www.revistageintec.net
ISSN: 2237-0722
revista GEINTEC
Gestão, Inovação e Tecnologias

The Analysis of Impacts of Geotoxicology, Hydrocarbon – and Environmental Challenges

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Abstract

The geochemical composition of the Earth's biosphere has changed radically. As a result - a disaster ancient ecosystems. This is the first geotoxicological disaster known to us in history. Earth. Of the former diversity of forms, only single islands of stromatolites survived. And as a consequence of the long, long emergence of a practically new biospheric environment and new creatures.

The paper aims to figure out What are impacts of hydrocarbon and Geotoxicology and challenges for environment.

By using descriptive method for primary model, synthesis methods and process analysis and analysis of difficulties and discussion, This study finds out that: The key problem of assessing environmental risks in the development of hydrocarbons is determination and targeted study of impurity components dangerous for biological objects in hydrocarbon raw materials at the exploration stage in order to preventively regulate the conditions environmentally safe development, processing and disposal, excluding or reducing damage to the environment by toxicants.

Key-words: Problems, Recommendations, Geotoxicological, Environment.

1. Introduction

Mass extinctions of most species occur from time to time. These processes, although has catastrophic consequences for the existing biosphere, but stretched for a significant time, usually millions of years. The main paleontological sign of extinction is a sharp decline in the biological diversity of land and sea taxa, as well as the existence of a significant number of biological niches that have not been filled for a long time.

From a comparison of the composition of atmospheric gases at key points in our known history development of the Earth, it follows that geotoxicology is a factor in global evolution.

Here are the key points:

- The first deposits of organic matter (appearance of life on the planet) - about 3.7 billion years.
- The beginning of the Riphean era dates back to about 1.6 billion. And the border of the Riphean and Vendian (approximately 0.68 billion years) is marked by a sharp depletion of phytoplankton, which was associated with the greatest glaciation in the history of the Earth (0.7–0.6 billion years). After the glaciation a variety of large multicellular organisms appeared, which everywhere and very quickly spread, however, almost completely died out at the beginning of the second half Vendian period, that is, about 0.675 billion years).
- Ordovician-Silurian extinction, the beginning of the Paleozoic. Probably large tectonic shocks associated with the movement of the supercontinent Gondwana - (moved close to south pole) led to global cooling, and as a result, a drop in the level world ocean. As a result, more than 60% of marine invertebrate species became extinct, i.e. the main taxa that inhabit the Earth. – about 0.57 billion years.
- Devonian extinction, Middle Paleozoic. High volcanic activity of the Earth led to a change in the level of the world's oceans and its oxygen depletion. AT As a result, 50% of all existing genera and almost 20% of all families became extinct. Two stages - 374 and 359 million years ago.
- Great Permian extinction, the beginning of the Mesozoic. Permian-Triassic boundary periods. 96% of marine and more than 70% of terrestrial animal species die out. Neither before nor after that, such a large-scale devastation of the biosphere is not recorded on our planet. This the period is commonly called the Great Dying - about 252 million years ago.
- Triassic extinction, the border of the Triassic and Jurassic periods. The fastest of known mass extinctions. For 10 thousand years, about 50% died out paleontologically known species. It is known that this time is the beginning of decay the supercontinent Pangea into separate continents. About 200 million years ago.
- Cretaceous-Paleogene extinction, the beginning of the Cenozoic. Cretaceous-Paleogene boundary period. About 65 million years ago, the most discussed in the media is recorded great extinction. Dinosaurs, marine reptiles, including mosasaurs and plesiosaurs, flying pangolins, many mollusks, including ammonites and belemnites, and many small algae. 16% of families of

marine animals became extinct (47% of genera marine animals) and 18% of families of terrestrial vertebrates - about 65 million years.

- Eocene-Oligocene extinction, the end of the Paleogene - the beginning of the Neogene. Pretty soft extinction". We know about it thanks to the good preservation of the paleontological material. It slightly exceeds the background values of species change. Percent extinction of species several times exceeded the "background" level - more than 3% against 0.7%, which is an order of magnitude weaker than the Cretaceous-Paleogene extinction. Eocene-Oligocene extinction It is customary to associate both with the fall of two large asteroids 35 million years ago (~5 and ~4 km in diameter, respectively), and with significant global volcanic activity 35-29 million years ago on all the American continents, as well as in Africa and Middle East. It is known that significant areas in North America are covered kilometer layers of deposits of tuff and ash of the Eocene-Oligocene age. Near 35-30 million years ago.

