Annotated Bibliography
of Tectonostratigraphic
and Organic Geochemical Characteristics
of Upper Precambrian Rocks
Related to Their Petroleum Potential

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This report is a bibliography of tectonics, stratigraphy, and organic geochemistry of upper Precambrian (principally Upper Proterozoic but also some Middle Proterozoic) rocks of the world. Only those publications that are related to the problem of petroleum potential of Precambrian rocks are included. The majority of listed publications discuss various aspects of petroleum geology or contain general geologic descriptions of Precambrian basins composed of unmetamorphosed sedimentary rocks. Some of these basins may possess a certain potential for petroleum exploration. Other basins have no potential; however, they are well exposed and may provide important data for comparative analysis of factors that controlled formation and destruction of oil and gas accumulations. Publications on these exposed basins are included because of general scarcity of drilling data in most buried sedimentary basins of Precambrian age.

The bibliography includes also a number of principal publications on deformed and inverted Late Proterozoic rifts. These rifts represent the final stage of destruction of previously petroliferous basins. Commonly, these deformed rifts (now foldbelts) are associated with undeformed sedimentary basins which were marginal parts of sags overlying the rifts before the deformation.

The bibliography is arranged on a regional basis. Each reference contains a short annotation that indicates the principal content of the publication.
General Problems

The monograph analyzes the structure of Precambrian rocks worldwide and provides for a geodynamic interpretation of various structures from the plate tectonic point of view.

Evolution of the first skeletal fauna in the English Midlands is discussed in comparison with volcanic, tectonic, and oceanographic events.

The diversity and abundance of burrowing infauna and consumption of organic matter in the bottom layer of sediments abruptly increased at boundary between the Precambrian and the Early Cambrian.

Discussion on the petroleum potential of old (Upper Proterozoic) and younger (Paleozoic) aulacogens.

The chemical composition of the Precambrian biomass and specific geochemical environments of sedimentation resulted in the characteristic composition of Precambrian oils.

Hydrous pyrolysis of kerogen in Precambrian rocks shows decreasing yield of biomarkers with increasing age. Samples older than 1.6 Ga yield no detectable hydrocarbons supposedly because of spontaneous dehydrogenation of kerogen.
The Pangeaic system includes orogens originated during the time span between 650 and 250 Ma. The author suggests that plate tectonics is responsible for orogenies in North America, Europe, and Asia, whereas ensialic model is more appropriate for orogens in Gondwana.


Sedimentary areas with different salinity of marine water (defined by the boron content) are characterized by different associations of microfossils (on the Siberian craton). The differentiation of phytoplankton depending upon sedimentary environments existed already in the Riphean.


The atmosphere became oxidizing not later than 2.4 Ga ago, but the deep ocean remained reducing until 1.7 Ga ago. After this, the rise of oxygen concentration in the atmosphere began.


Stratigraphy, depositional conditions, and tectonics of the Upper Proterozoic are discussed. Stages of Proterozoic tectonic deformations are considered mainly for various areas of the USSR but also for some other regions of Europe and Asia.


A model of rifting that includes six phases is proposed. Applications of the model are considered in the next article.


Evolution of various rifts is considered on the basis of a model proposed in the previous article. The Upper Proterozoic Damara rift belt (South Africa) is considered among other rifts.


Thirty pyrolyzed pre-Phanerozoic kerogens did not produce biochemical fossils.

Stages of biologic evolution beginning from the middle Proterozoic are reflected in oil types characteristic of rocks of different ages.

Along with other problems, the monograph discusses the evolution of biosphere and conditions of source rock deposition in the Precambrian.

The article is an extensive review of organic geochemical studies of Precambrian rocks.

The monograph reviews rifts (mainly of Late Proterozoic age) on all cratons. Formation of rifts is interpreted from the concept of pulsations and expansion of the Earth.

A review of the biological evolution in the Precambrian and petroleum occurrences generated by rocks of this age.

Discussion of factors (biologic, lithologic) that are favorable for generation of petroleum from Precambrian rocks.

A concept of periodic contamination of marine water by uranium is proposed. This contamination led to widespread deposition of uranium by its biochemical concentration, suppression of heterotrophic organisms and resulting intense deposition of organic matter, and increasing rate of radiogenic mutagenesis and biological evolution.
Analyzer kerogens (including that from Nonesuch Shale) fall into two distinct chemical groups. The Curie-point pyrolysis was employed for the analyses.

