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NEW INSIGHTS TO PROSPECT OF HYDROCARBONS IN EUROPE RIFT ZONES – A FIRST STUDY IN OHRE RIFT (NW CZECHIA)

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Key words: rift structures, migration of hydrocarbons, Polycyclic Aromatic Hydrocarbons

Abstract: Rift structures are the most favorable for the assessment of the origin of oil from both organic and inorganic sources. Earlier in rifts of: Dead Sea, Iceland, Pacific and Indian Ocean rifts, oil/gas bearing areas evidence of migration hydrocarbons had been discovered by using Polycyclic Aromatic Hydrocarbons (PAH). The assessment of the oil/gas potential has been initiated in the Ohre rift (Czechia) for the first time. Favorable geological settings, such as seismic activity and presence of migmatites, and geochemical indications, e.g. existence of typomorphic oil-associated PAHs (Phenanthrene, Chrysene, Pyrene, Benz(a)pyren, etc) are discussed in respect to oil genesis. The investigated localities and analyzed samples include 1- Medenec. 2- Ostrov nad Ohri, and 3- Jachymov. They provide evidence of probable former generation and migration of endogenous hydrocarbons. These early data justify the conduction of more detailed prospecting works in this area.

1. Introduction

Rift structures are the most favorable for the assessment of the origin of oil from both organic and inorganic sources. Supporters of organic conception consider rifts as a favorable structure for accumulations and maturations of organic matter on account of rapidly immersion and powerful heat flows. Supporters of inorganic conception consider rifts as favorable structure for synthesis hydrocarbons and migrations hydrocarbons from depth. Very important information in founding out of pathfinders of hydrocarbon migrations gives Polycyclic Aromatic Hydrocarbons (PAH). Earlier in rifts of: Dead Sea, Iceland, Pacific and Indian Ocean rifts, oil/gas bearing areas evidence of migration hydrocarbons had been discovered by using Polycyclic Aromatic Hydrocarbons.

And that is why they are considered to be most perspective for oil/gas fields prospecting in the first hand among other geological structure. In the World this confirmed by existence under oil/gas bearing basins the rifts system. View of Geology of Czech Republic and based on World distributions of reserves oil/gas in geological structures show that Ohre River Rift could content traces of hydrocarbons migration and origin.

PAH is such indicator. The assessment of the oil/gas potential has been initiated in the Ohre rift (Czechia) for the first time. We fulfilled investigations for finding evidence of oil/gas bearing of Ohre Rift by existing of PAH in rocks. Typical oil associations are the alkalized homologues of chrysene, pyrene and 3, 4-benzopyrene. PAH are geochemical indicators for oil and gas fields prospecting.

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2. PAH in crude oils and bitumen

By the PAH belongs very important role in the studying of the geochemical history of oil [1]. PAH widely distributed in rocks of oil/gas bearing territory. And, as a rule are present at closed to oil/gas fields and disjunctive dislocations of Earth Crust. Presence in content of PAH the alkalize substituted homologues are the common feature for oil from different regions.

Typical oil associations are the alkalized homologues of chrysene, pyrene and 3, 4 benzopyrene. PAH are geochemical indicators for oil and gas fields prospecting [2, 3].

PAH can both to migrate and are formed in rocks by acting epigenetic hydrothermal processes. Molecules PAH are solid subcutaneous and can't migrate itself, but can do it inside oil and gas fluids.

