

# GEODYNAMICS OF THE ALPINE-CARPATHIANS BELT

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The origin of the Alpine-Carpathians belt is related to collision, occurred between the African and Eurasian tectonic plates ( Fig .1).

It can be supposed that by these processes the territories towards North were affected, with following dynamical consequences in present time. The evidence of such an activity can be demonstrated by the data on principal stress

directions in Central Europe, determined by means of focal mechanism analyses, in-situ measurements as well as geodetic methods (Fig. 2.). It should be added that information, given there are not homogenous, and their densification, especially at the territory of former East European countries is requested. These assumptions are supported also by the recent movement studies, performed during

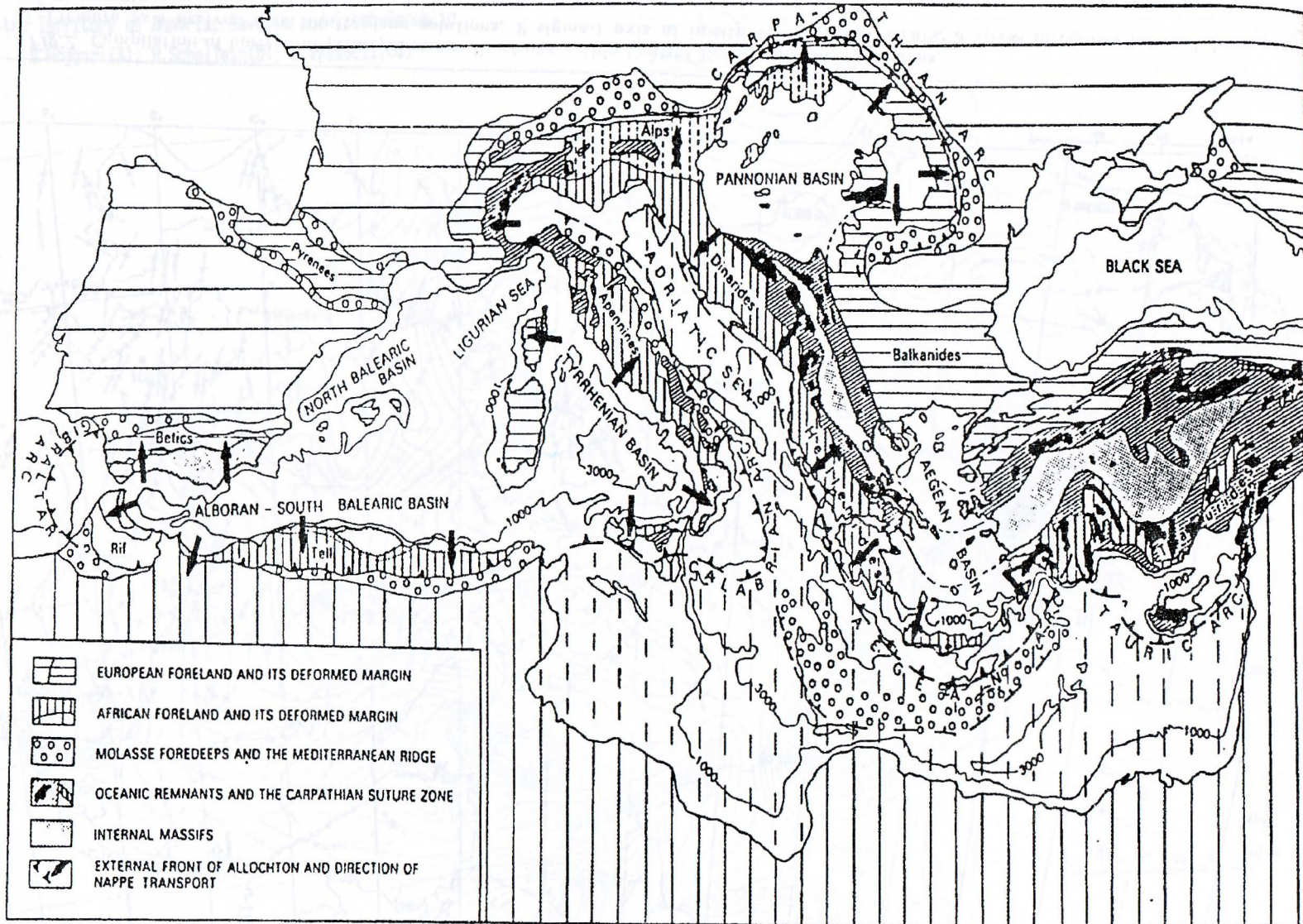


Fig.1. Geotectonic setting of Mediterranean back-arc basins (mainly after Channell et al., 1979).

