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PROBABILISTIC EARTHQUAKE HAZARD ASSESSMENT FOR LOCALITY PRAHA

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ABSTRACT. Probabilistic analysis of seismic hazard allows also to assess the degree of uncertainty with which this hazard can be determined for many years in advance. This paper deals with the above–mentioned method's application for the locality Praha, the capital of the Czech Republic. This general method, though, can be used also also for analysis of seismic hazard to mining openings (e.g. depositories of poison and radioactive wastes), or for analysis of seismic hazard to the stability of natural and man–made landslopes (open pit mines, embankments, dams). To this end a computer program HAZARD has been compiled. This program allows also for testing of impacts of uncertainties in input data.

KEYWORDS: earthquake, hazard, building, power plant, probability, seismostatistics, seismotectonics

1. INTRODUCTION

The earthquake is caused by a sudden release of deformation energy, which slowly accumulate in lithosphere. Such energy transformations in most cases occur within seismically active zones. The site of earthquake epicentra is connected with tectonically active faults, where, as a rule, epicentra occur repeatedly. The prognosis of an earthquake occurrence in the future can therefore be based upon the supposition, that their foci will most probably be located at tectonic faults in those zones, which are tectonically and/or seismically active.

Seismic waves, spreading from earthquake foci, induce vibratory ground motions and also irreversible seismodislocations of foundation soil at the considered site S. As a consequence, structures standing at this site are exposed to vibratory motions, which can cause their damage, or destruction.

Seismic hazard to a site S can be numerically expressed as the probability, that in the course of 1 year, the seismic ground motion which will exceed a certain level will occur here. Appropriately low seismic vulnerability of building structures in this site should be secured by anti–seismic design, which will take into account the value of seismic hazard.

The seismic vulnerability of structures and buildings is expressed by characteristics of ground vibrations and slips, during which damages of pre–defined extent can already be caused, with given probability. Among these characteristics are maximum seismic vibrations acceleration, design response spectrum, possibly also the magnitude of irreversible seismodislocations.

The prognosis of these characteristics of earthquake motions, which will occur in the future, is based on following models and input data:

a) the distribution of source zones in the locality (up to 50 km) and in the region (up to 250 – 300 km) of the site S,
b) the characteristic of seismicity of all source zones within the region and maximum earthquake magnitude, which could occur inside each of these zones (seismic potential),
c) the decrease of seismic ground motions with the epicentral distance of the site S.

As a rule, strong seismicity appears in regions with high tectonic slipping velocity, such as collision zones of lithospheric desks and their transverse faults. Although the occurrence of strong earthquakes on faults with moderate or weak activity cannot be entirely excluded, their probable recurrence interval is very long (in comparison to life expectancy of buildings). In cases of low velocity of tectonic motions, the relaxation of tectonic stress concentrations will appear, which results in limited seismic potential.

In zones with low tectonic activity (of about 1 mm per year), the mean recurrence period of maximum possible earthquake is estimated to be at least 10 000 years.

The locality Praha extends in the area with low seismicity of intracontinental type. The velocity of contemporaneous relative motions along faults on the territory of the Czech Republic, CR, is estimated to be 0.1 mm per year. The distribution of their values is, so far, very little known. This low tectonic activity is accompanied with also low seismic activity. The Alpine subduction zone, where relative horizontal motion velocities exceed 1 cm per year, is at the distance of more than 400 km from the locality Praha.

Historic earthquakes, which macroseismically felt in Praha with intensities $I \geq 3.5°$, are listed in Table 1. This list confirms that analyzing the earthquake hazard to this locality, it is necessary to consider the following earthquake source zones:

a) in regional distances of above 300 km (Yugoslavia, Rumania, Italy, Switzerland) are documented earthquakes with epicentral intensities up to 10° (Villach),
b) in distances of over 150 km (Eastern Alps, Swabian Yura, outer Carpathian arc, Sudety block) are documented earthquakes with intensity up to 8°,
c) The highest observed epicentral intensity of earthquakes within the Bohemian massif is up to 7° MSK–64. The seismic potential of faults on the territory of CR is small, so that the greatest hazard can be generated by faults, which are nearest to the considered locality. On the territory of

CR, the main tectonic faults are mapped on the basis of geological and also geophysical surveys. Missing are, though, sufficient data about their tectonic activity and also about the occurrence of contemporaneous microearthquakes.

TABLE 1. List of earthquakes observed in Prague

I ... the observed intensity in MSK–64 scale
s ... classified as "strong"
o ... observed with unknown intensity (about 3°)

Y	m	d	I_0	I	LAT°	LONG°	Site	Ref.
1117	01	03	8.5	s	45.4	11.0	Verona	28
1329	5	22		4.5				52
1366	6	3		destruction of buildings, atmosf. storm?				59
1411	5	30					Steiermark	64
1519	9	15	9	5	48.3	15.9	Neulengbach	118
1615	2	20	6	5	47.5	16.3	Wiener Neustadt	150
1690	2	4	9	5	46.6	13.8	Villach	188
1756	1	12		o			Altenberg, Cínovec	229
1756	2	18		o			Germany, W. Europe	231
1763	6	28	9.5	o	48.7	18.1	Komárno	239
1768	2	17	8	5	47.7	16.3	Vienna lineament	244
1784	3	20	6.5	o	50.6	13.9	Duchcov	284
1784	12	4		o			local	287
1785	8	22	7.5	5	50.2	18.3	Raciborz	292
1794	2	6	7.5	o	47.3	15.2	Leoben, Steyermark	316
1810	1	14	9	o	47.7	18.2	Mór, Hungary	343
1818	5	28	4.5	o			South Bohemia	351
1821	12	6		s			local, series	358
1837	3	14	7	o	47.5	15.5	Semmering	385
1872	3	6	8	4	50.8	12.3	Gera	494
1876	7	17	7.5	5	48.0	15.2	Scheibbs	512
1885	5	1	8	3			Kindberg, Murz	563
1901	1	10	7	4.5	50.5	16.1	Úpa, Metuje	637
1908	2	19	6.5	4	47.9	16.7	Breitenbrunn, Austria	701
1911	11	16	8	4	48.3	9.0	Ebingen, Schwab. Alb	764
1913	2	10		o			local	784
1927	7	25	7	3.5	47.5	15.5	Murz, East. Alps	829
1927	10	8	7.9	3.5	48.0	16.4	Schwadorf, Austria	831
1928	3	27	8.5	4	46.4	13.0	Udine, Tolmezzo, Italy	834
1935	7	27	7.5	4	48.0	9.5	Saulgau, Schwabien	876
1939	9	18	7	3.5	47.8	15.9	Puchberg, East. Alps	877
1963	12	2	6.5	3.5	47.9	16.4	Eastern Alps	KPB
1964	10	27	7	3.5	47.28	15.9		KPB
1965	06	30	5.5	3	47.7	15.9	Semmering	KPB