Stratigraphic correlation of major Precambrian sequences of the world is suggested.

General discussion on petroleum potential of Precambrian rocks. The potential for inorganic methane is emphasized.

The monograph contains four chapters on the Precambrian organic geochemistry and the development of the Earth's atmosphere in addition to discussions on the Precambrian paleontology, and the early origin and development of life.

The author proposes a model that describes a mechanism of regulation of the CO₂ and O₂ contents in the atmosphere and cyclic changes in amounts of these gases. It is supposed that a high content of O₂ existed already since the Middle Proterozoic and maybe earlier.

A review of achievements and remaining problems in stratigraphy and paleontology of the Upper Precambrian (Riphean and Vendian).

Black shales and slates are geochemical accumulators of many elements: Ni, Co, Cr, Mo, Cu, U, V, rare earth, and others. The enrichment in these elements is surprisingly uniform for organic carbon-rich rocks from the Precambrian to the Tertiary. This suggests mainly biochemical mechanism of accumulation of the elements and early biochemical evolution.

Organic matter of Upper Proterozoic rocks is rich in hydrogen and relatively poor in aromatic compounds. Petroleum potential is higher in rocks that experienced maturation in more recent time.

Yakobson, K.E., 1987, Boundary between the Cryptozoic and Phanerozoic: Sovetskaya Geologiya, no. 4, p. 57-63 (in Russian).

Stratigraphy of the upper part of the Proterozoic in Europe and Asia is considered. The stratigraphic marker is glacial rocks of the last Proterozoic glaciation. Overlying transgressive marine deposits are proposed to constitute the lower system of the Phanerozoic (below the Cambrian).
NORTH AMERICA


Stratigraphic correlation of Precambrian rocks drilled in the subsurface with the surface stratigraphy of the Keweenawan sequence of the Midcontinent rift.


Geologic models of the rift system along transverse profiles are developed based on the interpretation of geophysical data.


The stratigraphy, lithology, and regional correlation of the Oronto Group in part of the Midcontinent rift are described.


Black siltstone of the Dripping Spring Quartzite contains 3.4% of organic carbon. Geochemical characteristics indicate a low potential for hydrocarbon generation.


A stratigraphic and lithologic description of rift-filling sequences and their correlation from Kansas through Michigan are discussed.


Petroleum prospects in Precambrian rocks of the Midcontinent rift are discussed.


Oil shows from the Nonesuch Shale are described.


Hatch, J.R., and Morey, G.B., 1985, Hydrocarbon source rock evaluation of Middle Proterozoic Solor Church Formation, North American Mid-Continent rift system, Rice county, Minnesota: American Association of Petroleum Geologists Bulletin, v. 69, no. 8, p. 1208-1216. Studied organic matter is overmature and its concentrations are low (less than 0.8%) indicating little petroleum potential.


Howe, J.R., and Thompson, T.L., 1984, Tectonics, sedimentation, and hydrocarbon potential of the Reelfoot rift: Oil and Gas Journal, v. 82, no. 46, p. 179, 181-182, 185-190. The article describes stages of tectonic development of the Reelfoot rift that contains a sedimentary section greater than 30,000-ft thick. Potential source rocks, reservoir rocks, and drillable prospects are discussed.

TOC values in samples of the Nonesuch Formation vary from 0 to 2.5%. Two petrographic groups of kerogen are identified which reflect differences in source for the organic matter and in maturity.


Stratigraphy and lithology of the Proterozoic Jacobsville Sandstone are described. Correlation of the sandstone with the Bond du Lac Formation of Minnesota is proposed.


The article describes reefal and associated sedimentary sequences of three Precambrian formations: the Chenchin Formation of the Siberian craton and the Rocknest and the Denault Formations of the North American craton. Types of Precambrian reefal rocks are discussed.


Sedimentary basins connected with the Midcontinent rift are described and their petroleum potential is discussed.


An alluvial plain to lacustrine environment of deposition of the formation is suggested based on its cyclicity.


Ages of the Nonesuch Shale, Uinta Mountain Group, Belt Supergrupo, and of rocks in the Grand Canyon are evaluated.


