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Late Devonian magmatism in the Pripyat Palaeorift: a geodynamic model

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Late Devonian magmatism in the Pripyat Trough, Belarus was associated with the development of the intraplate Pripyat-Donets Palaeorift. Magmatic rocks belong to an alkali-ultrabasic–alkali-basaltoid suite. These are represented by explosive, effusive, subvolcanic and volcanic facies. The magmatic activity and rock composition changes from the periphery to the axial part of the Pripyat Trough, corresponding to the general trend of destructive processes in the rifting zone. Geodynamically, the Pripyat alkali-ultrabasic rocks represent a series of magmatic suites of the Pripyat-Donets palaeovolcanic region coinciding with a zone of disappearance of Late Devonian divergence processes in the south-west of the East European Craton.

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INTRODUCTION

Late Devonian magmatism in the south-east of the East European Craton (EEC) is associated with the formation of the intraplate Pripyat-Donets Aulacogen (PDA). This volcanic belt extends for 1200 km. The Pripyat palaeovolcanic region represents its western closure. It is situated in the northeastern part of the Pripyat Rift zone, which includes the Pripyat Graben, North-Pripyat Shoulder of the palaeorift and Bragin-Loev Saddle. Magmatic suites of the Pripyat palaeovolcanic region cover an area of 2000 km^2 and their total thickness ranges from 2.0 to 2.3 km.

Gonshakova and Korzun (1968), Korzun (1974), Korzun and Makhnach (1994), Veretennikov *et al.* (1997) made major contributions to the study of magmatism in the Pripyat Trough. Comparison of magmatic rocks of the Pripyat and Dnieper-Donets Troughs was carried out by Lyashkevich (1987, 1994). V. Beskopylny and T. Tsekoyeva have investigated volcanogenic rocks in many boreholes drilled by the commercial organisation "Belorusneft" and distinguished a zonation of these successions within the Pripyat Trough and Bragin-Loev Saddle. Y. Nikitin and L. Shtefan (Nikitin *et al.*, 1999) have described magmatic rocks of diatremes within the North-Pripyat Shoulder. Some geodynamic aspects of Late Devonian magmatism in the Pripyat-Donets Aulacogen were studied by Aizberg *et al.* (1999).

This paper represents a new geodynamic model of development of Devonian magmatism in the Pripyat Palaeorift. The model is based on recent petrographic and geological information obtained by analysis of new borehole records. It also considers previously published petrographical studies of the Devonian magmatic rocks of the area.

GEOLOGICAL SETTING

The tectonic and geological position of the Pripyat Palaeorift is determined by its relationship with other structures of the EEC. The Pripyat Trough belongs to the Russian Plate and at the same time it appears to be a part of the old Sarmath-Turanian lineament representing a large-scale zone of deep faults. In the west, this lineament is limited by the Teisseyre-Tornquist deep fracture zone and it extends to the east a distance of 4000 km from the Podlasie-Brest Trough to the south-west edge of the Gissar Ridge. The Sarmath-Turanian lineament is 100–150 km wide and consists of several tectonic structures (Fig. 1). These structures are located within the

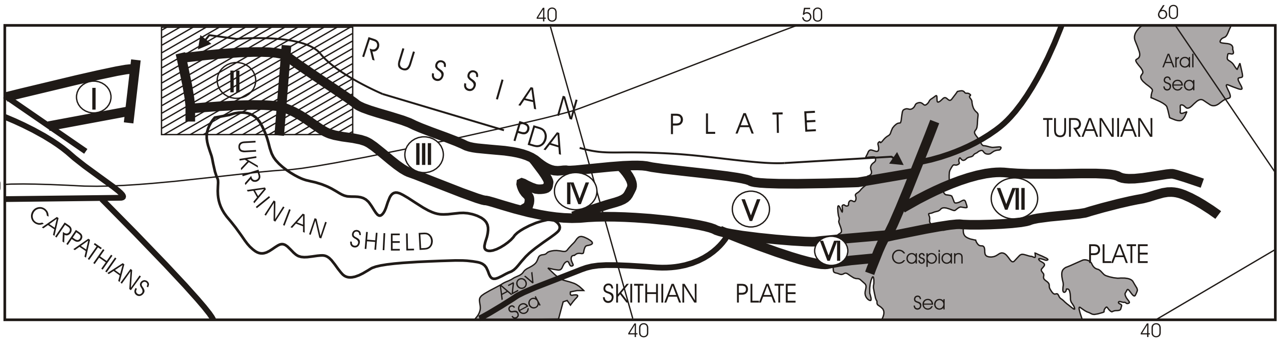

Fig. 1. Position of the Pripyat Trough in the Sarmath-Turanian lineament

Troughs: I — Podlasie-Brest, II — Pripyat, III — Dnieper-Donets, IV — Donbass fold belt, V — Carpinsky Ridge; **grabens**: VI — Manych, VII — Mangyshlak; PDA — Pripyat-Donets Aulacogen; area of study is hatched

overall tectonic system but differ in structure, evolution and geological history. The Pripyat and Dnieper-Donets Troughs, Donbass fold belt and Carpinsky Ridge are parts of the PDA which is about 1600 km long. This aulacogen formed in Devonian and Permian times. Its western part includes grabens, while the eastern part consists of inverted tectonic structures (Donbass fold belt and Carpinsky Ridge).