1967	1	29	7	3.5	47.9	14.2	Molln, Scheibbs	KPB
1972	4	16	8	4.5	47.8	16.2		KPB
1972	4	16	6.5	3	47.7	16.2	aftershock	KPB
1976	5	6	10	4.5	46.3	13.1	Friuli	KPB
1976	9	15	8.5	3.5	46.3	13.2	Friuli	KPB
1976	9	15	9.5	3.5	46.3	13.2	Friuli	KPB
1976	9	15	6	3	46.3	13.2	Friuli	KPB
1977	3	4	8	2.5	45.8	26.8	Vrancea	KPB
1977	3	24	5.5	3	51.4	16.1	Lubin, Poland	KPB
1978	9	3	8.5	3.5	48.3	8.9	Swabian Yura	KPB
1979	4	15	9	3	42.1	19.2	Yugoslavia	KPB
1979	11	21	5	2.5	50.5	16.0	NE Bohemia	KPB

The numbers in the last column denote the earthquake No. in [Kárník 1957].

2. Method

The seismostatistic method for earthquake hazard assessment is based on the analysis of seismicity of active zones, within which appeared historically documented earthquakes. Seismotectonic approach takes into account also possible earthquakes on tectonic faults, which were not seismically active in the past. Both areas with actual and potential seismicity will be further called source zones.

Probabilistic method of seismic hazard analysis is obligatory for nuclear power facilities (TECDOC–274). This method evaluates both seismostatistic and seismotectonic input data and models. These data are known only with considerable uncertainties. Therefore, it is necessary to project them to the resulting uncertainty of seismic hazard assessment. The method of probabilistic analysis allows to assess the probability, that the determined value of seismic hazard will not be exceeded in the future. This method is based on computing of many seismic hazard curves (PSHC), using various sets of possible input data values, and on their statistical processing and generalization. Contrary to the previous practice of acceptance of least favorable (conservative) values, the probabilistic method yields more realistic results.

It is not obligatory to use the probabilistic method for the design of civil engineering in the locality Praha. Its use in this paper aims to illustrate this method in a locality, which is well known, and where many documents about macroseismic observations of historic earthquakes exist. The whole locality covers the area of about $20\times20\,km^2$, which center's geographic coordinates are approximately 50.1° N, 14.4° E. Foundation soils of building sites within this locality are of different seismic categories and therefore, seismic hazard of each site would have to be adjusted on the basis of seismic microzoning. This problematic, though, is not the subject of this paper.

The calculation of probabilistic seismic hazard curves (PSHC) is based on following simplifying suppositions:

a) Within each of source zones, the earthquake epicentra have uniform distribution, and so, the probability of future earthquake occurrence does not depend on the location of its epicentrum inside the zone.

b) Empirical functions describing the distribution of earthquakes in time, site and magnitude express the fact supposition that the earthquake occurrence satisfies a random stationary process. Therefore, it's characteristics, determined by the analysis of historic earthquakes, will be valid also in the future. Earthquakes within each of source zones occur in time as mutually independent events.

These very simplifying suppositions can be better tested in regions with strong seismic activity, where periods of recurrence of strong earthquakes are comparable to historic period of their observation. It is becoming obvious, though, that the time distribution of historic earthquakes is clearly uneven. Aftershocks occur, periods of seismic gaps alternate with periods of higher activity. The analysis carried out in this paper, though, is based on a supposition, that the distribution of earthquakes in time satisfies to the Poisson model of mutually independent random events. The constant mean frequency of occurrence is one of characteristics of epicentral zones.

In the following chapters of this paper, input models and data used to calculate the PSHC will be described.

3. Seismicity of Source Zones

The frequency distribution function of epicentral intensities I inside each active zone is described by an empirical formula

$$\log N(I) = \log N(I_L) - b(I - I_L)\,, \tag{1a}$$

where $N(I)$ is the mean cumulative frequency of events per year, intensity I of which belongs to the interval of $I_L \leq I \leq I_U$. The lower limit I_L depends on the completeness of input data catalogue. The value $\log N(I_L)$ therefore represents the mean yearly number of all considered events. Earthquakes weaker than I_L (microearthquakes) are not taken into account in this formula, however, that does not mean that they do not occur in the meantime. The upper limit I_U is determined by magnitude of the strongest earthquake which occurred in the period of historical evidence. The parameter b (slope of reccurence graph) expresses the degree of events number decrease with increasing intensity. The formula (1a) is often given in the form of:

$$\log N(I) = a - b \cdot I\,. \tag{1b}$$

Catalogs of historic earthquakes in Europe are homogeneous for 200 to 800 years (in dependence on value I). However, much longer period T, e.g. 10^4 years, is considered for PSHC calculations. But the extrapolation of frequency graph (1) for longer periods is permissible only to a certain value of $I = I_P$, which is called the seismic potential of given source zone. From this it follows that

$$N(I) = 0 \quad \text{for} \quad I > I_P\,.$$

The seismic potential I_P is determined with the help of all available input data [Schenk et al. 1989]:

a) From the statistics of extreme values of historic earthquakes (Gumbel's function of III. type),

b) Using geological, tectonic and geophysical characteristics of the lithosphere in the source zone and their empirical relations to seismicity. These relations, deduced for areas of high seismic activity, are being applied to areas of lower seismic activity, for which not enough observed data is available.