A general description of upper Precambrian rocks is provided.


Eight major terranes are distinguished in Precambrian rocks. Their mineral potential is indicated. The Midcontinent rift is a potential exploration target for oil/gas and metals (Cu, Ni, platinum-group metals).
The paper reviews the geologic development of the Archean craton, orogenic belts, and the Midcontinent rift system of North America.

Identified biomarkers suggest eukaryotic source of organic matter and hypersaline environments of deposition.

The geophysical expression, petrology of rocks, stratigraphy, tectonics, and evolution of the Midcontinent rift are discussed.

Stratigraphy of the Chuar and Uinta Mountain Groups is described and the correlation with the Russian craton, Svalbard, and Greenland is proposed.


Young, G.M., 1984, Proterozoic plate tectonics in Canada with emphasis on evidence for a Late Proterozoic rifting event: Precambrian Research, v. 25, p. 233-256.
Rifting in the North American craton during Late Proterozoic time is discussed.
SOUTH AMERICA

The paper reviews the tectonic evolution of South America during late Precambrian time.

The Precambrian tectono-thermal events are distinguished. Correlation with analogous events recognized in Africa is provided. Major mobil zones were formed on the sialic crust.

Proterozoic sedimentary sequences, including the sequence of the Sao Francisco basin, are described and correlated.

A general synthesis of the Precambrian evolution of South America.

The paleogeography, lithology, and paleontology of the basin that was later deformed and partly metamorphosed by Paleozoic tectonism are discussed.

The Precambrian tectonic history of South America is interpreted in terms of a series of collisional events.
CHINA AND INDIA

A number of sections of Riphean and Cambrian age in China and adjacent regions are described and correlated.


Geology and geochemistry of Proterozoic rocks and oil and gas shows are described. The generative hydrocarbon potential is assessed for three tectono-stratigraphic provinces.

Stratigraphy, lithology, and depositional conditions of Sinian rocks of the Yunnan and Guizhou provinces are described.

Stratigraphy, correlation, and depositional conditions of Sinian rock in southern China are described.

Unmetamorphosed sedimentary rocks of late Precambrian age are described and correlated.

An extensive description of the geology of the Cuddapah basin is provided.

The article includes a description of oil shows from Sinian rocks of the Yanshan belt and compositional characteristics of gases generated from Sinian rocks of the Sichuan basin.
Sun Dazhong and Lu Songnian, 1985, A subdivision of the Precambrian in China: Precambrian Research, v. 28, p. 137-162. The Precambrian stratigraphic successions in four regions of China are described.


Australia


The geology of deeper central and western parts of the Bangemall basin is described. The correlation with marginal eastern facies is provided.


Geochemical study shows five potential source rock intervals in the basin. The Velkerri Formation (Roper Group) is not overmature and contains the best source rocks of the basin.


The Velkerri Formation of the McArthur basin is organic matter-rich (TOC reaches 7.1%). It was deposited in a lake or in a barred bay under anoxic conditions.


A general geologic description of the Bangemall basin is provided.


The McArthur basin sections are described and their age is evaluated.


A new crustal model of formation of the east-west chain of basins (Officer, Amadeus, Ngalia) is proposed. The model is based on the supposition of basin formation under the compressive stress affecting the viscoelastic lithospheric plate.


Comparison of laboratory models and field studies of the breccia suggest that a thick evaporite sequence was once present at the base of the Adelaide geosynclinal sequence.
A depositional model of the Arumbera Sandstone is developed based on facies analysis and seismic data.

Organic geochemistry of Precambrian rocks composing the Officer basin is described. The Observatory Hill Beds are rich in type I kerogen.

Regional and local geology of the ore body is described. The mineralization is connected with organic-rich black-shale facies on the edge of a rift filled with rocks of the Middle Proterozoic McArthur Group.

Black and green shale and sandstone in the upper Roper Group of the McArthur basin contain abundant microfossils. The rocks are 1,300-1,400 Ma old. Geochemical analysis indicate oil-prone organic matter and a low level of thermal maturity.

Correlation of Precambrian rocks of Australia with special emphasis on different correlation techniques.

