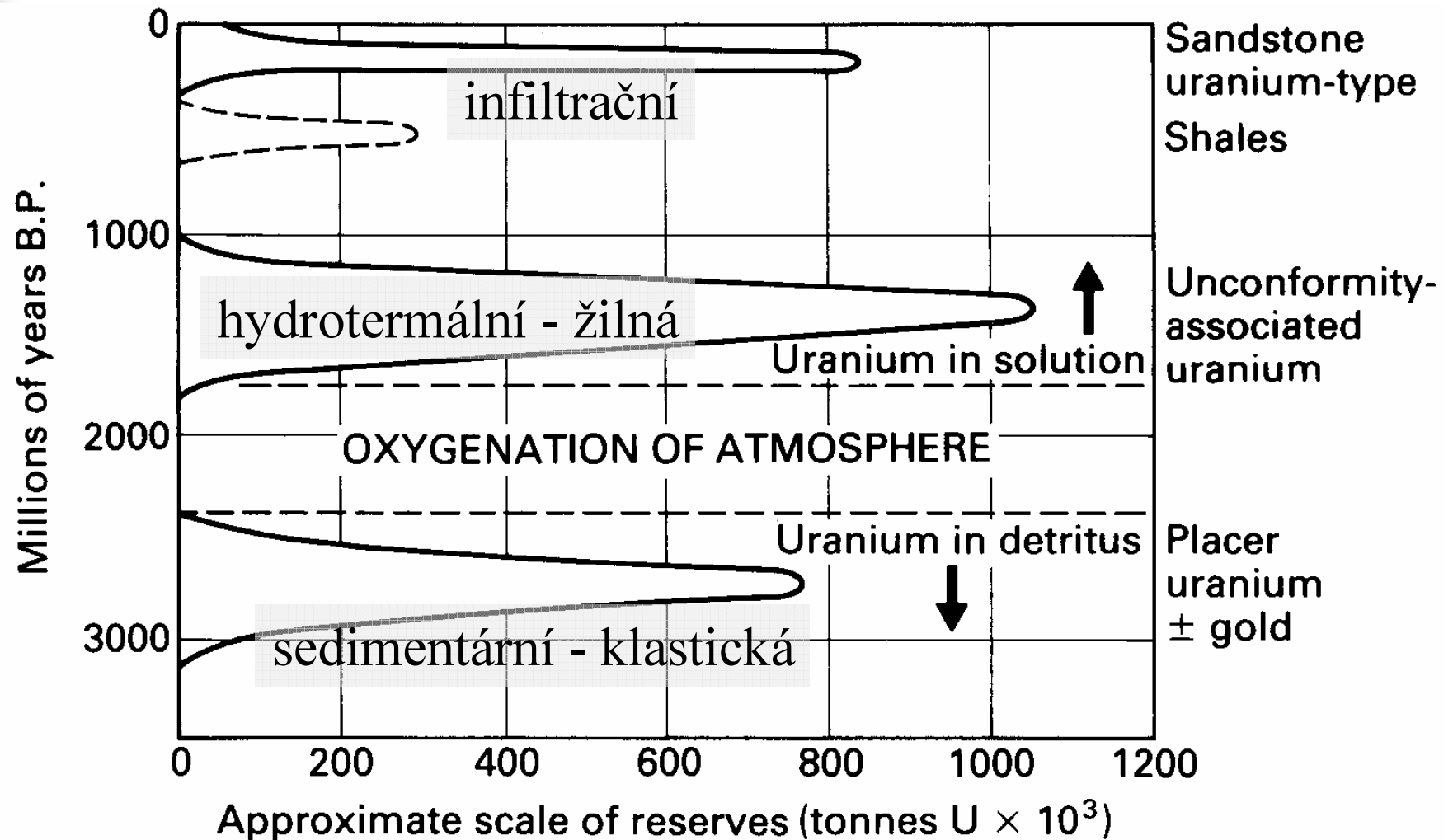


Uran - použití

- yellow cake, U₃O₈,
- obohacování izotopu 235 (plynná difúze), z 1 na 4 %



Průmyslové typy ložisek U a jejich stáří



U – Kanada, Athabasca

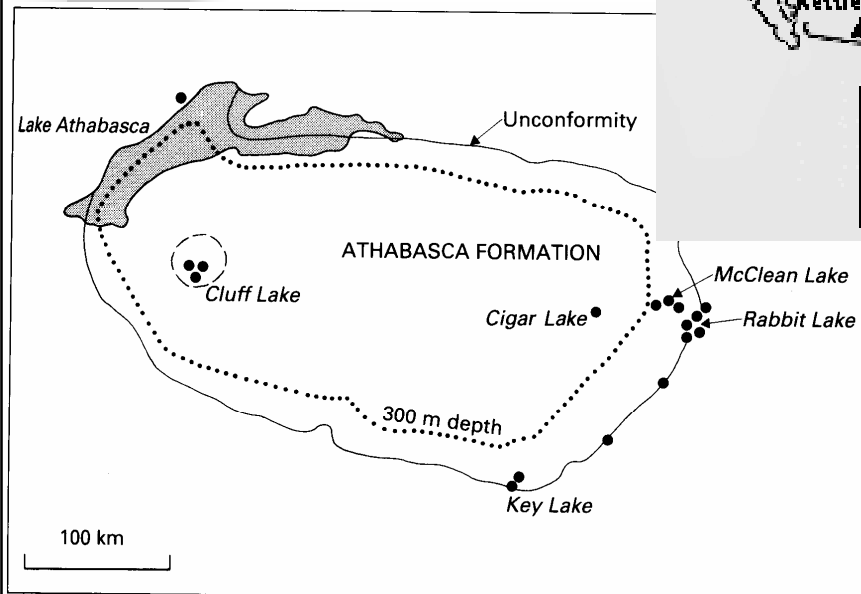
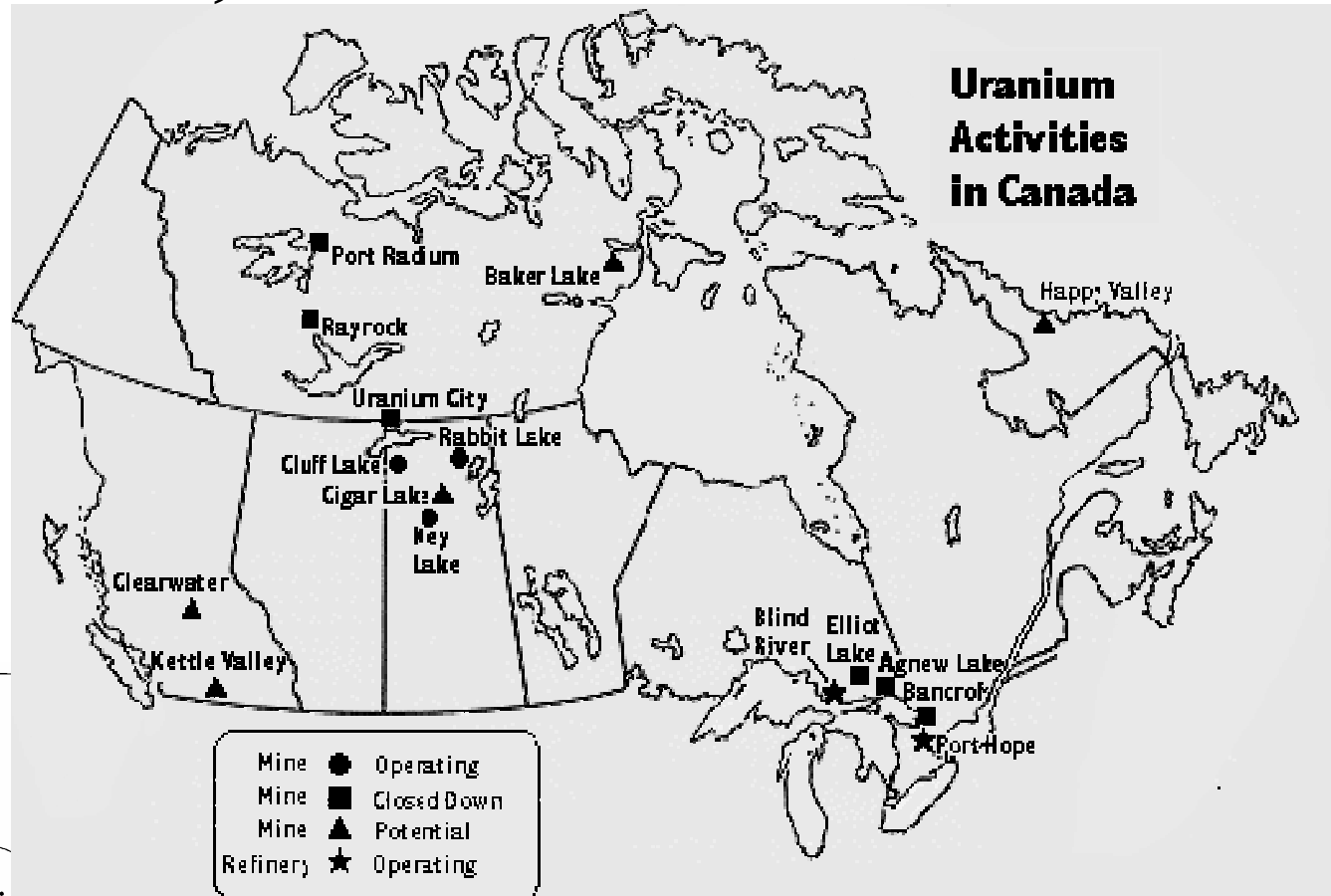


Fig. 17.9 Outline of the Athabasca Basin and distribution of the associated uranium deposits. The basement rocks outside the basin are older Proterozoic and Archaean in age.

