



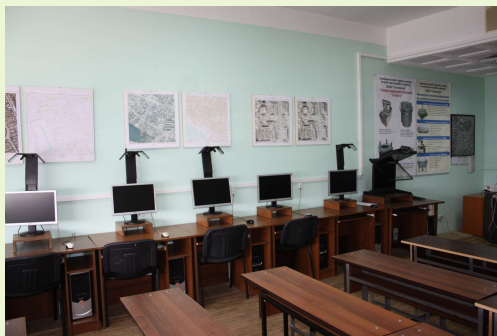
**LVIV POLYTECHNIC NATIONAL UNIVERSITY**

**DEPARTMENT OF PHOTOGRAMMETRY AND  
GEOINFORMATICS**

# DEPARTMENT OF PHOTOGRAMMETRY AND GEOINFORMATICS



Laboratory of digital photogrammetry



Laboratory of remote sensing



Laboratory of analytical photogrammetry



Laboratory of unmanned aerial vehicles





**Laboratory of UAVs  
Department of photogrammetry and  
geoinformatics**



**TRIMBLE UX5 HP for the Armed  
Forces of Ukraine**

## **The main directions of scientific activity of the department**

- ***Mathematical modeling of photogrammetric monitoring of natural and man-made phenomena and processes.***
- ***Application of aerial imaging methods and photogrammetric technologies in the study of the cultural landscape. In 2007-2009***
- ***Creation of geographic information systems for tourist destinations.***
- ***Monitoring of hydrological processes on the basis of aerospace surveying and building of digital relief models.***
- ***Theory and practice of microstereophotogrammetry.***

