

# **APPLICATION OF COSMIC SURVEY FOR ANALYSIS OF NETWORK AUTOMOBILE ROADS CONDITION AND BRIDGE PASSAGE.**

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## **SUMMARY**

Floods are caused by various events such as intensive snow melt in spring, prolonged and heavy showers, ice jams, as well as by destruction of dikes and protection embankments. One of the methods for the study of spring flood course and for the prediction of its possible after-effects is the comparative analysis of the flood course in the current year and in previous ones. A promising method in such an analysis is the examination of optical and radar space images acquired at different moments.

For the solution of different scientific problems connected to designing of automobile roads and bridge passage, the analytical methods with mining of mathematical models are applied, and also the statistical methods, which are grounded on definite overseeing for appropriate phenomena. The most perspective methods of full-scale investigations are methods with usage of a stereophotogrammetry, which connected with further processing of the obtained data on the computer. At designing of roads and bridge passage, and also at examination of these existing buildings, materials of air photography were used earlier. Presently it is offered to apply to this purpose land shooting of the indicated buildings, shooting from motodeltaplan or from easy airplanes. It enables to save appropriate means at realization of reconnaissance works with the purpose of designing of roads and bridge passage and at their examination with the purpose of renovation. Nevertheless necessity of obtaining of the appropriate information on a significant part of a roads network or on all roads network of the state has called to life a new method, namely method of remote sounding of the Earth. The sounding of the Earth from space vehicles allows near to research of global processes and phenomena to decide actual practical problems of a national economy. With this purpose fundamental theory, technique and computer technologies for remote sounding of existing automobile roads and bridge passage be created.

For fulfilment of space shooting the Ukrainian scientists in 1995 carry out start of the first Ukrainian satellite « Sich - 1 ». At the solution of different problems there is a capability to use alongside with materials of shootings from the Ukrainian satellite, as well the space information from other national and international space vehicles, such as SPOT (FRANCE), Landsat TM (USA) [4]. The obtained data can be used for forecasting of scales of flooding (fig.1-3) and installation of a condition of such difficult segments, as bridge passage.

The flooding can be caused different reasons, such as an intensive melting of snow in vernal time, lasting and strong showers, ice blocks, and also ruin of piers and locks. Depending on quantity of water, that expires with water of the area and character of a river valley during flooding the water-level in river mounts on an altitude up to 1-3

m, and sometimes and it is more. Deterioration of quality of water during floodings is stipulated both ruin of a coast band, and wash off with flooding territories biological, chemical and radiological contaminations , reallocation silt of bottom sediments.

Using materials of space shooting the measures on warning destruction of artificial features and motorways can be developed also. For this purpose the definition of dynamics of a snow melting , delineation of drainage basins, estimation of ice regime boundaries and dimensioning of a nonfreezing surface of water, delimitation of waterlogging is carried out during a high water, definition of a coast band and level of filling of water storage basins. One of methods of verification of development of vernal flooding and forecasting of its possible consequences is the comparative analysis of development of flooding in the current year in comparison to the previous years. The works of such level are executed usually with the help of a software package ERDAS IMAGINE 8.4.

With the help of space shooting becomes possible to evaluate a condition, both one automobile road, and all network of roads, to establish segments with a unsatisfactory condition of road clothing, with poor visibility and with geometric primitives, which do not meet the requirements of automobile transport.

With the help of remote sounding of the Earth there is to the possible solution of hydraulic problems, namely estimation of a ecology-sanitarian river condition, a detection of places of an output of sewage waters, research of processes of erosion and abrasion, shifts and fluid washes of shores, installation of accumulation of depositions at the river bottom, dynamics of rearrangement of sites of a river channel and shallow; dehumidifying and swamping of a channel .

It is possible to establish a condition of an earthen cloth of a road and condition of slopings, in particular it concerns high banks and steep extractions and availability of shifts of slopes. With the help of materials of space shooting is possible in detail to evaluate such global process as process of derivation of ravines, and also efficiency of measures on preventing derivation of ravines and to establish hazard of derivation of ravines for a network of roads [2].

With the help of space shooting becomes possible to evaluate conditions of motion, both on separate segments of roads, and on all network of roads. It is possible to receive for very short period of time a motion pattern on all network of country, to establish so-called «gorges», where queues of automobiles are derivated, to define parameters of a transport flow, among which easy for definition are density and running speed. Using relation

$$N = gV,$$

Where  $N$  - traffic density, automobiles / hour;  $g$  - density of motion, automobile / km,  $V$ - a running speed, km/h, becomes possible to establish traffic density with capacity, it is possible to define a link of a road network, which does not satisfy the conditions motion and is reason of an accident rate, that is reason of its necessary repair or renovation. Using the data of space shooting of a network of roads, becomes possible to execute regulation by motion, rationally arranging it on the not loaded bands of roads network . The space shooting of a network of roads can be used for a state

estimation of roads network not one countries, and several countries and their matching.