U – USA, Wyoming

infiltrační ložiska

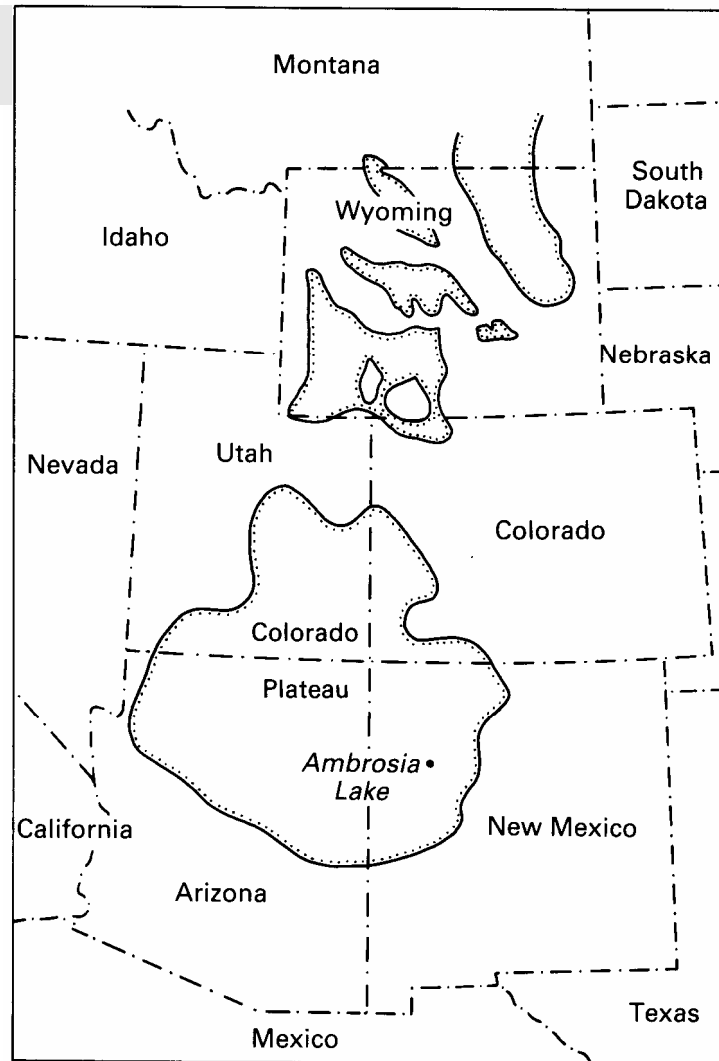
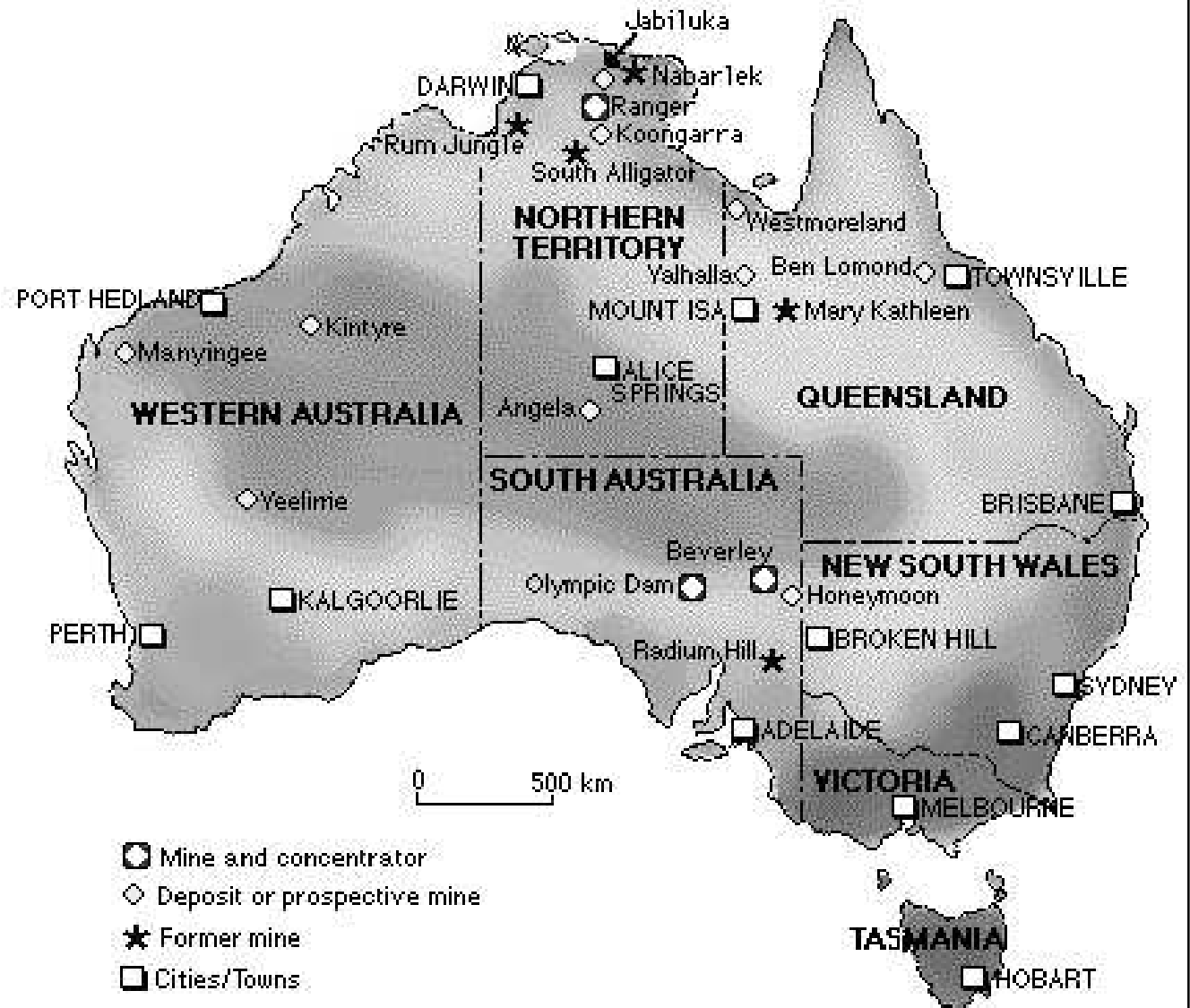


Fig. 18.3 Map showing the Colorado Plateau and Wyoming Basin.

U – Austrálie

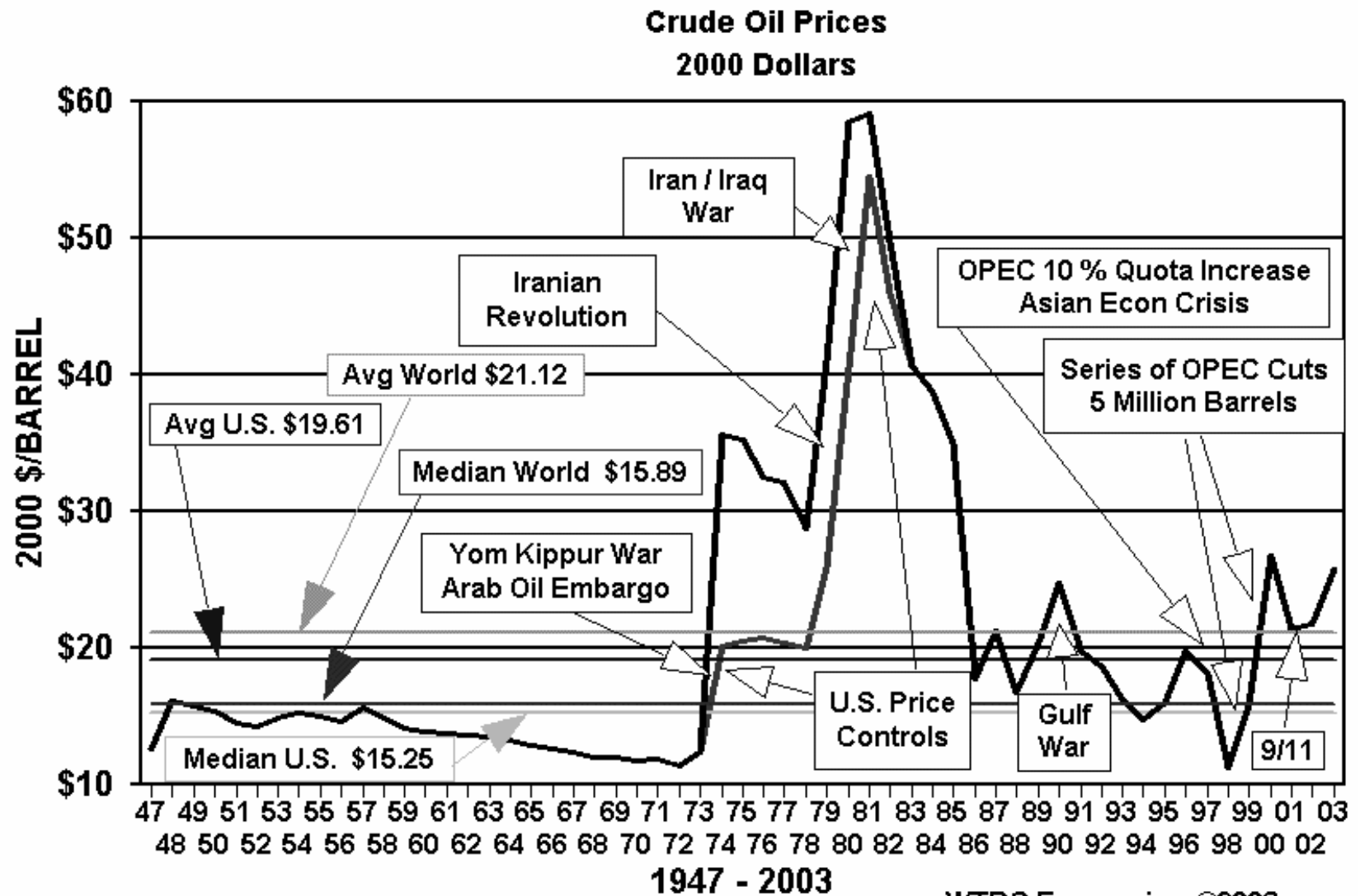




Hlavní světoví producenti, ceny

- Kanada
- Austrálie
- USA
- Rusko
- Evropa?
- 35 000 t uranu v r.2001
- 440 elektráren, 16% el.energie
- 10,73 \$/lb (2003)

Ropa – strategická surovina



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Vznik uhlovodíků

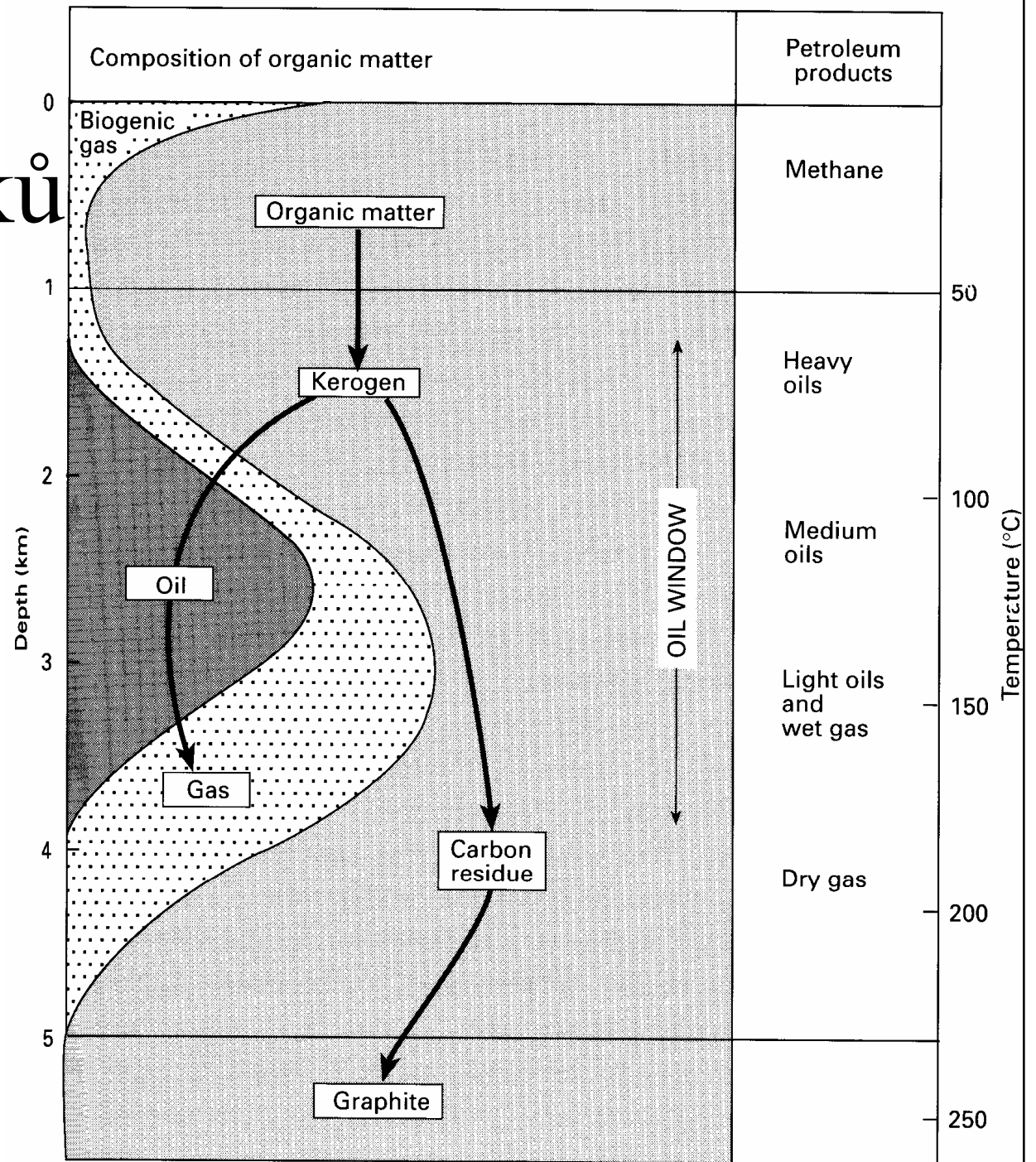



Fig. 25.5 Organic matter diagenesis showing the relationship between temperature, depth of burial and the petroleum products formed.