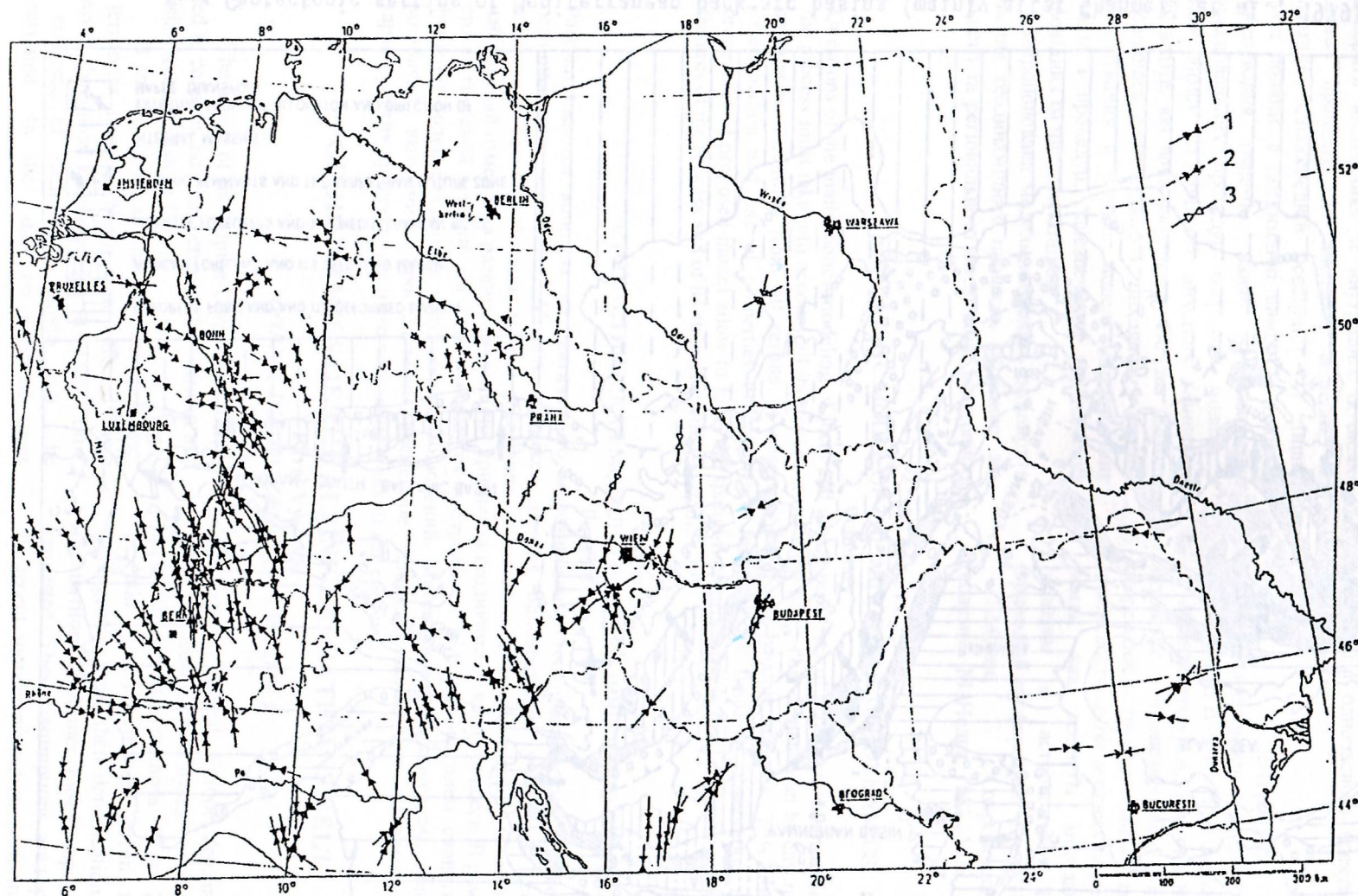