The Pripyat Palaeorift includes the Pripyat Graben, North-Pripyat Shoulder and Bragin-Loev Saddle, the latter dividing the Pripyat and Dnieper-Donets Troughs (Fig. 2). The Pripyat Graben is separated from the Belarussian Anteclise in the north and the Ukrainian Shield in the south by peripheral faults with throws of up to 3 km. The palaeorift is 270 km long and 150 km wide. The thickness of the sedimentary platform cover is 6 km, more than half of the total thickness (up to 3.5 km) being composed of Devonian deposits, which are underlain by crystalline basement rocks in the west of the studied area and by Late Proterozoic sandstones in the east. These are overlain by Carboniferous, Permian, Mesozoic and Cenozoic sedimentary rocks. The Devonian interval consists of two evaporite units and magmatic volcanogenic rocks of alkali-ultrabasic–alkali-basaltoid type (Fig. 3). The stratigraphical position of both evaporites and magmatic rocks has been found by comparison with overlying and underlying fossiliferous deposits (Golubtsov, 1997).

Evolution and structure of the Pripyat Trough was controlled by faulting. Several types of tectonic pattern were recognised for different structural complexes. The Eifelian, Frasnian and Late Proterozoic deposits underlying the evaporites together with the crystalline basement have a block structure. Several hundred borehole records together with seismic data show elongated segments divided by block and shift faults with throws ranging from 1 to 3 km. These segments form steps dipping from the graben axis towards the boundary faults. Fold structures are recognised in Famennian and overlying deposits which occur above the evaporites, while folded block structures are typical for inter-evaporite deposits.

Within the North-Pripyat Shoulder, the Devonian thickness is significantly reduced by comparison with those the Pripyat Graben. Carboniferous and Permian deposits, as well as upper saliferous stratum have not been revealed in the North-Pripyat Shoulder, where the thickness of the sedimentary cover ranges from 0.7 to 1.6 km. Numerous diatremes have been recognised in this area according to boreholes records. The Bragin-Loev Saddle is also characterised by reduced sedimentary thickness which is more than 2 km thinner than that in the Pripyat Graben. Upper and lower saliferous strata in the Bragin-Loev Saddle are replaced by volcanogenic rocks.

MAGMATIC FEATURES

Magmatic rocks of the Pripyat Trough belong to an alkali-ultrabasic–alkali-basaltoid suite (Gonshakova and Korzun, 1968) and are recognised in two main fields (Fig. 2). The main field covers the northeastern part of the Pripyat Trough, the Bragin-Loev Saddle and the adjacent parts of the northern shoulder of the palaeorift. The succession comprises three units: upper Frasnian (Yevlanovo-Domanovichi), lower Famennian (Yelets) and upper Famennian (Lebedian). The latter occurs locally in the extreme north-east of the Bragin-Loev Saddle (around the village of Sharpilovka). The strata comprise effusive and pyroclastic rocks (lavas, lavabreccia and tuffs) — products of eruption of central and fissure-type volcanoes. These are intermediate, basic and ultrabasic rocks: subalkaline and alkaline trachytes, trachybasalts, nephelinites, leucitites, limburgites and ankaratrite-picrites. These volcanic rocks, are intruded by many sills and probably some dikes, represented by syenite-porphyries, porphyritic picrites, vogesites and shonkinites.

The second area where Upper Devonian volcanomagmatic formations are widespread is confined to the North-Pripyat Shoulder and its junction with the Zhlobin Saddle. Early alkali-ultrabasic magmatism occurs there as diatremes. Geophysical investigations have detected about 100 anomalies of pipe type, 30 of which have been confirmed by drilling as diatremes containing isolated small diamond crystals (Nikitin *et al.*, 1999).

Late Frasnian and early Famennian volcanogenic strata within their main fields of distribution show similar structure and nearly identical extents (Figs. 4 and 5). The volcanogenic