The tectonic evolution of the Australian continental block is presented. Eight tectonic maps show the development of Australia during the Precambrian and seven maps show the Phanerozoic geologic development. The block-type structure of Australia and New Guinea is emphasized.

A review of the tectonics of northern Australia including the Amadeus, Ngalia, McArthur, and Victoria River Proterozoic basins.
Plumb, K.A., Derrick, G.M., and Wilson, I.H., 1979, Precambrian geology of the McArthur River-Mount Isa region, northern Australia, in Henderson, R.A., and Stephenson, P.J., eds., The geology and geophysics of northeastern Australia: Geological Society of Australia, Queensland Division, Brisbane, Australia, p. 71-88. Summary of the tectonic evolution and paleogeography of the Mount Isa orogen (craton margin), the McArthur intracontinental basin, the Batten and Leichhardt troughs (rifts), and the intervening platforms.

Plumb, K.A., and Derrick, G.M., 1975, Geology of the Proterozoic rocks of the Kimberley to Mount Isa region, in Knight, C.L., ed., Economic geology of Australia and Papua New Guinea, v. 1, Metals, Monograph Series no. 5: Australian Institute of Mining and Metallurgy, Parkville, Victoria, Australia, p. 217-252. The regional geology and tectonics of the region are described. The region includes the Victoria River, McArthur, and Arafura basin, the Hills Creek mobil zone, the Batten trough (rift), and the Mount Isa orogen (inverted and folded rift).


Eight exploration wells were drilled and two gas discoveries were made. Numerous oil and gas shows were recorded. Upper Proterozoic rocks have generated large volumes of oil and gas.

The Middle Proterozoic rocks contain abundant hydrocarbons. Identified biomarkers suggest that the organic matter was derived both from prokaryotes and eukaryotes.

A chapter describing stratigraphy of the Upper Proterozoic Adelaidean System.

Stratigraphic subdivision of the dolomite-dominated part of the Burra Group (Adelaidean) is proposed. Facies composition and depositional environments are analyzed.

The rift origin of the Adelaide foldbelt is substantiated by tectonic and sedimentary facies analysis.

Description of local geology of the H.Y.C. and Ridge II lead-zinc deposits that are connected with organic matter-rich pyritic shale of the McArthur Group in the McArthur River district.


Late Proterozoic glacial sequences of the Amadeus and Ngalia basins contain stromatolitic carbonates that were supposedly deposited in cold lakes.


General geology and evolution of the Ngalia basin are discussed.


A stratigraphic description and correlation of the Yeneena Group and the Bangemall Group (Middle Proterozoic) is provided. The latter fills the Bangemall basin whereas the former covers the Paterson province and underlies the Bangemall group in the basin.


The drilling of two wells showed the existence of a shallow basement ridge beneath Mesozoic sediments. The basin is east of the Late Proterozoic-Cambrian structures of the Flinders Ranges.
AFRICA AND ARABIA

A general stratigraphic description of Upper Proterozoic rocks in Iran and Oman is provided.

The author discusses youngest rocks known in the Mozambique belt and suggests that this belt was an intracratonic orogen in Late Proterozoic time.

The stratigraphy and depositional environments of the Umkondo System are described. The rocks are strongly deformed. Stratiform deposits of copper were formed in the lower sabkha unit of the system.

Sedimentary rocks of the craton are described and correlated.

Exposures of the Waterberg System in three areas of eastern Botswana are correlated with type sections of South Africa. Rocks in Botswana were formed in subaqueous conditions (lakes or shallow sea). Supposedly, the sedimentation was controlled by a series of grabens (rifts). Outside the grabens, the system is thin.

Oils in fields of the South Oman and, probably, central Oman areas were generated by Upper Proterozoic source rocks of the Ara Formation.

Stratigraphy, paleontology, and depositional history of the Nama Group (Upper Proterozoic) are described.

Germs, G.J.B., 1972, The stratigraphy and paleontology of the lower Nama Group, SW Africa: Precambrian Research Unit, University of Cape Town, Bulletin 12.
Stratigraphy and depositional conditions of the lower Nama Group (upper Precambrian) are discussed.

Grantham, P.J., Lijmbach, G.W.M., Posthuma, J., Hughes Clarke, M.W., and Willink, R.J., 1987, Origin of crude oils in Oman: Journal of Petroleum Geology, v. 11, no. 1, p. 61-80. Five types of oils in Oman, one of which was certainly, and another was probably, originated from source rocks of the Precambrian Huqf Group, are described. Data on oil/source rock correlation are provided.

