

A satellite map of the Black Sea region, showing the Mediterranean Sea to the west, the Black Sea in the center, and the Sea of Azov to the east. The landmasses of Europe and Asia are visible, with various geographical features like rivers and coastlines. The Black Sea is highlighted with a blue overlay, indicating a specific area of interest. The text labels are in a white, sans-serif font.

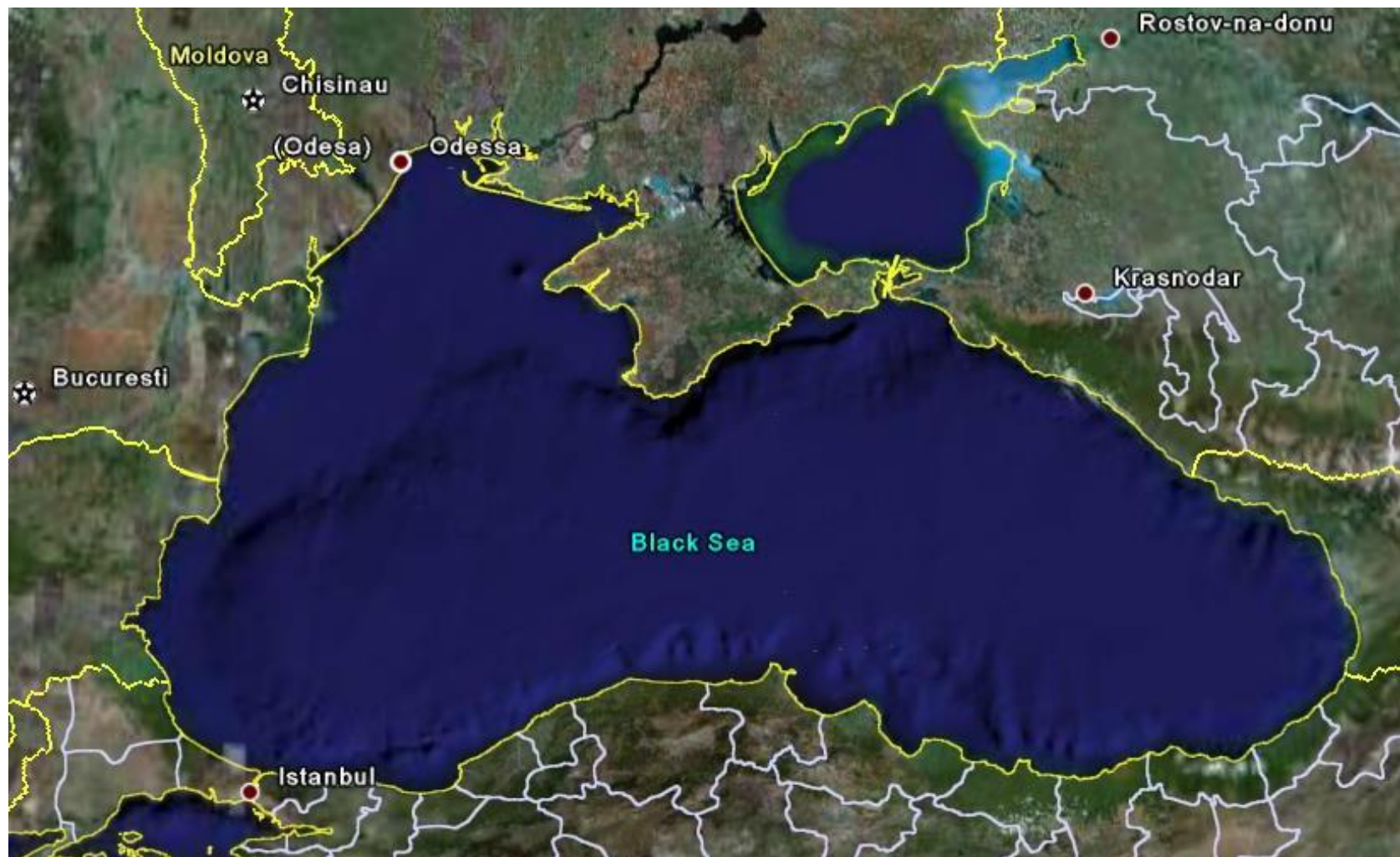
Mediterranean Sea

Black Sea

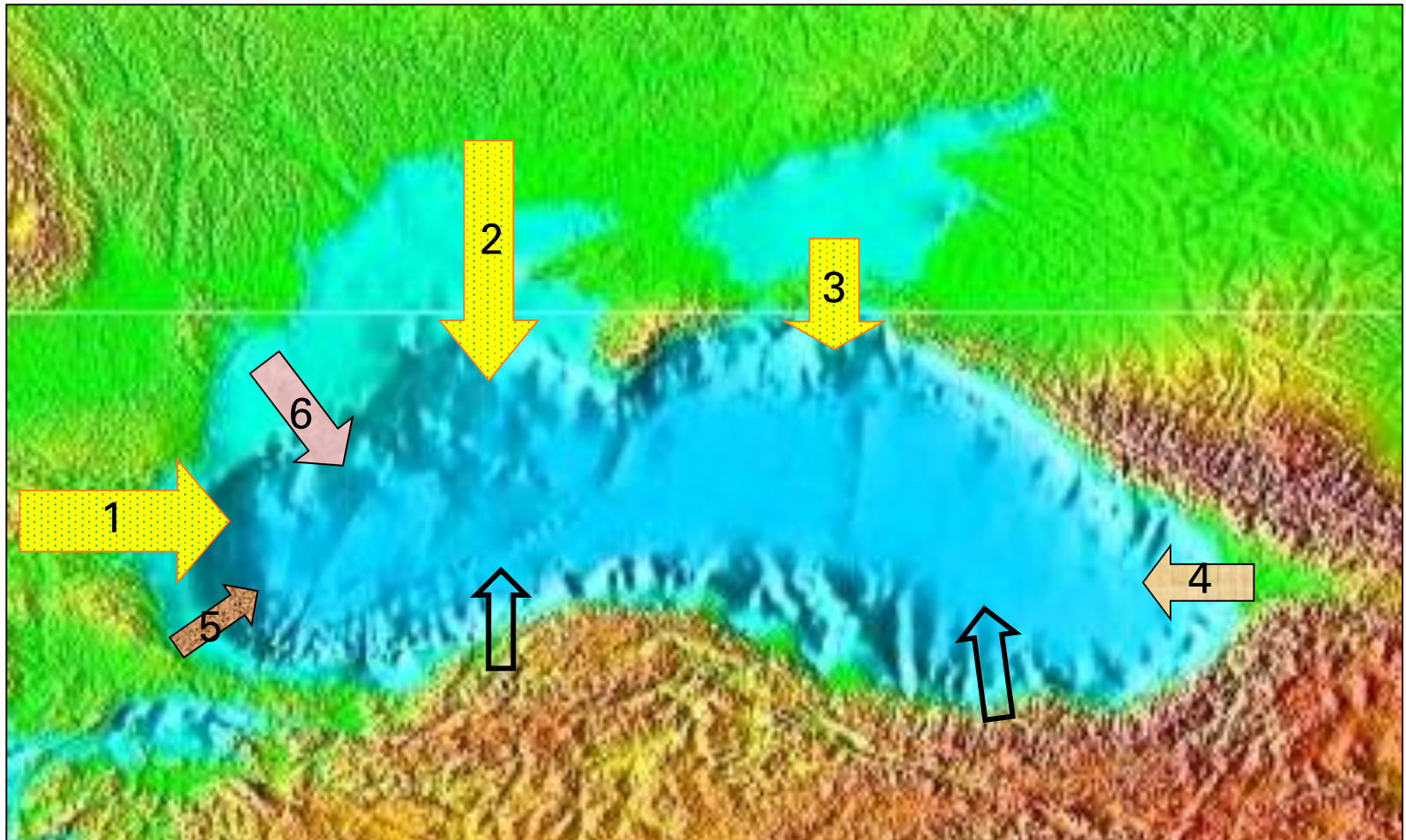
Sea of Azov

BLACK SEA DEEP SEA PERSPECTIVES

Hans Hutta - ICM

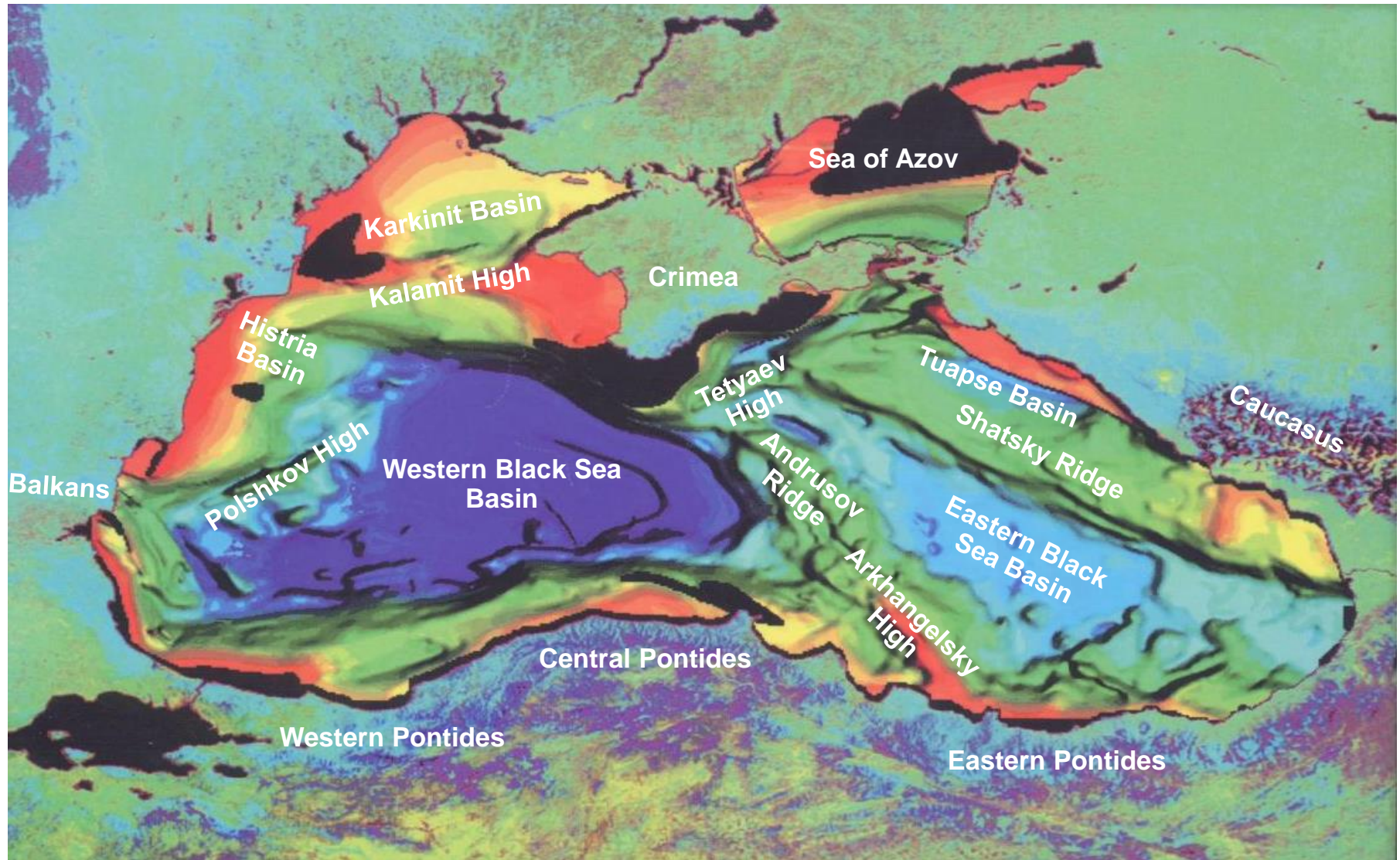


BLACK SEA – Sediment Influx



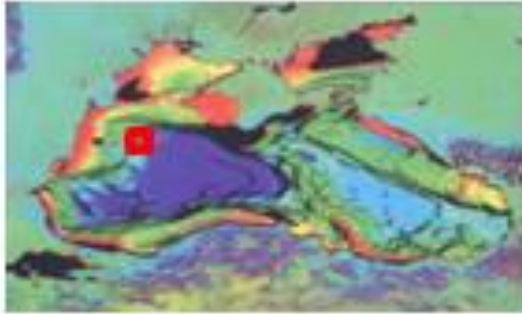