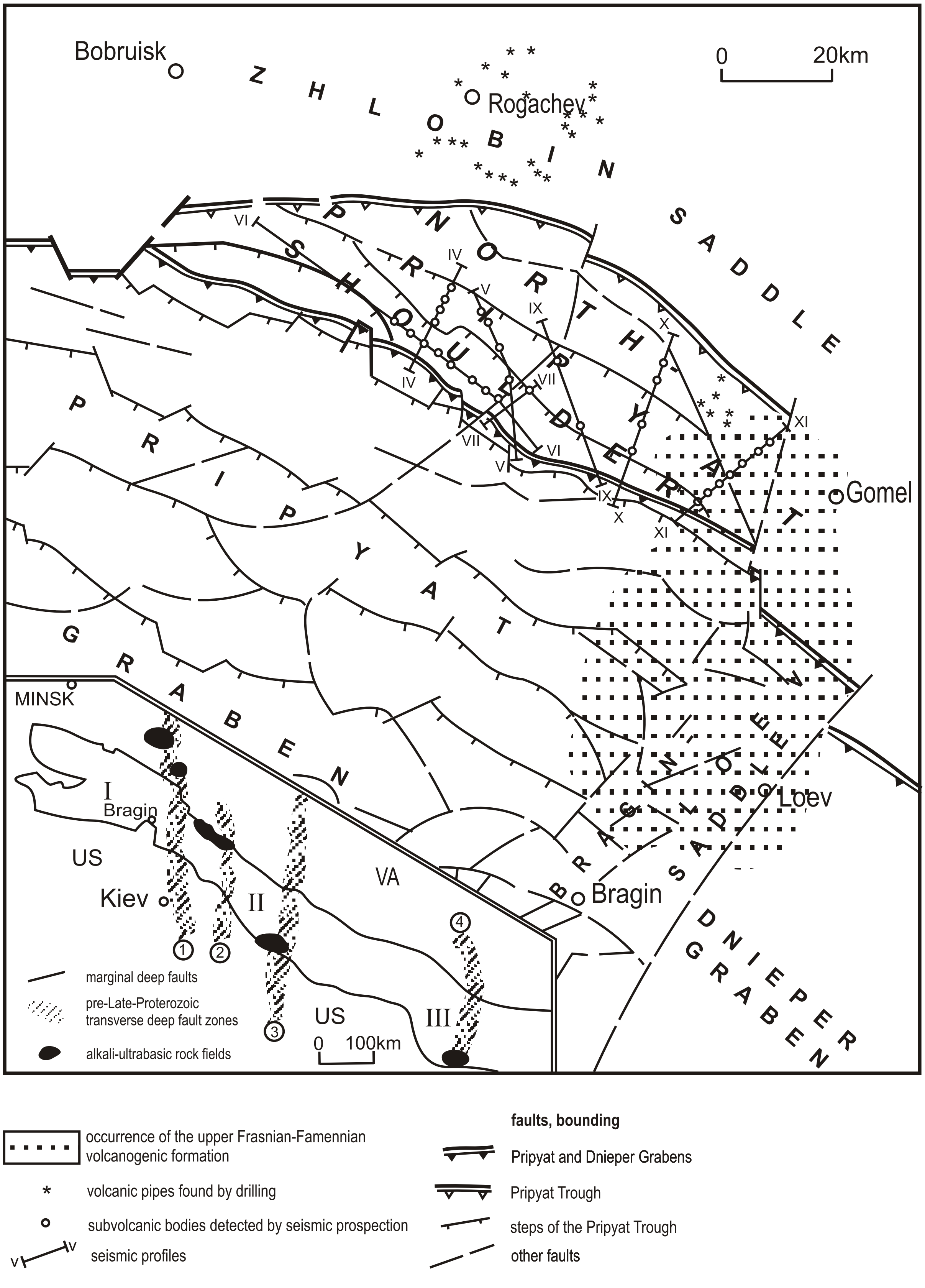

Fig. 2. Schematic map of the distribution of the Upper Devonian formation within the Pripyat rifting zone

Inset map shows a pattern of the Frasnian alkali-ultrabasic magmatism manifestation in the PDA (after Lyashkevich, 1987 with the authors' supplements); encircled numbers correspond to Odessa (1), Znamenka-Pirjatin (2), Krivoi Rog (3), Kalmiuss-Aidar (4) deep faults; **tectonic units**: VA — Voronezh Anteclise, US — Ukrainian Shield; **Pripyat-Donets Aulacogen**: I — Pripyat Trough, II — Dnieper-Donets Depression, III — Donets fold

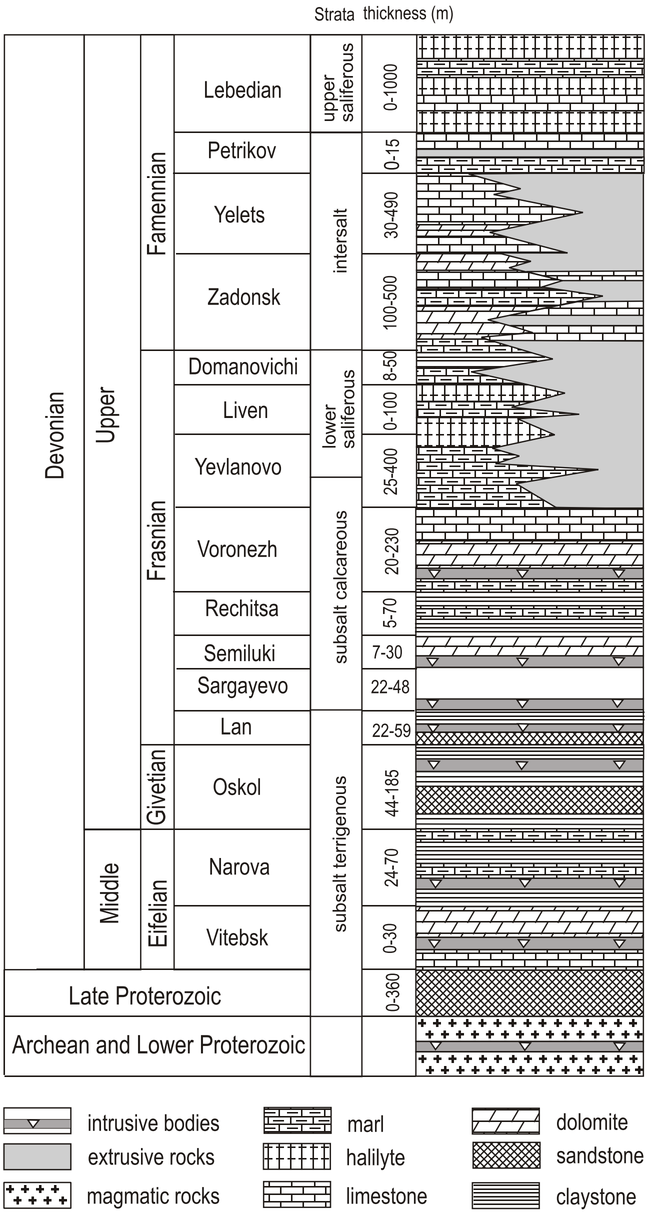

Fig. 3. Lithostratigraphic log of the Pripyat Trough

rocks in both intervals have revealed several facies zones: pipe and near-pipe, effusive-explosive, sedimentary-volcanogenic and volcanogenic-sedimentary.

