Flight Experiment on the Interaction of Piloted and Unmanned Fixed-Wing Aircraft and Rotorcraft for Aviation Search-and-Rescue Tasks

Alferyevo air base of MAI,

October 13-16, 2014

Goal of the experiment

- ascertaining the unmanned aviation use for search-and-rescue works;
- exercise of the interaction of piloted and unmanned aviation, ground forces and search-and-rescue means in the performance of aerospace search-and-rescue works;
- exercise of the search task transmittance to the input of the system which controls joint performance of search-and-rescue works by piloted and unmanned aviation on ADS-B technologies basis;
- demonstration of the possibility to perform search-and-rescue works with the use of ADS-D mode 4 placed on ground objects, aircraft, UA-C, UA-B for provision of flight safety in common airspace, interaction of attracted forces and means in the search area.

ADS-B – basis of forces and means interaction in the search area

- ADS-B is one of basic CNS/ATM technologies.
- Ministry of Transportation (MinTrans) of Russia has approved *Program of ADS-B Implementation* (May 19, 2011), one of final results of which is the raising of search-and rescue operations efficiency.
- VDL Mode 4 is a datalink supporting ADS-B work in «In» and «Out» formats, implementation of adjacent FIS-B, TIS-B, A-SMGCS, DGNSS functions, execution of search-and rescue works.
- Performed by FGUP “GosNIIAS” researches and flight experiments (at Siverskoye airdrome in 2011, at Lytkino airdrome in 2014) have confirmed the ability of VDL mode 4 and based on it adjacent applications to provide for the efficient control of aircraft and UA flights in common airspace.

Participants of the experiment

- FGUP GosNIIAS – development and implementation of scientific research and experimental search-and-rescue works with the help of ADS-B VDL-4);
- MAI (Moscow Aviation Institute) – UA of rotorcraft type as a part of VORON UAS; An-2 airplane, Alferyevo air base;
- AFM-Servers LLT – UA of fixed-wing type as a part of PTERO UAS;
- Pallada LLT – Poyisk system software.

Alferyevo air base of MAI
Search area

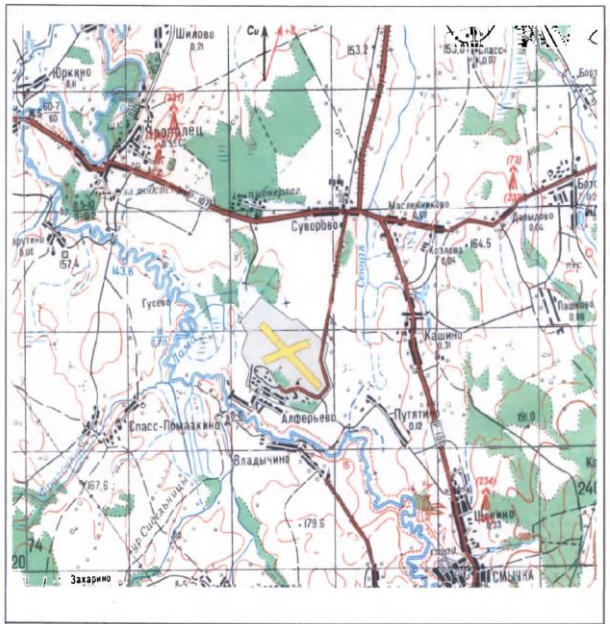
КАРТА АЭРОДРОМА

Приложение №9-

АЭРОДРОМ «Взор» - УТП 125.000 «Амазар» - 124.000

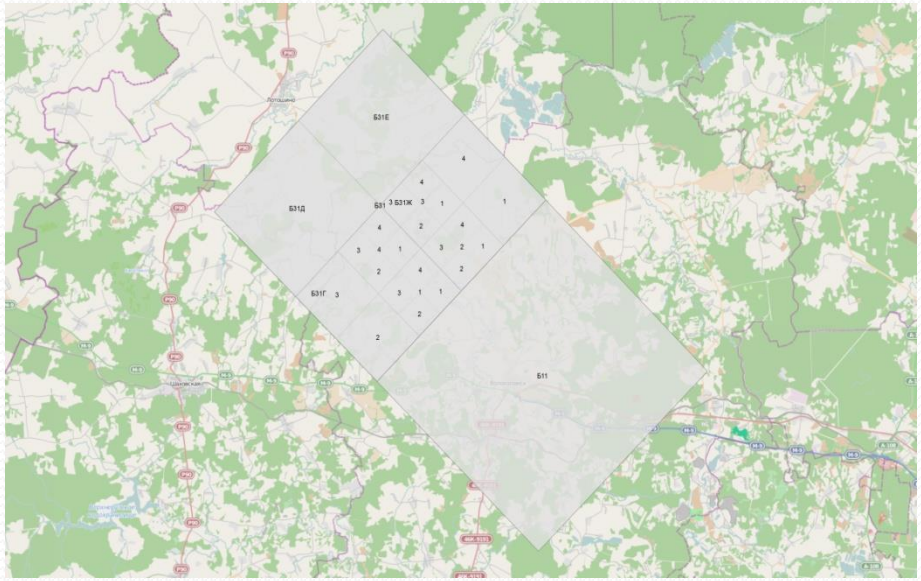
ЬУОА класс четвертый КТА: с560600 в0355200