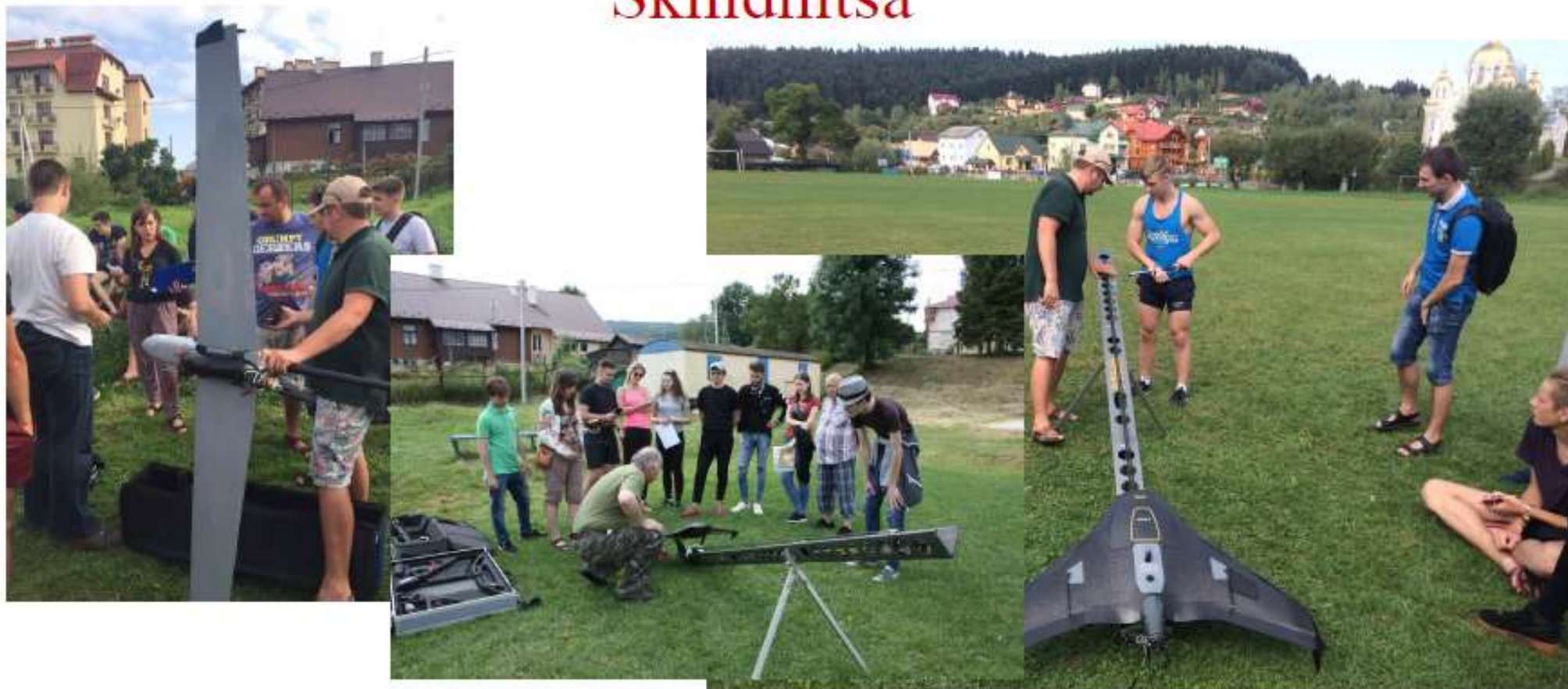


## The main achievements of the department in recent years

- Development of the concept of navigation-digital photogrammetry, head of the Doctor of Technical Sciences, prof. Dorozhynskyy O.L. (2003);
- "Formation of a generalized theoretical model of photogrammetric monitoring of kinematic processes", head - Doctor of Technical Sciences, prof. Dorozhynskyy O.L. (2004-2005);
- "Determining the quantitative parameters of island glaciers and large-scale mapping in the area of the station "Akademik Vernadskyyi" by the phototheodolite method", head - Doctor of Technical Sciences, prof. Hlotov V.M. (2005);
- "Large-scale mapping for the creation of a GIS basis of the "Akademik Vernadskyyi" station area using the phototheodolite method", head - Doctor of Technical Sciences, prof. Hlotov V.M. (2006);
- "Determining the deformation and technical condition of cooling towers, ventilation and smoke pipes by the method of phototheodolite surveying", head - Doctor of Technical Sciences, prof. Hlotov V.M. (2007);
- "Theory and methodic of photogrammetric monitoring of natural phenomena with a pronounced kinematic character", head - Doctor of Technical Sciences, prof. Dorozhynskyy O.L. (2006-2007).
- "Theoretical-experimental principles of construction of cadastral systems for monitoring recreational areas based on remote sensing and GIS technologies", head - Doctor of Technical Sciences, prof. Dorozhynskyy O.L. (2011-2012).



# Educational scientific geoinformation center at Skhidnitsa



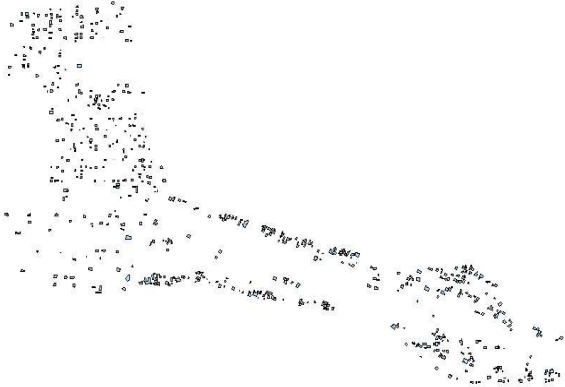


# Summer school for schoolchildren "Summer Polytechnic"



# Analysis of the destruction caused by Russian aggression by a semi-automatic method using orthophoto obtained from Trimble UX5 HP UAV

## Moshchun village



Destroyed buildings in Moshchun village

The purpose of the research is the analysis of orthophoto before and after the occupation of the Kyiv region by the Russian army, for the purpose of calculating the quantitative indicators of the destruction of infrastructure objects by a semi-automatic method in the Erdas Imagine software package.

Destroyed buildings is 663 objects, of which:  
590 were completely destroyed;  
73 – destroyed or partially damaged.  
The total area of destroyed objects is 55449 m<sup>2</sup>.

