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ANALYSIS OF THE USE OF GEO INFORMATION SYSTEMS IN THE MANAGEMENT OF FIRE AND RESCUE DEPARTMENTS

Lisniak Andrii

Ph.D., Associate Professor

Konoplich Oleh

Higher education student

Yermola Maksym

Higher education student

Shevchenko Valerii

Higher education student

Department of fire tactics and rescue operations

National University of Civil Protection of Ukraine, Ukraine

Geographic information systems (hereinafter referred to as GIS) are a set of software, hardware and information tools designed to collect, store, analyze, model and display spatially coordinated data.

Depending on the functional purpose, they are divided into desktop, server and web GIS.

The most common geographic information platforms that make it possible to analyze a significant amount of data in various areas of activity and, if necessary, create geographic information systems at an enterprise/institution with the display of corporate and situational data via an electronic map are given in Table 1.

Table 1. The most common geographic information systems in the world and their main characteristics (analysis of AI).

№	Name GIS	License type	Main purpose	Key features	Typical areas of application
1	2	3	4	5	6
1	ArcGIS (Esri)	Commercial	Professional multi-level GIS	Analysis, 3D modeling, web maps, databases	Territorial management, ecology, transport, defense
2	QGIS (Quantum GIS)	Open source software	Universal desktop GIS	Spatial analysis, plugins, database integration	Education, science, municipalities
3	Google Earth / Pro	Open source software	Satellite data visualization	3D Earth viewing, object drawing, measurement	Educational, demonstration, analytical purposes
4	MapInfo Professional	Commercial	Desktop GIS for organizations	Spatial analysis, working with large data sets	Urban planning, municipal services

Continuation of Table 1.

1	2	3	4	5	6
5	GeoServer	Open source software	GIS server platform	Geodata publishing (WMS, WFS), PostGIS support	WebGIS, state geoportals
6	GRASS GIS	Open source software	Scientific analytical GIS	Terrain modeling, hydrology, time series	Ecology, scientific research
7	ERDAS IMAGINE	Commercial	Satellite image processing	Classification, decoding, image analysis	Remote sensing, geodesy, defense
8	Global Mapper	Commercial	Engineering and topographic GIS	3D work, terrain analysis, GPS compatibility	Geodesy, topography, military projects
9	OpenStreetMap (OSM)	Open source software	Open geodatabase	Collective map updates, export to various formats	Education, navigation, web applications
10	Mapbox / Leaflet	Open kernel (with commercial services)	WebGIS platforms	Creating interactive online maps, API, design	Web development, mobile applications

«Open source software» – means free to use, modify, and distribute.

«Commercial» - requires a paid license or subscription.

All of the above systems support spatial coordinates, layers, databases, and import of geofomats (SHP, GeoJSON, KML, TIFF, etc.).

Commercial platforms usually have a more convenient and intuitive interface and advanced functionality: the ability to integrate with corporate databases, analytics, machine learning, etc.

Due to their accessibility and the ability to customize to the corporate needs of the State Emergency Service, free geoinformation platforms have become widely used in the activities of fire and rescue units.

The Ventusky [1] geoinformation platforms (in particular, the page with weather, wave, and meteorological data) Fig.1, and NASA FIRMS [2] Fig.2 are web geoinformation systems (webGIS) that display spatially coordinated data (a geographic map with layers of weather, waves, wind, clouds, etc.), thermal anomalies, and active fires in real time Fig.1.

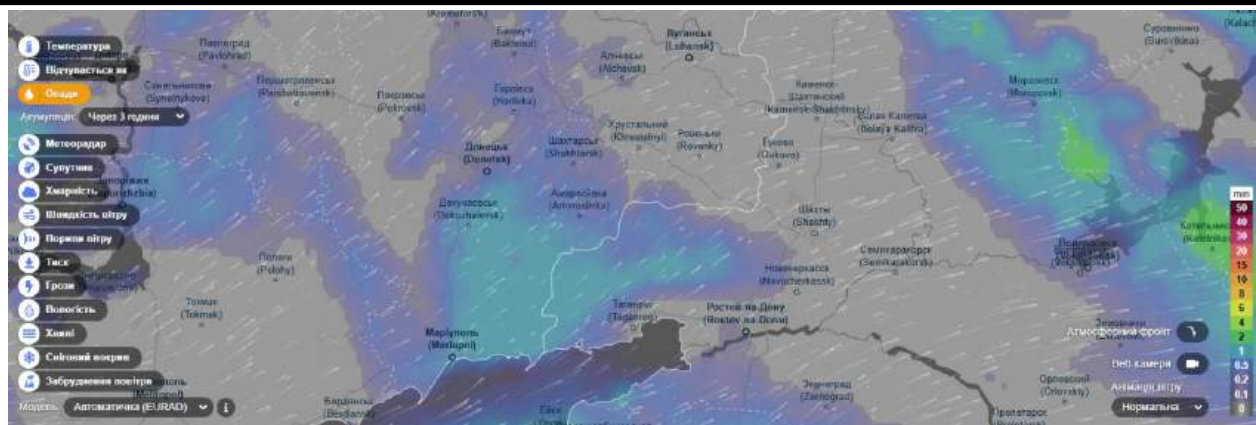


Figure 1. Ventusky platform interface display.