As a result, Sergey Germanovich formulated the thesis that mass extinctions of biota and subsequent updates of its species diversity are caused by the effect on living organisms radioactive and other mutagenic elements. These elements cyclically come from the depths to surface as a result of the endogenous activity of the Earth.

Research Questions

Question 1: What are previous studies on hydrocarbon and **Geotoxicology**?

Question 2: What are impacts of hydrocarbon and **Geotoxicology** and challenges for environment?

2. Methodology

Authors have used qualitative and analytical methods, descriptive method for primary model, synthesis and discussion methods in this paper.

We also used historical materialism method.

3. Main Findings

3.1. Background Information

Geotoxicology, as the name implies, studies the harmful effects of non-living substances. nature on a living organism. In English sources, the occurrence of the term is single character. So Google indexes 1060 links, with 488 of them dedicated to citing the same 1989 article. This similarity is due to the relationship with relatives. Directions: "ecotoxicology" - 2,110,000 Google links and "medical geology" - 98,600 google links. And this is no coincidence, since the use of the term geotoxicology is associated with health of the population in regions with unusual geological conditions, for example, increased natural level of radioactivity of rocks coming to the surface and springs, volcanic activity, geothermal releases, acid rain, elements leaching from rocks that are toxic for biota, and so on. Term "medical geology", in the opinion of the authors, is contrary to common sense. Medicine, according to TSB [TSB. - 1969-1978] is a complex of scientific knowledge and practical measures combined the purpose of recognizing, treating and preventing diseases, maintaining and promoting health and people's ability to work, life extension. Geology, according to the same source, is a complex sciences about the earth's crust and deeper spheres of the Earth; in the narrow sense of the word - the science of composition, structure, movements and history of the development of the earth's crust, and the placement of useful fossils. Combining these concepts is ontologically incorrect and leads to a world far from science and common sense.

In Russia, the main directions for the development of geotoxicological work are fundamental questions of the global evolution of living and non-living things on geological scales time. In the works of V.I. Vernadsky, his student of the military physician, and then the geochemist A.P. Vinogradov, the influence of geological processes on living matter was repeatedly discussed.

A serious analysis of this issue was made in the work of A.P. Pronin and R.V. Goleva "Gas respiration of the Earth and its global environmental consequences" (**Pronin A.P., Golevoy R.V, 2009)**. The article is very an important and practically not discussed in the scientific literature conclusion about a steady decrease in atmospheric oxygen content over the past few decades of observations. The reasons for this decrease are the continuous release of reducing agents from the deep geospheres.

For geotoxicology, the works of S. G. Neruchev, who drew attention to the fact that repeated in the Phanerozoic with a cycle of about 30 million years crises and periods of activation of geodynamic processes were accompanied by water contamination of the World Ocean with uranium and other rare chemical elements, which, from the point of view of Sergei Germanovich led to mass extinctions of biota and the subsequent change in its species composition. That is, inanimate nature, in the form of radioactive and other toxic elements, periodically arriving on the surface of the planet, has a fatal or close to its impact on living organisms on Earth. Vladimir Vasilievich Ivanov, Professor of the Institute of Mineralogy, Geochemistry and Crystal Chemistry of Rare Elements (IMGRE), in 1994 publishes a multi-volume study "Ecological geochemistry of elements" (**Ivanov V.V**, 1994) which is a basic reference tool in geotoxicology.

3.2. The Key Problem of Assessing Environmental Risks in the Development of Hydrocarbons

Arsenic is an active carcinogen regularly observed in fuel raw materials - oil, gases and coals. There is no need to continue listing such examples. Together with industries, The development of regions is also deteriorating the ecological situation, most of all in the areas of processing raw materials. Hydrocarbons play an important role in this kind of environmental pollution, both natural and processed products. Despite the lack of knowledge of this problem, there obvious positions. For example, according to the degree of prevalence and secrecy of the impact the most dangerous, especially when consumed, are processed products (fuel oil) of heavy sour oil enriched in metal complexes, massively produced in the European part

RF. The share of heavy oil production in the Russian Federation does not exceed 23% (2016), however, within the densely populated Volga region is at least 40% (2010) and the volume of production is constantly growing.

At the end of 2018, the volume of Russian oil production in absolute terms amounted to 555.9 mmt. More than half of the increase (+5.0 mmt, +13.5%) came from new deposits with a life of up to 5 years (**Official website of the Ministry of Energy of the Russian Federation. Oil production raw materials. In the link: URL https://minenergo.gov.ru/node/1209).**

In 2016, the Russian Federation produced 126 billion tons of heavy oil (**G.K. Bikmukhametova, A.I. Abdullin, E.A. Emelyanycheva, R.I. Sibgatullina, L.I. Mullakhmetova, A.M. Mustafina, 2016).**

The key problem of assessing environmental risks in the development of hydrocarbons is determination and targeted study of impurity components dangerous for biological objects in hydrocarbon raw materials at the exploration stage in order to preventively regulate the conditions environmentally safe development, processing and disposal, excluding or reducing damage to the environment by toxicants.