1 – Paleo Kamchia River; 2 – Paleo Dnepr-Dnestr River; 3 – Paleo Don River; 4 – Paleo Rioni River;
5 – Paleo Maritza River; 6 – Recent Danube River

Black Sea Basin

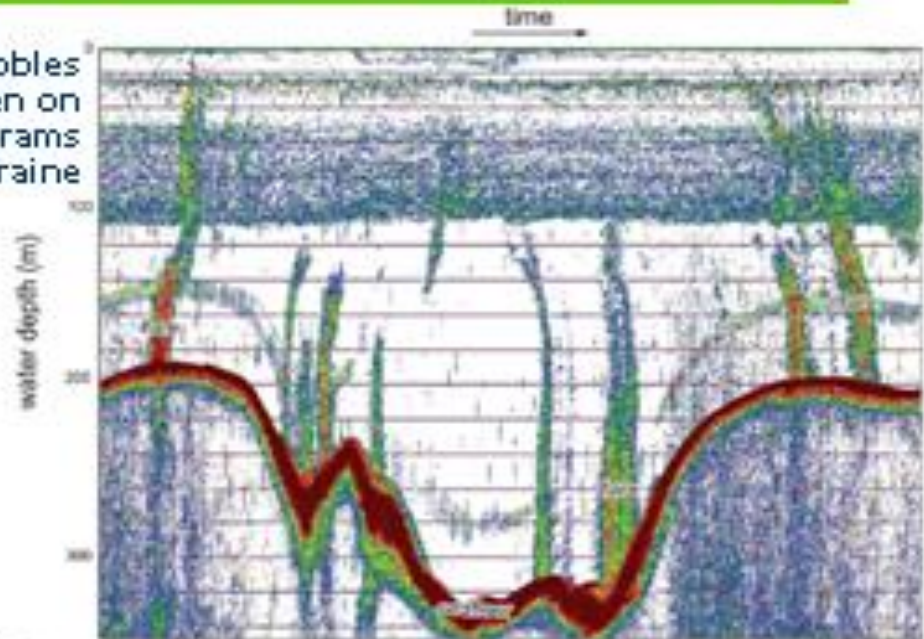


Robinson et al. (1996)

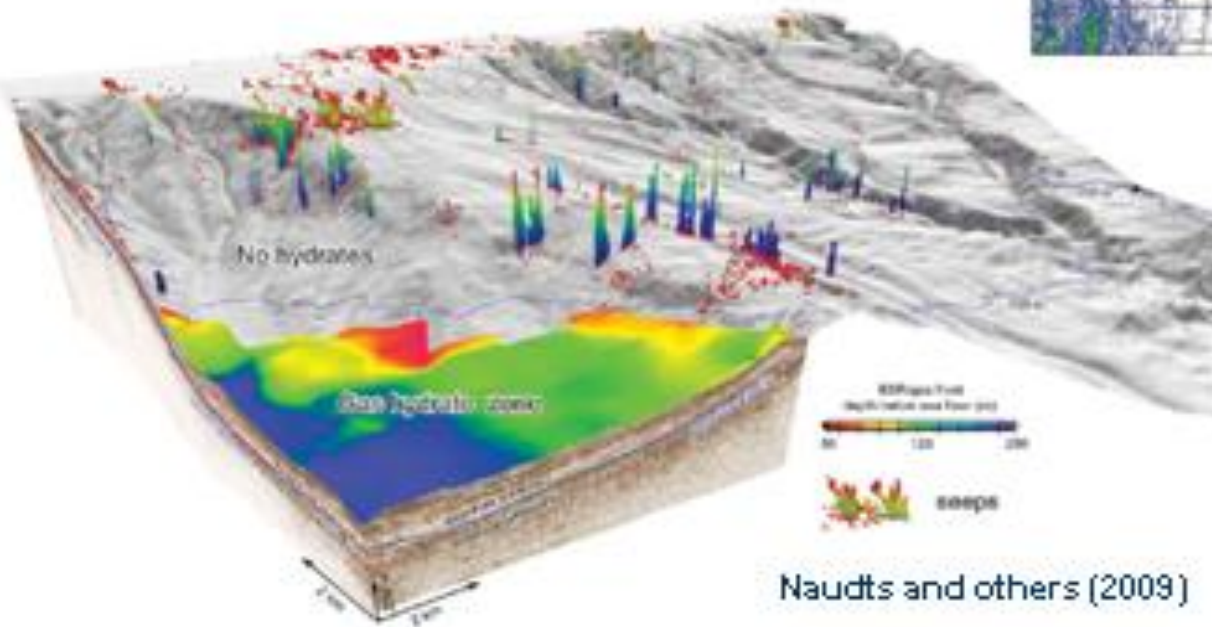
Biogenic (and thermogenic?) gas in the NW Black Sea