АЛФЕРЬЕВО Назр.=+160 м.



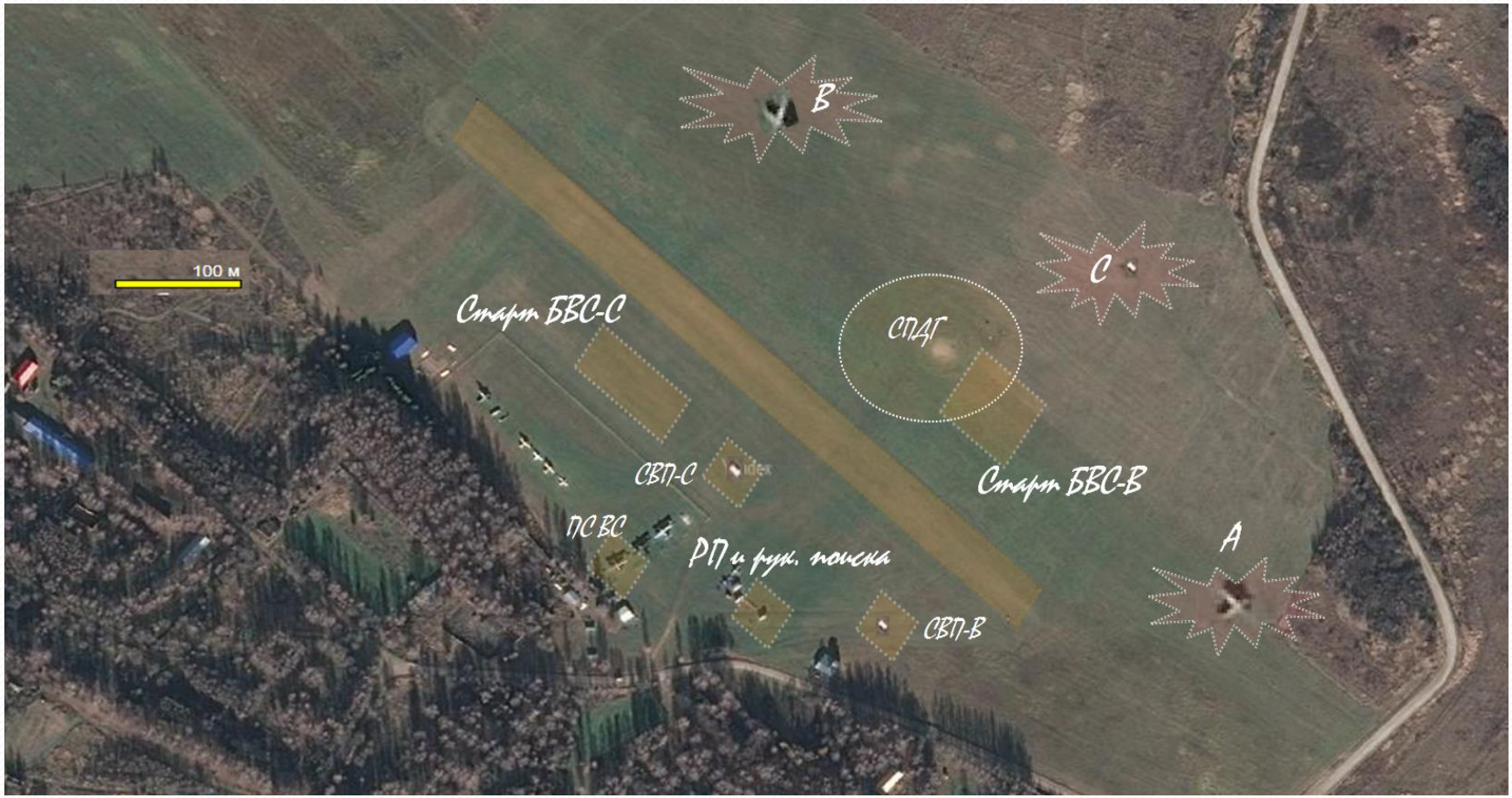
ПП	Светооборудование, маркировка	Располагаемые дистанции (м)			
		РДР	РДВ	РДПВ	РПД
ГВПП 31-13	Маркировка дневная, стандартная	1150	1850	1850	1600
ГВПП 25-07		600	800	550	650