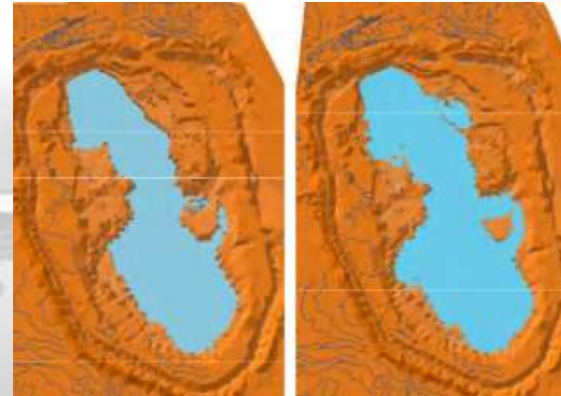
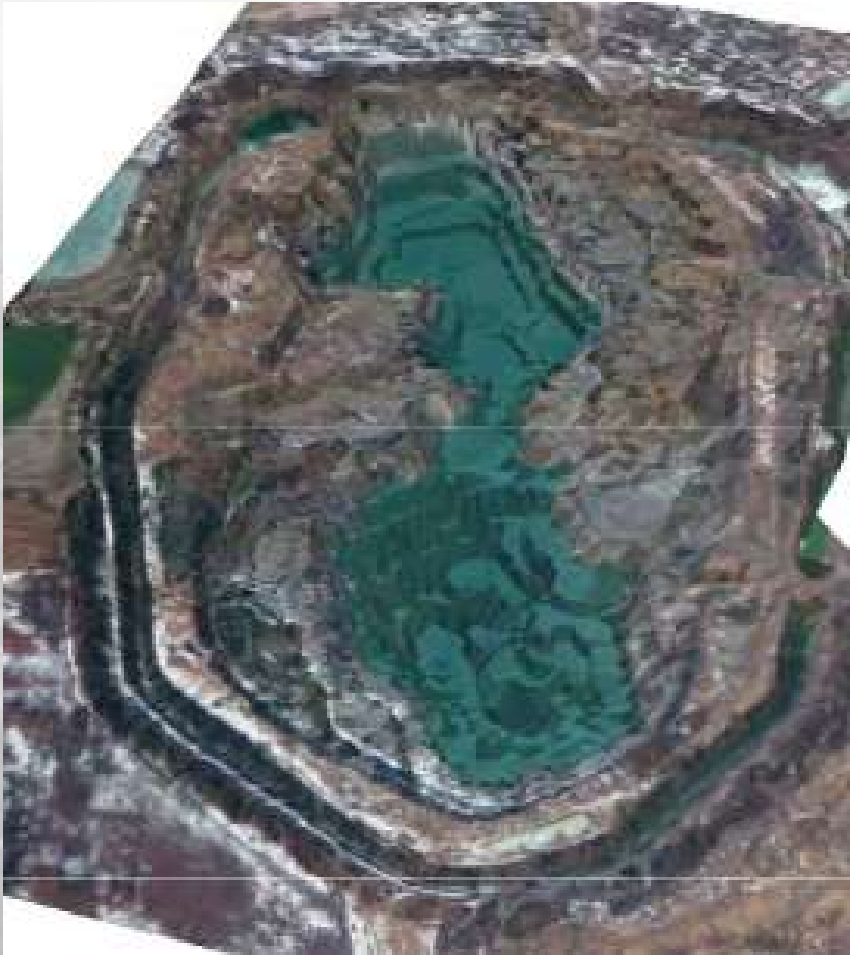