In the Central Europe, 60 seismoactive zones have been recently delimitated in [Schenk et al. 1989]. They are shown in Fig. 1. Their seismicity parameters a, b and I_P are given in Tab. 2, [Schenk et al. 1989]. Fig. 1 also shows fault lineaments. Seismic potential of faults is given in Tab. 3 [Šimůnek 1995]. The supposed recurrence period of maximum possible earthquake I_P at these faults is 10^3 years.

TAB. 2. Parameters of epicenter zones seismicity

zone	a	b	I_P	zone	a	b	I_P
1	3.31	0.72	7	29	2.29	0.66	6.1
2	1.77	0.57	8.3	30	1.90	0.48	8
3	2.24	0.69	5.7	31	1.60	0.45	8
4	1.84	0.61	7.0	32	2.82	0.67	9.5
5	2.14	0.62	5.7	33	2.59	0.63	6.9
6	1.78	0.68	5.9	34	3.02	0.59	8.7
7	2.80	0.83	6.4	35	2.59	0.54	10
8	1.38	0.51	8	36	1.93	0.50	10.5
9	0.24	0.38	6.8	37	2.34	0.46	10
10a	0.37	0.43	6.6	38	1.06	0.47	8.4
10b	0.15	0.37	7.2	39	2.30	0.45	10.7
11	1.38	0.81	4.7	40	1.67	0.40	11.5
12	−0.55	0.30	7.6	41	3.28	0.66	8.6
13	−0.16	0.27	7.5	42	1.75	0.52	7.2
14	1.46	0.52	8.2	43a	2.84	0.65	6.7
15	0.30	0.33	8.5	43b	1.57	0.42	9.4
16a	1.50	0.48	8.2	44	2.00	0.44	9
16b	0.64	0.38	7.5	45	1.46	0.45	8.6
17	0.05	0.35	6.5	46a	2.22	0.52	10.5
18	1.26	0.38	9.1	46b	1.76	0.47	8.1
19	0.28	0.22	8.5	47	0.80	0.36	7.5
20	0.88	0.30	8.5	48	4.15	0.76	8.5
21	2.21	0.45	9.5	49	1.65	0.49	7.8
22	1.02	0.38	9	50	1.78	0.15	8.4
23	1.92	0.40	8.5	51	0.69	0.44	7.8
24	2.88	0.57	8.3	52	−0.32	0.24	7.5
25	−0.26	0.30	9	53	1.40	0.55	7.5
26	1.51	0.46	8	54a	3.95	0.99	6
27	−0.20	0.21	5.2	54b	0.10	0.52	5.5
28	0.21	0.29	7.5	55	0.93	0.46	6.5

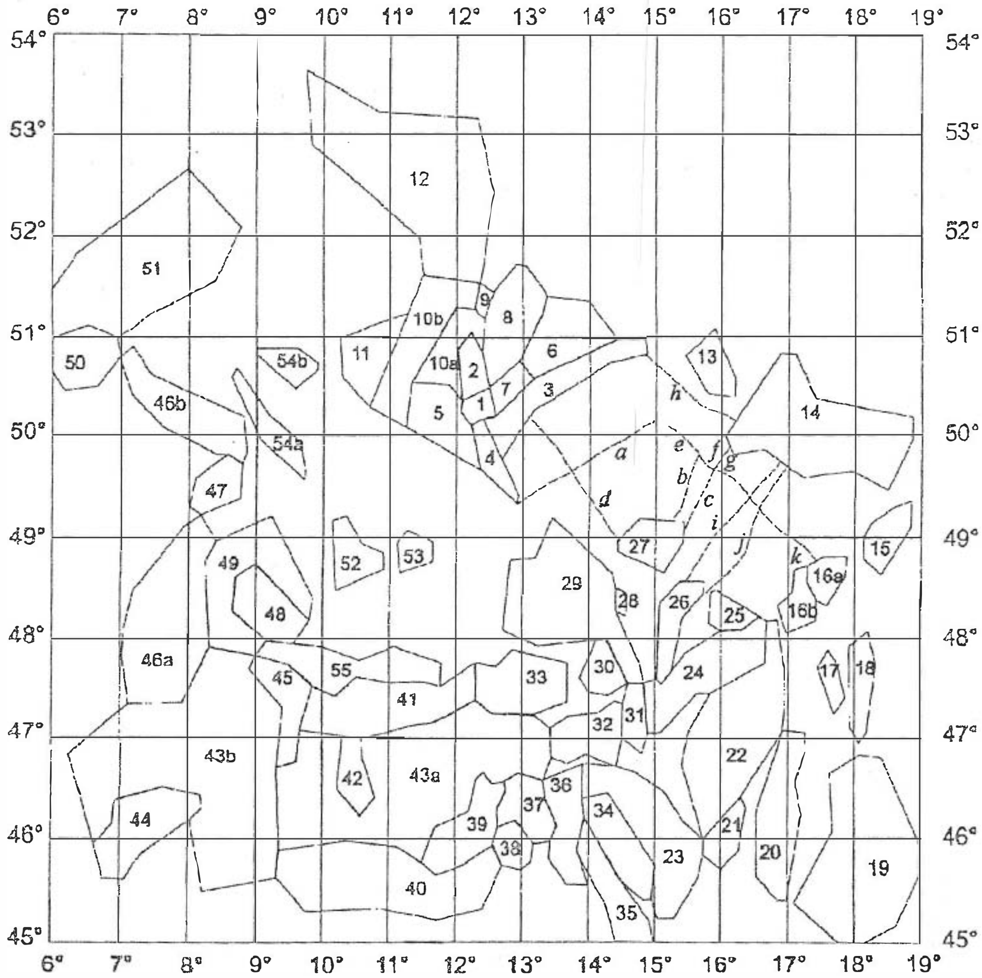

FIG. 1. Source zones for the locality Praha 50.1° N, 14.4° E
Seismoactive zones are demarcated by full lines and numbers 1 to 55. Tectonic faults are marked by dashed lines and letters a to k

Calculating PSHC, each source zone is divided on s elementary areas of size 0.1° by 0.15° of geographic degrees, i.e., about $20 \times 20\,\mathrm{km}^2$. Similarly, each potentially active fault lineament will be divided
20 km. The distances of these elementary zones from the locality (site S) are different. As a consequence of dependence of earthquake intensity on the distance R, earthquakes of the same magnitude, but in various elementary areas, exert different seismic hazards on point S. For each of such defined elementary zones then, (provided the above-mentioned distribution functions are met) the following frequency distribution is valid:

$$\log N(I) = a - \log(s) - b \cdot I\,. \tag{1c}$$

For calculating the contributions to the total hazard (shakeability) of site S, these

TAB. 3. Seismic potential of faults

name	I_P^o MSK–64
a	5
b	6
c	6
d	5
e	7
f	6
g	6
h	6
i	5
j	6
k	7

elementary areas are considered to be points, which distances from S are measured from their centers. In this paper, 71 source zones in total are examined (i.e. 60 active zones zones and 11 tectonic lineaments). These zones are divided on 1724 elementary areas.