Минимумы для взлета							
Категория ВС		ГВПП 31-13			ГВПП 25-07		
		с огнями оси ВПП	без огней оси ВПП		с огнями оси ВПП	без огней оси ВПП	
			день	ночь		день	ночь
«А»	самолеты	–	«А», «В»	–	–	«А»	–
	вертолеты	–	«А», «В»	–	–	«А»	–



Scheme of forces and means interaction during the experiment

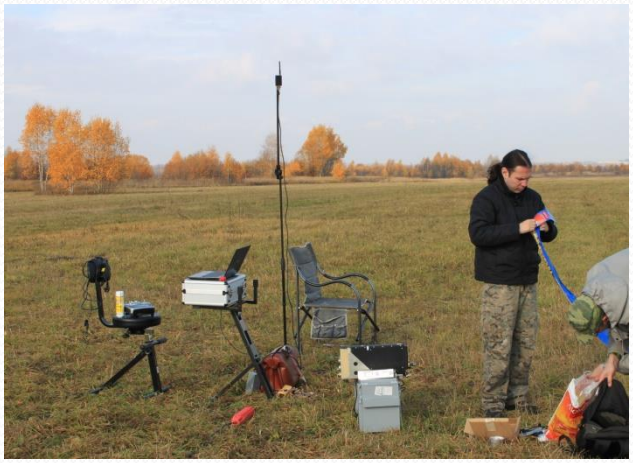
Deployment of forces and means at Alferyevo air base of MAI