The pipe and near-pipe zones are associated with central-type volcanoes. The effusive-explosive zone covers a territory adjacent to the central and fissure-type volcanoes. The two last facies zones include sections where volcanogenic and normal sedimentary rocks occur in varying proportions. Subaerial volcanogenic facies occasionally occur (Korzun, 1974). Volcanogenic rocks were erupted mainly subaqueously, as can be inferred from the small distance (up to 40–50 km) between the volcanic centres and the outer limits of pyroclastic material.

In late Frasnian time the magmatic activity was associated with central and fissure volcanoes (Fig. 4). The eruptive products of these volcanoes are mainly of intermediate composition (subalkaline and alkaline trachytes, trachybasalts and syenite porphyrites) and are represented by explosion, effusive, pipe and subvolcanic facies.

The alkaline character of the magmatism persisted into early Famennian time. Various facies types were formed, represented by intermediate, basic and ultrabasic varieties of rocks (Fig. 5). Pyroclastic deposits were dispersed some tens of kilometres from central volcanoes and formed strata and interlayers of volcanic tuffs of mainly mixed basaltoid-trachyte composition. Lava flows were spread no more than 10 km from eruption centres. Zones with abundant leucitic, nephelinitic and trachytic lavas occur. Lavas of ultrabasite composition (limburgites and ankaratrite-picrites) form subordinate components. Volcanogenic rocks of various petrographic compositions related to the second phase of magmatism possess some regular trends in their distribution. Rocks of ultrabasic composition are widespread in the western periphery of the palaeovolcanic region, rocks of intermediate (trachyte) composition are more abundant in its central part, and basic (nephelinite) rocks occur in the southern periphery.

One more peculiarity of the Pripyat palaeovolcanic region is the abundance of intrusions, mainly sills, that penetrate into sedimentary rocks mainly in the pre-Yevlanovo part of the Devonian succession. The maximum number of sills revealed in one borehole is 27. The thickness of intrusive bodies generally varies from 15 cm to several tens of metres; some are possibly subvertical stocks and dikes. The maximum thickness of some intrusions ranges from 300 to 700 m, but their base was not reached by boreholes.

Most intrusions occur in the Oskol (Givetian) and Lan (Frasnian) parts of the succession, with a second maximum confined to the Rechitsa-Voronezh part of the section (Frasnian). Individual intrusions were noted in the Vitebsk-Narova (Eifelian) and Sargayevo-Semiluki (Frasnian) deposits. Some areas with abundant sills in borehole sections were found to coincide with a zone of thicker subsalt effusive-tuffaceous strata. This might be indirect evidence of a synchroneity and genetic relationship between intrusions and the Frasnian phase of volcanism, though this process certainly continued in the early Famennian. This supposition is supported by the presence of sheet intrusions in sedimentary rocks of the Zadonsk horizon and in seismic data. Seismic profiles show that, at the northern shoulder of the palaeorift, intrusions penetrate into various levels: from the upper part of the crystalline basement to the Famennian deposits. It is likely that such intrusive bodies in the upper levels of the consolidated crust are much thicker than magmatic rocks within the platform cover, as is assumed for the majority of ancient and recent continental rifts.

GEODYNAMIC SETTING

Magmatic complexes are the most informative geological indicators of geodynamic environments. Volcanogenic rocks of intracontinental rift zones differentiated in composition, time