## Bucha

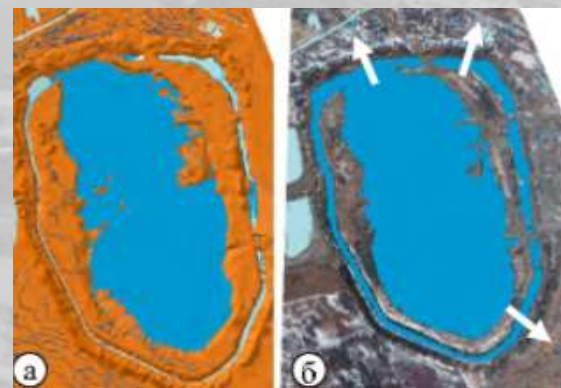




## Study of dynamic processes of Dombrovsky quarry using Trimble UX5 UAV



Model of flooding of the Dombrovsky quarry for different years



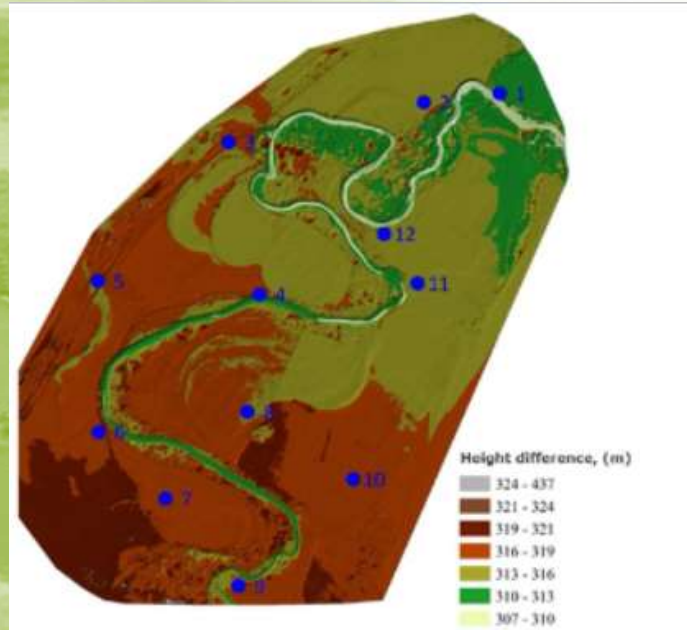
Models of quarry flooding:  
a) till critical mark 284 m  
б) till mark 294 m

The height map of the Dombrovskiy quarry was built based on the results of an aerial imaging with an applied texture

# Study of changes in riverbeds and calculation of flood zones based on DEM and orthophotos obtained using aerial imaging from Trimble UX5 HP UAV