Joint station of flights and searches control

Search-and-rescue aircraft – MAI An-2 airplane equipped with ADS-B

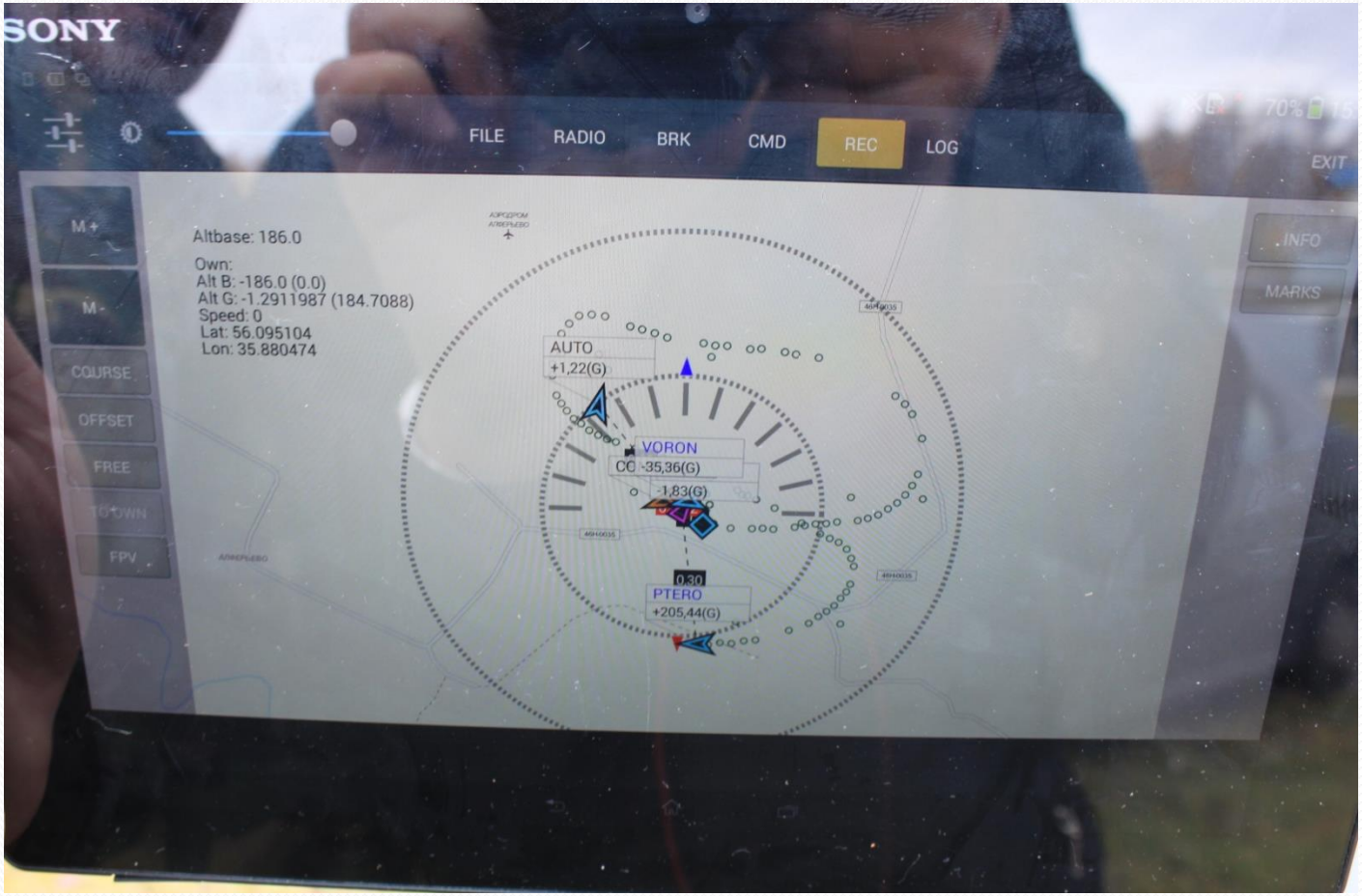
Searching UAS-B based on Voron UA-B



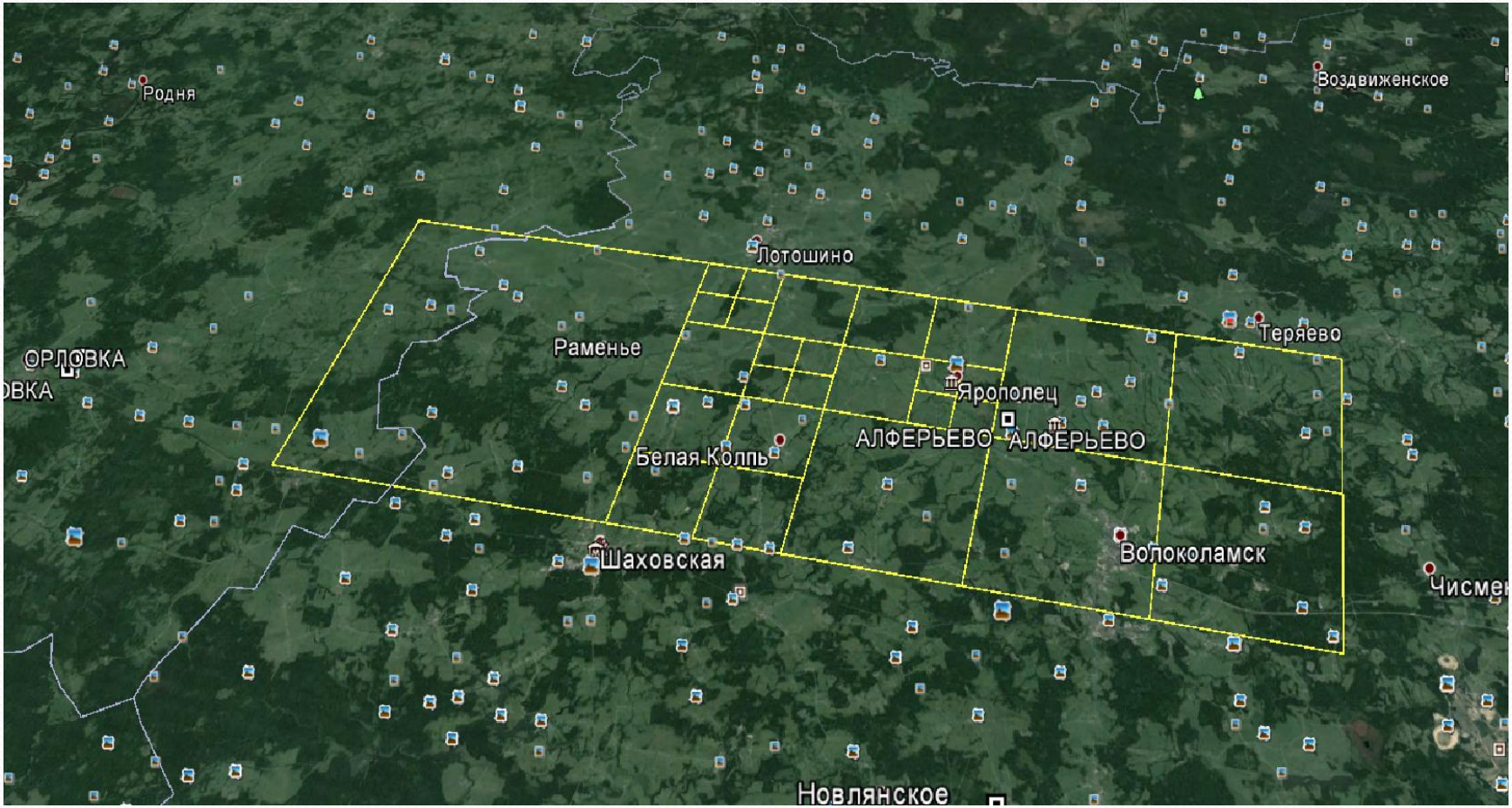
ADS-B display on the tablet of Voron UA-B pilot-in-command