Geneze kerogenu

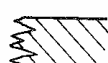
Fig. 25.6 The evolution paths of the three kerogen types during diagenesis.


Principal products of kerogen evolution

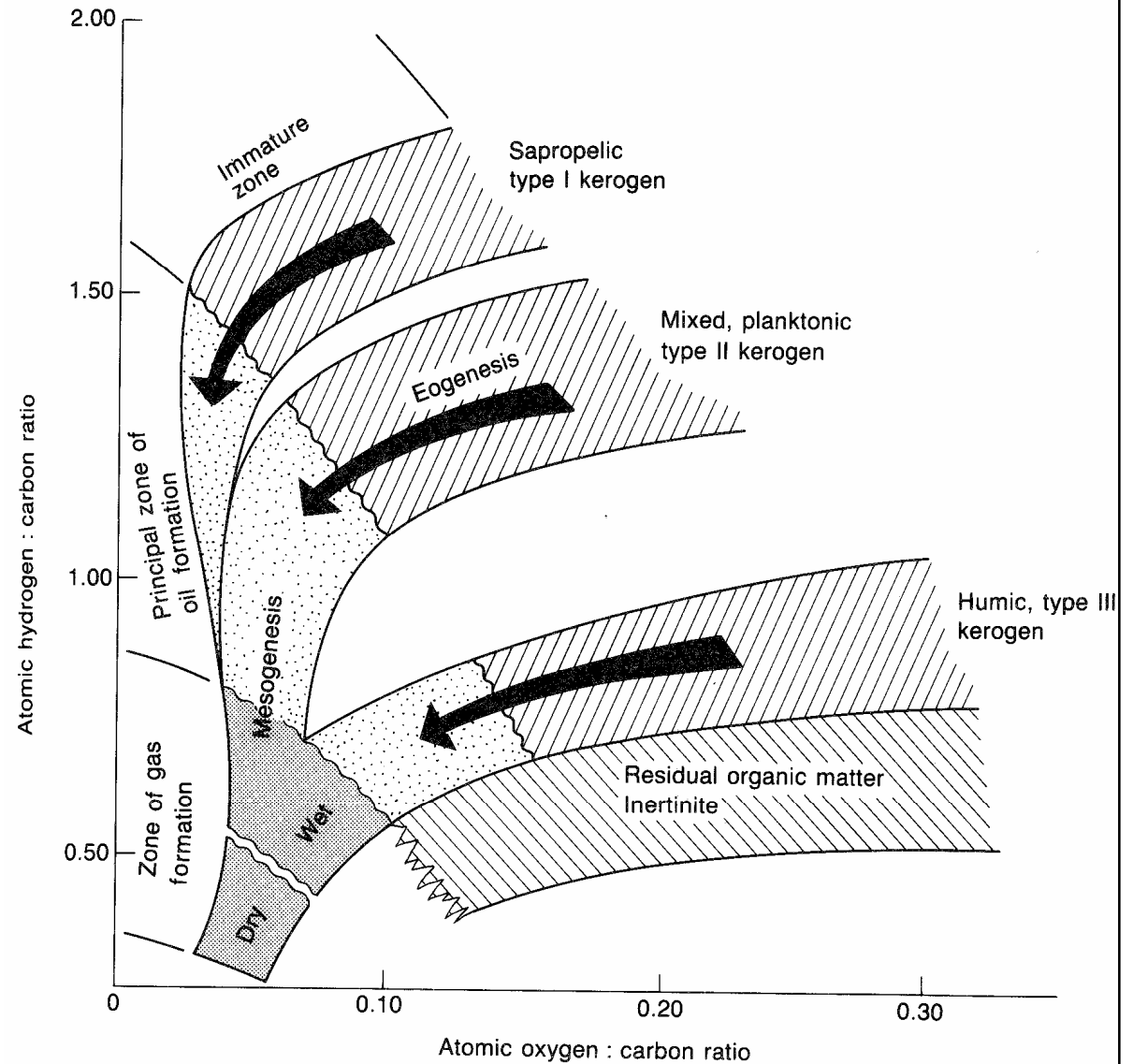
 CO_2 , H_2O , biogenic CH_4 , organic acids

 Oil

 Gas

 Residual organic matter with no further potential for hydrocarbon generation

 Kerogen evolution paths



Ropa - oblasti

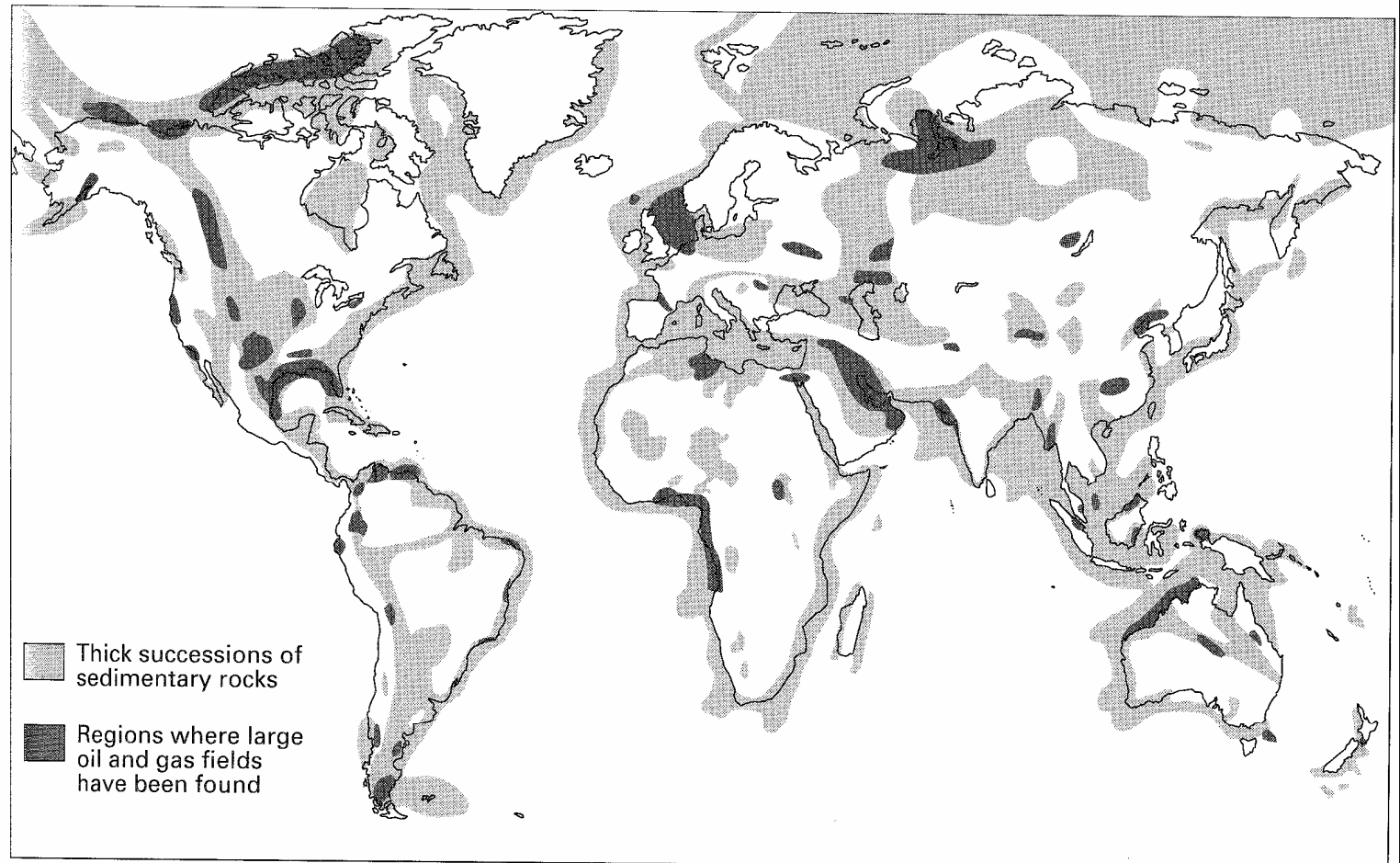
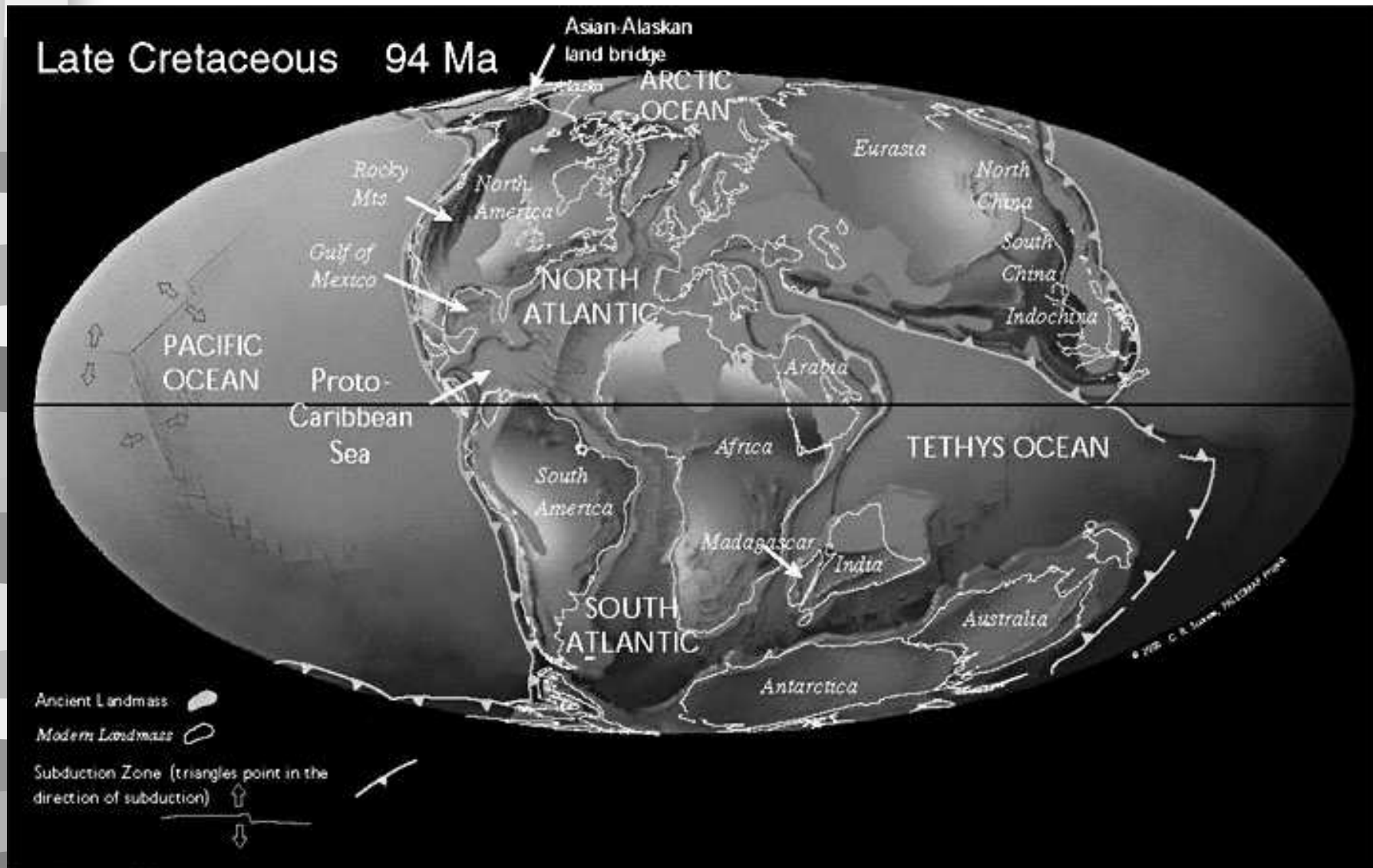


Fig. 25.1 Distribution of sedimentary basins that contain known or potential oil or gas accumulations and the main known oil and gas bearing regions of the world.