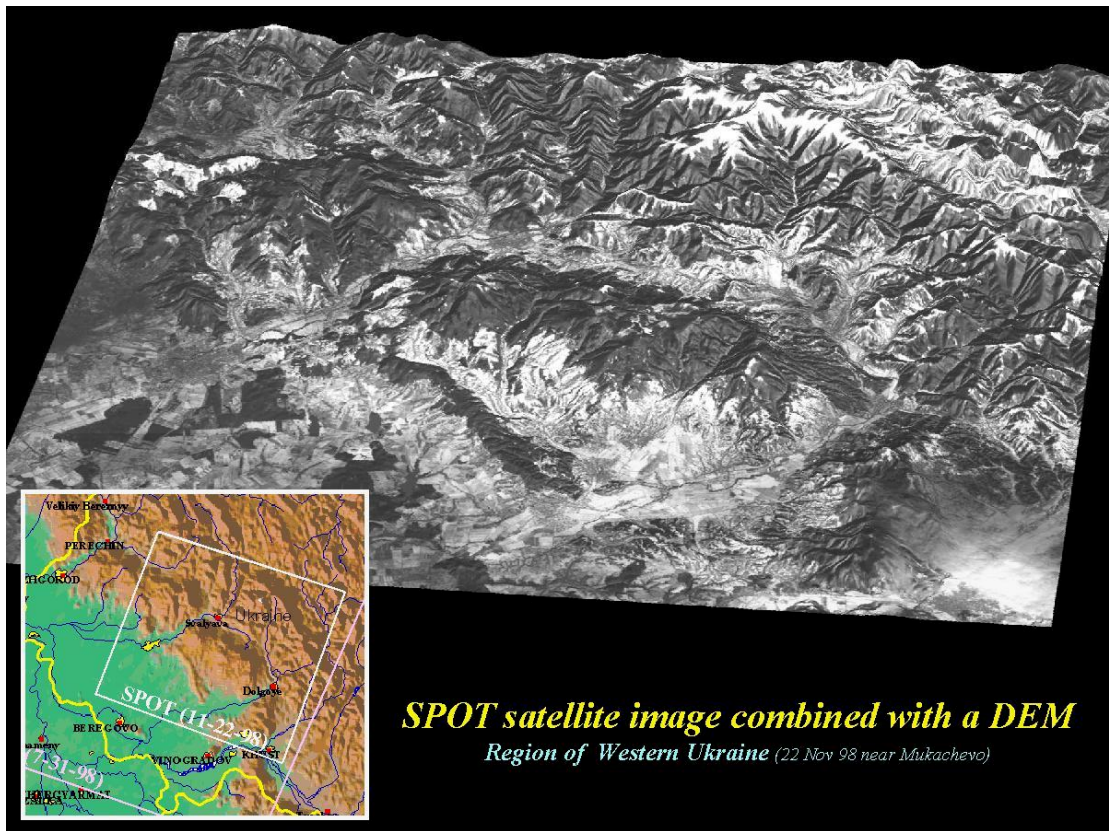
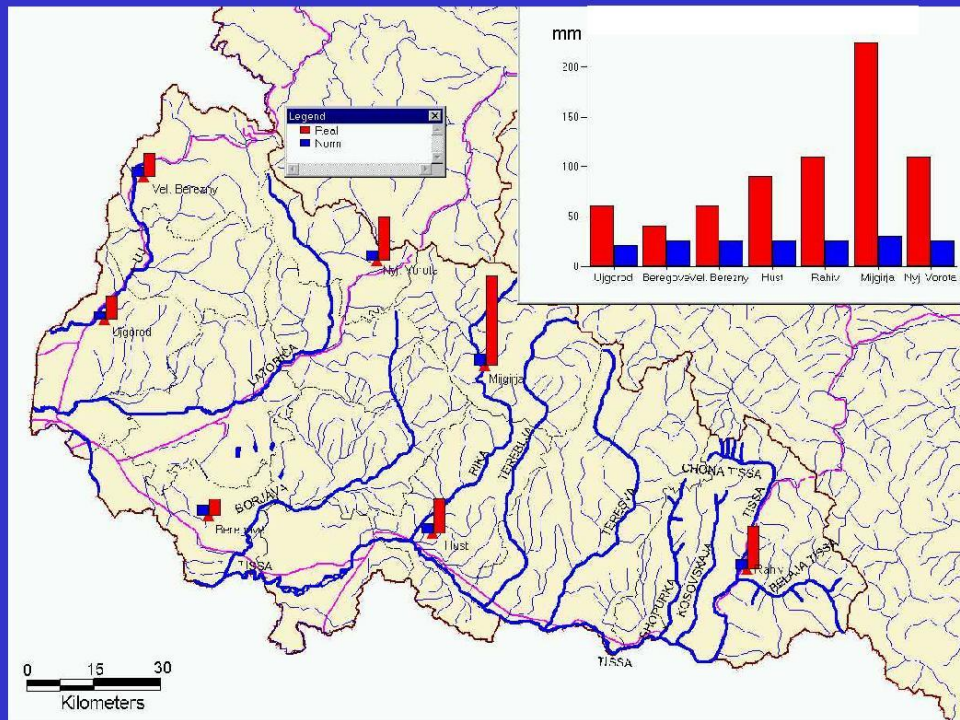
The materials of space shooting, computer processing of the space information allow to evaluate also transport-operational parameters of a road, among which there is such important parameter, as availability of visibility on roundings and which influence safety of motion. The shooting from space of roads network at one o'clock «spike» will enable to exhibit places of road - transport incidents, which have taken place or dangerous parts of the road, where there can be road - transport incidents . Using these data can be working out cardinal measures improvement of safety of motion on all network of roads [2].

