# SUMMARY


## **Digital modeling and monitoring of the ice cover in the area of the Bulgarian Antarctic Base “ St. Kliment Ohridski” and development of an integrated information system** for polar research

The main purpose of the research is to create a dynamic model of the ice cover for particular areas in the area of BAB "St. Kliment Ohridski ".

The implementation of the model will lead to the creation of a database of investigated snow fields, which can expand its scope with other research objects in science such as geology, biology and others.

Along with the implementation of the main purpose, as a result of the project, an integrated information system for polar research will be created and placed for use at the Bulgarian Antarctic Institute. The information system will be able to store measurements and results of all research on the area of BAB, as well as to obtain information about them through Internet access.

The development of a computer-based, dynamic model of snow-ice field data collected by a dron creates prerequisites for the accumulation of large amounts of information, with high resolution, as well as high density of the capturing period. Comparing data from different years will provide an opportunity to understand the processes and overall dynamics of the observed area.

For the purpose, it is important to use a multirotor platform with 4 or 6 airsrewmotor groups that can provide high accuracy of positioning of the aircraft during field shooting. The high resolution of the aircraft's main camera enables safety to be ensured through the crossing of ice cracks and snow bridges by the team operating on the ground. The model will be created in a reference coordinate system in a appropriate projection, with the GNSS control points (GCP) defined on the area of BAB. The recommended configuration is: Phantom 4 Pro, four batteries with capacity 5870mA (89Wh), 64GB or 128GB memory cards, the appropriate flight management software and data processing software.

High image quality can be used in several ways. Some of them are: identification of geological structures free from snow and ice, rock formations, measurements of areas with lichen and grass areas, etc.

The realization of the dynamic model of the ice cover will lead to the implementation of the second purpose of the project - creation of an integrated information system for polar research.

The integrated information system will allow integration of all data and results from all Bulgarian expeditions in BAB "St. Kliment Ohridski "and will provide information about them through Internet access. The information system will be able to integrate with other similar research systems in the Antarctic region. This will provide an opportunity to expand the scope of research, to comparison of the results of Bulgarian scientists' research and to verify hypotheses based on them. The services that the system will provide will be realized through:

- Internet access through a web site by searching on different criteria;
- Obtain measurement data and processing results in appropriate file formats;
- Standard web services for integrating the information system with other (external) systems.

In the integrated information system, measurements and processing results will be stored, structured in a database on the subject of the survey and their scope. The database will store:

- spatial data in vector and raster, such as photographs, scanned maps, points, lines and polygons with coordinates in an appropriate reference coordinate system, as well as attribute information about them;

- Scope of each research and metadata for it - expedition, general description of the purpose of the study, research team, date of study, used tools, available measurements and results and their use, publications related with the research, links to other similar research in the area.
- Measurement data and processing results that do not relate to a particular geographic location.
- Articles and publications

The database will ensure the link between the individual elements, which will allow search by different criteria (spatial and non-spatial). In the integrated information system, there will be no limitation in terms of number, scope and type of research. It will be an open system that allows adding new research and results and archiving old ones. With its introducing, BAI will be able to plan expeditions and researches in the long run as well as synchronize its actions with scientists from other expeditions. A compulsory data structure with the implementation of the information system will be the dynamic model of the ice cover. The system will be open and when other research data is provided in the area, they will be entered into the database within the framework of project implementation.