Values of b were deduced by analyzing the catalogue of historic earthquakes. However, these historic earthquakes represent relatively short (400 to 800 years) realization of random seismogenesis, which characteristic time interval is at least 10^4 years. With the help of computer simulation of this random process, the estimation of reliability of using the parameter b_0, deduced from short–time process realization, also for required long period [Vilhelm, Buben 1994], was carried out. Results of this simulation suggest that it is necessary to take into account a considerable uncertainty of values b_0, given in Tab. 2. This can be achieved by calculating a greater number of PSHC using different parameters b. In our case we used five values: $0.8b_0$, $0.9b_0$, b_0, $1.1b_0$ and $1.2b_0$. These values must be considered to be equally probable, because the empirical distribution function is not known.

4. DECREASE OF INTENSITY WITH THE EPICENTRAL DISTANCE

Only observed values of macroseismic intensity I_0 and isoseismal maps are at disposal for evaluation of historic earthquakes impacts on the territory of CR. Up to now, no seismograms of strong seismic motions in the territory of the Czech Republic are at hand. In this paper, the decrease of macroseismic intensity I with increasing epicentral distance R will be expressed by the following formula:

$$\mathrm{d}I(R) = I_0 - I_R \,, \tag{2a}$$

where R is the epicentral distance, I_0 is the epicentral intensity, I_R is the intensity in the distance R (point S).

Parameters of this empirical function were deduced on the basis of 309 isoseismal maps [Procházková 1982]. The course of isoseismals for different source zones is not similar. The East Alpine earthquakes, e.g. spread in NNW direction into the Bohemian massif with relatively small intensity attenuation, [Zátopek 1948]. Therefore, locally specified anisotropic attenuation models must be deduced individually for each path between source zones and the locality S.

Procházková (1982) used the well known Blake decrease function

$$dI = k \cdot \log(D/H) . \tag{2b}$$

The parameter k is dependent [illegible] S. Fig. 2 depicts these functions for 15 zones, marked A to P. The approximative locations of these zones is given in the following Tab. 4.

TABLE 4.

Zone	Lat. °N	Long. °E
A	50 – 51	12 – 14
B	50.5	13 – 14
C	50 – 51	16 – 18
D	49 – 50	12 – 13
E	49.5 – 50.5	17 – 19
F	50 – 51	16.5 – 17.5
G	50	18
H	48 – 49	17 – 18
I	49.5	18.5
J	49.0 – 49.5	18 – 19
K	47 – 48	9 – 10
L	48.5 – 49.0	10 – 12
M	47.0 – 47.5	10 – 13.5
N	45 – 47	11 – 15
O	47 – 47.5	14 – 16
P	47.5 – 48.5	16 – 17.5

These intensity decrease functions, however, are not available for all 60 epicenter zones, delimitated in Fig. 2. For some areas where attenuation functions are missing, known parameters k pertaining to similar areas were used. In cases where it was not possible to find an adjoining area with known isoseismal lines, the isotropic formula (2b) with an average value of parameter k_0 was used. This procedure was used also for faults within the Bohemian massif, which are not seismically active at present, and therefore, their authentic attenuation functions cannot be determined. In this paper, the uncertainty of k values was estimated to be about $\pm 0.1 \cdot k$. Therefore, 5 alternative values, i.e. $0.90\, k_0$, $0.95\, k_0$, $1.05\, k_0$, $1.10\, k_0$ and $1.2\, k_0$ were used as input data for calculating PSHC.

5. CONVERSION OF INTENSITY TO GROUND MOTION ACCELERATION

Four empirical relations $A_H(I_s)$ between intensity I_s and peak acceleration A_H