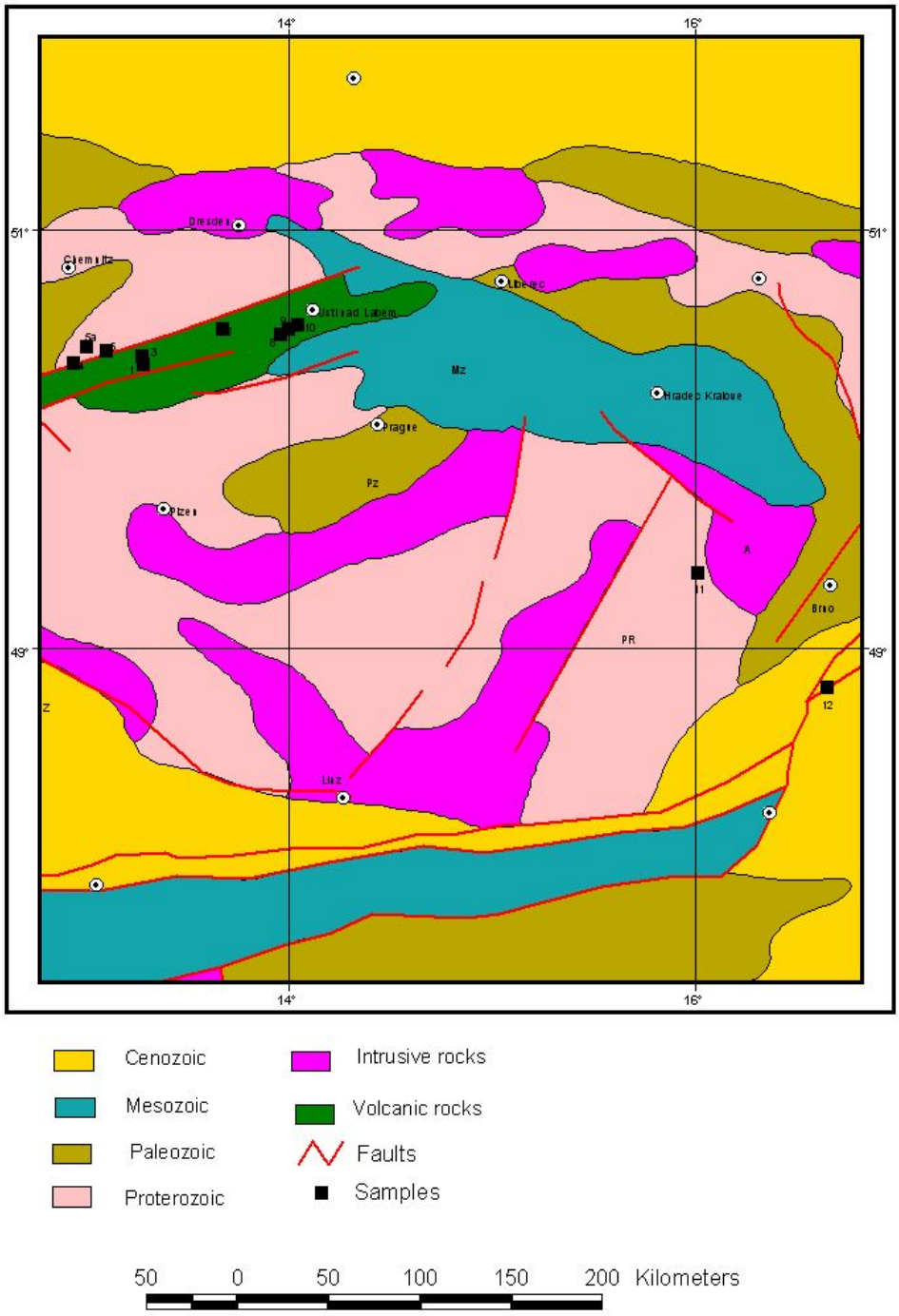


Fig. 1 *Map of Sampling. (OHRE RIFT NW CZEHIA).*

3. Review

In the Czech Republic The small oil and gas deposits are located mainly in south Moravia. Their exploration started in the early years of 20th century, first commercial oil extraction opened in 1919. In 2005 340,600 m³ of crude oil and 98.75 million m³ of natural gas were extracted [4].