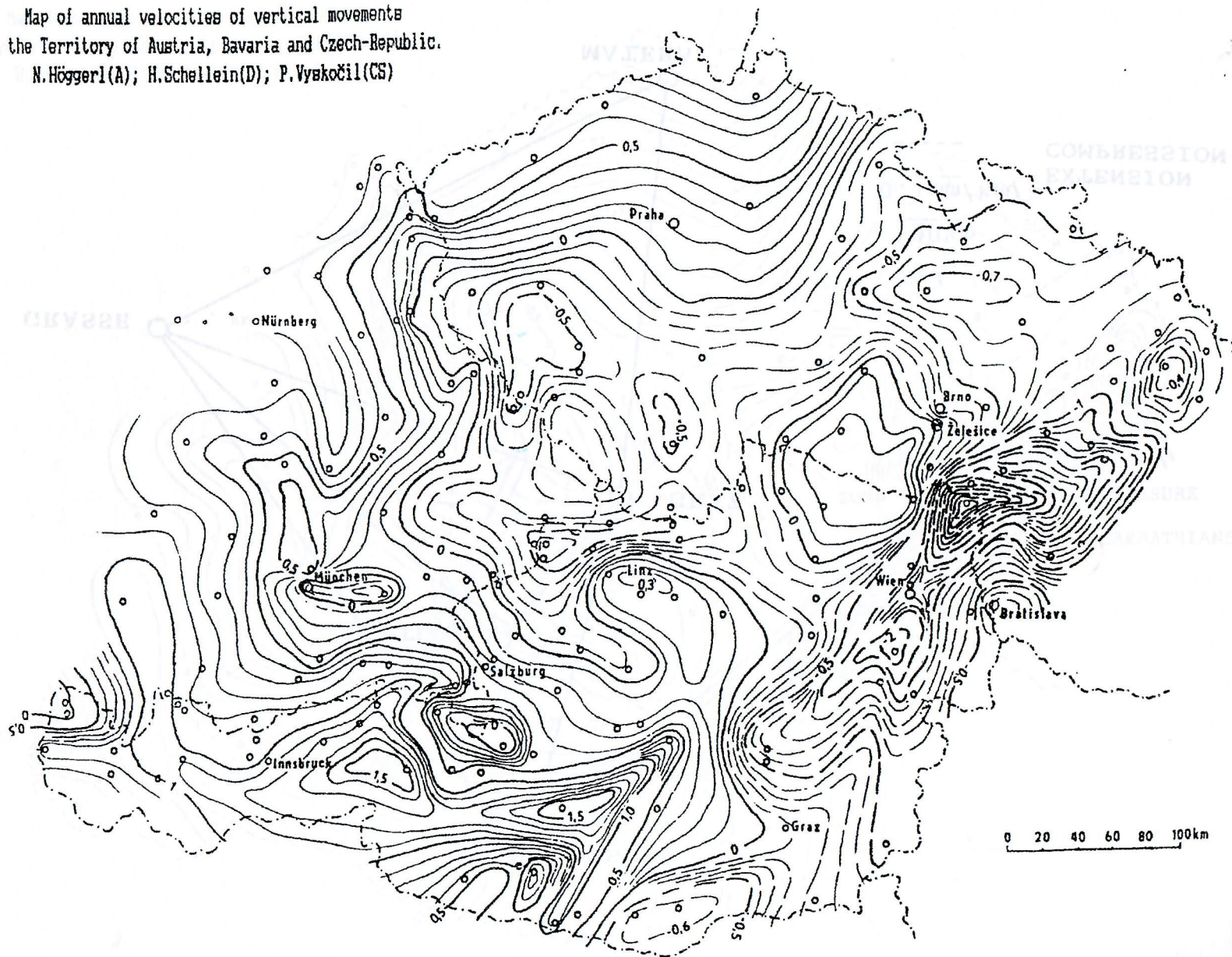