Rising methane bubbles
(gas flares) seen on
single-beam echograms
Dnepr paleodelta, Ukraine



Naudts and others (2009)

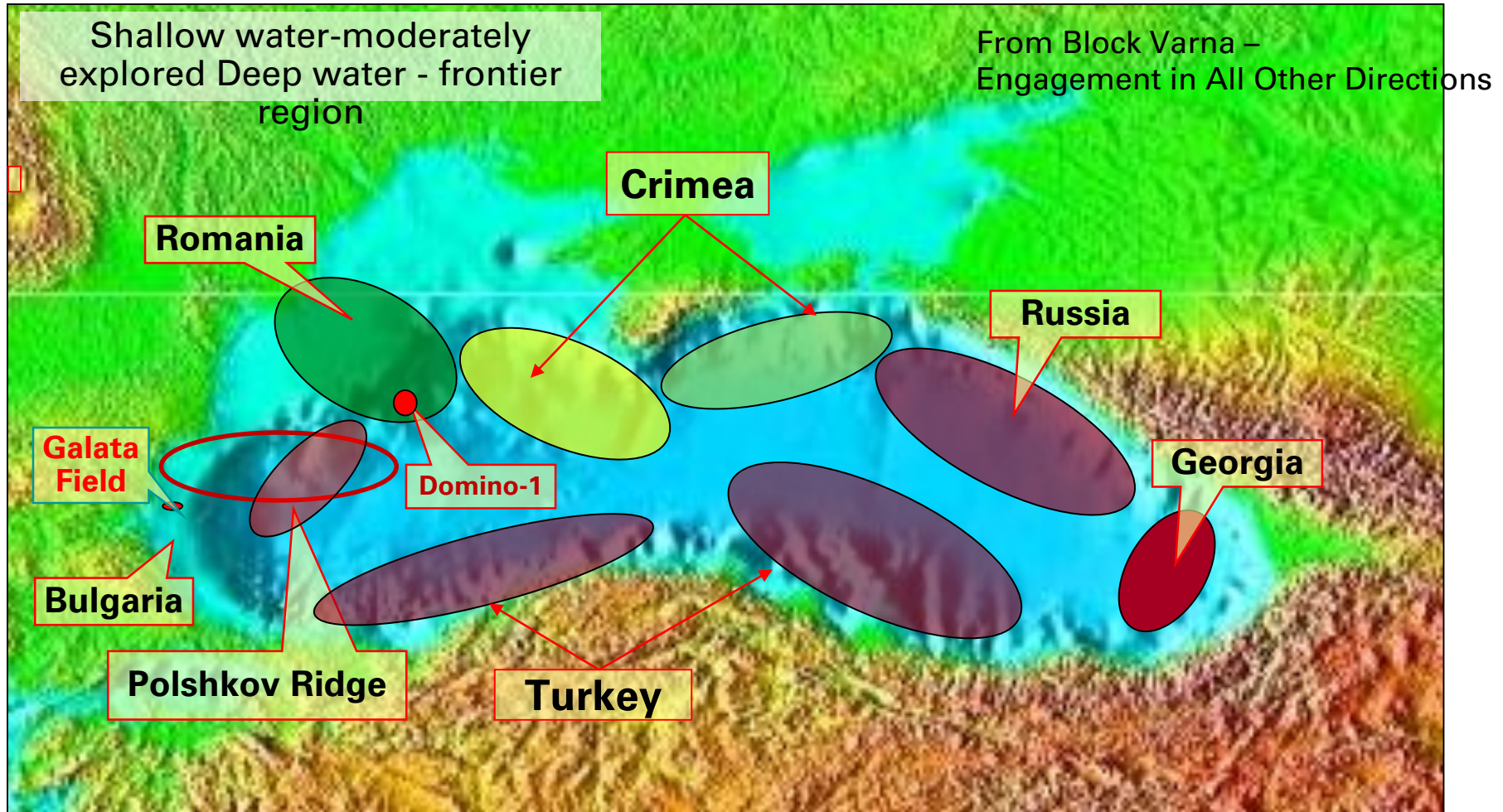


Gas flares and gas-hydrates
in the Dnepr paleodelta area,
Skifyska, offshore Ukraine

Naudts and others (2009)

Source: OMV – AG congress Presentation

Eastern and Southern Black Sea



Black Sea – Deep Sea

Significant Exploration Opportunities

Polshkov Ridge – Western Black Sea

- Various different **Play Types** have been identified
- Defined by several **Fault Blocks**

Tetyaev High – North West Black Sea

- Same play like Andrusov, but Western black sea has thicker **tertiary sediments** as compared to the eastern BS

Andrusov Ridge – Mid Black Sea

- Offshore Turkey **was drilled** - 2 wells dry

Shatzky Ridge – North East Black Sea

- Offshore Russia/Caucasus, needs **more exploration**

History:

- Deep-water hydrocarbon exploration drilling began less than 20 years ago**
- Economical/technological challenges associated with mobilizing suitable rigs through the Bosphorus**
- To end 2017, c. 20 deep-water wells have been drilled, targeting a large variety of plays in this underexplored basin**

Observation:

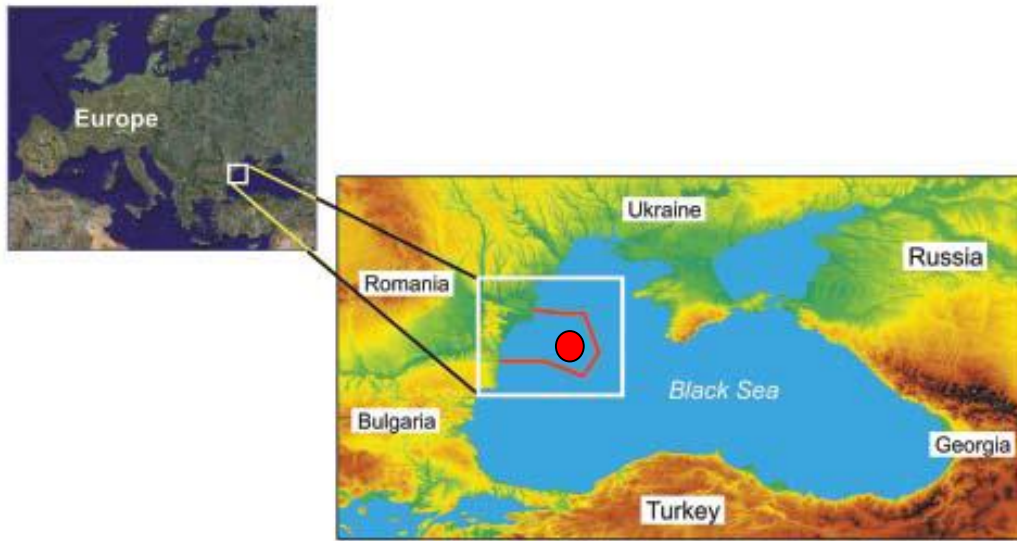
-- Recent discoveries have underlined the presence of active and effective petroleum systems that cover large parts of the deep-water Black Sea Basin

Detailed study of deep-water Black Sea by:

“History of deepwater exploration in the Black Sea and an overview of deepwater petroleum play types”

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Romania - Deep Sea Discovery: Domino-1



- First Deep Sea Drilling at 3000 m Depth, 970 m Water Depth
- Gas Horizon 70.7 m (Operator: Exxon, Petrom)
- Estimated Reserves: 1.5 to 3 Tcf
- Investment of Several Billion USD required
- Possibility to Combine with Bulgarian Polshkov Ridge?

North West Forosa and New Skifska Area

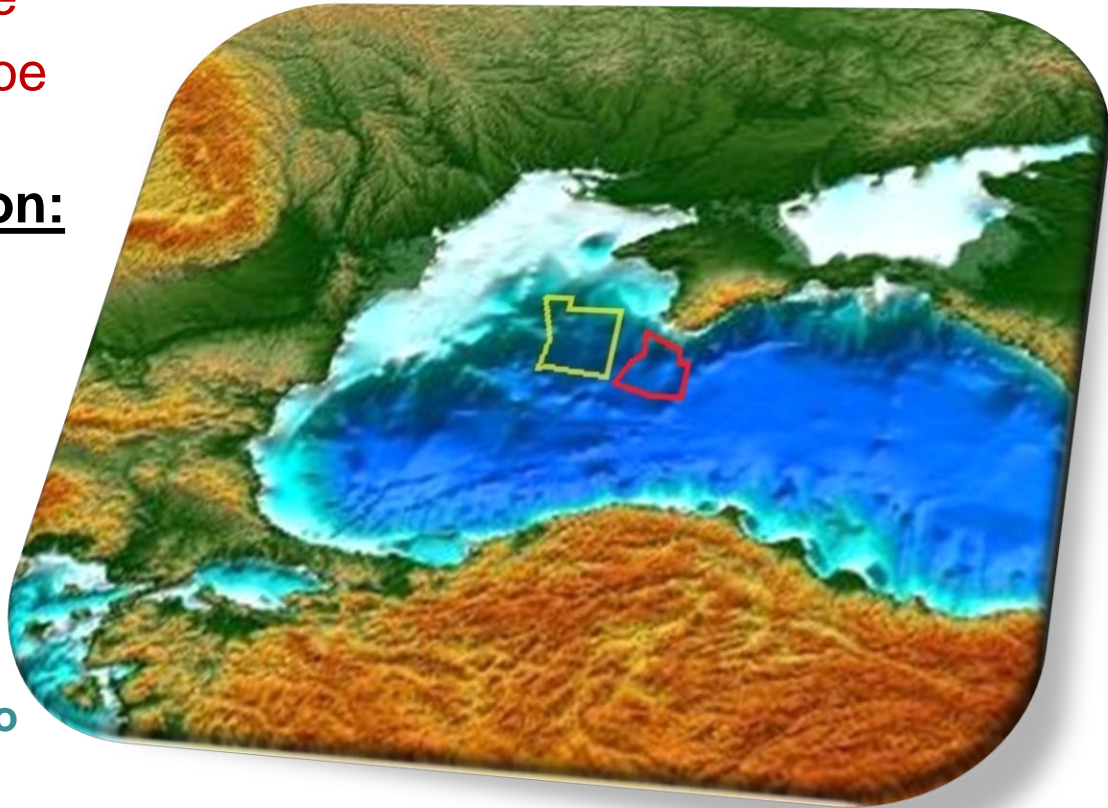
Recoverable Resources:

Skifska	80-100 M toe
Forosa	130-150 M toe

Expected Annual Production:

Skifska	up to 3 M toe
Forosa	up to 4 M toe

Source: Dr. Volodymyr Ignashchenko
Secretary of PSA Inter-Agency
Commission, Ukraine