Vznik uhlovodíků - paleogeografie



Pasti

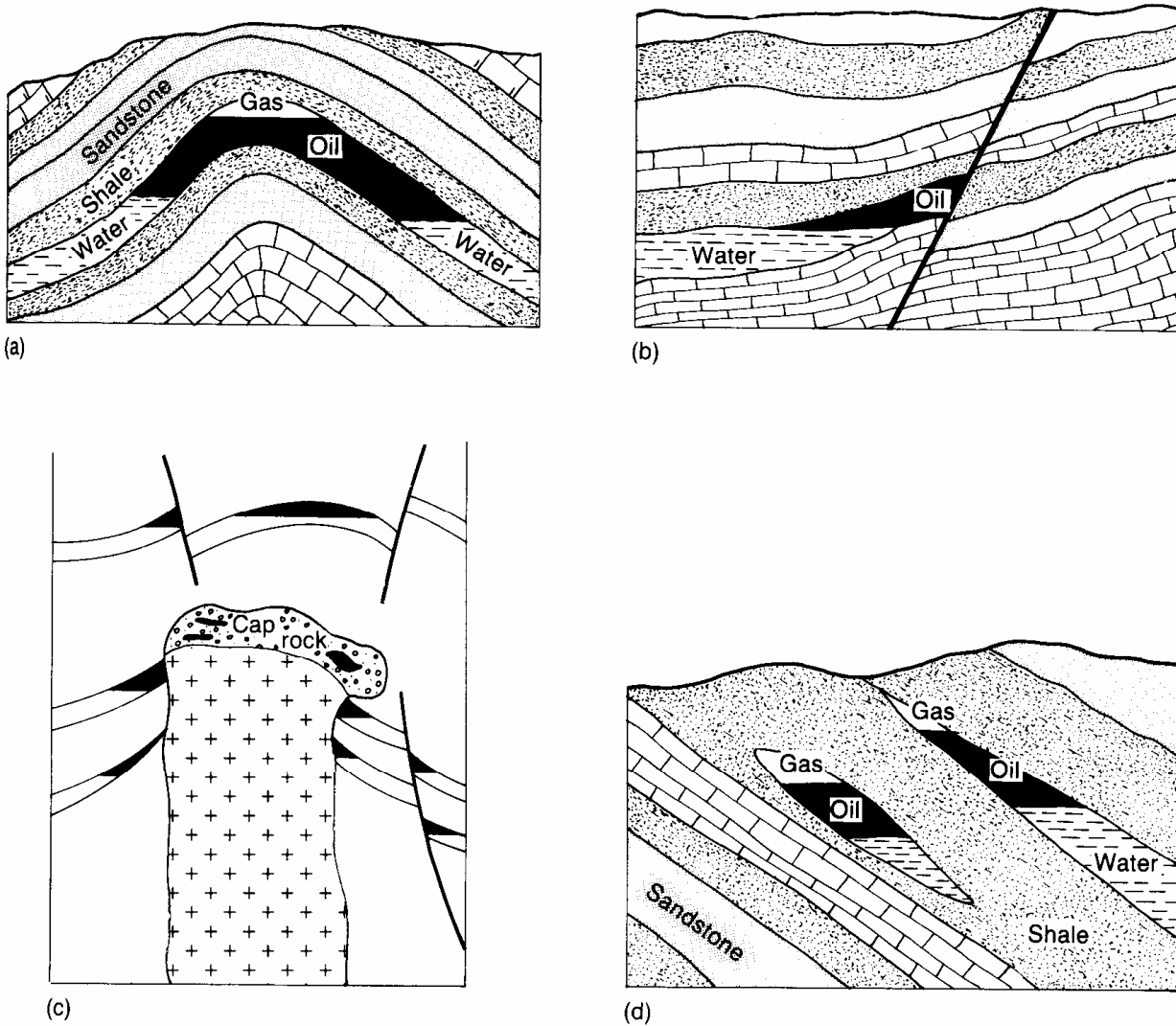
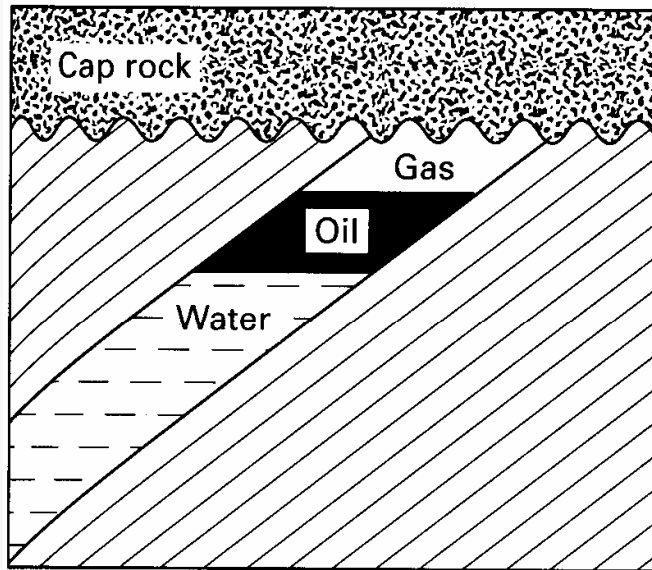
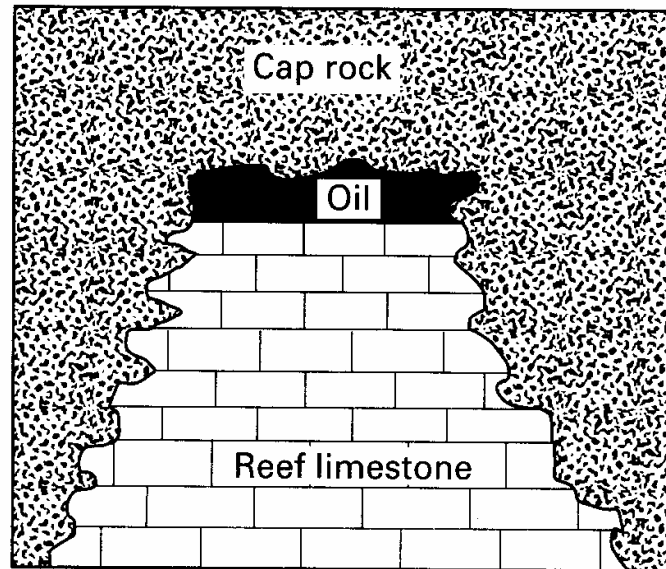


Fig. 25.8 Structural and stratigraphical oil traps. (a) Anticlinal trap developed in a sandstone reservoir in an open, asymmetrical fold. (b) Oil trapped by a fault seal. (c) Schematic diagram of salt dome traps, in supercap, cap rock and flank sandstones (abutting, fault sealed and pinch out). (d) Two types of stratigraphical traps. Right, sandstone wedge out; left, sandstone lens.

Pasti II.

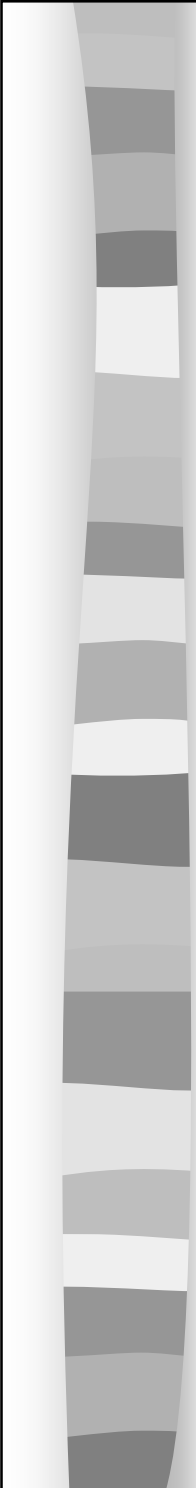


(a)



(b)

Fig. 25.9 (a) Unconformity trap.
(b) Reef trap.



Nejvýznamnější produkční oblasti

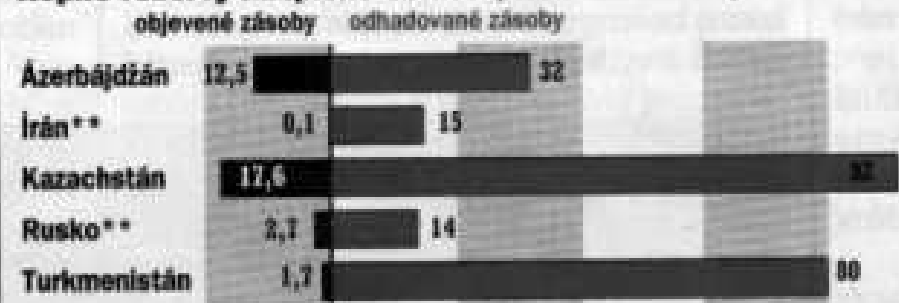
- Perský záliv
- Severní moře
- Rusko
- jv. Asie
- ...