Guj, P., 1970, The Damara mobil belt in the SW Koakoveld, SW Africa, Precambrian Research Unit, University of Cape Town, Bulletin 8, 132 p. The stratigraphy and structure of the central part of the Damara paleotrough are described.

Hedberg, R.M., 1979, Stratigraphy of the Ovamboland basin, SW Africa: Precambrian Research Unit, University of Cape Town, Bulletin 24. Stratigraphy and depositional conditions of the upper (shelfal) stratigraphic unit of the Damara System are described.

Husseini, M.I., 1989, Tectonic and depositional model of late Precambrian-Cambrian Arabian and adjoining plates: American Association of Petroleum Geologists Bulletin, v. 73, no. 9, p. 1117-1131. The stratigraphy and correlation of Infracambrian and Cambrian sequences of the Turkish, Arabian, and Lut plates are interpreted in terms of tectonic development of the northern Tethyan margin.

Jansen, H., 1976, The Soutpansberg trough (northern Transvaal)—an aulacogen: Transactions of the Geological Society of South Africa, v. 78, p. 129-136. The aulacogen (rift) was developed on the older Limpopo mobile belt at some time between 2000 and 1300 Ma. The structure of the aulacogen and the correlation between the Soutpansberg, the Waterberg, and the Umkondo Systems are discussed.

Jansen, H., 1976, Precambrian basins on the Transvaal craton and their sedimentological and structural features: Transactions of the Geological Society of South Africa, v. 78, p. 25-33. Tectonic conditions of deposition of the lower and upper Waterberg System (~2000-1350 Ma) are described. Seemingly, sedimentation occurred in rifts and on the surrounding platform. Two rift systems of early and late Waterberg age are probably present and they have different strikes. The sedimentation was not followed by orogeny.
A number of monomethylalkanes in the oils may suggest Precambrian age of the source rock.

Stratigraphic correlation shows that the Damara and Nama Systems are completely or partly coeval. Same is true for the underlying Gariep and Nosib Groups that were deformed before the Damara tectonic event.

The stratigraphy, structure, and petroleum potential of foreland Late Proterozoic basins south of the Damara orogenic belt are described.

Geodynamic interpretation of the Damara, Zambezi, and Mozambique belts is discussed.

The aeolian origin of sandstones of the Makgabeng Formation (Waterberg Supergroup) in northern Transvaal (South Africa) is substantiated.

The rift origin of the Damara orogen is indicated and the rifting history is described.

Stratigraphic description and correlation of Upper Proterozoic formations. Five formations of sedimentary and volcanic origin are distinguished. The area is a part of the Damara geosyncline.

Sedimentology of the Mogalakwena Formation (Waterberg Supergroup) is described. Thick coarse clastics were deposited by a braided river system with a provenance area in mountains of the Limpompo belt.
The orogens occur along the western edge of the West African craton. The geodynamic interpretation of three main orogenic events (two in the Late Proterozoic and one in the Hercynian stage) is considered.

Subdivision, stratigraphy, and regional correlation of rocks of the upper Precambrian (1400-950 Ma) Sinclair Group, which was deposited and deformed in pre-Damara time, are described.
RUSSIAN CRATON

A new geologic map with removed Vendian and younger rocks is described. The map shows a system of Riphean aulacogens (rifts) and marginal depressions of the craton. Isopachs of Riphean rocks are shown.

The seismostratigraphic analysis of Precambrian sedimentary rocks provide understanding of the regional structural conditions and suggests the potential exploration plays in the area which is located in the Volga-Ural province.

Two chapters of the monograph describe Upper Proterozoic sedimentary rocks of the western Russian craton.

Stratigraphic studies indicate the absence of significant Baikalian (pre-Paleozoic) tectonic event in the region.

Comparative analysis of petroleum potential of the East European (Russian) and Siberian cratons.

The monograph includes information on the stratigraphy, tectonics, and petroleum potential of Upper Proterozoic rocks of the eastern Russian craton.

Paleogeographic conditions of sedimentation during Riphean–Vendian (Middle–Late Proterozoic) time are discussed.