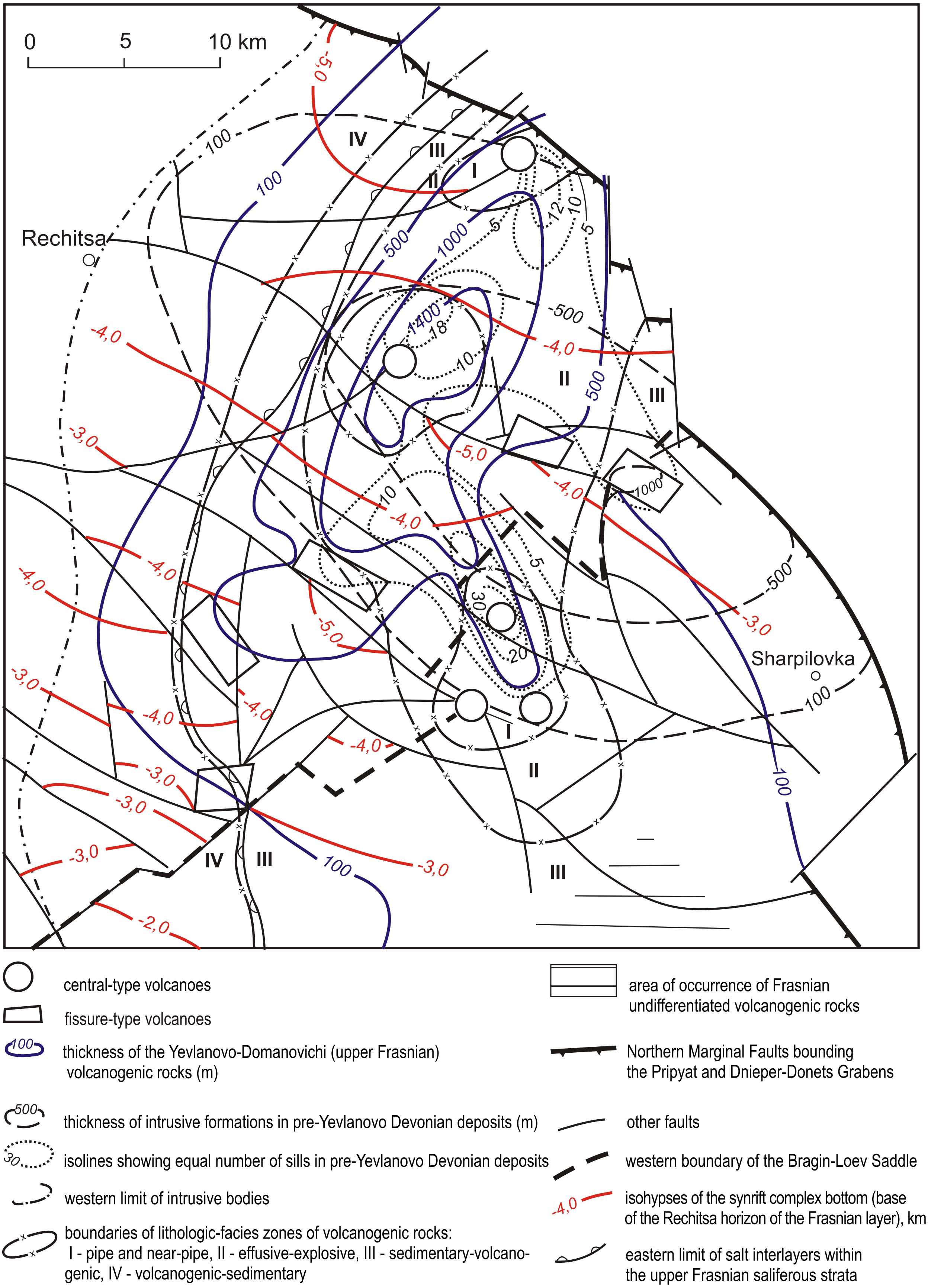

Fig. 4. Volcanogenic rocks in the Eifelian-Frasnian deposits of the Pripyat rifting zone

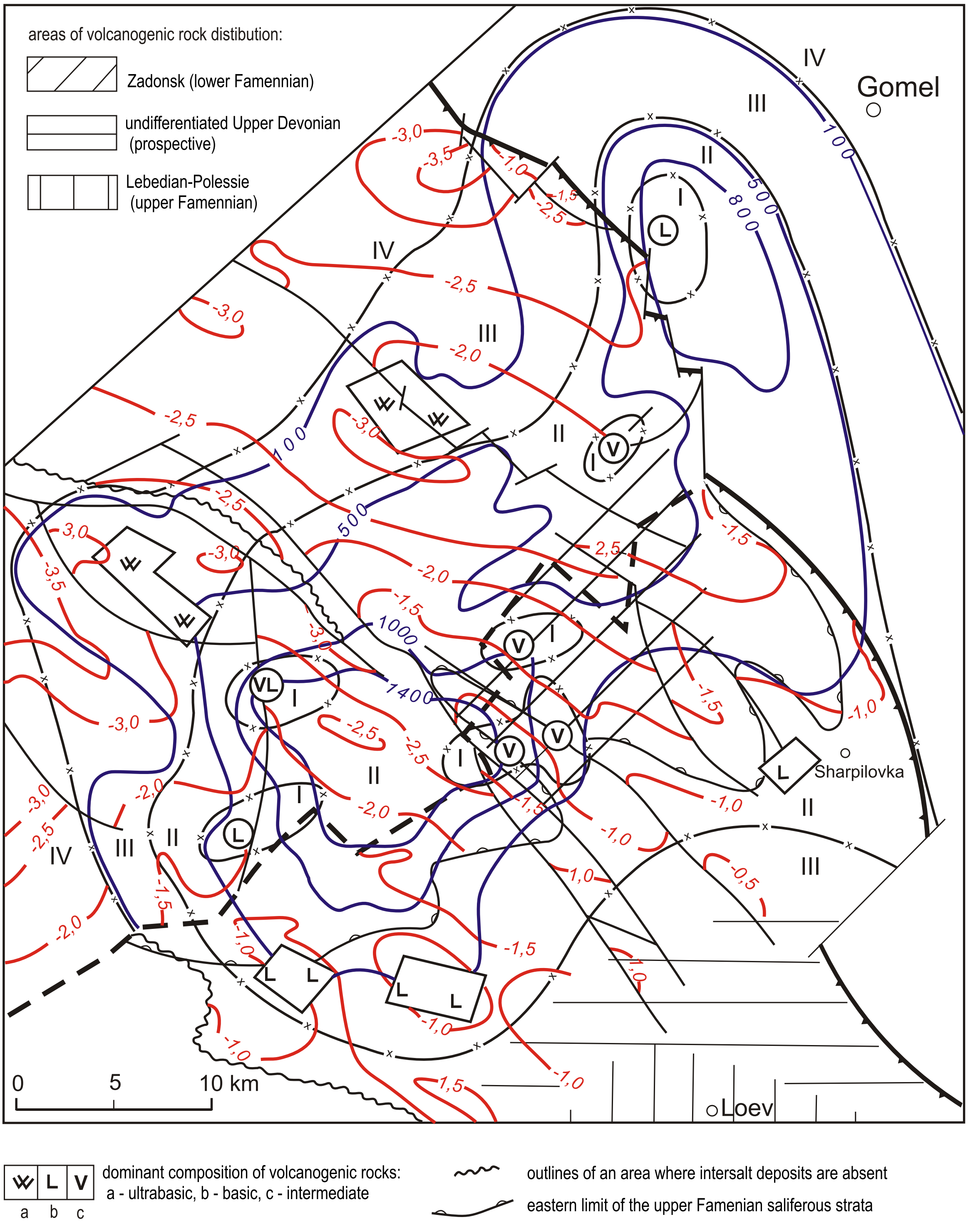

Fig. 5. Distribution of the early Famennian volcanogenic deposits within the Pripyat rifting zone

Blue lines — total thickness of the Yelets volcanogenic rocks (m), red lines — isohypses of the lower Famennian intersalt strata surface (km); other explanations see Fig. 4

of origin and area of occurrence carry important information on the timing and location of tectonic processes.