ISSN: 2237-0722
Vol. 11 No. 1 (2021)
Received: 30.01.2021 – Accepted: 28.02.2021

Figure 1 - Volumes of oil Production (Including gas Condensate) for the period from 2009 to 2018 Authors: Yakutseny S.P., Solovyov I.A. (According to the Ministry of Energy)

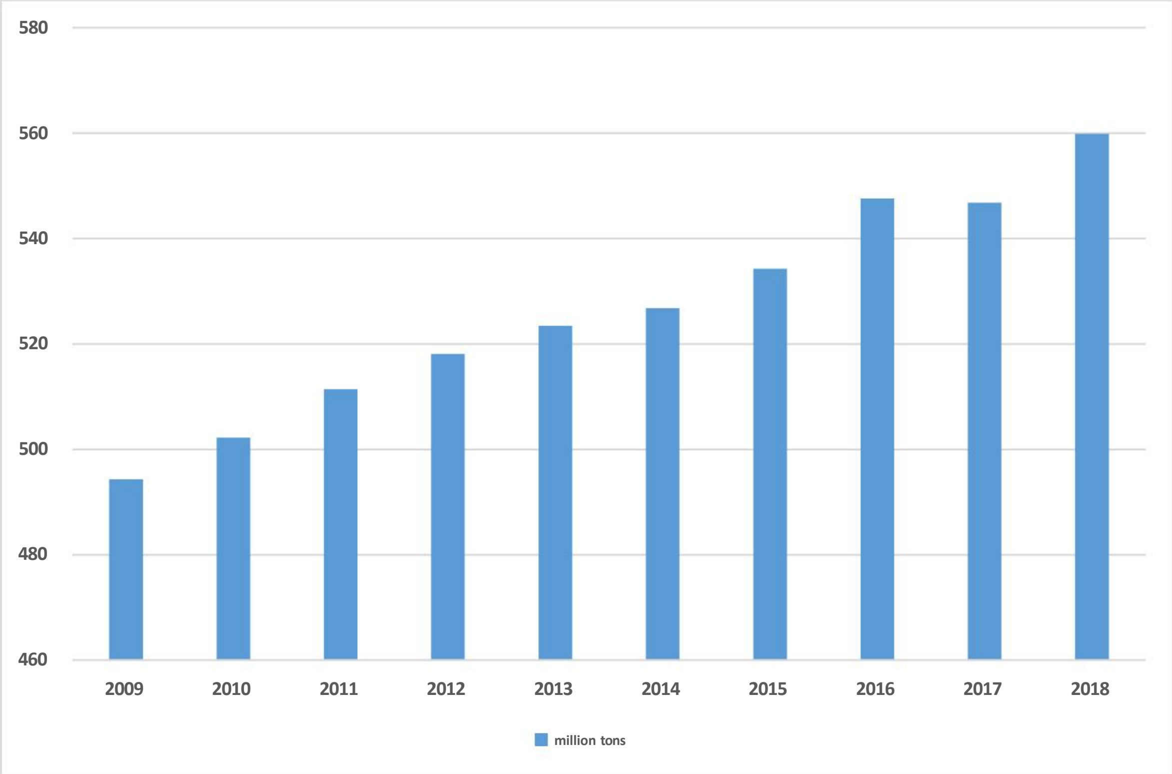
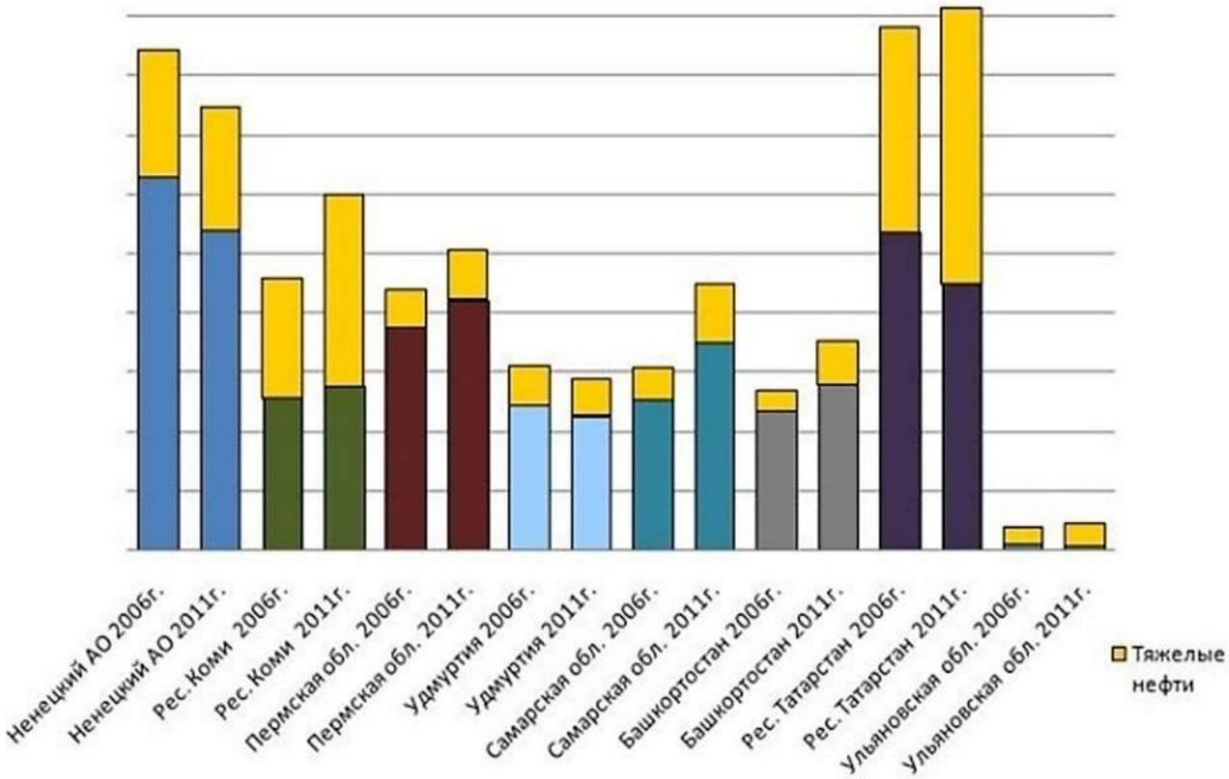