Bulgaria and Polshkov Ridge

- **Shallow Waters**

1995-Galata Discovery (Texaco, Exxon, OMV), Tested then 34 MMcf Gas

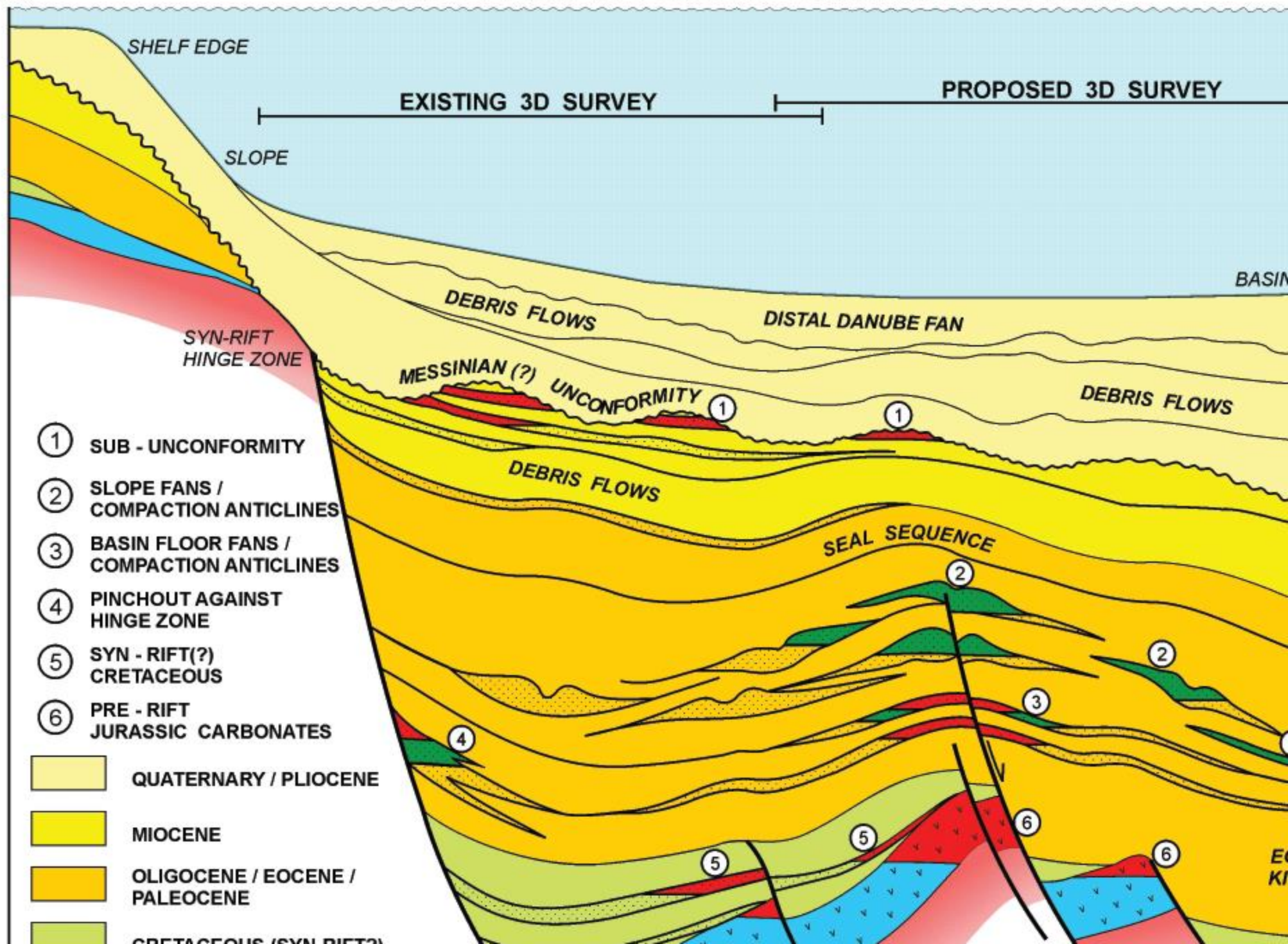
- **Polshkov Ridge**

High Potential Identified in Block **KhanAsparuch** on Polshkov High - Primary Target Post Mesozoic Sequence

- Gabor Tari et. al. Identified at Least **three to four Post Mesozoic Deepwater Plays** - Segment Severely Underexplored

NW

PLAY TYPES, OFFSHORE VARNA, BULGARIA



Istranca-A (TPAO)

