

DS-2 digital fluxset D/I instrument

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Observatories usually use automatic instrumentation for time variation recording but the absolute instrument used for baseline determination operated manually. This procedure is time consuming and has several possibilities to make mistakes. In our new absolute D/I instrument DS-2 optical angle reading system was replaced with a digital one. In order to increase angular precision new graduated disk was produced and applied. Magnetometer and angle reading data are transmitted to a tablet which is used as display and data collection system. At the same time the tablet can be used to calculate data for baseline correction.

Using experiences of DS-1 digital D/I theodolite a new instrument was designed and built. The base of the instrument is again a Zeiss theodolite where optical angle reading system is replaced with digital angle reader. The fluxset magnetometer electronics which is fixed on the telescope has an extra board to process data of digital angle encoders. Both data are transmitted via bluetooth to a tablet and when the telescope is adjusted to the desired position the operator should press a button on the remote commander and data are stored into the memory of the tablet together with GPS time (and coordinates) data.

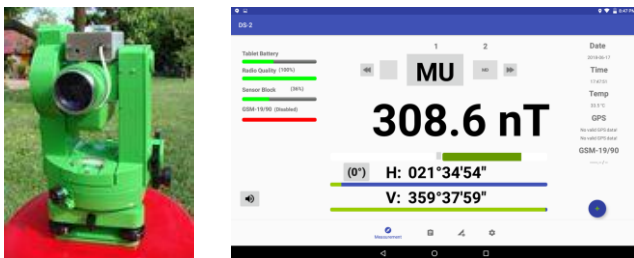


Figure 1: DS- 2 digital absolute instrument

Scalar magnetometer's serial data can be received directly by the tablet in real-time giving the possibility to calculate absolute components of the geomagnetic field vector. Data stored in the tablet can be copied to a memory card or uploaded via wifi to the server of the observatory. Data format can be xls or csv.

Android application running on the tablet has several usefull tools to help the operator's job. On the display can be found information In addition to the actual magnetometer output and angles on date, time, temperature of the of the instruent, geographical coordinates, battery charging status of the magnetometer

and of the tablet. Also the next position of the telescope is shown. To speed up the measurement process after declination observations the mean value is calculated and displayed.

Working parameters can be entered by the tablet. There is also possibility to enter here measurement identification data as place, operator's name etc.

All instrumentation is running from battery at least for six hours. To charge 12 V DC or 230 V (115 V) can be used.

We carried out absolute observations with DS-2 in parallel to classical optical instruments equipped DTU and Bartington magnetometers (354459 and 153567). Measurement errors are in the same range.

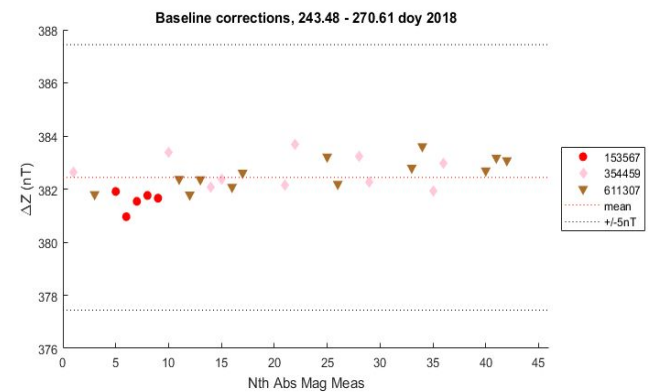


Figure 2: sample data of comparison

References:

Hegymegi, L., Szöllősy, J., Hegymegi, C., and Domján, Á.: Measurement experiences with FluxSet digital D/I station, *Geosci. Instrum. Method. Data Syst.*, 6, 279-284, <https://doi.org/10.5194/gi-6-279-2017>, 2017.

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