Kaspická oblast

Kaspické moře: Ropný zdroj budoucnosti



Ropné rezervy kaspické oblasti (v miliardách barelů*)



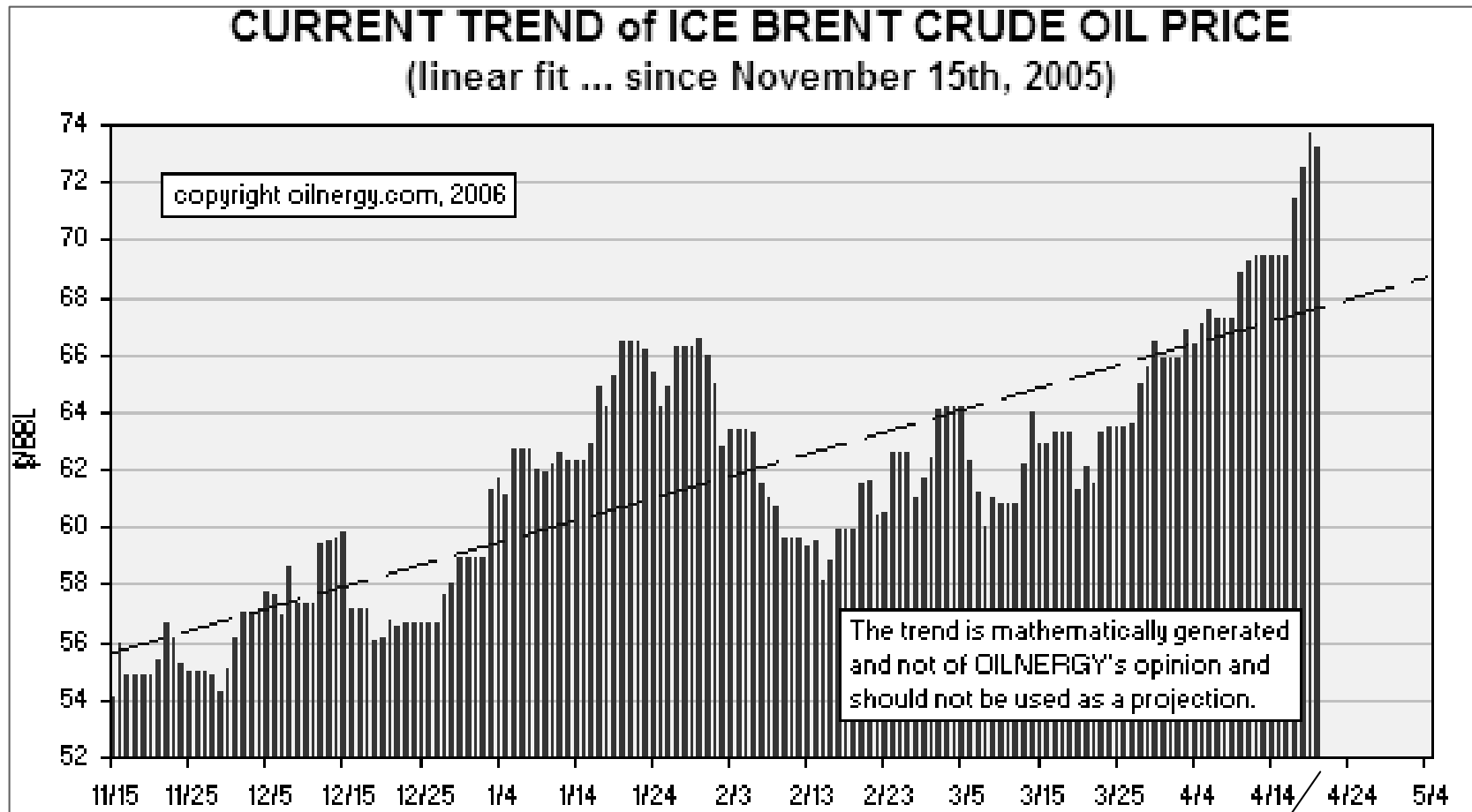
*) barel je zhruba 159 litrů

**) započítány jsou jen těžební oblasti v kaspickém regionu

Zdroj: U. S. Energy Information Administration

REUTERS

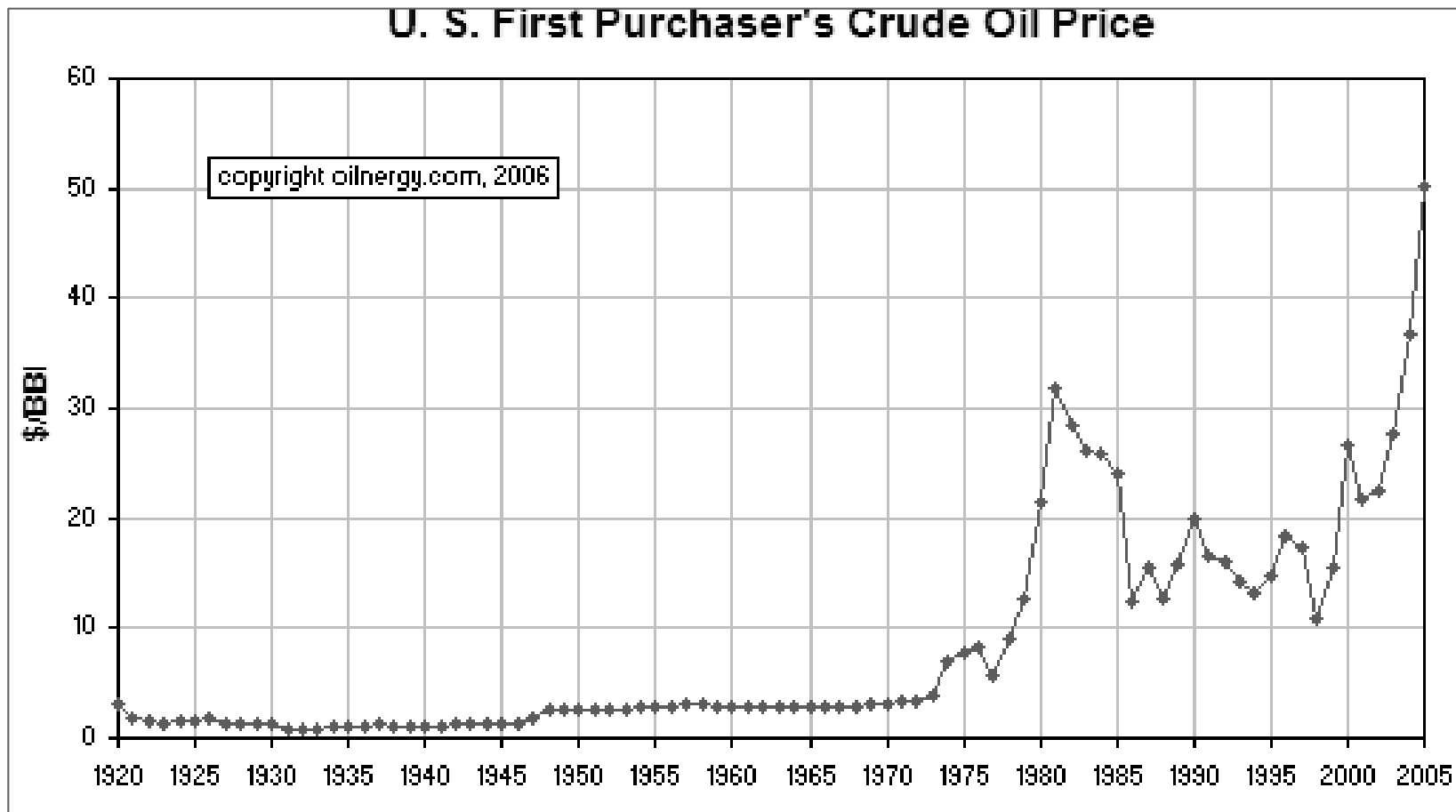
Cena ropy



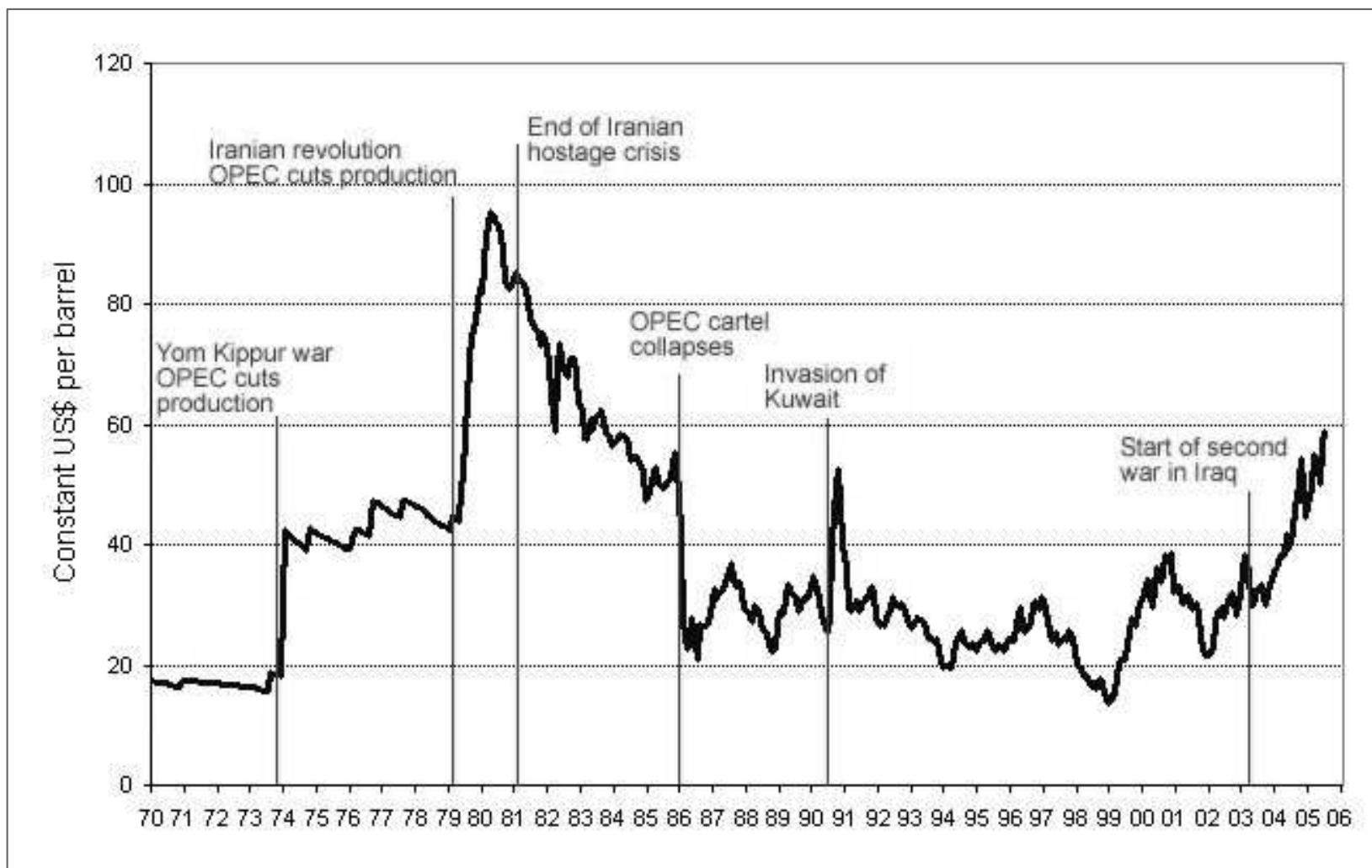
20.4.2006

Historie cen ropy

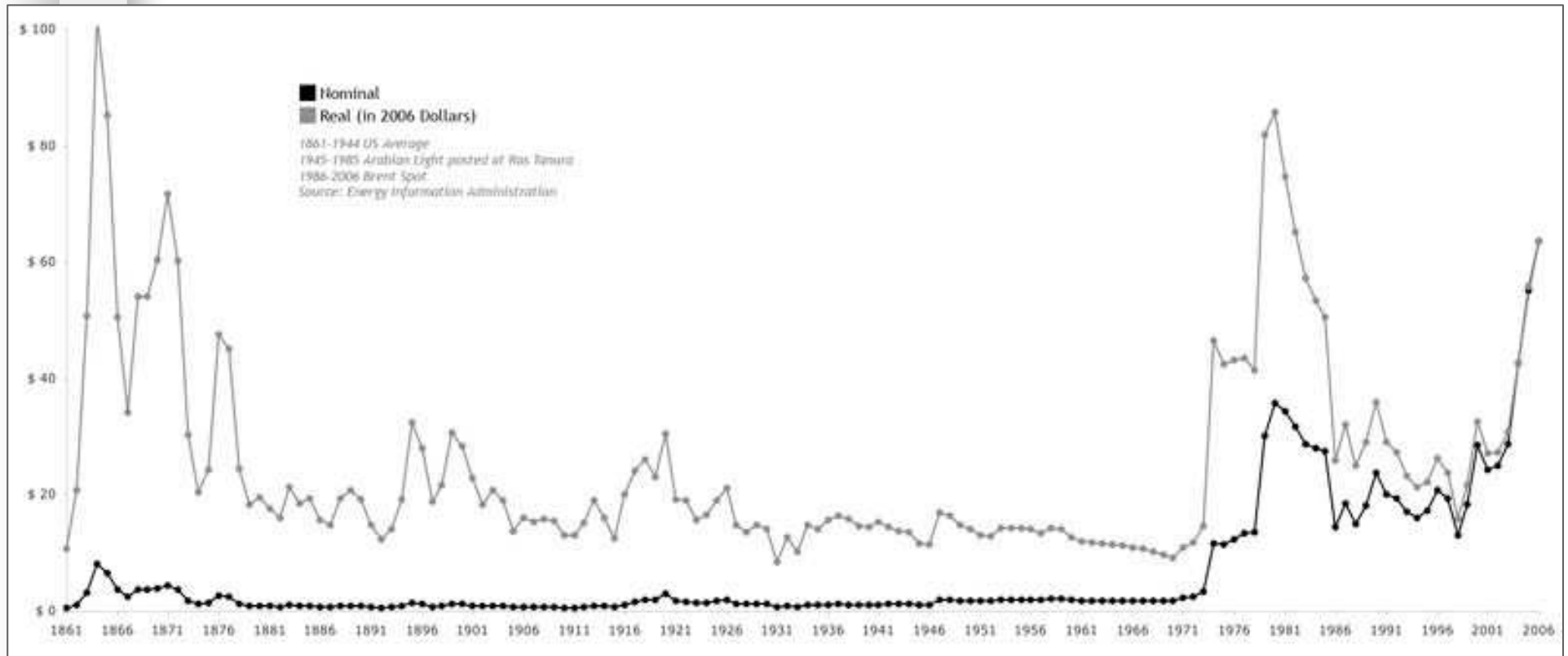
U. S. First Purchaser's Crude Oil Price