Orthophotomap of the Dniester River according to Trimble UX5



Digital elevation model with control points for the 2021 survey



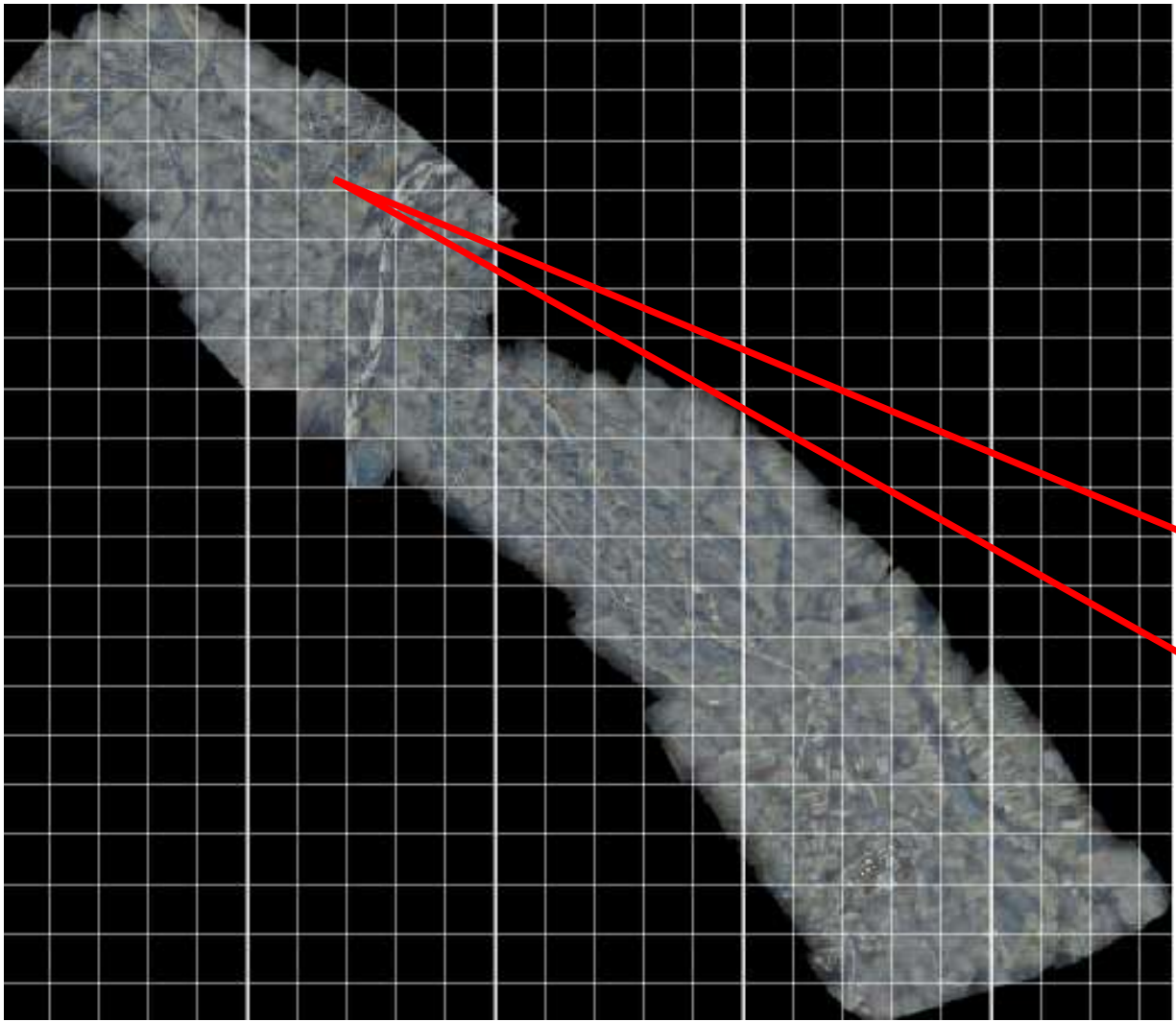
Height map with applied texture



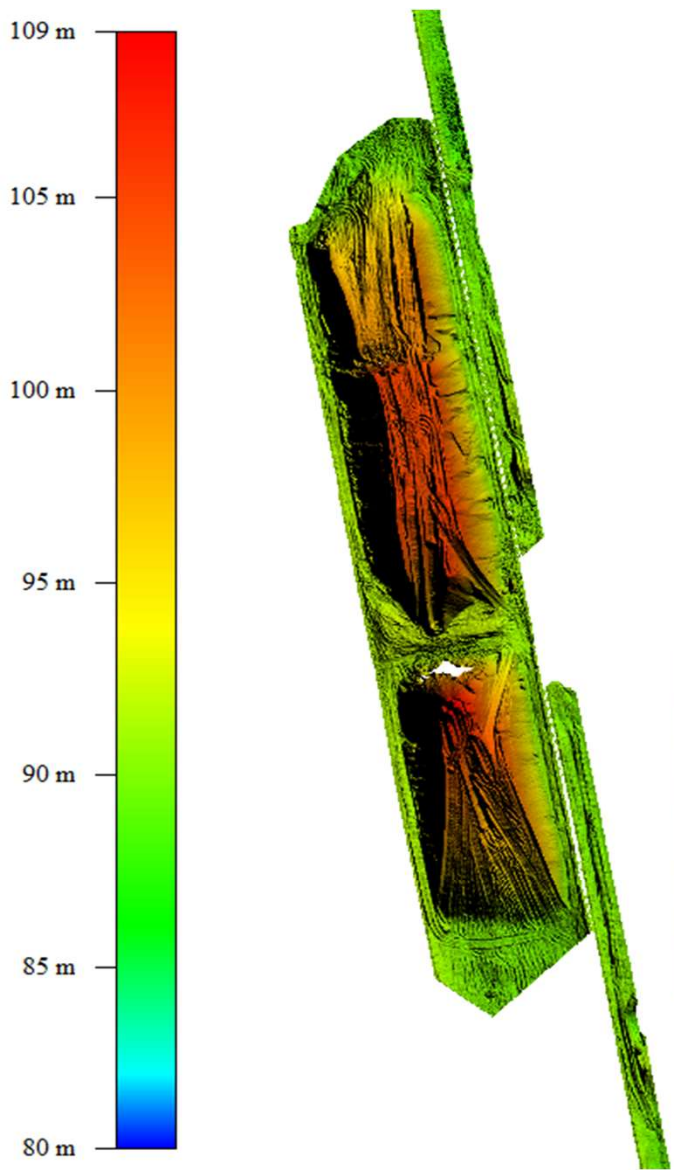
Predicted flooding zones along the Dniester riverbed