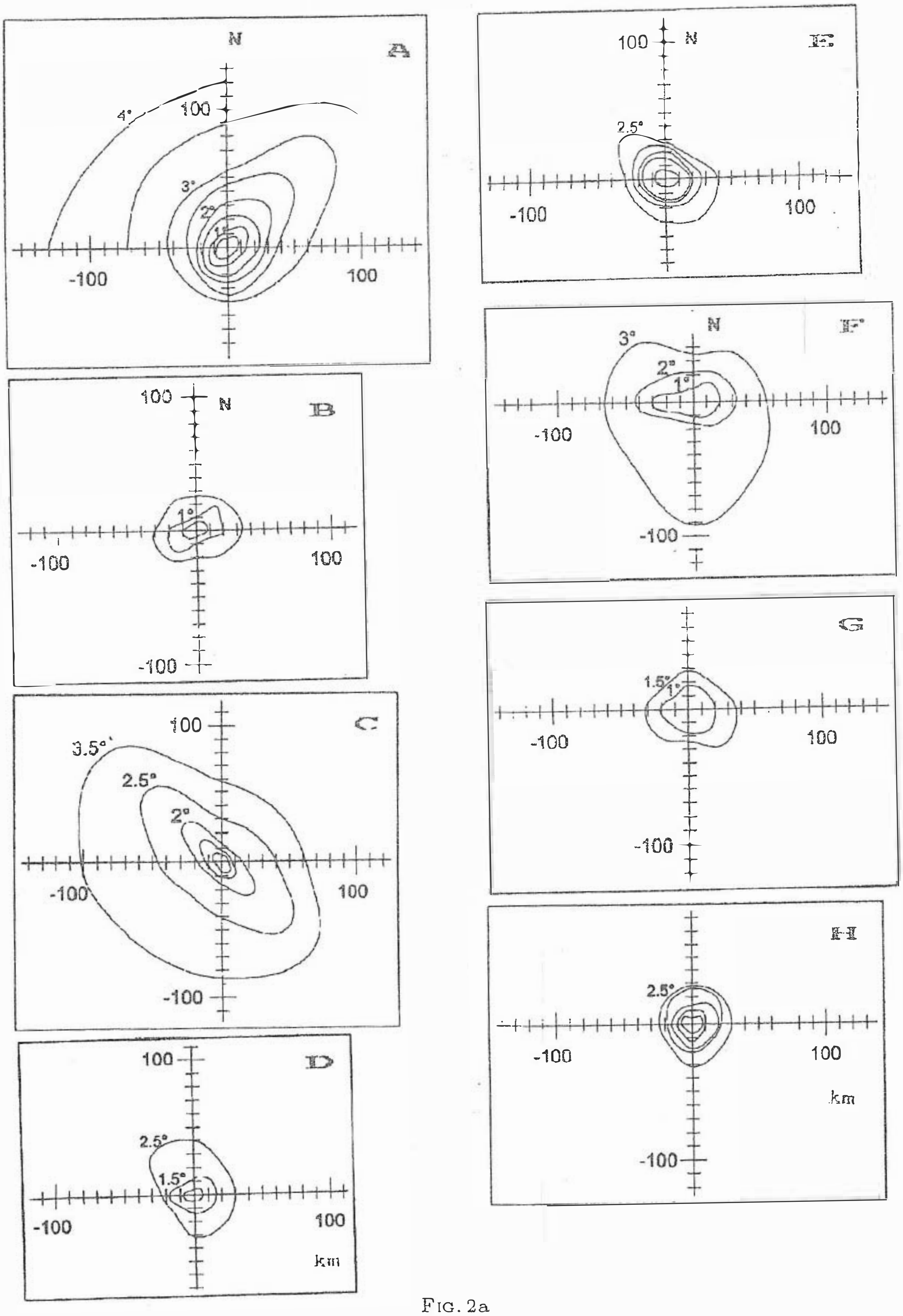

FIG. 2a

FIG. 2. Intensity decrease functions for seismoactive zones A to P described in Tab. 2

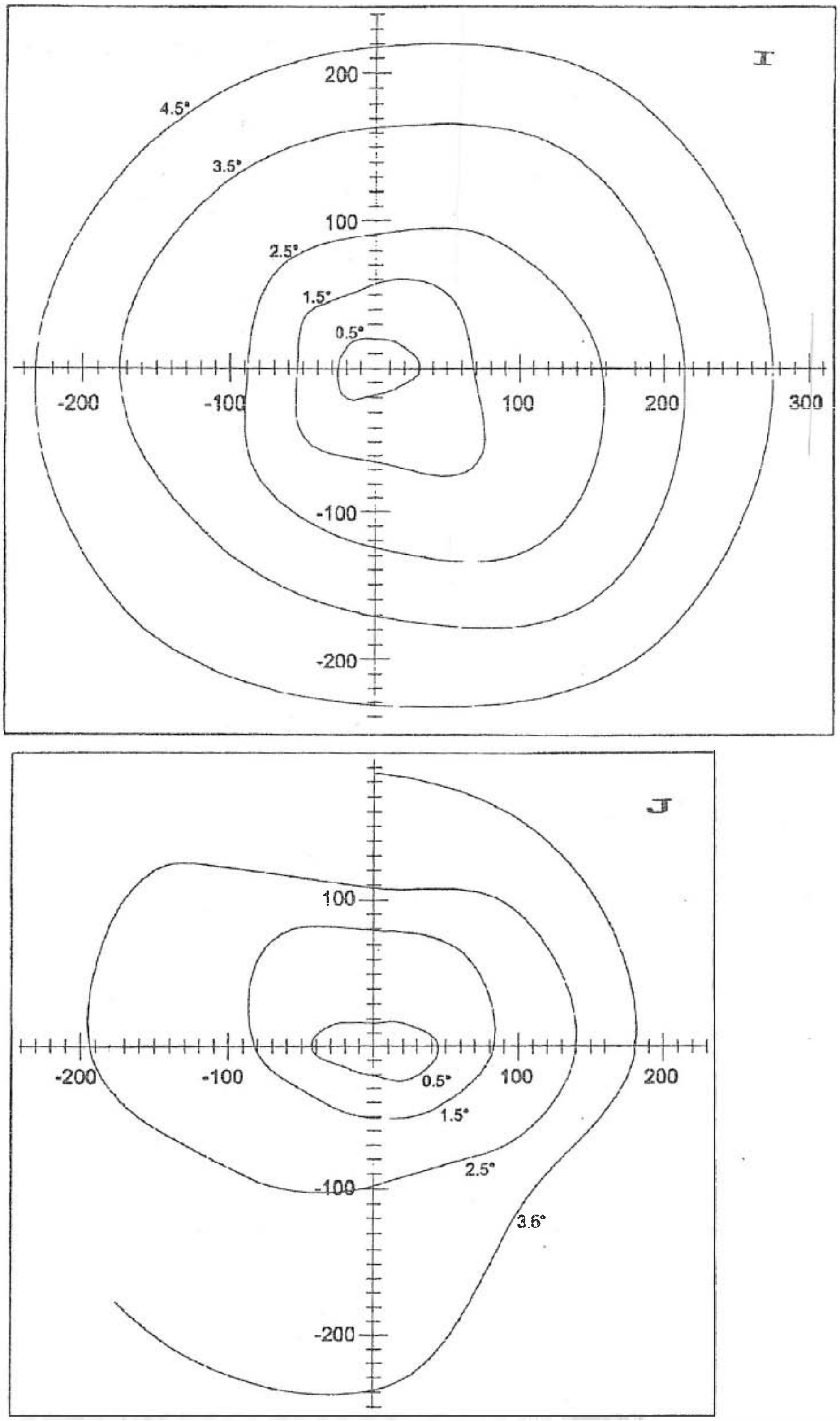
I
200
100
-100
-200
4.5°
3.5°
2.5°
1.5°
0.5°
-200
-100
100
200
300
J
100
-100
-200
-200
-100
100
200
0.5°
1.5°
2.5°
3.5°