Searching UAS-C based on Ptero UA-C

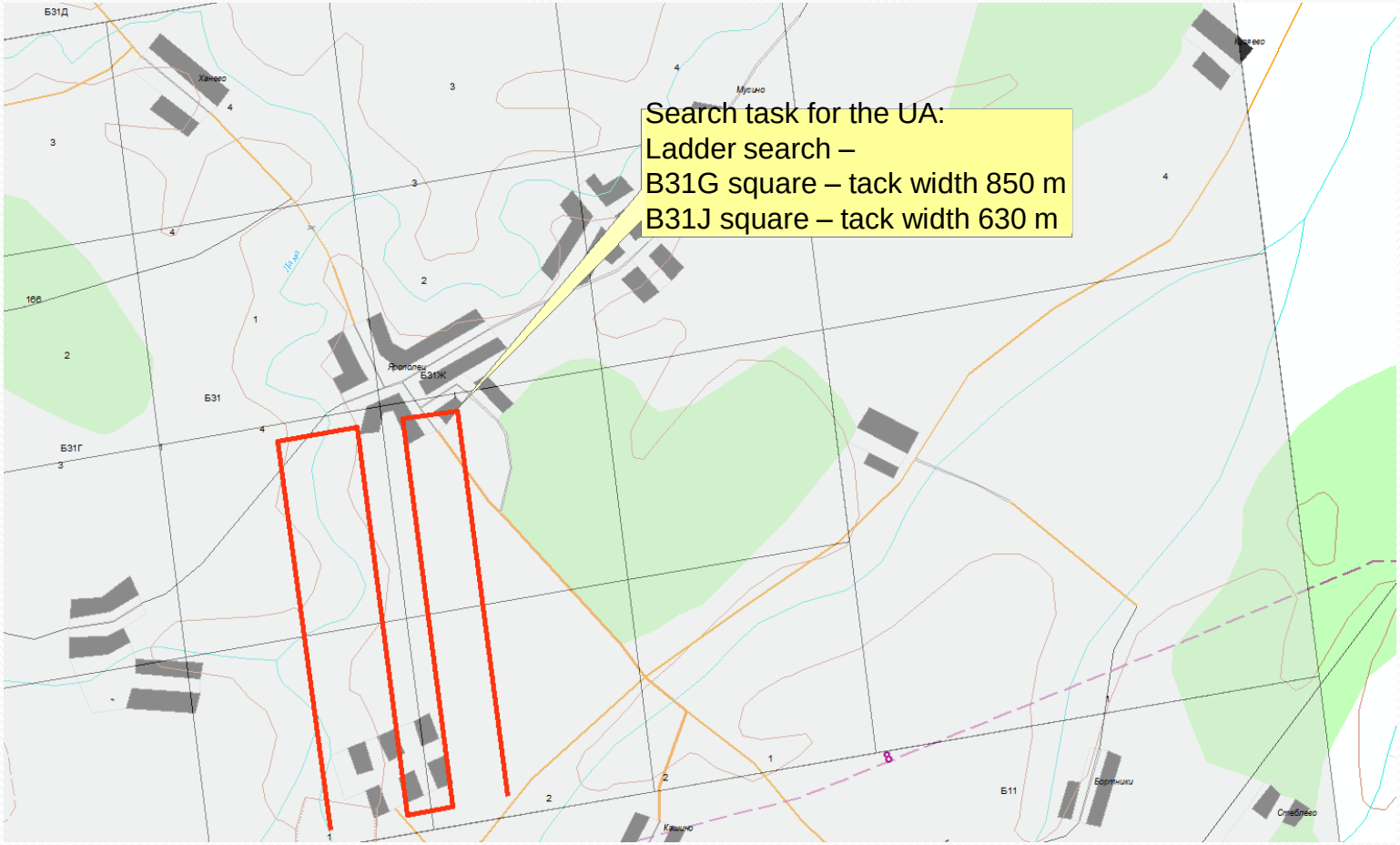
ADS-B display on the tablet of Ptero UA-C pilot-in-command