Fig. 2. Compilation of horizontal principal stress directions within Central Europe and adjacent areas. 1 Pressure axis derived from fault plane solutions, 2 sigma-1 axis of in-situ stress measurements, 3 stress directions inferred from geodetic measurements

Fig.3.

Map of annual velocities of vertical movements  
at the Territory of Austria, Bavaria and Czech-Republic.

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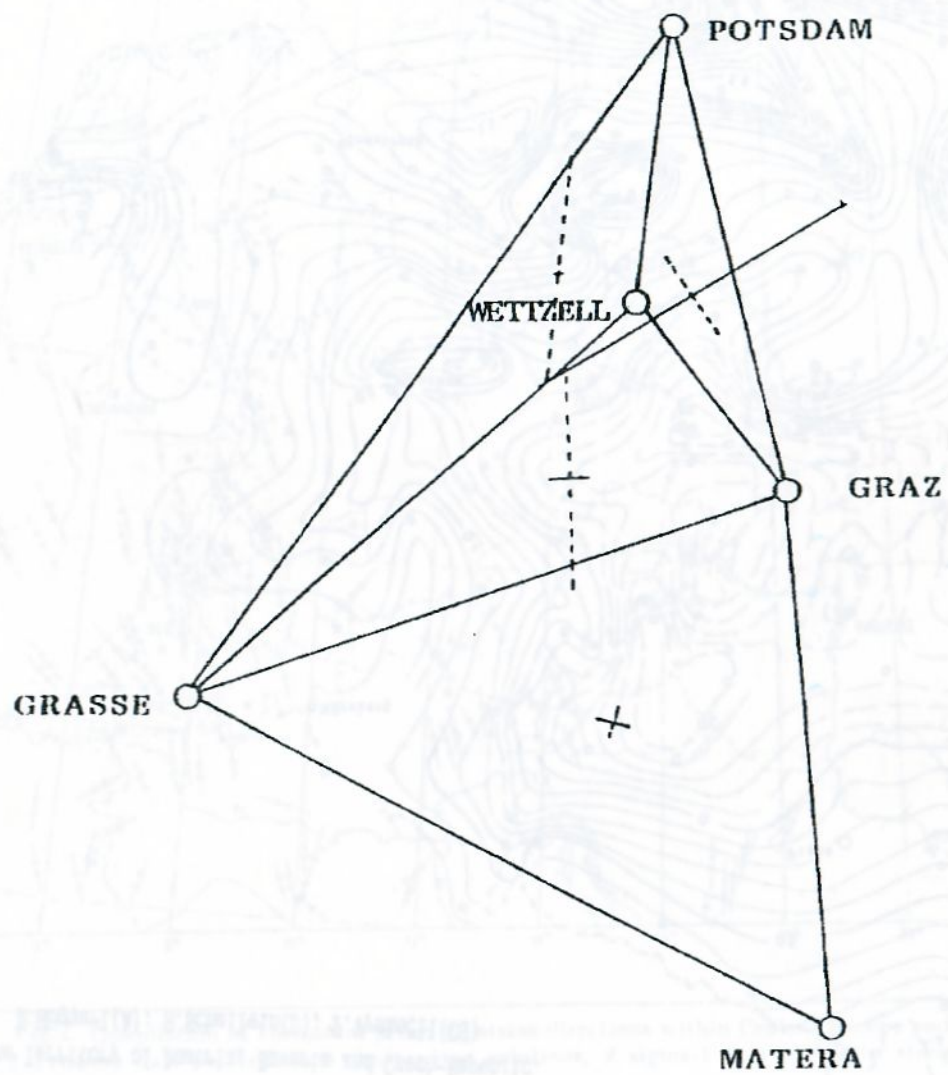


Fig.4.