FIG. 2b

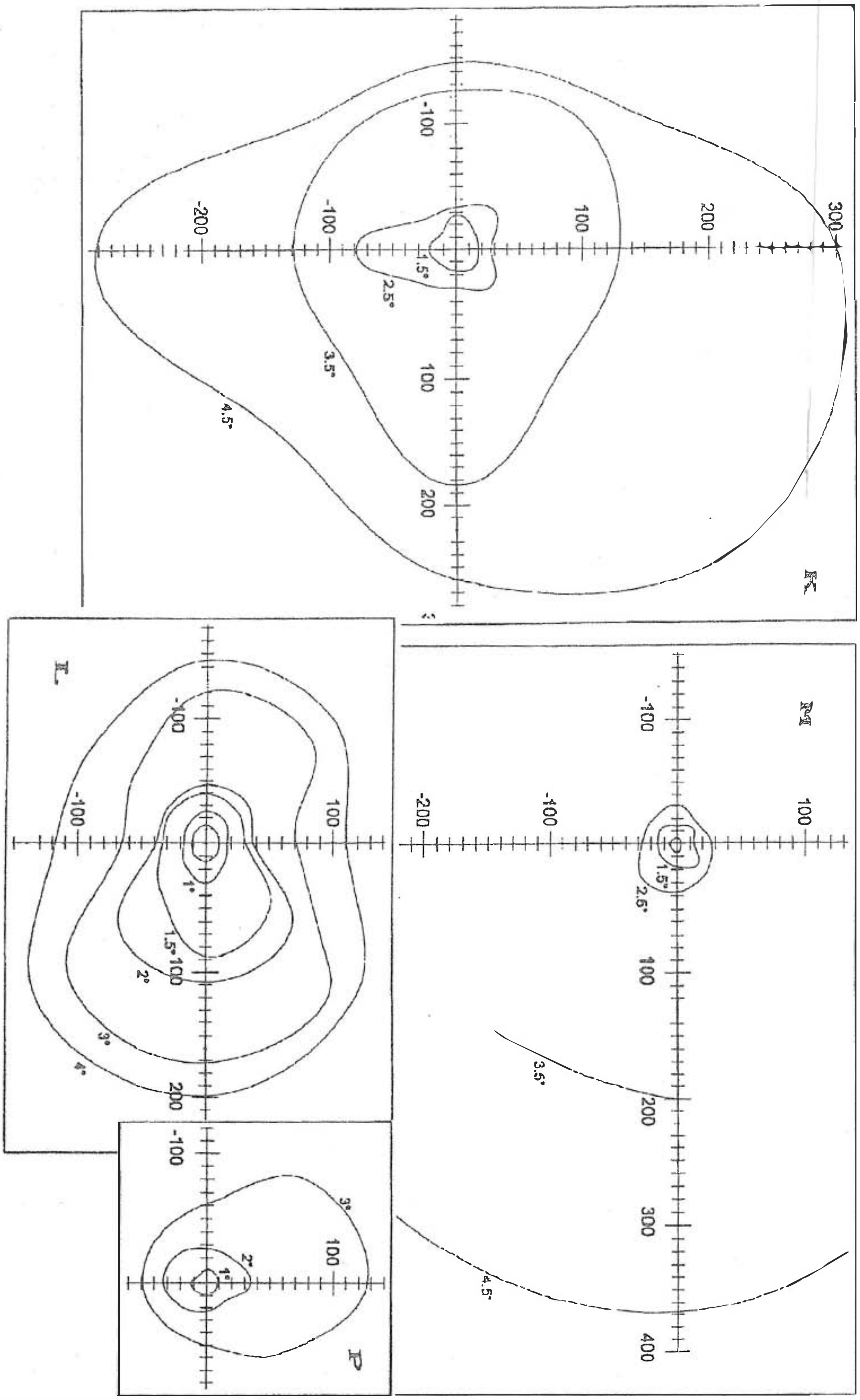
K
300
200
100
-100
-200
-100
100
200
1.5°
2.5°
3.5°
4.5°
M
100
-100
-200
-100
100
200
300
400
1.5°
2.5°
3.5°
4.5°
L
100
-100
-100
100
200
1°
1.5°
2°
3°
4°
P
100
-100
1°
2°
3°