Ceny a mezinárodní konflikty



Ceny ropy



Další zdroje uhlovodíků

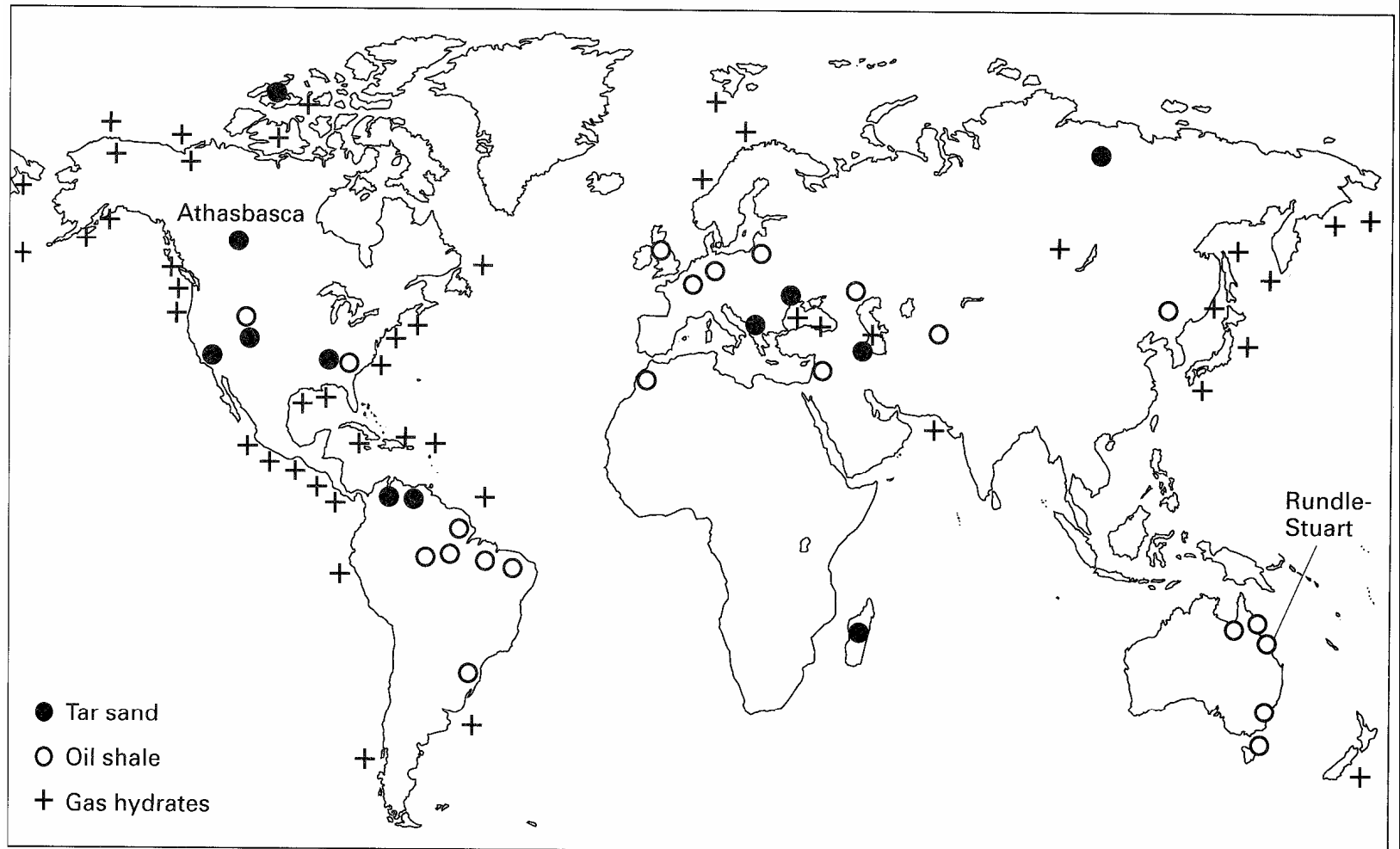
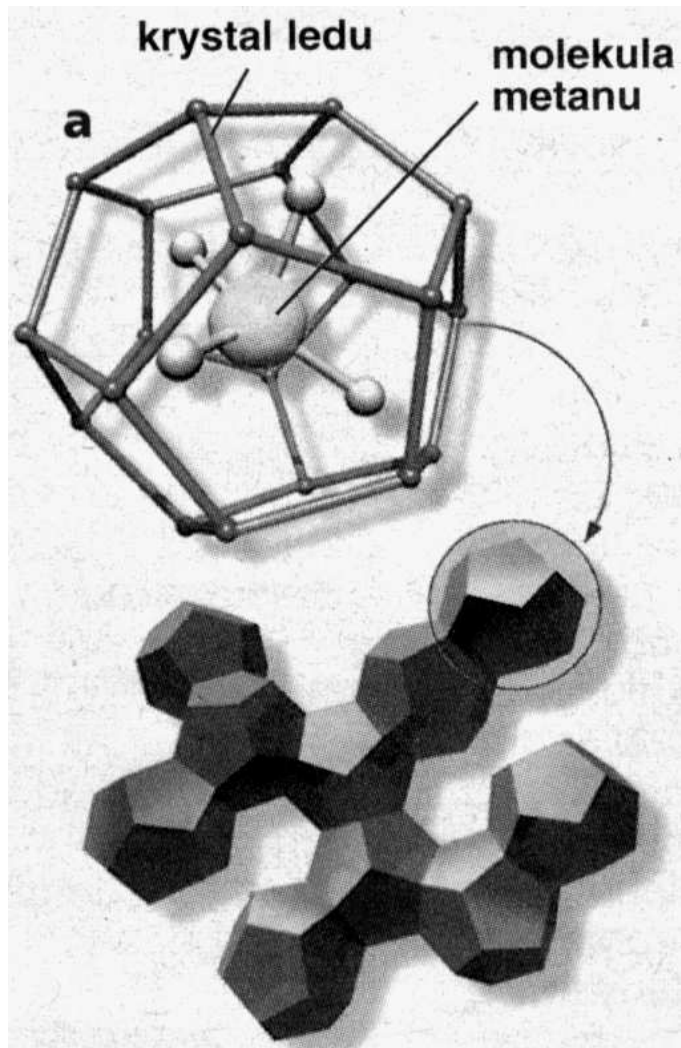


Fig. 25.13 World distribution of important tar sand and oil shale deposits, and the known occurrences of gas hydrates.

Hydráty CH_4



Vrstvičky hydrátů metanu

Figure-2 Layers of gas hydrate in a subsea sediment sample.

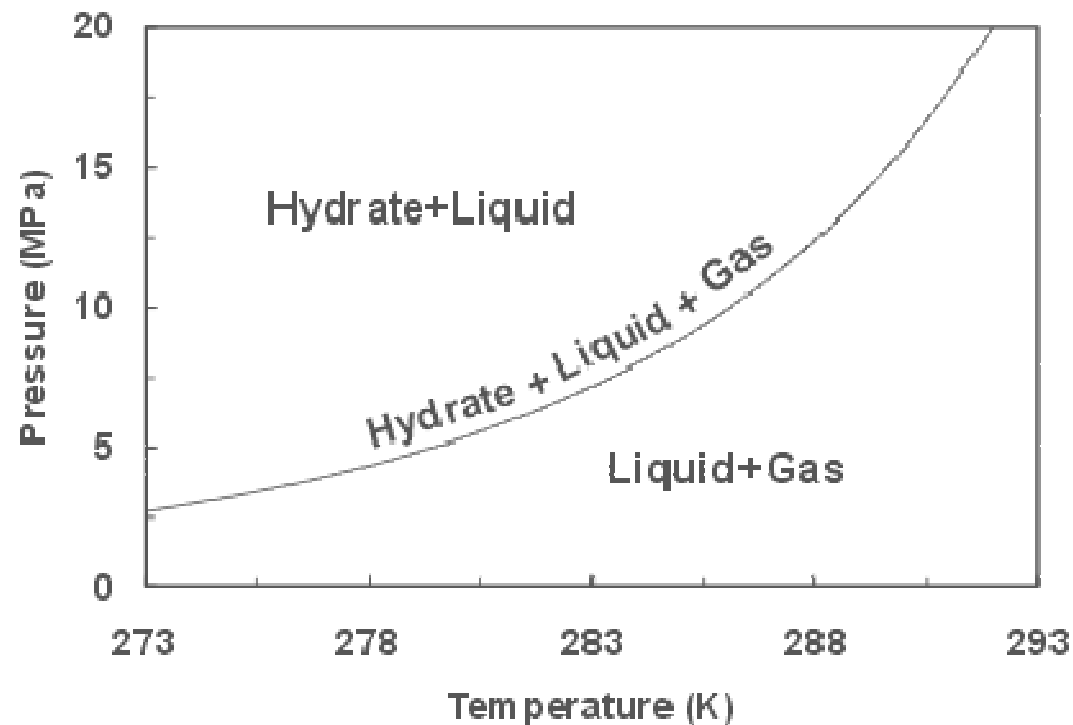
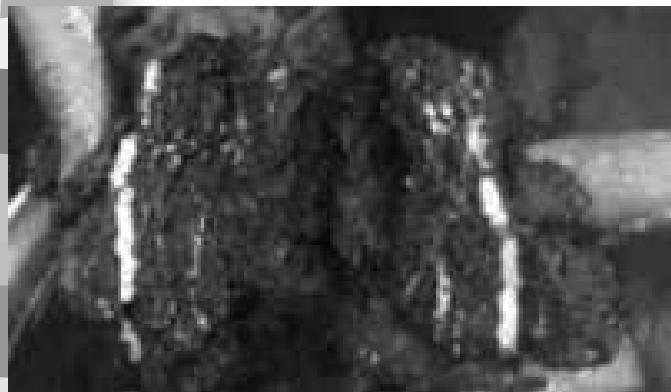


Figure 1 Pressure versus temperature phase diagram for simple methane hydrates.