Hydrocarbon deposits of the Czech Republic are confined to Moravian part of the Vienna basin and Carpathian Foredeep in the Eastern part of the country. The deposits are distributed over a great number of individual hydrocarbon-bearing structures and producing horizons.

4. Sampling

Geochemical survey was initiated (2010, May) for found out perspective sites (fig. 1, Map of Sampling). Samples of Rocks were taken from Quarry and Outcrops (tab. 1).

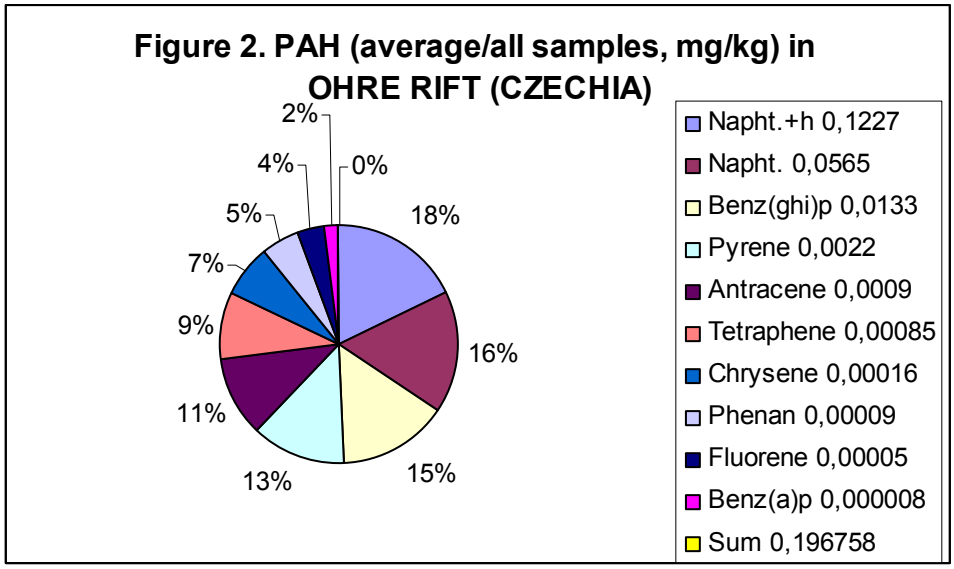
13 rocks have been sampled. Among them: igneous rocks-11. sedimentary rocks -2. Igneous rocks presented by Basalt (6 samples), and Granite (5 samples). For compare was collected syenite and limestone from an other geological regional units

Tab. 1

SITUATION	PLACE	№ SAMPLES	TYPE of ROCKS
Quarry	UHOSTANNY	1	Basalt
Quarry	UHOSTANNY	2	Basalt
Outcrops	OSTROV	3	Basalt
Outcrops	JÁCHYMOV	4	Gneiss (Phylitte)
Outcrops	OBERWIESENTHAL	5A	Granite (Muscovite-Biotite)
Outcrops	OBERWIESENTHAL	5B	Granite (Grey)
Outcrops	MEDENEC	6	Basalt
Outcrops	MOST	7	Basalt
Outcrops	VLASTISLAV	8	Basalt
Outcrops	BILINKA	9	**Mergel**
Quarry	KUBA	10	Rhyolite
Outcrops	MEZIRICI	11	Syenite
Outcrops	MIKULOV	12	**Limestone**

5. Discussion

So: 1**-** All 13 samples contain PAH. Attract attention, that in sedimentary samples 9 –marl and 12-limestone there are only Naphthalene and Naphthalene and homologous. (fig. 2).



And also interesting, that exactly same association found out in samples: 10-riolyth and 11-syenite and, as well as in samples 1-basalt and 2- basalt. The most diversity of PAH is in the samples 6- basalt, 3- basalt, 4-gneiss.

Average numerous for all samples done in figure 2, and see quite well that rate of 4 components : Naphthalene and Naphthalene and homologous. Benz (ghi) perylene and Pyrene is equal more a half of all components = (62 %).

