Academy of Sciences, Naukova 3b, 1 Carpathian Division of Geophysical Institute, Ukrainian
on the Tethyan continental margins; 3. the structure of the
tements; 2. what group of deformed tectonic units are situated
when succeeds its main squeezing (oceanic closing) mo­
ments which must rule the palinspastic reconstructions of
stions: 1. where is located the main Tethyan suture zone and
locations). The paper try to select the most important ele­
by two groups of constraints: the geotectonic (structural and
sions of the folded belts are, or at least should be, dominated
sections and numeric modelling techniques are used to estimate paleo-he­
at flows in Tertiary basins in Slovenia and adjacent areas.
Paleogene sediments occur in Slovenia mainly south of
he Periadriatic Lineament. Their coalification increases
wards to the Periadriatic Lineament from 0.3 to 1.5 %Rr. A
clear spatial relationship between the coalification maxi­
mum and the center of Egerian (Smrekovce) volcanism
suggests, that magmatic activity was the main heat source.
Egerian/Eggengburgen heat flow in the eastern Sava Folds
was in the order of 125 mW/m. Probably, the Egerian
volcanism is also responsible for high (pre-Karpatian) coali­
fication of Eocene coals located between the Periadriatic
Lineament and the Donat Line. Small remnants of Paleogene
sediments located at the southern margin of the Pohorje
(Zrece) matured in pre-Karpatian time, probably due to the
emplacement of the Oligocene Pohorje tonalite.
The area north and east of the Pohorje (Murska Sobota
High, Radgona Depression, Styrian Basin) was charac­
terized by Karpatian heat flows up to 400 mW/m. Apatite
fission track ages prove that the thermal overprint ended at
the early/middle Badenian transition. At least partly, high
heat flow was a result of Karpatian magmatic activity (west­
ern Pohorje, eastern Styrian Basin). Perhaps advective heat
transport due to rapid exhumation of basement units also
increased surface heat flows.
The SW–NE striking Ljutomer Fault forms the western­
most part of the Mid-Hungarian Line. It separates the deep
Ljutomer trough to the north from the Boc–Ormoz–Sel­nica
Anticline to the south. The latter formed during Plioce­
ne/Quaternary times. The Ljutomer trough is characterized
by low coalification gradients and moderate Neogene heat
flows (70 mW/m). Pontian to present-day heat flow in the
Ormoz–Selnica Anticline is 80 to 90 mW/m. Possible expla­
nations for higher present-day heat flows in the Ormoz–Sel­nica
Anticline include thermal effects due to young and rapid
erosion and convective heat transport. Coalification data
indicate, that the eastern Ormoz–Selnica Anticline was lo­
cally affected by a Badenian heating event (145 mW/m).
Badenian magmatism in northern Croatia represents a po­
sible heat source.
Post-Pontian erosion in the eastern Ormoz–Selnica Antic­
line is in the order of 600 to 900 m. Vitrinite reflectance patterns
from wells and outcrops indicate post-early Pannonian uplift of
the (pre-Mesozoic) Boc region in the order of 4.5 to 5 km!

Geotectonic and sedimentological constraints concerning the palinspastic
tectonic units proceeding from the continental margins in
order to determinate the geotectonic framework of their
evolution; 4. the structural and consequently the palinspastic
relationships between the continental crust bearing tectonic
units of the East and South Carpathians and the main Tethyan
suture. All this points are developed and discussed with
different key examples from the Carpathians.
The geotectonic constraints concern the following ques­tions: 1. where is located the main Tethyan suture zone and
when succeeds its main squeezing (oceanic closing) mo­
moments; 2. what group of deformed tectonic units are situated
on the Tethyan continental margins; 3. the structure of the
The paper try to select the most important ele­
ments which must rule the palinspastic reconstructions of
the Carpathians.
The geotectonic constraints concern following ques­tions: 1. is limited mainly to the results of seismic study, carried out
in the region along the three profiles crossing the Carpathian

Geotectonic and sedimentological constraints concerning the palinspastic
tectonic paleogeography of the Carpathians