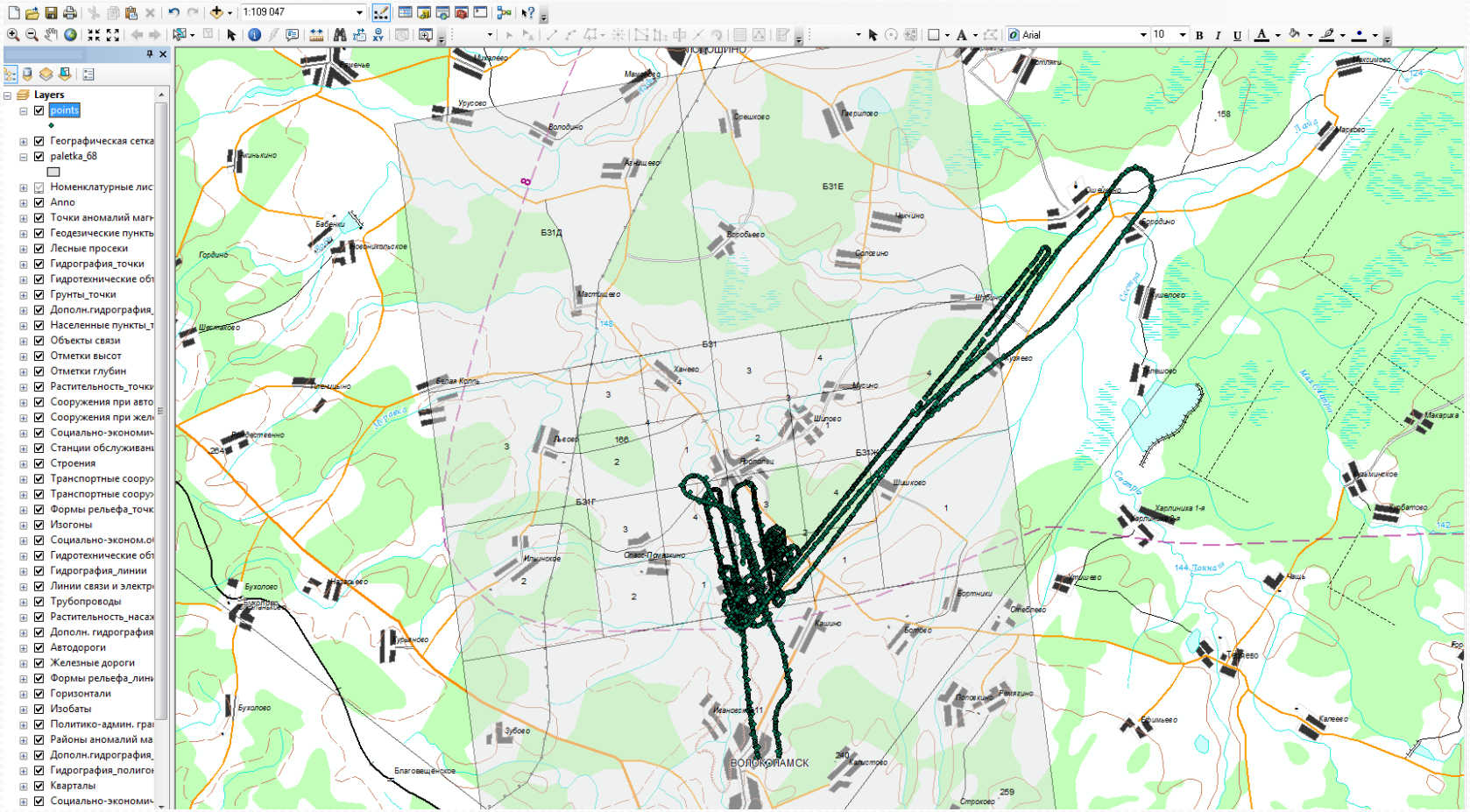
Search area and pallet for search works defined in Poyisk system



