TAOUDENNI BASIN PETROLEUM SYSTEM VS. OTHER PROTEROZOIC PETROLEUM SYSTEMS OF THE WORLD
Proterozoic stromatolitic limestone in the oil window position suggest a presence of a petroleum system.

VERIFICATION, DESCRIPTION AND MAPPING OF THE NEOPROTEROZOIC PETROLEUM SYSTEM OF THE BAMAKO AREA

PHASE I:
Stratigraphy, sedimentology and gechemistry of the Proterozoic succession of the Bamako area (F1&F2 Wells), Analysis, identification and description of the potential source and reservoir rocks, Recommendation for the further petroleum exploration in the area based on an integrated geological, geophysical and petrophysical methods.
ELEMENTS OF A PETROLEUM SYSTEM

- Source rock in the oil window
- Reservoir
- Seal

Petroleum accumulation (A)

Fold-and-thrust belt: arrows indicate direction of relative motion

Location used for burial history chart

Essential elements of petroleum system

- Overburden rock
- Seal rock
- Reservoir rock
- Source rock
- Underburden rock
- Basement rock
- Top oil window
- Top gas window

Sedimentary basin fill
NEOPROTEROZOIC PETROLEUM SYSTEMS OF THE WORLD

- Russia
  - Volga-Ural Province
- Potwar Basin, Pakistan
- Siberia
  - Lena-Tunguska Province
- Rajasthan, India
- Middle East
  - Oman
- Saudi Arabia
- North Africa
  - Tindouf Basin (Morocco and Algeria)
  - Taoudenni (Mali, Mauritania, and Algeria)
- Kufra Basin, Libya
- Brazil
  - Sao Francisco Basin
- Argentina, Bolivia, and Paraguay
- U.S.A.
  - Nonesuch, Michigan

Legend:
- Potential
- Proven
- Producing
PALEOGEOGRAPHY OF NEOPROTEROZOIC PLAYS

North Gondwana
Paleozoic-sourced Petroleum System

North Gondwana Margin Paleozoic Basins

TINDOUF BASIN MOROCCO and ALGERIA

TAOUDENNIBASIN MALI, MAURITANIA, ALGERIA

KUFRA BASIN LIBYA

MIAJALAR BASIN PAKISTAN

cyrenaica-sirte rift margin, lieya

WEST RUB ALKHALI BASIN SAUDI ARABIA

SOUTH OMAN SALT BASIN OMAN

potwar basin PAKISTAN

PUNJAB PLATFORM PAKISTAN and INDIA

OFFICER BASIN AUSTRALIA

AMADEUS BASIN AUSTRALIA

Bamako
STRATIGRAPHY OF THE NEOPROTEROZOIC PETROLEUM SYSTEMS

Key Geological Events
- Ediacaran Radiation
- Glaciers Event (c. 580 Ma)
- Impact Australia (c. 630 Ma)
- West Gondwana assembled by 580 Ma
- Acadian/Mississippian Superplume Event
- Formation of Rodinia
- First multicellular organisms (c. 1000 Ma)
- Break-up Rodinia

Petroleum Systems
- Baghewala, India and Potwar, Pakistan oil plays
- Vendian-Cambrian, Siberia
- Shug Group (Ara Salt e Buih Carbonate) oil and gas plays
- Vendian Petroleum System, Siberian Craton
- Sinian Dengying Fm, China
- Atar Group Petroleum System, Mauritania, Gas in Abalog-1
- Source of E, Siberian oils (Riphean)

Atar Group Petroleum System, Mauritania, Gas in Abalog-1

Ice Extent (°Lat)
- 90°
- 60°
- 30°
- 0°

F1&F2

Marinoan Glaciation 665–635 Ma
Sturtian Glaciation 740–700 Ma
Greenhouse Climate

δ¹³C % (VPDB)
- Glaciation
- Negative δ¹³C excursion

In part after Knaul, 1996, Eigenbrode et al., 2006
ABOLAG I WELL – ATAR GROUP CORRELATION

CAMBRIAN

NEOPROTEROZOIC (INFRACAMBRIAN)

TONIAN - CRYOGENIAN

ATAR GROUP?

Abolag I (Texaco 1974)

LOCATION MAP

Top Atar Unconformity?

Radiometric Age*

** General Stratigraphy from MPRG study
*Rb/Sr on clay minerals
STRATIGRAPHY OF THE ATAR REGION

Stromatolitic limestone

Stromatolitic limestone & black shale

Neoproterozoic Stromatolitic Limestones and Interbedded black shales (North Taoudenni Basin)
PROTEROZOIC-PALEOZOIC OF THE ADRAR ESCARPMENT

- Diamictite - Glacial deposit
- Black shale
- Limestone
- Stromatolitic limestone
NEOPROTEROZOIC OF THE BAMAKO AREA (WELLS F1&F2)
POTENTIAL PETROLEUM SOURCE, RESERVOIR AND SEAL ROCKS OF THE BAMAKO AREA

WELL F1

BOURAKEBOGU WELL (B)

WELL F2

SEAL

RESERVOIR

SOURCE
BLACK SHALE IN WELL F2–THE POTENTIAL SOURCE ROCK
POTENTIAL SOURCE OF PETROLEUM - PROTEROZOIC ORGANIC-RICH FORMATIONS

Precambrian Organic-rich Formation
- Hugi Fm, Oman
- Pertataka and Rodda Fms, Centrallian Superbasin Australia
- Rinkabeena Fm, Centralian Superbasin, Australia
- Dengying Fm Dolomites, Sichuan Basin, China
- Abolag-1, Taoudenni Basin; AZ-1, Tindouf Basin
- Bitter Springs, Albinia, and Brown Fms Centralian Superbasin, Australia
- Chau Fm
- Nonesuch Fm
- Siberian Craton
- McMinn Fm, McArthur Basin

Rivularia haematites from Proterozoic of India

Neoproterozoic Palynomorphs, Abolag 1 Well, Taoudenni Basin, Mauritania

Organic matter and Kerogen from Neoproterozoic deposit

Microflora from Sirban Limestone, India