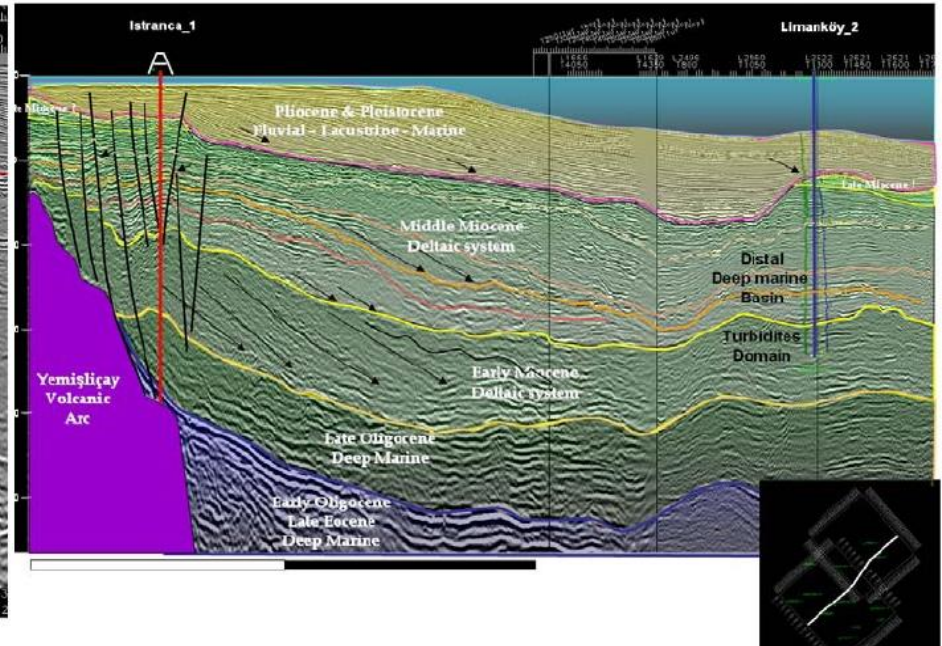
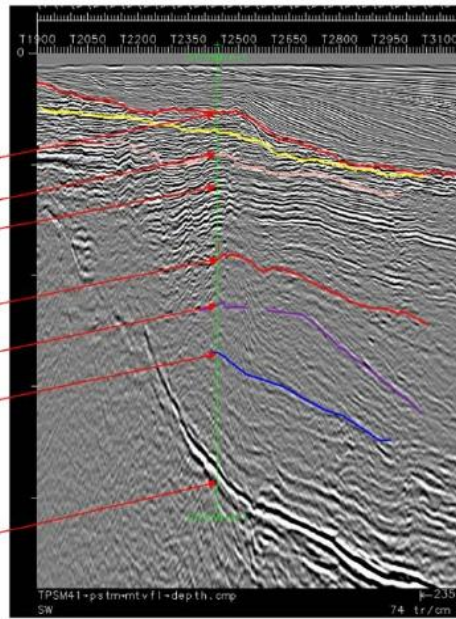
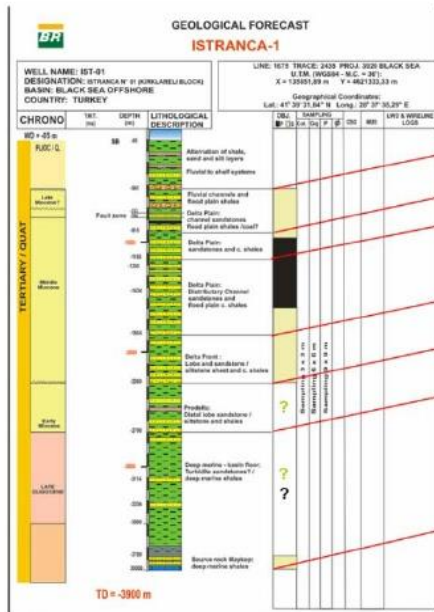
BBSPA Conference, 15 April 2010, Vienna, presentation by Yurdal Öztaş, TPAO