FIG. 2c

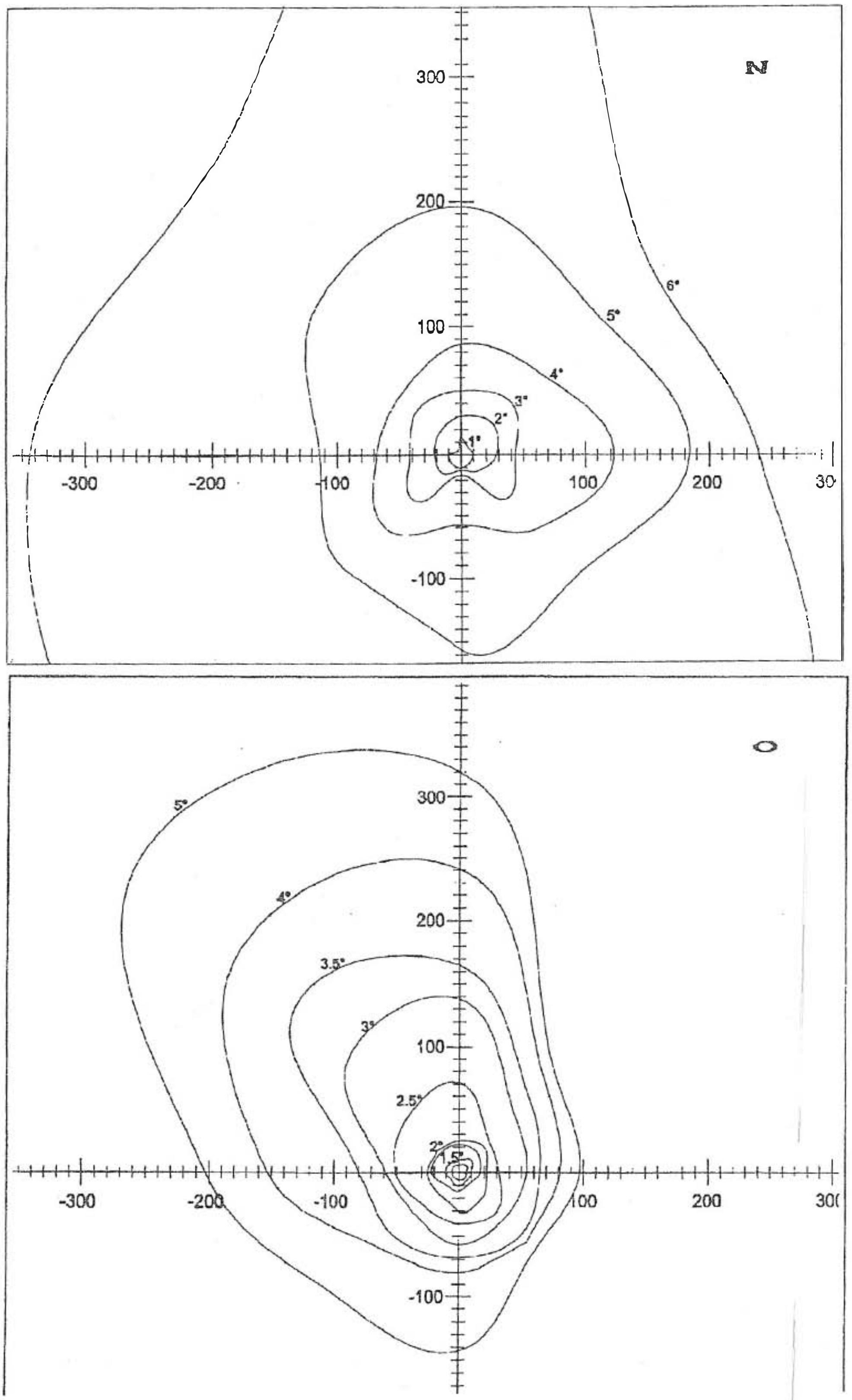
N
300
200
100
-100
-300
-200
-100
100
200
30
1°
2°
3°
4°
5°
6°
O
300
200
100
-100
-300
-200
-100
100
200
30(
1.5°
2°
2.5°
3°
3.5°
4°
5°

FIG. 2d

(cm/s^2) in randomly oriented horizontal ground motion component were used:

$\log A_H = 0.45 \cdot I_s - 1.3$	°MSK–64	[Drimmel 1985]	(3a)
$\log A_H = 0.33 \cdot I_s - 0.50$	°MM	[Gutenberg, Richter 1956]	(3b)
$\log A_H = 0.30 \cdot I_s + 0.014$	°MM	[Trifunac 1975]	(3c)
$\log A_H = 0.19 \cdot I_s + 0.62$	°MSK–64	[Schenk 1985]	(3d)

These formulas were obtained in abroad for zones with different seismotectonic characteristics (earthquake magnitude interval, type of foci, epicentral distances, decrease of intensity with distance). This procedure causes the uncertainty of input data, which reaches up to order value and so it contributes very substantially to the uncertainty of final seismic hazard curves. Alternative acceleration values, obtained from these formulas, are considered to be equally probable.

6. Calculation Procedure

A probabilistic seismic hazard curve express the dependence of probability (vertical axis Y) of exceeding during the period of one year the acceleration value A_H (horizontal axis X). To calculate these curves, the software HAZARD was compiled.

These are the input data for HAZARD program:

- source zones borders, number and size of elementary areas
- coordinates of site S
- seismicity parameters a, b, I_P of all source zones
- parameters describing the intensity–distance decrease $\mathrm{d}I(R)$
- parameters of all conversion relations $A_H(I_s)$

Program HAZARD will first

their distances from site S. Further, it calculates the intensity–frequency relations for zones and elementary areas. Then it will calculate the intensity decrease on the path from elementary areas to the site S. Further, the program will compute the probability, that during 1 year will occur in the given elementary area such intensity, which will in site S induce ground motions with various values A_H (independent variable on horizontal axis X). The minimum value of A_H is taken as $A_H = 10\,\mathrm{cm/s^2}$, because of subjective perception of earthquake ground vibrations (frequency 1 to 10 Hz) is about this value. The maximum value of A_H on the X axis corresponds to minimum probability taken into account, e.g. 10^{-4}.

Then, contributions of all elementary areas to total probability of exceeding each acceleration value are summed. These calculations are carried out for all combinations of alternative input data values. In the actual calculation for the locality Praha, we deal with 5 values of parameter b, 5 values of parameter k and 4 relations $A(I)$, therefore, there are 100 combinations of input data. As a result of calculation, 100 curves were obtained.

But these curves are not yet the final

HAZARD. Further is evaluated the distribution of obtained alternative PSHC. Three resulting curves are calculated which show the occurrence probabilities of acceleration values (X axis) which will not be exceeded during time periods T (given on Y axis as $T = 1/N$) with the probabilities, given as parameters of these curves (i.e. 5, 50 and 95 per cent). Fig. 3 shows such resulting PSHC for the locality Praha.

