ONE YEAR EXPERIENCE WITH THE CMVS 2 MAGNETIC VARIATION STATION

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Abstract. A year's operation of a digitally recording variometer (CMVS 2) employing a Bobrov magnetometer is described. The equipment provides hourly mean values of the geomagnetic component on paper tape. It has a range of outputs including analogue recording of the field variations which can be measured in the range 0-1999.9 nT with a sensitivity of 0.1 nT. After a running in period of some months the standard deviation of baseline values is in the range 1.5-2 nT with a drift rate of about 2 nT per month.

1. Introduction

The purpose of this report is to summarise the results obtained in the course of one year of operating the CMVS 2 digital magnetic variation station. The station is one of the first three produced at the SKB FP of the U.S.S.R. Academy of Sciences. Employees of the organisation installed the equipment at the Geomagnetic Observatory in Hurbanovo in March, 1982.

2. Brief Description of the Equipment

The CMVS 2 consists of three principal parts: the assembly containing the D, H, and Z variometers, the variometer electronics, and the measurement unit. The sensitive part of the equipment consists of Bobrov-type variometers with photoelectric conversion and negative feedback. This pattern of variometer was chosen because of its excellent time and temperature stability.

The CMVS 2 provides instantaneous values of the field components together with information from an external data channel, and hourly mean field values which are output, via an interface, to a tape punch. The facility for recording real time variations of the geomagnetic field components on analogue recorders is also available. The options for connecting external equipment to the CMVS 2 are very wide (see Figure 1). The measurement range of the geomagnetic field variations is 0-1999.9 nT. The resolution is 0.1 nT, and the frequency range 0–5 Hz.

3. Recording Conditions

The CMVS 2 is installed in two buildings. The variometers and their control electronics are installed in the variometer house. The measurement unit is in another building 80 m distant.

During the period of the investigation the variometer house temperature was
controlled between 19.2 and 21.1 °C. Temperatures in the building which houses the measurement unit varied between 15 and 30 °C. The relative humidity ranged between 30% and 80% during the second half of the observing year.

The mean values of the level of artificial disturbance did not exceed 1 nT. However, pulses with amplitude of several nT were observed.

4. Results Obtained

Our observations were primarily concentrated on establishing the long term stability of the variometer baselines. For this purpose the CMVS 2 readings were compared regularly, twice a day, in the morning and afternoon, with the readings derived from a normal 20 mm hr\(^{-1}\) analogue record. On days of absolute measurements, we also calculated the baseline values for the individual variometers [1].

The measured baselines are shown in Figure 2. The running-in period of the equipment is reflected during the first months. All three variometers displayed a continuous change of baseline after July 13th, 1982, which on the evidence of the absolute measurements exhibits a jump. The most probable explanation for this is the occurrence of a release of elastic tension in the photoconverter [2].

The mean quadratic deviations of the observed baseline values are given in Table I (a), (b), (c). As can be seen the scatter of the values underwent a decrease with time for the \(H\) and \(Z\) variometers and slightly increased for the \(D\) variometer.