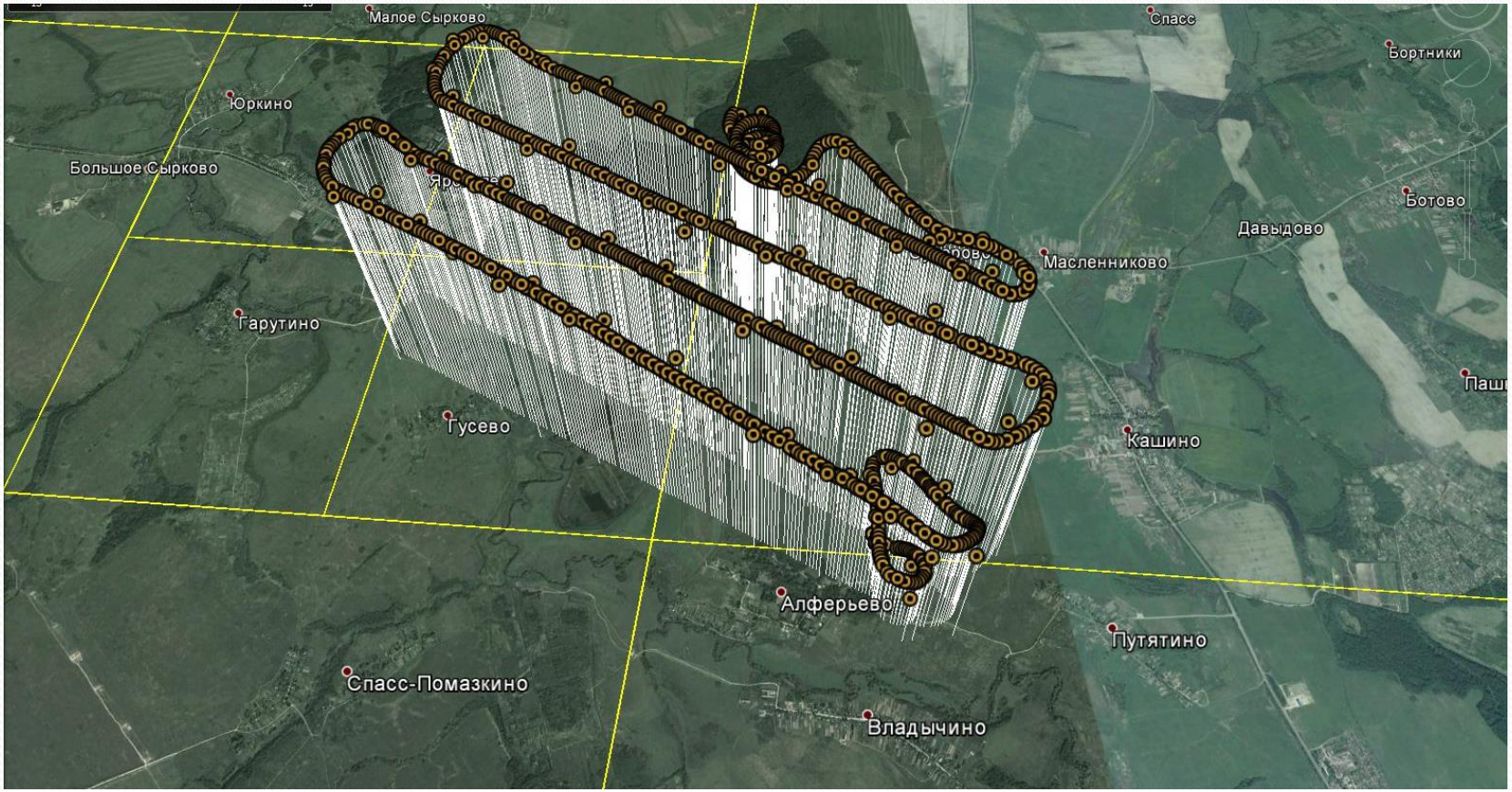
Search task for Ptero UA, the scheme is created in Poyisk system