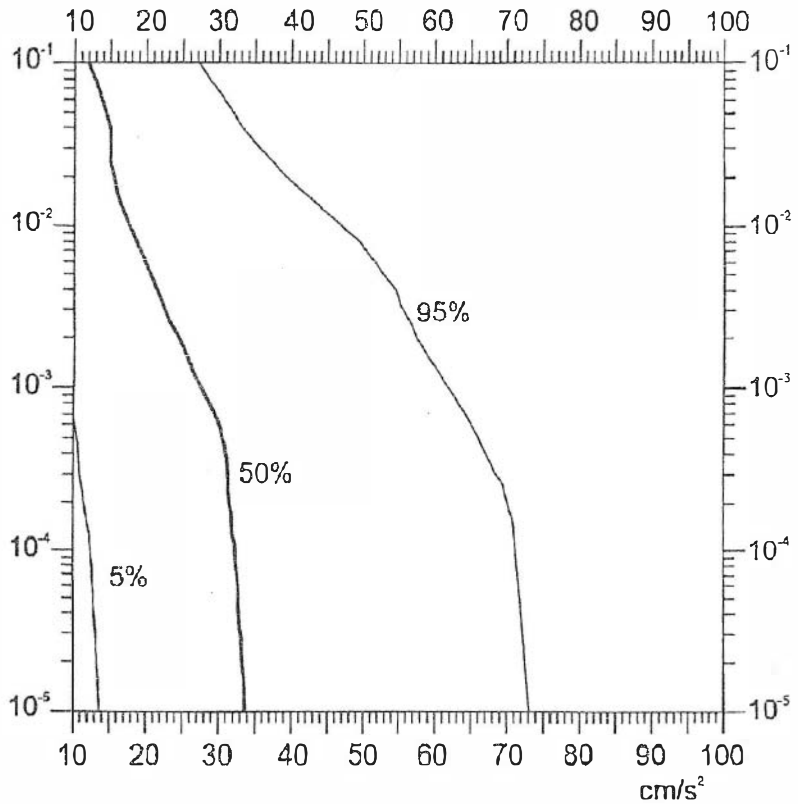

FIG. 3. Probabilistic seismic hazard curves for locality Praha

7. DEPENDENCE OF CALCULATED SEISMIC HAZARD ON UNCERTAINTIES OF INPUT DATA AND MODELS

Fig. 4a shows curves calculated for various values of parameter b, while all other input parameters are kept constant. It is obvious, that variations of b exert strong influence only for lower acceleration values. Maximum acceleration values are primarily dependent on values of seismic potential I_P of source zones. Generally, the determination of I_P plays a decisive role in calculation of seismic hazard.

Curves calculated for various intensity decrease parameters k are shown in Fig.4b, while other parameters are kept constant. Parameter k exerts the influence for the whole acceleration range. However, this influence is more significant for low values of probability (i.e. higher values of acceleration). This is due to prevailing contributions of very strong, but remote, earthquakes, because of their impact is strongly dependent on the intensity decrease.

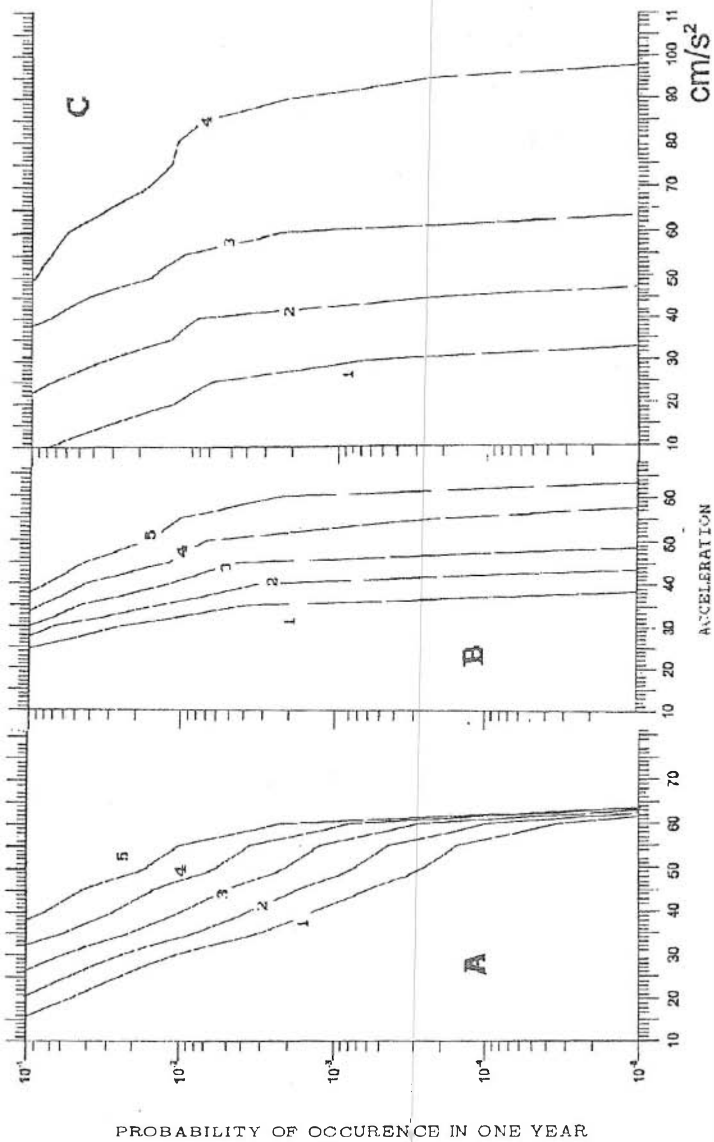

FIG. 4. The dependence of PSHC on various values of input data
Curves 4A for various values of the slope b: 1 ... $b = 0.8\,b_0$, 2 ... $b = 0.9\,b_0$, 3 ... $b = 1.0\,b_0$, 4 ... $b = 1.1\,b_0$, 5 ... $b = 1.2\,b_0$
Curves 4B for various values of the factor k: 1 ... $k = 1.10\,k_0$, 2 ... $k = 1.05\,k_0$, 3 ... $k = 1.00\,k_0$, 4 ... $k = 0.95\,k_0$, 5 ... $k = 0.90\,k_0$
Curves 4C for intensity decrease models: 1 ... (3d), 2 ... (3b), 3 ... (3c), 4 ... (3a)

Fig. 4c illustrates extremely strong dependence of resulting acceleration values on the choice of empirical formulae (3) for intensity to acceleration conversion.

Calculated PSHC document, that during a very long time interval (10^4 years), the maximum hazard to the locality Praha comes from Alpine source zones, where the seismic potential I_P reaches up to 11.5° MSK–64, despite their distance R of more than 300 km. However, this holds only in case when seismic potential of local faults, namely that of Middle Bohemian (denoted as a in Tab. 3), has been assessed realistically. In case this seismic potential would be greater by 1 to 2 intensity degrees, the maximum earthquake hazard would be caused by local earthquakes with foci connected to local tectonic faults.

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