According to Abramovich (1989), geographical and temporal variation in magmatic rocks at diverging plate boundaries reflects the evolution of tectonomagmatic structures: from isolated ultramafic diatremes through complicated rift magmatic provinces to vast trappean fields ("imperfect oceans") and then to mid-ocean ridges of "perfect oceans". The compositional variations and spatial distribution of magmatic rocks within the PDA is consistent with such a geodynamic scheme (Aizberg *et al.*, 1999).

Late Devonian volcanism in the south-west EEC is confined to the Pripyat Trough and Dnieper-Donets Depression, the folded Donbas region (Pripyat-Donets Palaeorift) and the southeastern slope of the Voronezh Anteclise. Volcanic rocks in this extensive belt are represented by several magmatic suites distinguished by the proportion and predominance of the same assemblage of component rocks (Lyashkevich, 1987). Their distribution both in vertical succession and in lateral (east to west) arrangement, as well as their geochemistry may be used as indicators of the geodynamic evolution of the southwestern EEC during the Mid to Late Palaeozoic time. In this respect, tholeiitic basalts that form several magmatic units, as well as the alkalinity of the igneous rocks are of most significance.

Late Fransian tholeiitic basalts are widespread on the southeastern slope of the Voronezh Anteclise in a transition zone between the Donbas region and the Dnieper Trough (Lyashkevich, 1994). They also occur across the Dnieper Trough as dikes and small bodies of diabase (more rarely, dolerite) and gabbro-diabase in Devonian successions. In the Pripyat Trough basalts are absent. Despite their widespread occurrence and variable age, the tholeiitic basalts show generally constant chemical and mineral composition, except for the K_2O content which significantly increases to the west (Korzun and Makhnach, 1994). Low-potassium tholeiites of Late Devonian age similar in composition to tholeiitic basalts of mid-ocean ridges (Gladkikh and Gusev, 1993) are widespread in the east of the area: in the Donbas region and on the southeastern slope of the Voronezh Anteclise, where basalt flows represent evidence for rifting on the Pripyat-Donets Palaeorift shoulders. This indicates the proximity of the eastern termination of the palaeorift to the margin of the Late Palaeozoic oceanic basin: a centre of the triple rift system, in which the Pripyat-Donets branch was a deadlock.

The processes associated with the penetration of the diverging plate boundaries deep into the EEC along the Pripyat-Donets Palaeorift are attenuated from east to west. That is indicated by the alkalinity increasing in the same direction. Such a relationship is well illustrated by the migration of the alkalinity indeices of the volcanic rocks in time and space along the East African Rift system away from a plume: the site of its junction with the Red Sea and the Gulf of Aden (Seyfert, 1991). These rocks form a lateral succession of associations: tholeiite-rhyolites → alkali basalt-comendites → basanite-phonolites → nephelinites. By analogy with this scheme, the extreme members of the lateral succession are a volcanic tholeiite-rhyolite association of the Donbas region in the east of the area, and a complex of ultrabasic alkaline rocks of the Pripyat Trough which most corresponds to the nepheline association in the west. Most volcanic rocks from this trough (mainly nephelinites and alkaline trachytes) are supersaturated with alkali $(Na_2O + K_2O)/Al_2O_3 > 1$ and depleted in silica ($SiO_2 < 57\%$) (Korzun and Makhnach, 1994).

The chemical composition of magmatic rocks relates to both the depth at which magma is formed and the tectonic regime. The same low-potassium tholeiites of the Donbas region are derivatives of the early basic magmas. According to Turkotte and Schubert (1985) the basalt melting occurred under decompression and low temperature conditions at relatively shallow depths starting from 50 kilometres. Tholeiitic basalts are markers that outline a palaeoplume under a zone of continental rifting at the initial stage of lithosphere break up and pressure release. In the lateral genetic succession of magmatic rocks, tholeiites occur at the very spreading centre. Farther away from the centre the magma is probably supplied from deeper levels at higher pressure, as is reflected in the petrochemical properties. The alkalinity index and K_2O content of rocks regularly increase with a simultaneous depletion in silica (Korzun and Makhnach, 1994).

Volcanic rocks from the Dnieper Trough and from the junction of the Donbas region and the Azov Sea crystalline massif of the Ukrainian Shield are sodium-bearing and those from the Pripyat Trough are potassium-bearing (Lyashkevich, 1994). This might suggest that an anomalous mantle occurs below the Pripyat Trough under high pressure conditions. The alkali-ultrabasic–alkali-basaltoid association of the Pripyat Trough was formed by differentiation of primary alkali-ultrabasic magma derived from much greater depths (more than 100–150 km), than those at which basaltic magma originated (Korzun, 1974). This likely indicates that the magma-forming centres within the PDA plunged during the Late Devonian from the east to the west of the area.

DYNAMICS OF MAGMATISM AND RIFTING EVENTS

The vertical and spatial zoning of the rocks of the Pripyat palaeovolcanic region are of as significant as the lateral distribution of magmatic rocks along the diverging zone of the PDA. Firstly, this is concerned with the change in timing of the initial stage of magmatism from the periphery to the centre of the Pripyat Trough.