Figure 2 - Distribution of Conventional and Heavy Oil Reserves by Regions of the European Part Russia in 2006 and 2011



ISSN: 2237-0722
Vol. 11 No. 1 (2021)
Received: 30.01.2021 – Accepted: 28.02.2021

The study of this problem to some extent facilitates the extensive, although scattered and extremely heterogeneous analytical material in terms of the content of impurity elements in crude oil, refined products and gases accumulated over the years of exploration, production and disposal of hydrocarbons.

The nature of the relationship between oil and PTE, especially such as V, Ni, Co, Cd, As, U, Zn, Cz, was of interest geologists, geochemists and technologists for a long time. Received even independent development branch of geochemistry - naphthometallogeny.

This is due to two reasons. The first is the aggressive influence of impurity components, sulfur and heavy metals on the quality of commercial products, as well as on equipment, catalysts and technological processes. This forces processors to constantly research the content

PTE in raw materials, although these studies rarely appear in publications. The second reason - use of data on the content of impurity elements in hydrocarbons as indicators geochemical processes to address the issues of formation, formation and search accumulations of oil and gas in the bowels. Unfortunately, in these situations, the interest of researchers is aimed at assessing the presence of a limited number of elements in hydrocarbons, such as S, V and Ni, less often

- Co, U, Hg, As and rarely others, including toxic elements and compounds. In that the reason for the lag in the knowledge of the contents and forms of PTE in hydrocarbons.

A paradoxical situation has arisen. Against the background of the study of the properties and consequences impacts of hydrocarbons on the environment, toxic elements remained out of research - impurities present in the hydrocarbon feedstock. It must be taken into account that the intensity

PTE revenues from the utilization of hydrocarbon raw materials has been increasing over the years. As exhaustion relatively "clean" light oil, the volume of production of heavy, enriched toxicants of oil and sulfur-containing gases.

4. Discussion and Conclusion

The above summary of the state of knowledge of the evaluation problem environmental impact of HC enriched with PTE on the environment predetermined the relevance of the study.

The solution to this problem is based on the identification of geological and geochemical conditions for the formation and distribution of hydrocarbon deposits enriched with PTE. The other side of the problem is the state the study of the impact on the biosphere, including human health, falling into the environment - the environment of the products of processing and utilization of hydrocarbons enriched with PTE is unsatisfactory.

Acknowledgement

Thank you editors, friends to assist this publishing.

Conflicts of Interest

There is no conflict of interest.

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