For the solution of the indicated problems with the help of space shooting the Memorandum of mutual understanding between the science officers and industrial workers was signed with the purpose of acceleration of an intrusion of outcomes of sounding of a surface of the Earth on Ukraine territory in practice of roads and bridge construction and in practice of improvement of road motion organization .

## **REFERENCES**

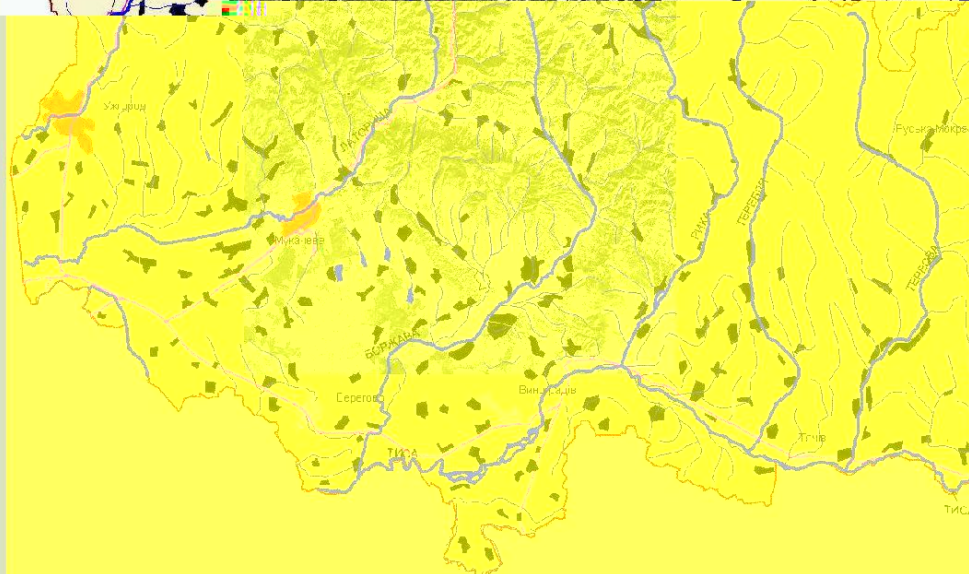
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The sum of rainfall during first 10 days of November 1998 year on meteorological stations in Zakarpattia

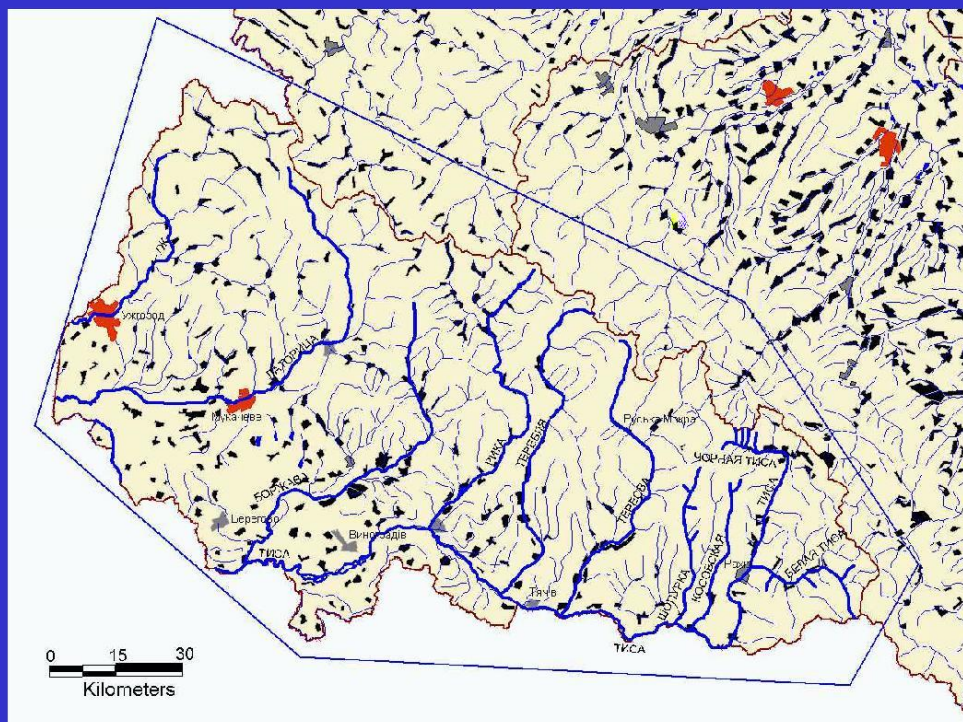




Available SPOT image (22 November 1998 year)



Rivers where flood was occurred



0 15 30  
Kilometers