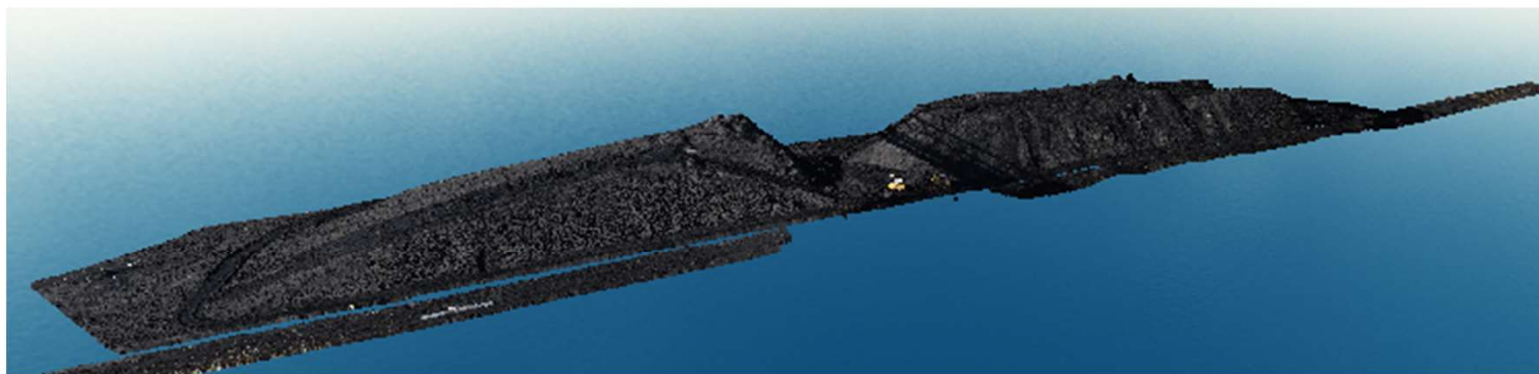
# Mapping the territory of oil fields by orthophoto with Trimble UX5 HP UAV







**3D modeling of the territory of the Burshtyn thermal power plant to calculate the volume of coal used. The 3D model is built on the basis of a height map based on aerial imaging materials from Trimble UX5 HP**



### Monitoring of island glaciers of the Antarctic coast

Glaciers were monitored on the islands of Galindez, Winter and Skua (Argentine Islands of the Wilhelm Archipelago, Antarctic Peninsula). To study the changes in the volume of glaciers, a method of integrated application of ground-based laser scanning and digital stereophotogrammetric imaging has been developed. To create topographic plans of the islands, a survey of the Trimble UX5 UAV was performed.

The research has made it possible to detect climate, glaciological and biological changes, as well as to obtain valuable information for forecasting climate change, not only in the Antarctic region, but also for the whole planet.