Stabilita hydrátů CH_4

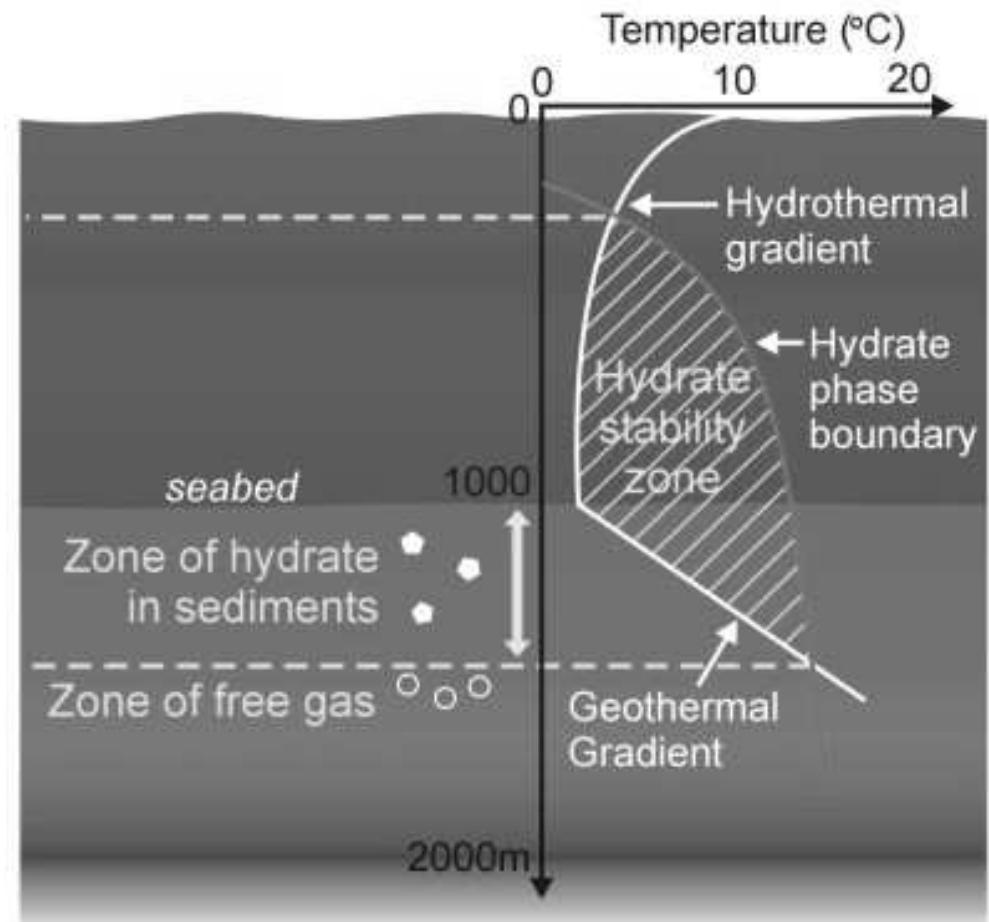


Figure 3 The Hydrate Stability Zone in Subsea Sediments

Rozšíření hydrátů metanu

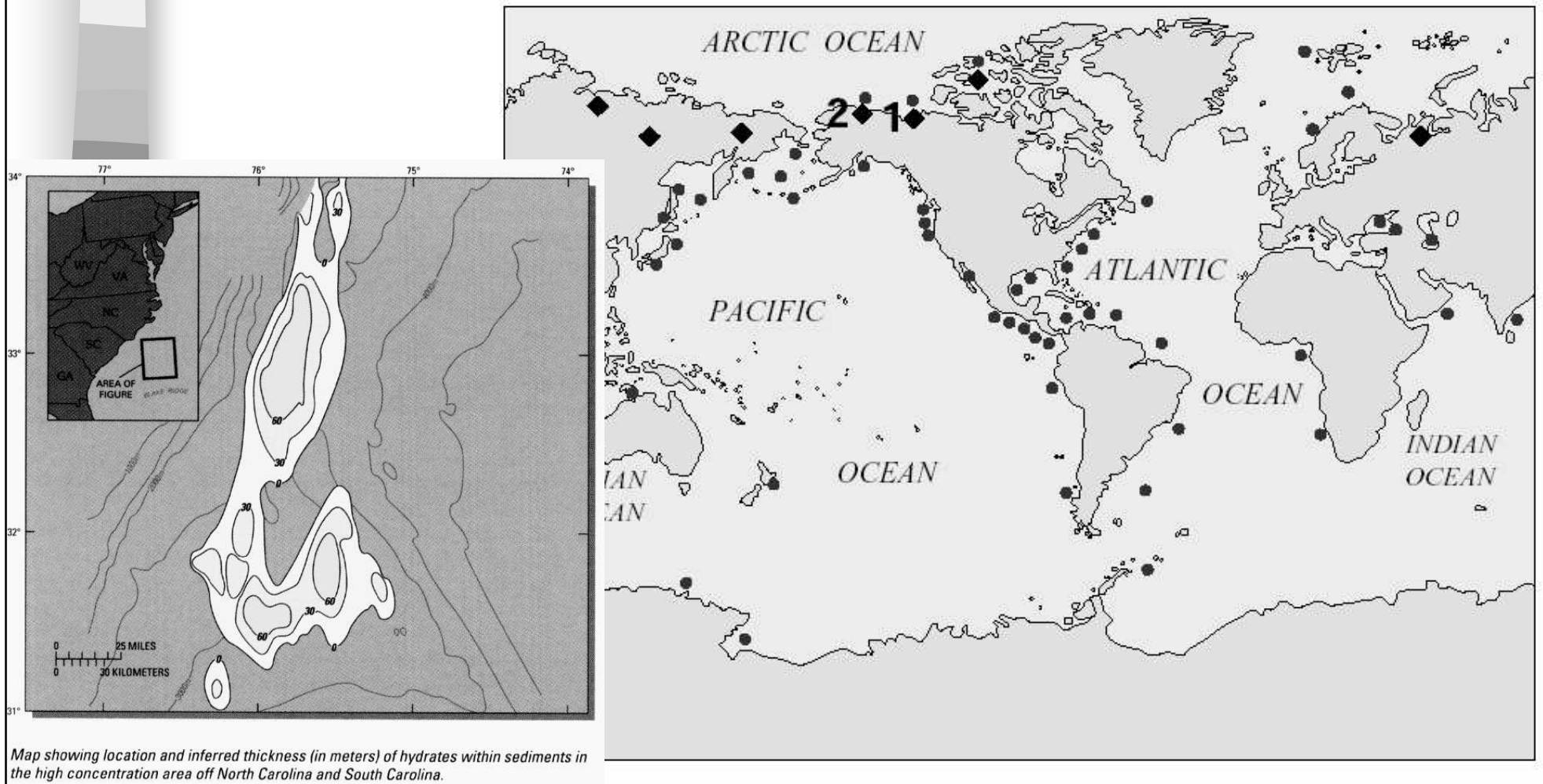
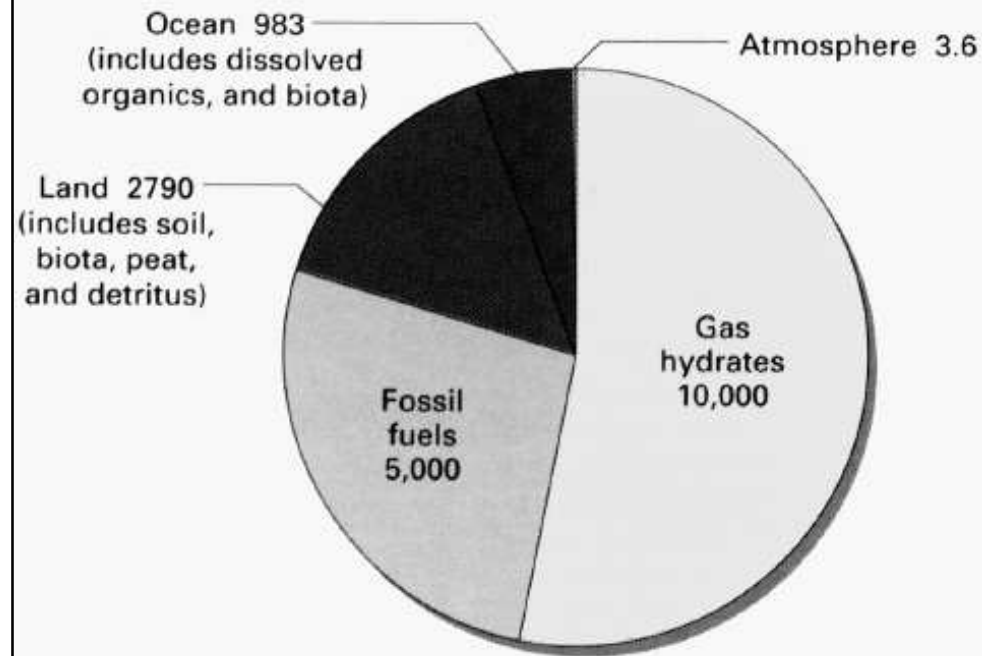
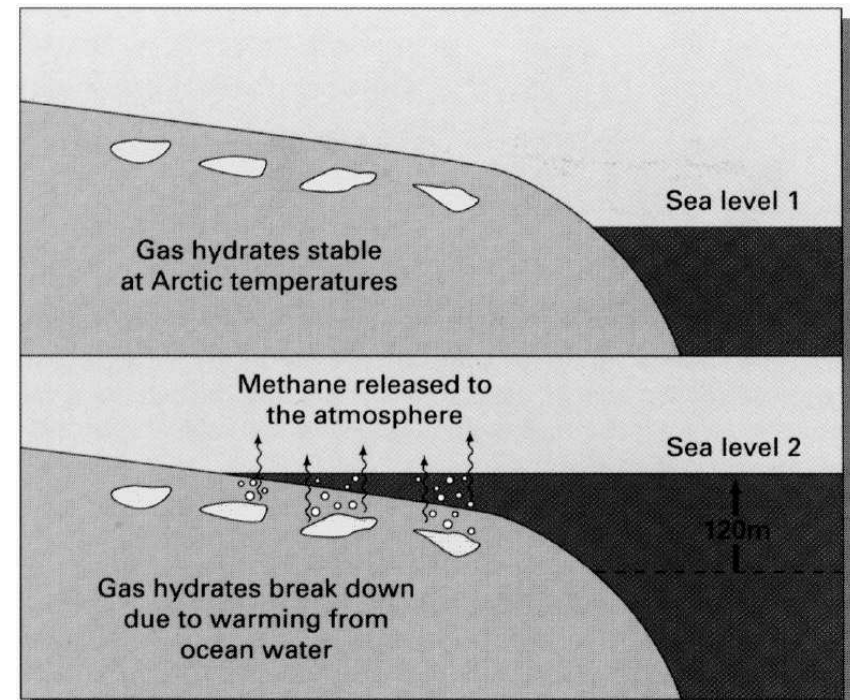
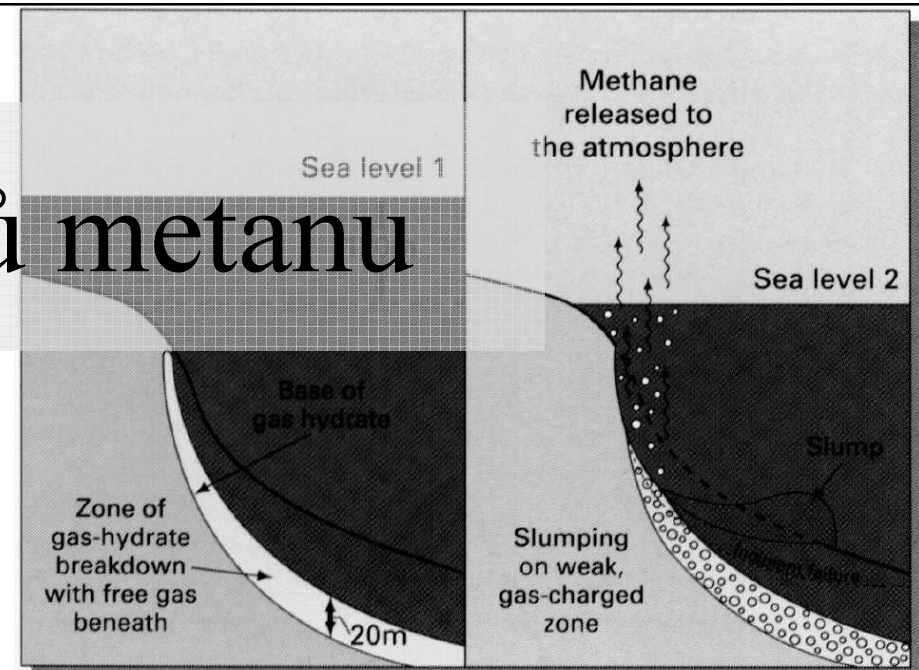


