COMPARISON OF $m_{PV}$ MAGNITUDES
(KAŠPERSKÉ HORY – PRŮHONICE – USCGS)

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1. INTRODUCTION

A separate monthly list of magnitude determinations was published for the period September 1968—August 1972. The magnitudes of P waves, determined from the records of short-period instruments ($Z$ — component), located at the stations of Průhonice (PRU) and Kašperské Hory (KHC) were compared. The seismic stations Kašperské Hory and Průhonice are equipped with short — period instruments SVKM-2 and SVSN-4, respectively, the amplitude responses of which are shown in Fig. 1.

The magnitudes have been calculated using the standard procedure, recommended by the IASPEI Committee on Magnitudes (Zürich 1967), i.e. using the formulâ $M = \log (A/T)_{\text{max}} + \sigma(A)$, where $(A/T)_{\text{max}}$ is the maximum value of the ratio of the recorded amplitude $A$ and the corresponding period $T$, and $\sigma(A)$ is the calibrating function. For body waves the $\sigma(A)$ curves of Gutenberg - Richter [1] — shallow foci, and Gutenberg [2] — deep foci, are used; for surface waves the calibrating function $\sigma(A) = 1.66 \log A + 3.3$ tabulated, e.g., in [3], are used; no station correction are applied.

Amplitudes of P waves are measured on records of short-period seismographs at both stations. Some P waves consist of two or more groups within the first 10—20 second, in which case we take • peak of multiple P waves, and $PV1$ and $PV2$ phases are distinguished. In this case we calculate two values of $m_{PV}$.

2. RESULTS

We carried out the analysis of the differences $m_{PV}(KHC)$, $m_{PV}(PRU)$, $m_{PV}(USCGS)$ and $m_{PV1}$ and $m_{PV2}$. Assuming that the investigated deviations have a normal distribution $N(\mu, \sigma)$, characterized by a mean value $\mu$, and a standard deviation $\sigma$, we obtain the numerical values in Tab. 1. If we test this hypothesis by the test of goodness of fit [4] we obtain the value $T$ in Table 1. From the magnitude of the values of $T$ it follows that with the exception of the first case, i.e. $m_{PV}(PRU) - m_{PV}(KHC)$, the normal distribution in the other cases is rejected at the 5% significance level.

The relative frequency of the deviation of $m_{PV}(PRU) - m_{PV}(KHC)$ is in Fig. 2. From this figure it follows that the frequency of $m_{PV}(PRU) - m_{PV}(KHC)$ decreases very quickly on both

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sides from the mean value \( \mu = -0.05 \) of a magnitude unit and that the function \( F(\Delta) \) [\( F(\Delta) \) is the relative frequency of the deviation of \( \Delta = m_{pv}(PRU) - m_{pv}(KHC) \)] is not symmetrical for \( m_{pv}(PRU) - m_{pv}(KHC) < -0.4 \) of a magnitude unit and for \( m_{pv}(PRU) - m_{pv}(KHC) > 0.3 \) of a magnitude unit. Asymmetry of the curve \( F(\Delta) \) is probably the cause of the rejection of the normal distribution. The standard error of a magnitude determination is about \( \pm 0.3 \) of a unit of magnitude [5]. From Fig. 2 it follows that the observed deviations of the magnitudes \( m_{pv}(PRU) \) and \( m_{pv}(KHC) \) can be neglected, considering the standard error of a magnitude determination.

![Fig. 1. The amplitude responses of SVKM-2 and SVSN-4.](image)

![Fig. 2. \( \Delta = m_{pv}(PRU) - m_{pv}(KHC) \); \( F(\Delta) \) is the relative frequency of the deviation of \( m_{pv}(PRU) - m_{pv}(KHC) \).](image)

**Table 1.**

<table>
<thead>
<tr>
<th>Random variable</th>
<th>Mean value(*)</th>
<th>Standard deviation</th>
<th>Dispersion ( \sigma^2 )</th>
<th>Number of cases</th>
<th>( T )</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>( m_{pv}(PRU) - m_{pv}(KHC) )</td>
<td>-0.05</td>
<td>0.16</td>
<td>0.03</td>
<td>1425</td>
<td>162.15</td>
<td>nuclear explosion</td>
</tr>
<tr>
<td>( m_{pv}(PRU) - m_{pv}(KHC) )</td>
<td>-0.03</td>
<td>0.09</td>
<td>0.008</td>
<td>48</td>
<td>12.28</td>
<td></td>
</tr>
<tr>
<td>( m_{pv2} - m_{pv1} )</td>
<td>0.36</td>
<td>0.25</td>
<td>0.06</td>
<td>111</td>
<td>16.79</td>
<td></td>
</tr>
<tr>
<td>( m_{pv1} - m_{pv}(USCGS) )</td>
<td>-0.12</td>
<td>0.35</td>
<td>0.12</td>
<td>111</td>
<td>18.28</td>
<td></td>
</tr>
<tr>
<td>( m_{pv2} - m_{pv}(USCGS) )</td>
<td>0.24</td>
<td>0.30</td>
<td>0.09</td>
<td>127</td>
<td>11.81</td>
<td></td>
</tr>
</tbody>
</table>

*) Means of a magnitude unit.