The structure and stratigraphy of Riphean and Vendian rocks of the Kama area are described. Petroleum potential is connected with the weathered top of Riphean carbonates and with three sandstones in the clastic Vendian sequence in large structural traps.


Paleobiologic and geochemical characteristics and oil-source potential of Upper Proterozoic–Cambrian rocks of parts of the Russian and Siberian cratons are discussed.


The article contains geochemical characterization of Upper Proterozoic and Cambrian formations of the Russian and Siberian cratons.


The content of organic carbon in Vendian rocks reaches 2.5%. Time of petroleum generation by these rocks vary from end of the Vendian on the western Urals to the Carboniferous west of them.


Depositional conditions of Vendian rocks, character of organic matter, oil shows and noncommercial pools suggest a significant petroleum potential. Evaluation of conditions of preservation of oil fields is critical for exploration success. A proposed exploration program is discussed.

A monograph describing stratigraphy, lithology, paleontology, known oil and bitumen shows, and petroleum potential of Upper Proterozoic rocks of the Volga-Ural region (Russian craton).


Comparative analysis of Late Proterozoic, Paleozoic, and younger rifts, especially those of the Russian craton.


A number of young rifts and ancient aulacogens are discussed including the Late Proterozoic Kama-Belaya, Sergiev-Abdulin, and Vyatka aulacogens of the Russian craton.


Analyzed Vendian oils and organic matter are rich in heavy isotope of sulphur and highly enriched in light isotopes of C and H. This reflects the specificity of Precambrian biota and low salinity of ancient ocean water.


Depositional environments reflect the tectonic development of the sedimentary basins. A wide spectrum of sediments, from continental to deep-water, is present in the sequence.


The monograph describes the lithology, stratigraphy, and paleogeography of the Karatau Series exposed on the anticlinorium in the western Urals.


The monograph describes the stratigraphy, lithology, depositional conditions, and tectonic development of Middle–Upper Proterozoic (Riphean and Vendian) rocks of the Volga-Ural region (Russian craton).

Description and stratigraphic correlation of Vendomean (upper Riphean plus Vendian) rocks.


Detailed chemical composition of naphthenes in Riphean oil of this field in the Volga-Ural province (eastern Russian craton) is described.


The monograph describes the stratigraphy, lithology, and tectonic history of upper Precambrian rocks of the Russian craton. The geology of Vendian rocks and their oil potential are discussed on the basis of the comparative analysis of these rocks on the Russian and Siberian cratons.


The Kaltasy Formation is composed of thick carbonate rocks and reefal builds formed by blue-green algae. The formation is oil-source rock. Significant oil shows are known from the carbonates and overlying sandstones of the Gozhan Formation.


The main parts of the monograph describe Precambrian rocks of the Russian and Siberian cratons, both metamorphosed rocks composing the basements and unmetamorphosed rocks of the sedimentary cover.


Analysis of the tectonic conditions of deposition of Proterozoic formations including Upper Proterozoic unmetamorphosed rocks.

The late Precambrian Biri Formation in the Sparagmite basin contains up to 3% of organic matter in limestone beds. Depositional conditions of the limestones are discussed.


History of formation, composition, and tectonic evolution of aulacogens (rifts) of the East European (Russian) craton are described in the monograph. The petroleum potential of the aulacogens is evaluated. Most of the aulacogens are of Late Proterozoic age.


Geochemical characteristics and thermal histories of Upper Proterozoic rocks suggest their significant generative potential.


The monograph describes lithology, geochemistry of organic matter and bitumens, and maturation of organic matter in Upper Proterozoic rocks of Bashkiria (the Volga-Ural province of the Russian craton).

The monograph describes organic matter-rich Upper Proterozoic and Cambrian formations of the Siberian craton and surrounding areas. These formations are possible sources for oil and gas found in Proterozoic rocks of the craton.


A review of Riphean formations of the Siberian craton and surrounding folded regions.


Tectonic stages in formation of the sedimentary cover and conditions of petroleum generation from source rocks deposited during these stages are considered.


Evolution of biocenoses on the Siberian craton from Late Proterozoic to middle Paleozoic time resulted in changes in the composition of organic matter and its generative potential.