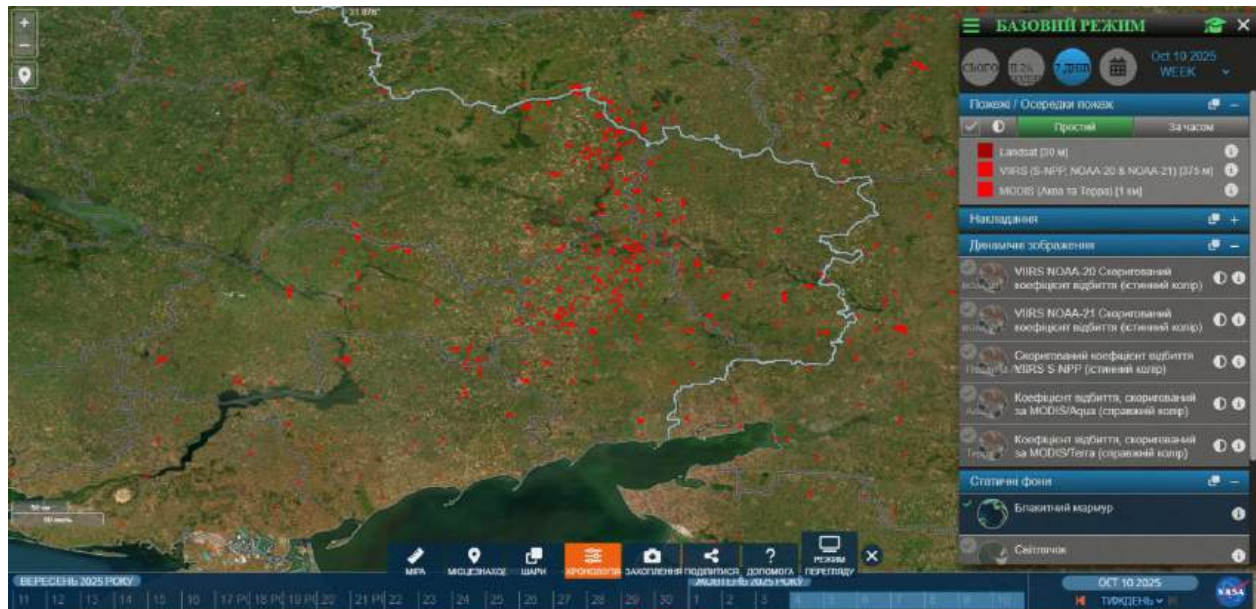


Figure 2. NASA FIRMS platform interface display.

The combination of these data with geographic data can be used to predict the possible direction and scale of fire/chemical cloud development and ensure the concentration of sufficient forces and resources for fire elimination/emergency localization.

The Google Earth / Pro [3] geoinformation platform makes it possible to display the necessary information and situational data (with the ability to draw your own objects) obtained from the Ventusky, NASA FIRMS platforms and other ways of obtaining information via an electronic map Fig.3.

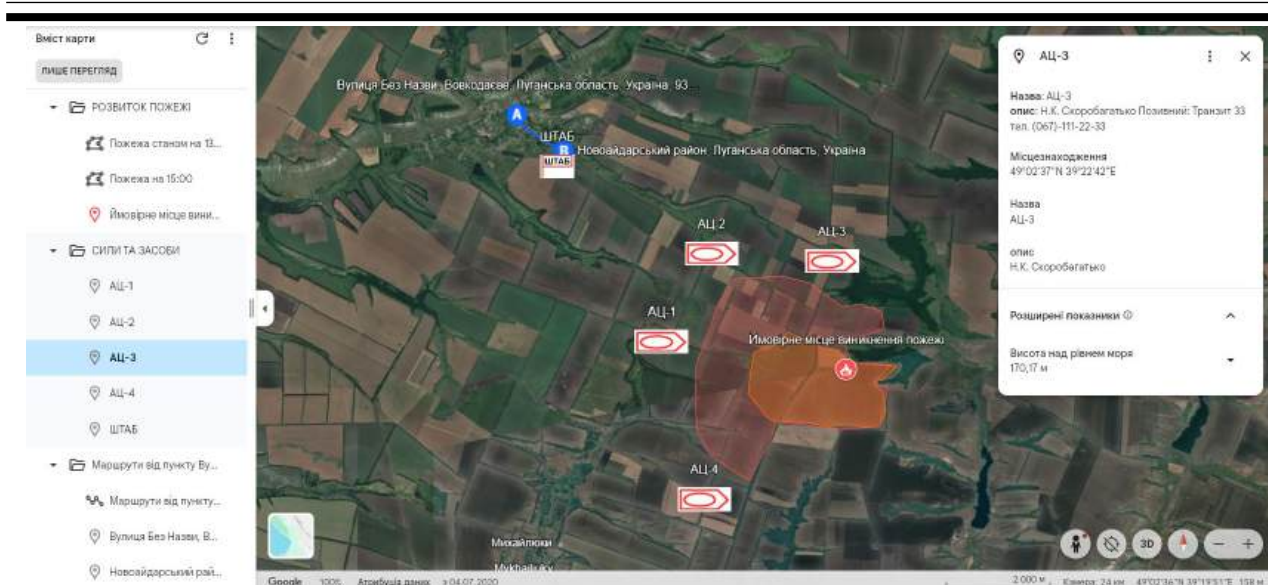


Figure 3. Display of the Google Earth/Pro platform interface.

The key parameters of using such platforms are the ability to exchange information between firefighting participants online, mapping the locations of equipment by coordinates, planning routes, etc. This ensures situational awareness of all firefighting participants.

The achieved situational awareness allows for timely and well-founded, and if necessary, critical decisions, using the full potential of modern geoinformation technologies.

References

1. Ventusky - Weather Forecast, Radar and Wind Maps. URL: <https://www.ventusky.com>
2. Fire Information for Resource Management System. URL: <https://firms.modaps.eosdis.nasa.gov/map>
3. Google Earth / Pro URL: <https://earth.google.com/web/>

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Contact details of the organizing committee:
Sole Proprietor Viktoriia Tsiundyk
E-mail: info@isu-conference.com
URL: <https://isu-conference.com/>

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