Ptero UA-C tracks while performing the search task of Poyisk system



Ptero UA-C flight track on the results of ADS-B log-files processing



ADS-B display at the workplace of the flight operations director

Videodata from Ptero UA-C and Voron UA-B at the workplace of the search leader

Drop of a medical kit from Voron UA-B at the place of found object of search

Leader of the search-and-rescue team with a portable ADS-B set

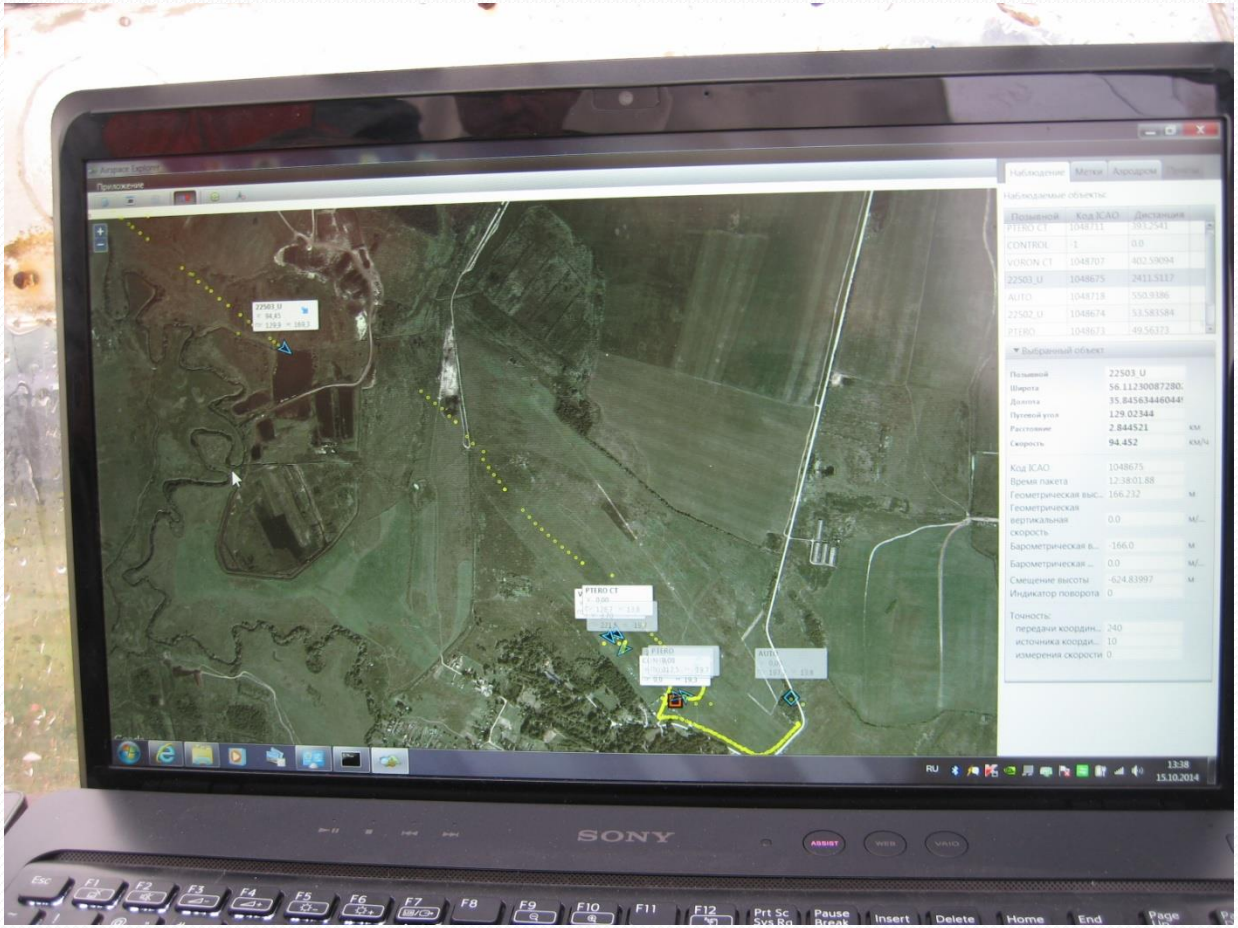
An-2 airplane take-off and dropping the search-and-rescue team at the found place of aircraft crash

ADS-B display on the tablet of An-2 pilot


FILE
RADIO
BRK
CMD
REC
LOG
EXIT
12:19
M+
M-
COURSE
CENTER
FREE
TO OWN
FPV
INFO
MARKS
AUTO
CONTROL
SAMSUNG

Scene 2. Object of search – Barguzin car simulating an aircraft with ADS-B and aircrew in emergency situation

Ptero UA-C flight to the point of aircraft crash transmitted by flight operations director (loss of ADS-B mark)



Ptero UA-C overflight above the crash area with remote transfer of videodata

Track of Barguzin car movement and Ptero and Voron UAs flights

Ptero UA-C videodata at the workplace of the search leader

Results of the flight experiment

- The experiment allowed to practice problems of the interaction of piloted and unmanned aviation, ground forces and means attracted to the solution of aerospace search-and-rescue tasks.

- The experiment demonstrated the possibility to use ADS-B for safe execution of flights in common airspace, provision of forces and means interaction in the search area.


СПАСИБО ЗА ВНИМАНИЕ!