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## Using Move software by geological field works

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### SUMMARY

This paper is written about Field Move Clino and FieldMove programs and their capabilities. We describe the features of processing in field works. Advantages and disadvantages of using gadgets during geological field camp are indicated. These thesis demonstrate that Move software is the right solution for field geological work.

## Introduction

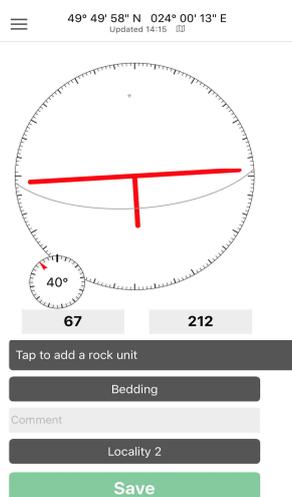
The first students' field practice is an additional element that helps in the learning process. It is the most important stage in the formation of ideas about the application of theoretical knowledge in practice. Quite often the teachers of educational practices face with a classic problem - students who have completed a course in certain disciplines and successfully passed exams, do not know how to apply their knowledge and skills in the field. Our task is to teach students to put their knowledge gained in University into practice using new approached programs such as Field Move Clino and FieldMove and the using of gadgets.

## Stage of investigation

1) The aim of the preparatory period, the purpose of which is to acquaint students with the tasks of geological practice, preparation of the necessary equipment and maps. 2) The main goal of the field period is to describe the geological structure, measure the azimuths of strike and dip, as well angles. The classic period was based on the use of a compass, a hammer, and a map, however, smartphone with the Field Move Clino program installed, which act as a compass and a map, became an alternative, while the geological hammer remains indispensable. 3) The cameral stage consists of the processing and registration of the received information, in a result students get the written report and the created map.

## Field Move Clino and FieldMove

Field Move Clino is a digital compass designed to gather and store data on iPhones or smartphones (Figure 1)(MOVE 2020). Designed to simplify a field work, including location and GPS sensors, Field Move Clino is not only used for orientation by compass, it also allows you to measure the strike and dip of layers, cracks, faults and cleavages. It also allows you quickly perform large numbers of measurement, make the data set statistically more reliable. Field Move Clino allows you to create observation points, attach series of photos to them, and even add text notes with a geographical links (Figure 2). In addition to supporting online maps (Figure 3), FieldMove Clino also supports offline maps, which allow you to import your own base maps with geographic links and collect data out of connection. Data can be exported as MOVE, CSV, or KMZ files, and then imported directly into FieldMove, Move, or other applications such as Google Earth. Examples of applications of this software product include hundreds of names. The most important of them should referenced (Allmendinger et al, 2017; Bubniak et al, 2020; Cawood et al, 2017; Lee et al, 2013; Whitmeyer et al, 2019; Lee et al, 2018; Pavlis et al, 2014; McCarthy et al, 2009; Sun et al, 2010; Pavlis et al, 2010; Brush et al, 2019).



*Figure 1 Measurement the strike and dip of the layers*

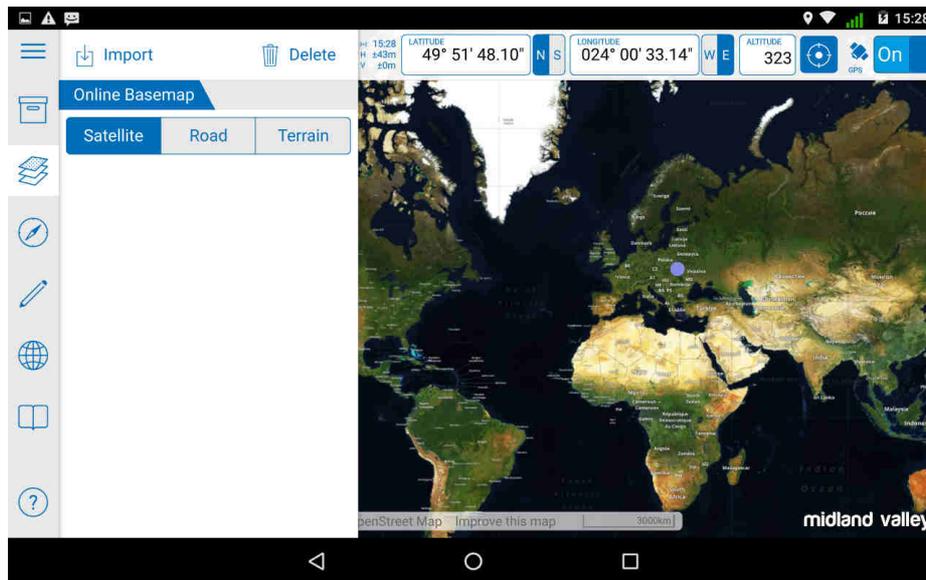


**Figure 2** Sample of saved locations with attached photos on the example of the route of geological field camp in Birki village



**Figure 3** Map with the location points and measured cracks (indicated in green) and the position of menilites (orange) on the example of the route in Dolyna district, Lypa river.

FieldMove (MOVE 2020) (Figure 4) is a program for mapping polygons on a map and collect geological data. It is presented in a cartographic format and is intended for use on tablets. The program allows users to use drawing tools to mark geological contacts, as well as create polygons to show different types of rocks. Data can be exported as MOVE, CSV or KMZ files. FieldMove relies on three sensors in your device - a magnetometer, gyroscope and accelerometer. These sensors can be programmed to measure the orientation of planar and linear features in the field. All three sensors are standard on iPhones and iPads, but are not always available on other hardware devices. Always check the device to make sure that all three sensors are present and that the compass and clinometer give accurate readings before you start collecting information.



*Figure 4 Satellite map in the program with the specified location*

## Results of investigations

Thanks to programs mentioned above a map of geological field camp was given to every student's smartphone. Series of photo of outcrop attached to each location point with strike and dip of the layers specified. They also had the opportunity to put down in the notes the name of the outcrop as well as the names of the minerals and their features. As a result, each student was able to analyze the information which led to the successful writing of the report.

## Use of gadgets during geological field camp: advantages and disadvantages

Modern technologies are created to facilitate the task. Knowledge of new programs and mastery of functions is the clue to success in any scope. The first student geological field camp is a clear example of this. Decades ago, the classical period of geological field camp was based on manual labour. All data were measured with a compass, location - with GPS device, and with a printed topographic map. Now only one smartphone is able to perform several functions: photo, watch, calculator, compass, GPS, map, information guide, translator, etc. What could be edited only after field day now can be partly automatized in the field, processing the information and thus significantly reducing the field period and simplifying the cameral period. Of course, there are disadvantages of using gadgets in the field – programs and data processing and export requires certain knowledge and skills to be learned, and you also need to be interested in software updates, because these are new opportunities. Among the technical disadvantages are the speed of discharge of the device battery, especially on a sunny day, the probability of malfunction program during operation, saving data failure in software. Also, if we are talking about creating map with coordinates, it will be for charge.

## Conclusions

The using of gadgets and software has demonstrated high productivity and efficiency of field work over the past few years. Experience shows that students prefer digital technologies.

The time released during field work can be used for other purposes, such as processing information in the field. But remember that every field geologist must have a paper map of the study area, an analog compass and be able to use them.

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