100km

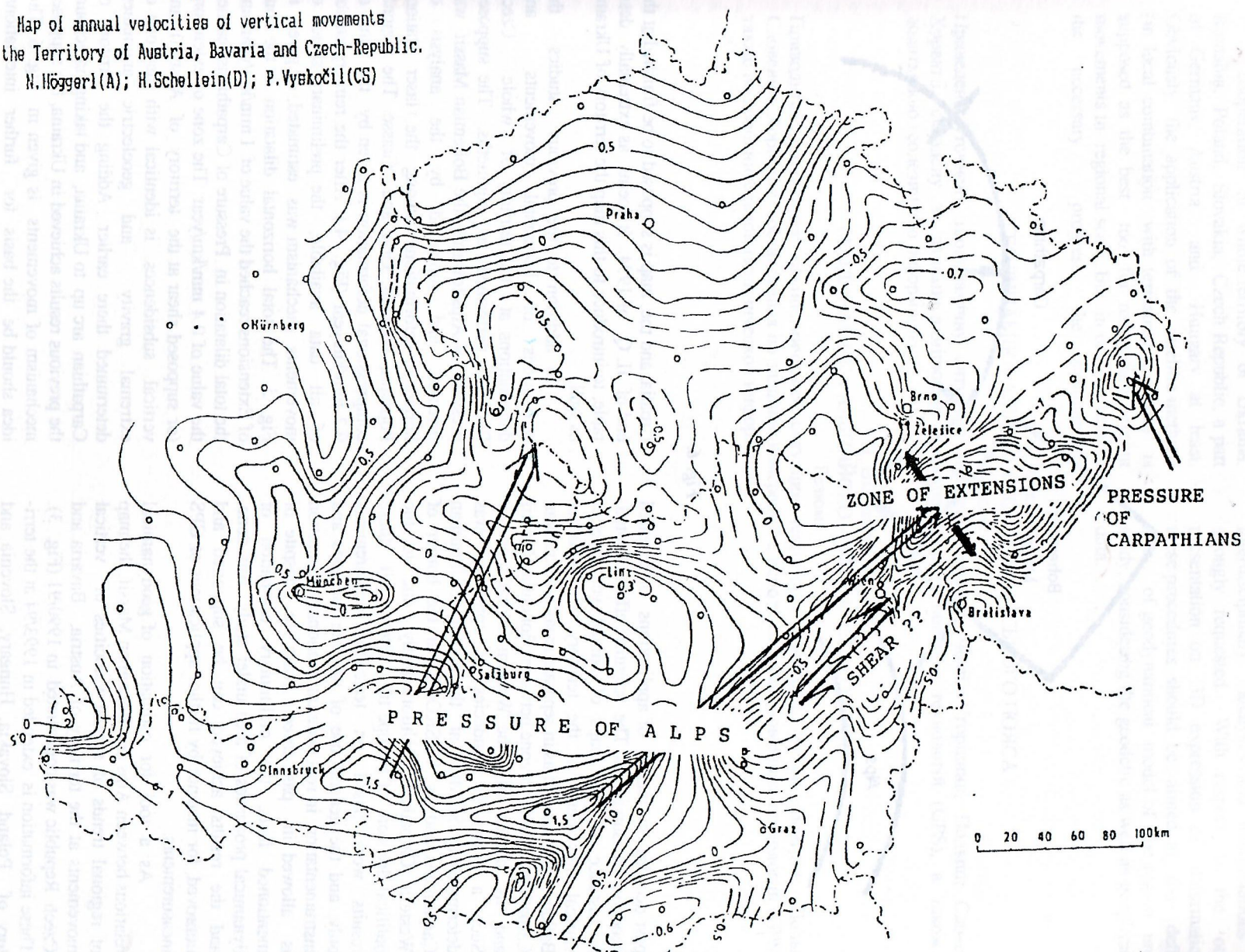
0.1mm/km/a

EXTENSION

COMPRESSION

Fig.5.

Map of annual velocities of vertical movements  
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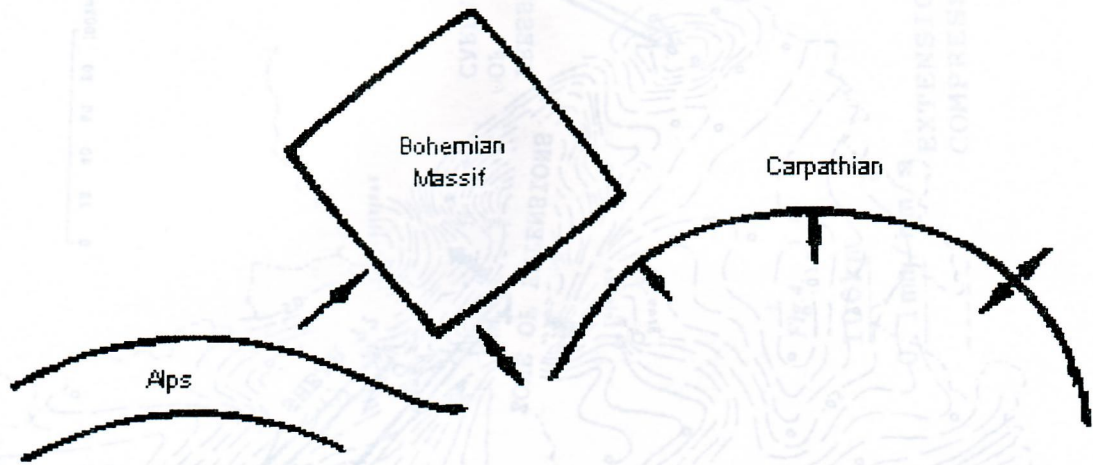