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The modern palinspastic paleogeographical reconstruc­tions of the folded belts are, or at least should be, dominated
by two groups of constraints: the geotectonic (structural and
evolutive) and sedimentological (source areas versus basin
locations). The paper try to select the most important ele­
ments which must rule the palinspastic reconstructions of
the Carpathians.
The geotectonic constraints concern following ques­tions: 1. where is located the main Tethyan suture zone and
on the Tethyan continental margins; 3. the structure of the

Exploration of structure peculiarities and geodynamics of the Carpathian
zone on the Ukraine territory

Yaroslav S. Sapuszchak¹, George P. Starodub¹, Taras Z. Verbytsky¹, Valentyna G. Kuznetsova¹,
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The geophysical experiment to investigate litosphere
structure in the Ukrainian part of the Carpathian region is
proposed. Modern knowledge of local crustal deep structure
is limited mainly to the results of seismic study, carried out
in the region along the three profiles crossing the Carpathian
Miocene and Plio-Pleistocene volcanic rocks from two Neogene sub-basins of the Pannonian system (Styria and Carinthia): geochemical and Sr, Nd, Pb data, and geodynamic implications

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During the Neogene the Carpatho-Pannonian Region underwent major tectonic and magmatic events due to the combined effects of roll-back subduction of the European Plate under the Carpathians and the N–S shortening between the Adriatic and European Plates, to the west. The most evident results are the Carpathian thrust and fold belt, the Pannonian Basin and the associated volcanic activity. The volcanic activity can be divided into three phases: 1) widespread, but poorly studied acid volcanism began around 19 Ma ago in various sectors of the Pannonian Basin and was followed by 2) the formation of a calc-alkaline volcanic arc, active along the Western Carpathians and the northern part of the Eastern Carpathians from about 16 to 10 Ma ago; then the volcanism continued up to 0.2 Ma, shifting progressively southward along Eastern Carpathian arc; the origin of this continental margin arc is generally considered to be related to the Miocene subduction followed by detachment of the oceanic crust of the European Plate; 3) an "extension"—related Na-alkali basaltic volcanism phase which took place sporadically in the Pannonian Basin, from about 11–9 Ma up to the Pleistocene. The volcanism of the Styrian and Lavanttal Basins (Eastern Alps, Austria) occurred in Karpatsian/Early Badenian–Middle Badenian (K/Ar ages: 16.3–14.0 Ma) and in Late Pliocene–Early Pleistocene (K/Ar ages: 3.8–1.7 Ma).

According to the new petrographic, major (XRF), trace (XRF, INAA) element and Sr, Nd, Pb isotopic data carried out in this work on volcanics from most of the Miocene and Plio-Pleistocene centres, the petrogenetic affinity changed from orogenic-type in the Miocene (numerous2 outcrops and three boreholes from the Styrian Basin and one centre -Kollnitz- from the Lavanttal Basin) to anorogenic-type in the Plio-Pleistocene (numerous outcrops from the Styrian Basin).

The Miocene lavas have a variable serial affinity, ranging from high-K calc-alkaline (Kollnitz, Weitendorf, Mittlerlabill) up to shoshonitic (Gleichenberg, Walkersdorf, Paldau). In the most voluminous Miocene volcano (Gleichenberg, 16.3–15.5 Ma) lattices are the dominant lithotype; there trachytic and rhyolitic lavas occur locally. To the west, outcropping products are represented by relatively primitive (Mg# 66–70) high-K basaltic andesites/andesites (Kollnitz, 14.9 Ma) and high-K basaltic andesites (Weitendorf, 14.0 Ma). Boreholes samples are lattites (Paldau and Walkersdorff) and high-K dacites (Mitterlabill). Incompatible trace element patterns of all the Miocene lavas, normalized to primitive mantle, show a moderate negative Nb-, Ta- and Ti-anomaly and high LILE/HFSE ratios, typical of "subduction-related" magmas. On geochemical basis, three groups of rocks can be distinguished: the first, Gleichenberg latites-trachytes and Walkersdorf lattites, have negative Ba-anomaly with respect to Rb and Th; the second, Weitendorf high-K basaltic andesites, Paldau lattites and Mitterlabill high-K dacites show a small negative Ba-anomaly. Otherwise they share similar incompatible trace element patterns, including a significant negative Eu-anomaly in chondrite-normalized REE diagrams. The rocks of these two groups,