



Decision support system on radioactive consequences of wildfires in Chernobyl exclusion zone (Belarus)

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1. INTRODUCTION

Among natural emergencies, forest fires are one of the most harmful disasters. It is on a special interest for Belarus because of radioactive contamination. After Chernobyl nuclear power plant accident more than 1.7 million hectares of forested areas became contaminated by the long-lived radionuclides. Resuspension of long-lived radionuclides with smoke aerosols during biomass burning can cause additional internal exposure for people in the area of fire. It also cause a big social and psychological stress.

According to the Regional Eastern European Fire Monitoring Center (REEFMC), between 1993 and 2013 over 1147 natural fires has occurred at the territory of the Chernobyl exclusion zone (CEZ) (Zibtsev, 2015, Evangelidou et al, 2015). At the territory of Belarusian part of the CEZ over the period 1996-2015 about 263 of forest fires has occurred.

AIM OF THE RESEARCH

The overall aim of the current research is to develop a special decision supporting system (DSS) based on the experimental data of long-lived radionuclides behavior in the air during forest fires, spatial information on fire risks and exposure dose prediction.

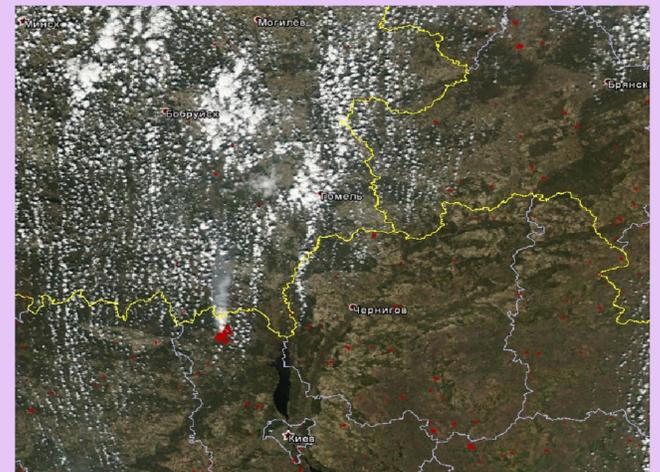


Fig 1. Example of trans boundary effect of forest fire in the CEZ

2. MATERIALS AND METHODS

The methodology is based on experimental data on long-lived radionuclides release during forest fires, mapping and modelling. It is also includes a programming methods (Dvornik et al, 2017).

The DSS is a decision supporting system called Forest Fire GIS Application. It is based on the MapWinGIS - a free and open source geographic information system programming ActiveX Control and application programmer interface (API) that can be added to a Windows Form in Visual Basic, C#, Delphi, or other languages that support ActiveX. To build Forest Fire application we used Borland Delphi environment.

The level of forest fire hazard in Republic of Belarus is estimated by scale based on weather conditions. The scale includes five classes, where the first class is the most dangerous. We used forest fire hazard scale to estimated fire risks at contaminated areas.

3. RESULTS

The software complex Forest Fire GIS App allows to calculate the risk of fires in contaminated areas, the parameters of radionuclide transfer with smoke aerosols, additional exposure doses for firefighters and for population. Visualization of the results occurs using the GIS module MapWinGis (Fig.2). For the moment DSS Forest Fire GIS App performed by a demo version installation package for Windows OS (Fig.3)

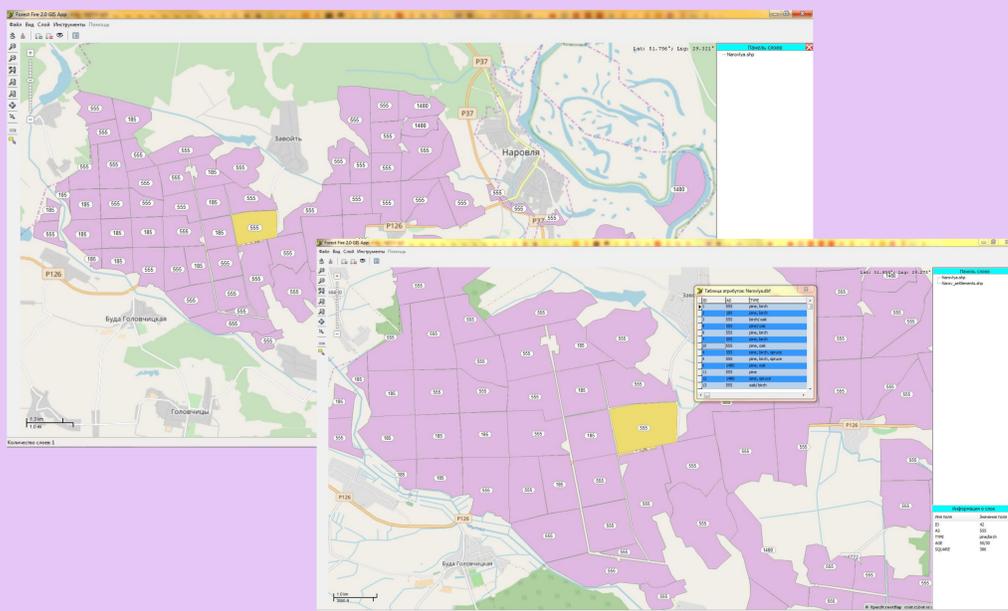


Fig 2. Example of DSS working space



Fig 3. General view of Forest Fire 2.0 GIS App

4. CONCLUSIONS

- DSS is a tool for all responsible authorities to reduce amount of wildfires at contaminated areas, and consequently, reduce a risks of additional internal exposure for firefighters, social and physiological stress.
- The Forest Fire DSS is integrate all available spatial information on fire risks, mathematical models of radionuclides migration and exposure dose prediction, and potential threat of fire for nearest infrastructure.
- The system addresses the problem of protection of fire fighters, local population and environment on different implementation levels such as administrative or regional levels.
- The final version of Forest Fire GIS App will available in 2018.

5. REFERENCES

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