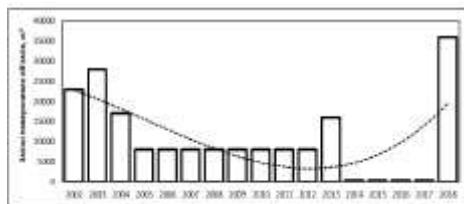
#### Glacier on the island Galindez



2002



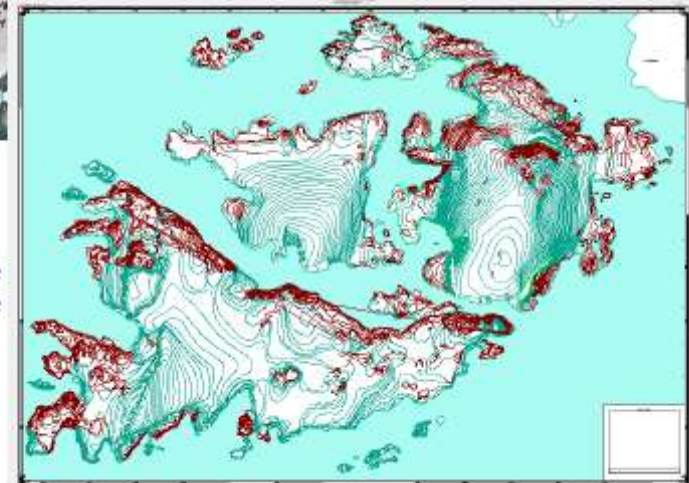
2019



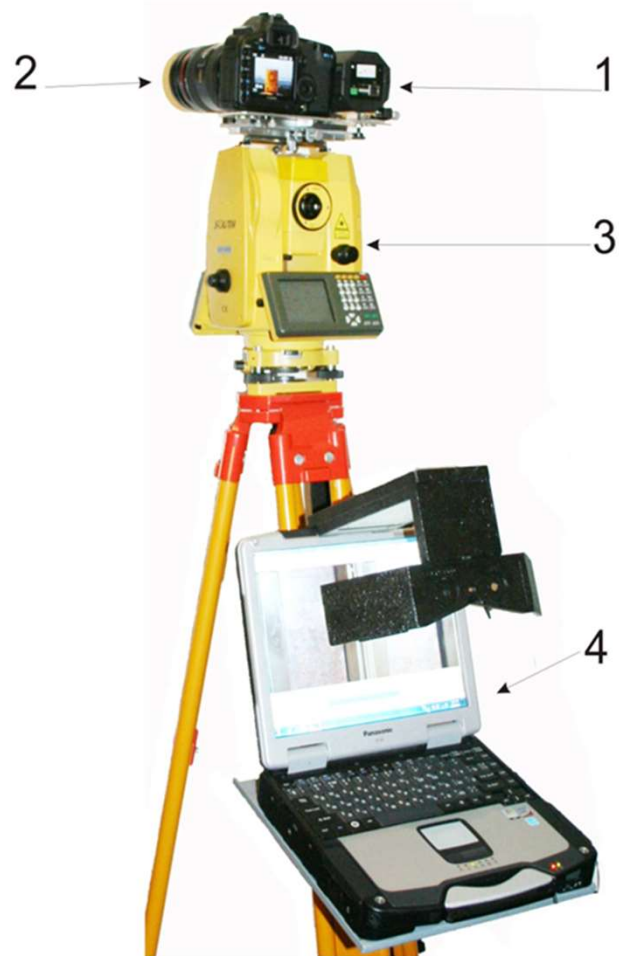
Glacier volume changes, m<sup>3</sup>



Orthophotoplan on the territory of the Argentine Islands



Topographic plan for the territory of the Argentine Islands



**A digital video phototheodolite developed by representatives of the department, which can be used for military purposes**



Фіг. Загальний вигляд цифрового відеофототеодоліта:

- 1 – цифрова мережева відеокамера;
- 2 – цифрова знімальна камера;
- 3 – орієнтуєчий пристрій – електронний тахеометр;
- 4 – цифрова фотограмметрична станція, цифровий відеореєстратор.



## Published monographs

### ЗАСТОСУВАННЯ БПЛА У ВІЙСЬКОВІЙ СПРАВІ ТА АЕРОЗНІМАННІ



### ГЕОМАТИКА

В МОНІТОРИНГУ ДОВКІЛЛЯ  
ТА ОЦІНЦІ ЗАГРОЗЛИВИХ  
СИТУАЦІЙ



Б. Четверіков, М. Шейхет, Т. Грицюк

ВИЗНАЧЕННЯ МЕЖ  
НЕКРОПОЛІВ І МЕМОРІАЛІВ  
ДИСТАНЦІЙНИМИ ТА НАЗЕМНИМИ  
НЕІНВАЗИВНИМИ МЕТОДАМИ





# International Scientific-Technical Conference on Environmental Engineering, Photogrammetry, Geoinformatics – Modern Technologies and Development Perspectives (Ukraine-Poland)

In Ukraine: Lviv-Shidnitsia 2017



In Poland: Lublin 2019







## Laboratory for processing mobile mapping data

As can be seen from the presentation, the department widely uses UAVs manufactured by the Trimble company to implement applied tasks using photogrammetry. On the other hand, the GIS component and data processing of terrestrial laser scanning using Trimble technologies is rather poorly developed.



The opening of a specialized laboratory at the department using Trimble technologies in the form of GIS map-boards with RTK antennas and software for processing data obtained from mobile mapping systems will allow the introduction of additional Trimble technologies into the curriculum for the training of highly qualified professionals.







**Thank you for attention!**