Fig. 6.

past decades by means of applications of repeated geodetic measurements. The scientific effort resulted, for instance, in two maps of annual velocities of vertical movements at the territory of Carpatho-Balkan region as well as in separate areas in Ukrainian Carpathians, contact zone between Bohemian Massif and its border with the Western Carpathians etc. Such a way, the tendencies to spreading was determined by SOMOV at the border of Ukrainian Carpathians, and by VYSKOCIL at the border of Western Carpathians. Unfortunately, due to the political division of Europe till 1989/90, all these results were based on terrestrial measurements only, and the general use of satellite methods and instrumentation in real wide international cooperation is allowed in past three years. In despite of mentioned facts, the preliminary estimation of dynamical properties of area under study was done, and the results achieved can be supported and improved, for instance by further applications of GPS measurements.

As a tool for estimation of geodynamical relations between Alps and Bohemian Massif, the map of regional trends of annual velocities of vertical movements at the territory of Austria, Bavaria and Czech Republic was constructed in 1990/91 (Fig. 3). These information is extended in 1993/94 at the territory of Poland, Slovakia, Hungary, Slovenia and

Croatia, and the map is supposed to be finished at the end of II. Q. of 1994. It deems as extremally desirable, to introduce to this map the territory of Ukraina as well.

In addition to the previous studies, the estimations of horizontal movements and deformations at the territory of whole Czech Republic, performed in eightieths. The supposed pressure of Alps towards the Bohemian Massif was revealed, and supported by the analysis of horizontal deformations among the laser stations Potsdam, Wettzell, Graz and Grasse. The regional compressional deformation is given by the value of 0.2 mm/km/year (Fig. 4.). After the reinterpretation of all data available, the preliminary sketch of movements mechanism was estimated, as given in Fig. 5. The total horizontal dilatation in the Zone of Extensions reached the value of 1 mm/km/year, and the total dilatation in Pressure of Carpathians reached the value of 0.4 mm/km/year. The zone of extensions (or supposed shear at the territory of Austria) and vertical subsidences is identical with the zone of extremal gravity and geoelectric anomalies, determined there earlier. Adding the territory of Carpathian arc up to Ukraina, and taking in account the previous results achieved in Ukraina, the supposed mechanism of movements is given in Fig. 6. This idea should be the basis for further international

cooperation at whole territory of Ukraina, Romania, Poland, Slovakia, Czech Republic, a part of Germany, Austria and Hungary at least. Obviously, the application of the satellite methods (in local combination with terrestrial methods) is supposed as the best tool for monitoring recent movements in regional scale. But, in order to achieve the necessary progress, the simultaneous

interdisciplinary analyses and interpretations are strongly requested. With respect to the other presentation on 3D expression of deformations, these procedures should be aimed at the definition of geodynamical model of the region under study, considering the geodetic as well as geophysical data.

П. Вискочіл

#### ГЕОДИНАМІКА АЛЬПІЙСЬКО – КАРПАТСЬКОГО ПОЯСА

Резюме

Приведено уточнену геодинамічну ситуацію територій Австрії, Чехії, Угорщини, Польщі, Словенії, Хорватії, складену за даними вимірювань з використанням новітніх технологій (GPS), а також за додатковою геодезичною інформацією.

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#### ГЕОДИНАМИКА АЛЬПИЙСКО – КАРПАТСКОГО ПОЯСА

Резюме

Приводится уточнённая геодинамическая ситуация территорий Австрии, Чехии, Венгрии, Польши, Словении, Хорватии, составленная по заданным измерениям с использованием новейших технологий (GPS), а также по дополнительной геодезической информации.