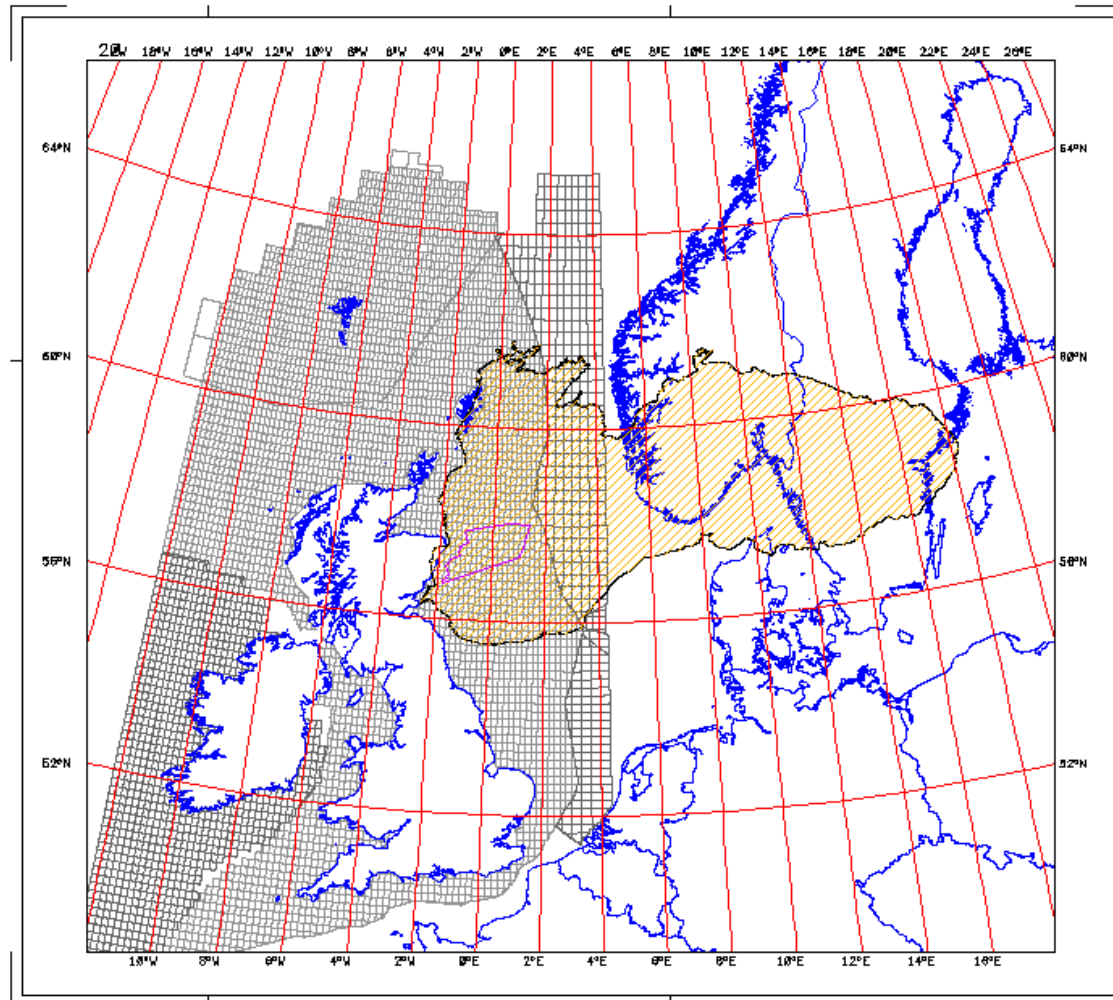
2010



Istranca-1 Well – Prognosis



BLACK SEA AS COMPARED TO NORTH SEA



COMPARISON BLACK SEA vs NORTH SEA

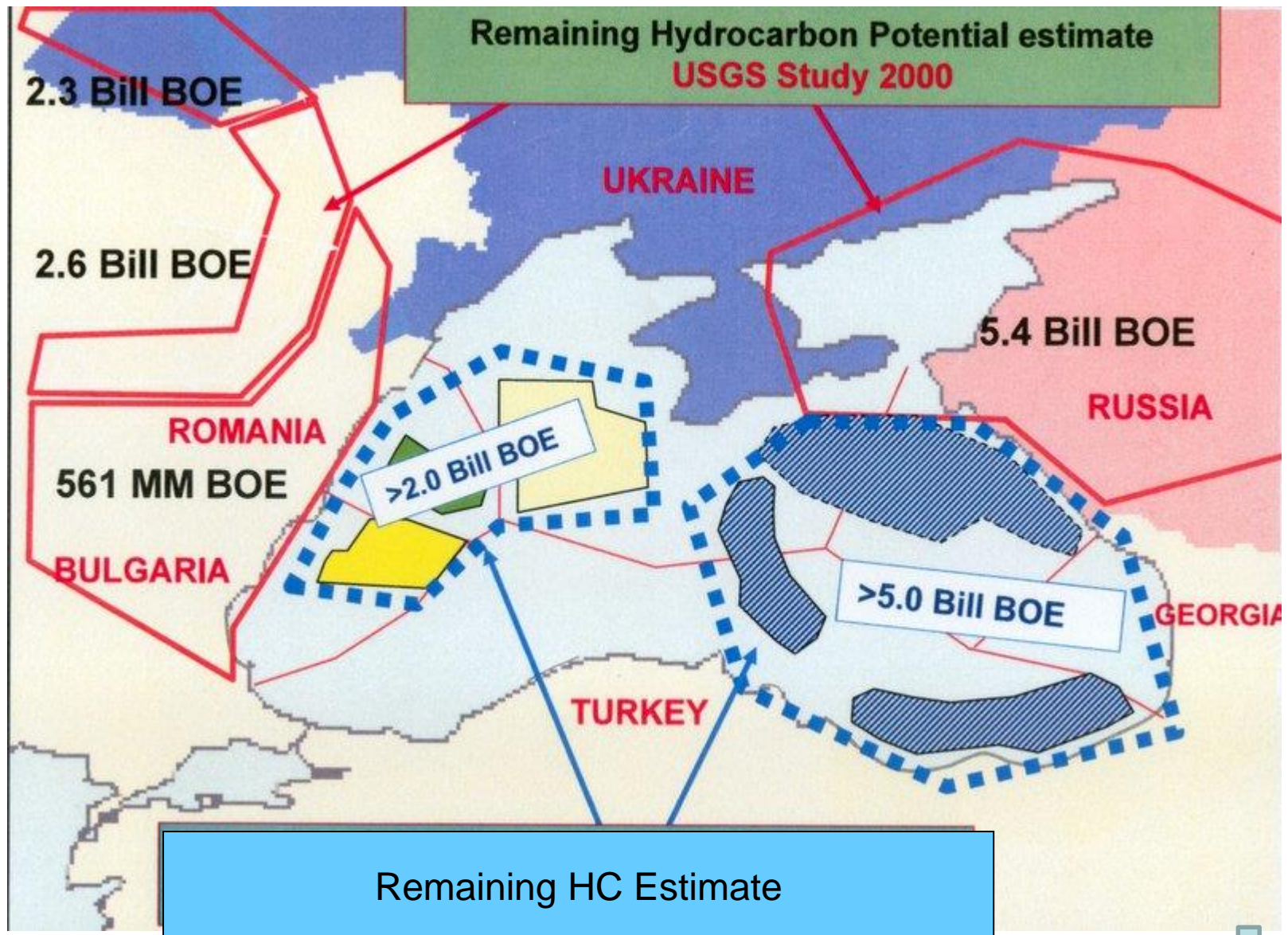
Black Sea-Deep Sea

- Less than 20 DeepwaterWells drilled
 - Largely Unexplored
 - Black Sea Deep Water one of World's last promising Areas
- (Gas Hydrates: Hundreds of Yrs Current Gas Production?)

North Sea

- More than 7000 wells drilled
- First 75 wells dry
- Industrial focus over 30 years
- Declining Production

THE BLACK SEA STORY



THE NORTH SEA STORY (as of 2010)

World 4th largest oil – producing area

World 3rd largest gas – producing area

Cumulative gross revenues of approx. 1500 Billion US\$

500,000 person-years of effort to understand Geology

300,000 jobs onshore – 50,000 jobs offshore

Cum. production about 48 Billion bbl oil and 127 TCF gas

Black Sea and the New Economic/Political Situation

- Plenty of HC resources available
O/G Projects currently less economic
- Required Oil price needs to be \$ 80 to \$100
- Europe plans to diversify gas imports in future
- S. Stream dropped for Turkishstream
- N. Stream 2, parallel Line to N. Stream
- Can Black Sea compete with North Sea?

Hans Hutta

--ICM--

**PETROLEUM
MANAGEMENT**

**IENE – 3rd SE EUROPE
HYDROCARBON
UPSTREAM
WORKSHOP,**

Athens, October 30 / 31, 2018