Some isolated diatremes revealed at the junction of the North-Pripyat Shoulder and Zhlobin Saddle belong to the oldest magmatic rocks. These are of the early Rechitsa age (the beginning of late Frasnian time). The earliest intrusion found in the diatreme field, located 60 km south of the junction of the North-Pripyat Shoulder and Zhlobin Saddle close to the Northern Marginal Fault, was formed in late Voronezh-early Yevlanovo time (mid-part of the late Frasnian) (Kruchek and Obukhovskaya, 1997). Within the Pripyat Graben and Loev Saddle the volcanic and igneous activity was associated with the major rifting phase and started even later — in Yevlanovo-Liven time (end of the late Frasnian).

Such a migration of early magmatism in time and space conforms with the stages of graben formation due to mantle diapirism. A comparable regularity was noted in the structure and development of many continental rifting zones and supported by results of kinematic modelling (Abramovich, 1989; Seyfert, 1991). Processes of destruction and tensional deformation in the initial stages of rifting occurred within areas much wider than the future Pripyat Graben.

Within the Pripyat Graben territory the volcanism tended to migrate towards the centre of this structure. The maximum thickness of late Frasnian volcanic rocks (up to 1900 m and thicker) occurs in its northern part (Fig. 4). The thickest early Famennian volcanic rocks (up to 1400 m) are located further south (Fig. 5). The limit of widespread Famennian volcanic structures also occurs further south in comparison with Frasnian structures.

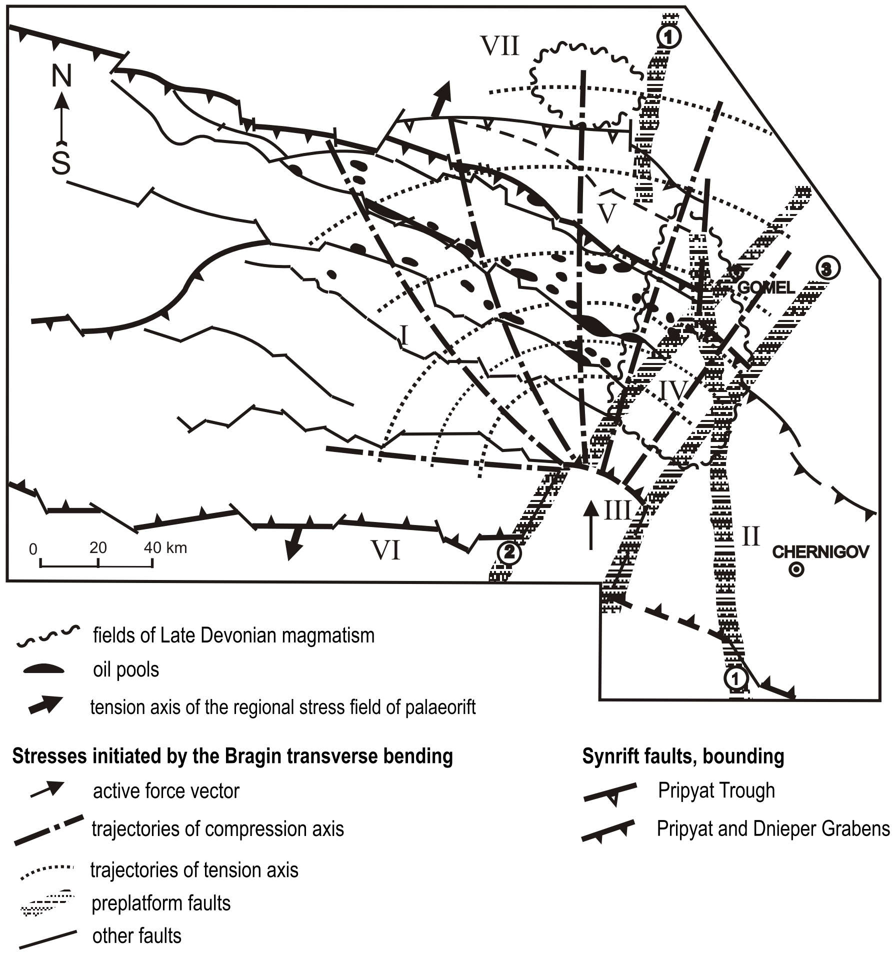

Fig. 6. Synrift stresses of the Pripyat palaeovolcanic region

Tectonic units: I — Pripyat Graben, II — Dnieper Graben, III — Bragin Uplift, IV — Loev Saddle, V — North-Pripyat Shoulder, VI — Ukrainian Shield, VII — Zhlobin Saddle; encircled numbers correspond to faults: 1 — Odessa, 2 — Teterev-Brianskand, 3 — Loev

Changes in the composition of late Frasnian volcanogenic rocks are observed with the same trend from the northern periphery to the centre of the Pripyat Palaeorift. Among the oldest (early Rechitsa) diatremes that are most distant from the palaeorift axis there are volcanic pipes infilled with xenotuff breccias of alkali-ultrabasic and alkali-basaltoid rocks. Magmatic rocks of Yevlanovo-Liven age widespread in the North-Pripyat Shoulder and directly adjacent to the Northern Marginal Fault of the graben are subalkali-basic and intermediate rocks. Intermediate rocks (trachytes) are dominant among volcanic rocks of various composition from the Pripyat Graben and Loev Saddle. Therefore, the trend of compositional changes in rocks of the first (Frasnian) phase of volcanism appears to be transverse to the palaeorift axis. Dominant rock varieties change gradually from the periphery to the centre in the following way: ultrabasic — basic — intermediate. Such lateral trend in composition is not evident in the rocks of the second (early Famennian) phase of volcanism.