There, 2 prevailing associations have been outlined: Naphthalene, Naphthalene- Pyrene.

And also are: Naphthalene-Phenanthrene, Naphthalene-Pyrene-Chrysene, Naphthalene-Chrysene-Pyrene, Benz (ghi) perylene-Antracene-Tetraphene.

Eexistence such components as Phenanthrene, Chrysene, and Pyrene probably pointed on migrations of Hydrocarbons from depth-(From HC-deposit?).

Samples analyzed show on the existence Hydrocarbons migrations of gases and a more Heavy Hydrocarbons.

According the most diversity content of PAH intensity migrations flows exist at areas:

1. MEDENEC-7 components of PAH,
2. OSTROV-6 components of PAH,
3. JÁCHYMOV-5 components of PAH.

6. Resume

Favorable geological settings, such as seismic activity and presence of migmatites, and geochemical indications, e.g. existence of typomorphic oil-associated PAHs (Phenanthrene, Chrysene, Pyrene, Benz(a)pyren, etc) are discussed in respect to oil genesis. The investigated localities and analyzed samples include 1- Medenec. 2- Ostrov nad Ohri, and 3- Jachymov. They provide evidence of probable former generation and migration of endogenous hydrocarbons. These early data justify the conduction of more detailed prospecting works in this area.

7. Favourable of oil prospecting indications of Ohre river rift

Geological data: [5, 6, 7, 8] 1-Rift structure with presence of migmatites, 2-Seismic active area, 3-New tectonic movements, 4-Crystaline porous rocks – analog of one of the collector rocks of the oilgasbearing basins of Moravia.

Geochemical data: 5-Existing and diverse composition of PAH, 6-Presence the components resembling on compositions of Moravia oil, 7- Existing of typomorphic oil association – the components characteristically for oil, videlicet: Phenanthrene, Chrysene, Pyrene, Benz(a)pyrene

8. Recommendation

Data received can serve as base for set detail works and in particularly for seeking centre of migrations of Hydrocarbons. And in the first instance at areas:

1. MEDENEC-7 Components of PAY,
2. OSTROV-6 Components of PAY,
3. JÁCHYMOV-5 Components of PAY.

And in the second instance at areas: 4- Oberwiesenthal 5- Most, and 6- Vladislav.

9. Planing researching

Methods of researching:

5X 5 km. Scale of researching is expecting to be 1: 50 000 with square net.

In the each area is expecting to take 100 samples. In first instance are planned 3 areas: 1- Medenec, 2- Ostrov, and 3- Jáchymov. So each area sampling square = 5 X 5 km=25 km^2. Alltogether on 3 areas total square of sampling 75 km^2.

Planning period of fulfilling works = 1 years.

Planned to investigate: analysis free gas phase of soil and rocks, analysis of bituminous substance and polycyclic aromatic hydrocarbons. Revealing among these substances primary and secondary mineral/gas scattering halos.

Mineralogical and petrographical investigations for revealing of paths/evidences of hydrothermal processes.

Building of "Map of Recent Blocks Structure /Tectonically knots" for discovering areas of oil/gas accumulations**.**

Expecting Results:

The concentration all investigations will become "map of geochemical galos". On these map will be done the most perspective sites for prospecting hydrocarbons.

Below done the distributions the study of investigations on months (Table 2).

Tab. 2

12	10	8	6	4	2	Month/ Stage	№
						Analysis of previous geological-geochemical (fluids) investigations	.1
							.2
						Sampling of different geological objects (rocks, water, another)	.3
						Analysis of samples (fluid content , isotopes, PAH and bituminous instants)	.4
							.5
						Treatment the results – searching correlation and regularity between all component	.6
						Building of map of distributions of content of fluids and its Intensivity and Building of map of Tectonically knots. Building the map of geochemical halos.	
						SUM Cost Common**109 700$**USA	

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