Riphean rocks are richest in organic matter on the Siberian craton. The biological and environmental conditions of deposition of this organic matter and its geochemical transformation during burial are discussed.
Two structural zones are distinguished in Riphean rocks. The southern zone is composed of thick sedimentary rocks including carbonates. The northern zone is primarily composed of volcanics and flysch.

Riphean rocks in the southern part of the Tunguska basin were mapped. The region includes the Kamov arch and the Katanga saddle were the rocks proved to be oil productive.

The well on the northeastern Siberian craton drilled Riphean, Vendian, and Cambrian rocks. The Riphean Starorechensk Formation is organic matter-rich and has generated hydrocarbons judging from geochemical data.

The monograph discusses facies and geochemical conditions of organic matter deposition and maturation. The petroleum potential is assessed by application of material balance method.

A number of analyzed biomarkers suggest a marine source rock for the oil and a prokaryotic source for organic matter.

Stratigraphy and paleogeography of Riphean and Vendian rocks in marginal rifts of the Siberian craton (Baikal-Patom and Yenisey rifts). The Baikal-Patom rift is most potential (4.8 x 10^7 tons of hydrocarbons).


Oils and condensates of Vendian-Lower Cambrian rocks are characterized by a common character of biomarkers. Composition of biomarkers indicates that oils were generated by source rocks deposited in strongly reducing environments. Condensates were formed by dissolution of oil fractions in gas.


Oil/source rock correlation indicates that the oil-source rocks for oils in Vendian and Lower Cambrian rocks of the eastern Siberian craton are in the Riphean sequence of the adjacent Patom region.


Two groups of bitumens are identified. Inside each group, the difference in composition of bitumens is connected only with different degree of biodegradation. Two source rocks are suggested.


The monograph describes stratigraphy, lithology, depositional environments, and paleontology of Riphean rocks of Siberia.

The monograph describes the composition, depositional environments, and spatial distribution of the Upper Proterozoic reefal rocks in eastern Siberia in the southern Ural Mountains, and in the Timan region.


The monograph describes deposits of natural bitumens in the arctic regions. The geology of some deposits in Upper Proterozoic rocks of the northern Siberian craton suggests the indigenous source for the bitumens.


The monograph describes stratigraphy, paleontology, and correlation of the Upper Proterozoic-Cambrian sequences of the southeast of the Siberian craton.


A monograph describing stratigraphy, tectonics, geochemistry, hydrogeology, oil and gas fields, and petroleum potential of the Siberian craton.


Stratigraphy, geochemistry, and hydrocarbon-source potential of Vendian and Cambrian rocks of the Cis-Patom basin (Siberian craton) are discussed.


The program of superdeep drilling in the USSR is discussed. Cross sections and a map reflect new data on the rifts of the Siberian craton that are filled with Upper Proterozoic sedimentary rocks.

The Nyuysk-Dzhebrin trough is located between the petroleum productive Nepa-Botuoba arch (Siberian craton) and the Baikal-Patom fold system. Riphean and Vendian rocks are overlain by the lower Paleozoic and are potential for gas.


Original average amounts of organic matter in Precambrian-Lower Cambrian formations varied from 0.1 to 5-6%. Blue-green algae (cyanobacteria) were the main suppliers of the organic matter. Organic-rich formations are described.


Facies zones of the miogeosynclinal Patom trough and the marginal Bodayba trough are described and correlated.


The main tectono-stratigraphic sequences (including the Upper Proterozoic) are described in the monograph.


Thick Riphean rocks are developed on the craton margins and in aulacogens (rifts). A structural unconformity is present at base of the middle Riphean.

Stratigraphy of Riphean rocks along the southern margin of the Siberian craton and in the adjacent Baikalian and Sayan folded regions is described.


Oil and gas fields and shows in Upper Proterozoic and lower Paleozoic rocks are reviewed. Oils and gases in these rocks are specific in their composition. The petroleum potential of Upper Proterozoic rocks of the Siberian craton is evaluated.


The composition of gas in hydrocarbon pools and in water solution on the Russian and Siberian cratons is described. Potential resources of dissolved gas are evaluated at $10 \times 10^3 \text{ m}^3$ for the Russian craton and at $75 \times 10^3 \text{ m}^3$ for the Siberian craton (for pre-Devonian rocks).