The petrographic diversity increased because of the progressive destruction of the crust within the Pripyat rifting zone. Volcanic clastics infilling the oldest diatremes show an alkali-ultrabasic composition. Voronov (1969) suggested that the rapid opening of deep detachment fissures may be accompanied by an explosive vertical migration of subcrustal (poorly differentiated) material with the formation of volcanic pipes. In the Pripyat rifting zone, a branching system of faults (magma pathways) was formed, the primary alkali-ultrabasic magma (parental magma of all the magmatic rocks in the region) being differentiated in transition chambers at various depths. This resulted in a diversity of rocks of ultrabasic, basic and intermediate composition across the area of their occurrence, which is mostly restricted to the second (early Famennian) phase of volcanism, corresponding to the mature rifting phase.

MAGMATISM AND FAULT INTERSECTIONS

Magmatic activity associated with the development of the PDA tends to occur at sites of the aulacogen's intersection with earlier deep faults trending approximately N–S. This was noted by Korzun (1974), Lyashkevich (1987) and Korzun and

Makhnach (1994). Sites of intersection of deep faults in a tensional geodynamic environment were zones of highly permeable crust.

The early alkali-ultrabasic magmatism is of most interest within the PDA zone. It occurs within the Belaya Tserkov Uplift of the Dnieper-Donets Depression and at the junction of the Donbas region and Azov coastal block of the Ukrainian Shield (Lyashkevich, 1987), where the Southern Marginal Fault of the PDA intersects zones of the Krivoi Rog and Kalmiuss-Aidar deep faults of probably pre-Proterozoic age. According to Lyashkevich (1987), rocks found near the intersection of the Northern Marginal Fault of the PDA with the Znamenka-Pirjatin Fault (Fig. 2, inset map) also belong to the alkali-ultramafic rocks of the first late Frasnian stage of volcanism. Within the Pripyat Trough the alkali-ultrabasic–alkali-basaltoid suite occurs close to intersection of the Odessa old submeridional deep fault with the Northern Marginal Fault.

Areas of widespread occurrence of magmatic rocks are not typical for all PDA intersections with zones of old deep faults, but are concentrated at certain sites. It was earlier supposed (Chekunov, 1976), that as the Dnieper-Donets Aulacogen formed, it was not only dispersed crustal tension that played a significant role, but separation of basement megablocks accompanied by probable horizontal rotation was also of importance. Hinges for such a relative rotation were ledges of basement segments located in places of the palaeorift's intersection with old deep fault zones. This supposition is supported by analysis of the structure and evolution of the Bragin-Loev Saddle (a junction of the Pripyat Trough and Dnieper Depression) and also by the reconstruction of synrift stresses in this area (Aizberg *et al.*, 1991; Starchik, 1999).

The mechanism of tectonic deformation and associated geological events in areas with bending linear structures depends on the distribution of stresses that act in the horizontal plane when transverse bending structures are formed. A stress field of such structures may be divided into two essentially different segments. A segment adjacent to the concave side of the bended structure is subject to a high overall compression, and that adjacent to a convex side, to longitudinal tension. Bending segments located in sectors of local longitudinal tension under geodynamic conditions of regional transverse tension of the palaeorift will represent the highest permeability of the Earth's crust with respect to magmas. Such a situation is especially important at the initial stages of fracture, when a branching fault system in the rifting zone had not yet been formed. As can be seen in Figure 2, the centres of early alkali-ultrabasite magmatism are confined to just these areas — convex arcs of bends of the palaeorift linear structure.

The Bragin basement block appears to be a transverse bending structure within the Pripyat rifting belt. This block is located at the intersection of some deep faults of various age (Fig. 6). Horizontal shifting of the Bragin block with a northward-directed vector may have provoked an arcuate break of the PDA linear structure in a northern direction with a left-hand rotation of the Pripyat unit and a right-hand rotation of the Dnieper unit relative to each other. The centre of the arc line coincides with a series of approximately E–W Hercynian faults that formed the North-Pripyat Shoulder of the palaeorift. Their intersection with the Odessa transregional fault was a site of relaxation of the initial tensile stresses, with ascent of the earliest plutonic material within volcanic pipes. Migration of magmatic activity along the same path towards the centre of the rifting zone occurred simultaneously with increasing crustal destruction at various depth levels. Such conditions of high permeability of the sedimentary cover within the northeastern segment of the Pripyat Graben were mostly favourable for the oil accumulation.

CONCLUSIONS

1. A synthesis of data on Late Devonian magmatism in the Pripyat Trough and adjacent areas indicates that the widespread volcanic rocks are characteristic of typical continental rifting zones as distinguished by Ramberg and Morgan (1984).

2. The rifting magmatism in the Pripyat zone is characterised by the following features: the presence of highly alkaline rocks, including alkali-ultrabasic ones; diverse explosive volcanic eruptions and multiple intrusions within the platform cover and at various levels within the crystalline basement; and migration of volcanic activity from the periphery to the axial part of the rift.

3. The lateral migration of magmatic activity and changes in the rock composition are correlated with stages of rifting due to mantle diapirism. At the initial stage of rifting, areas much wider than the future Pripyat Graben were subject to destruction, and at the mature stage this process was confined to the main destruction zone.

4. A special feature of magmatism in the Pripyat Palaeorift is the absence of complexes indicating geodynamic environments of intracontinental rifting of the tholeiitic basalts and bimodal volcanic series including the younger acid differentiates of the alkali rock association.

5. These freatures suggest a geodynamic position associated with the disappearance of Late Devonian divergence within the Pripyat-Donets Aulacogen.

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