Figure 1. Known and inferred natural gas hydrate occurrences in marine (red circles) and permafrost (black diamonds) environments. Modified from K. A. Kvenvolden, U.S. Geological Survey (written commun., 1999). The USGS is studying hydrates at sites 1 (Mackenzie Delta, Canada) and 2 (North Slope, Alaska).

Význam hydrátů metanu



Distribution of organic carbon in Earth reservoirs (excluding dispersed carbon in rocks and sediments, which equals nearly 1,000 times this total amount). Numbers in gigatons (10^{15} tons) of carbon.



Sea-level rise causes relatively warm ocean water to cover cold Arctic strata. The resulting breakdown of stable gas hydrates within the sediment releases gas into the atmosphere.

Uhlí - oblasti

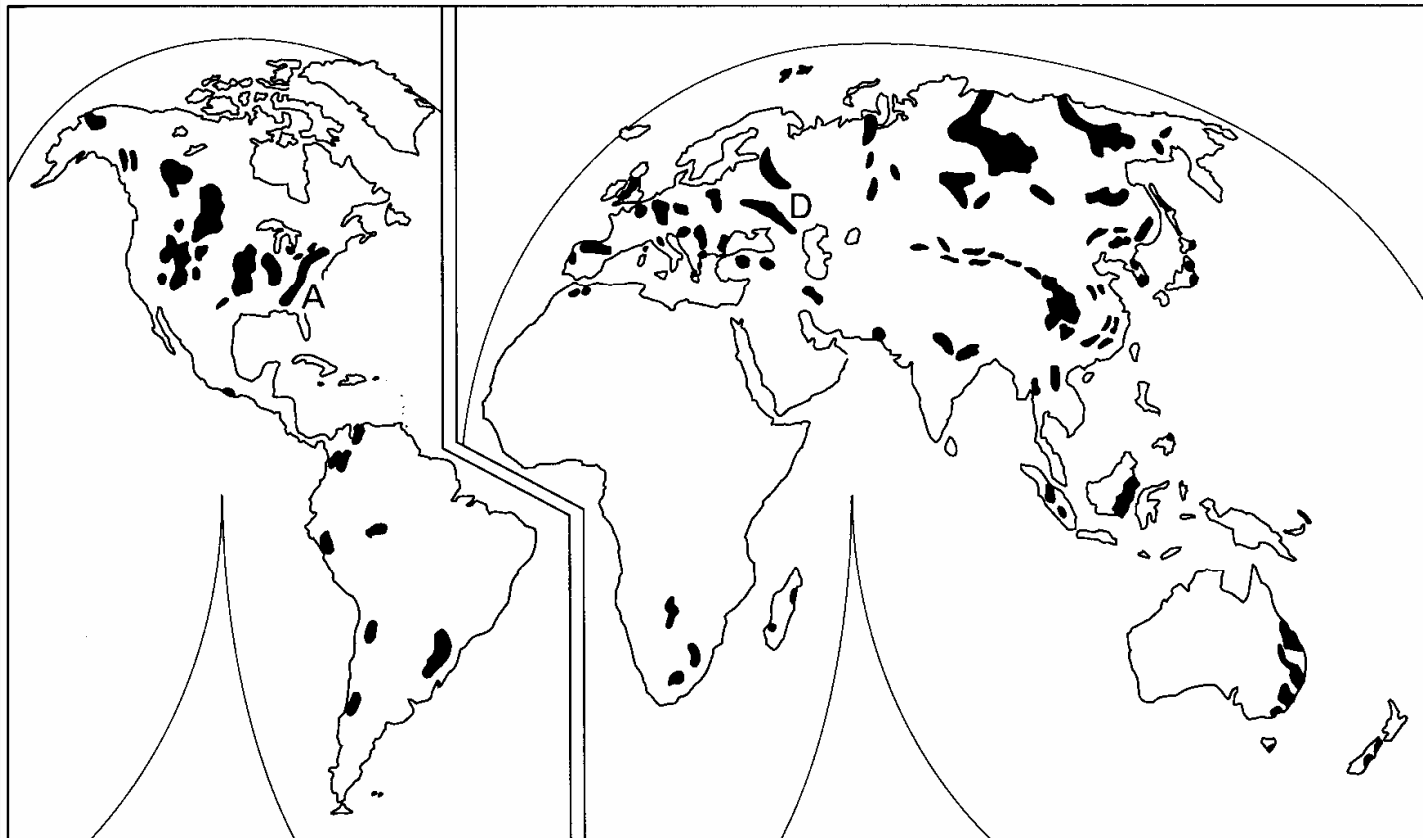


Fig. 24.2 World distribution of coalfields. A, Appalachian; D, Donets.

Uhlonosné pánve - typy

■ paralická

pasivní okraje kontinentů, delty

■ limnická

intrakratonní pozice



Mangrove Swamp in the
Everglades, SW Florida

Delta – uhlonosné cykly

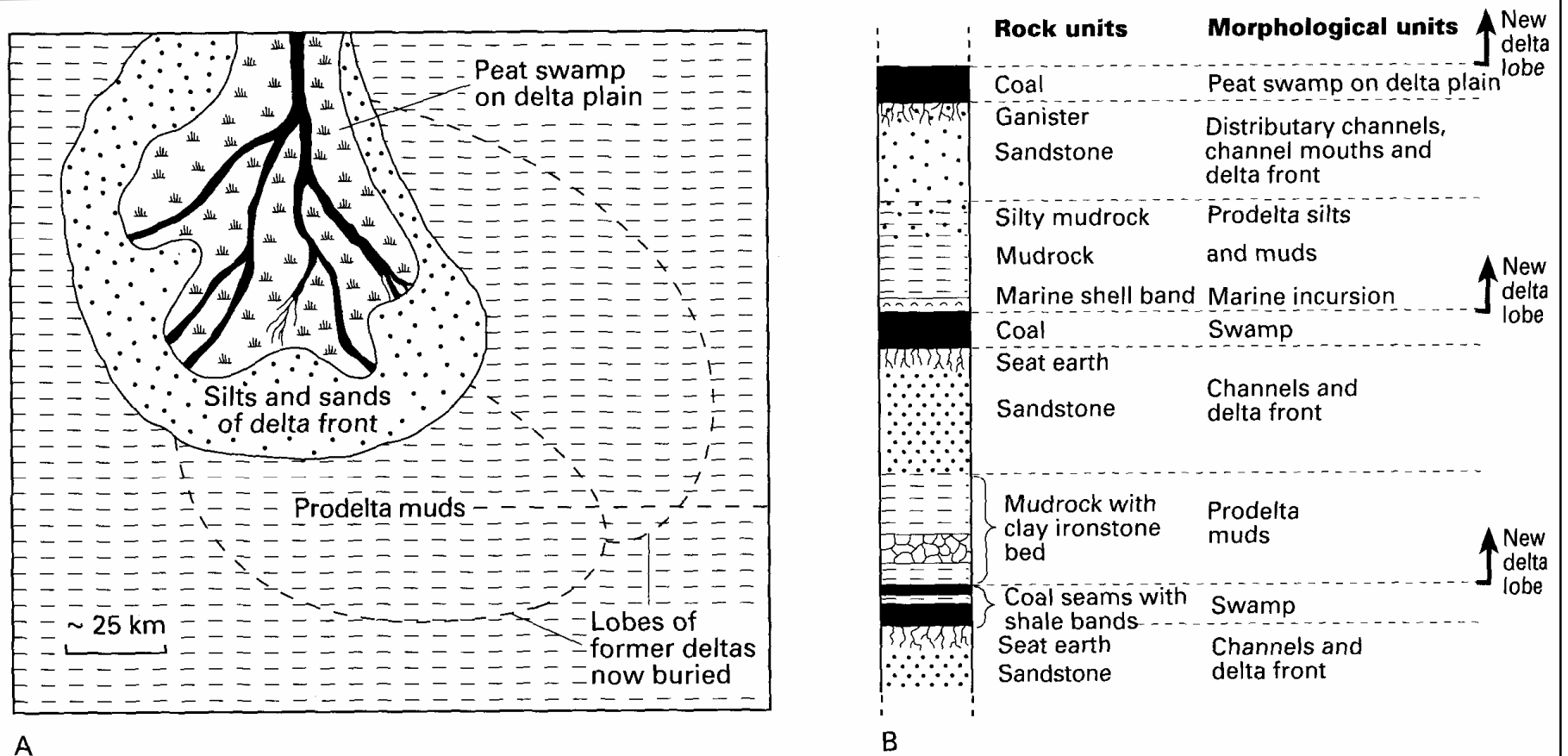


Fig. 24.4 (A) Three elongate delta lobes superposed upon each other with the three principal morphological units of the latest delta indicated. (B) A typical sequence of cyclothems. The positions of the approximate boundaries between the deposits of the three main morphological units of the delta are indicated with pecked lines.



Významné pánve světa

- Rusko: doněcká, podmoskevská, kuzněcká, tunguzská, lenská
- Německo: magdeburská, rúrská
- Polsko: hornoslezská, lublinská
- Velká Británie: East Penine Coal Basin, Newcastle Basin
- Čína: Šan-si, Fu-šun
- USA: apalačská, Powder River
- Jihoafrická republika: South Transvaal Coal Area
- Austrálie: pánev Sydney

Zásoby, ceny, ...

- zásoby
- cena: uhlí – USA: 1990: 22\$/t
1999: 16\$/t
ČR: 620-920 Kč/t velkoobchod
730-1100 Kč/t MUS