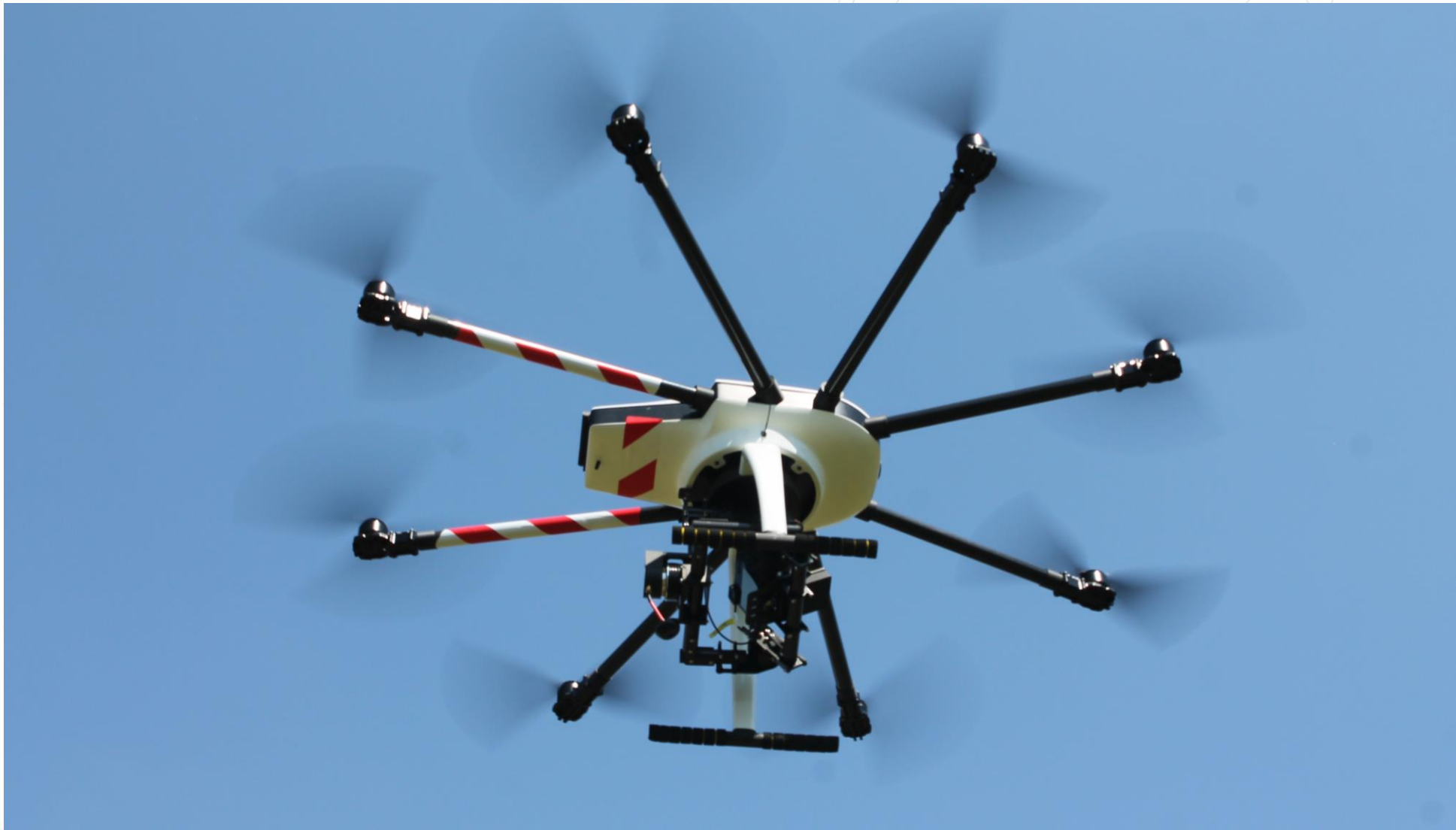
CIVIL AVIATION SAFETY INVESTIGATION AND ANALYSIS CENTER (CIAS)

Investigative Technologies and Techniques

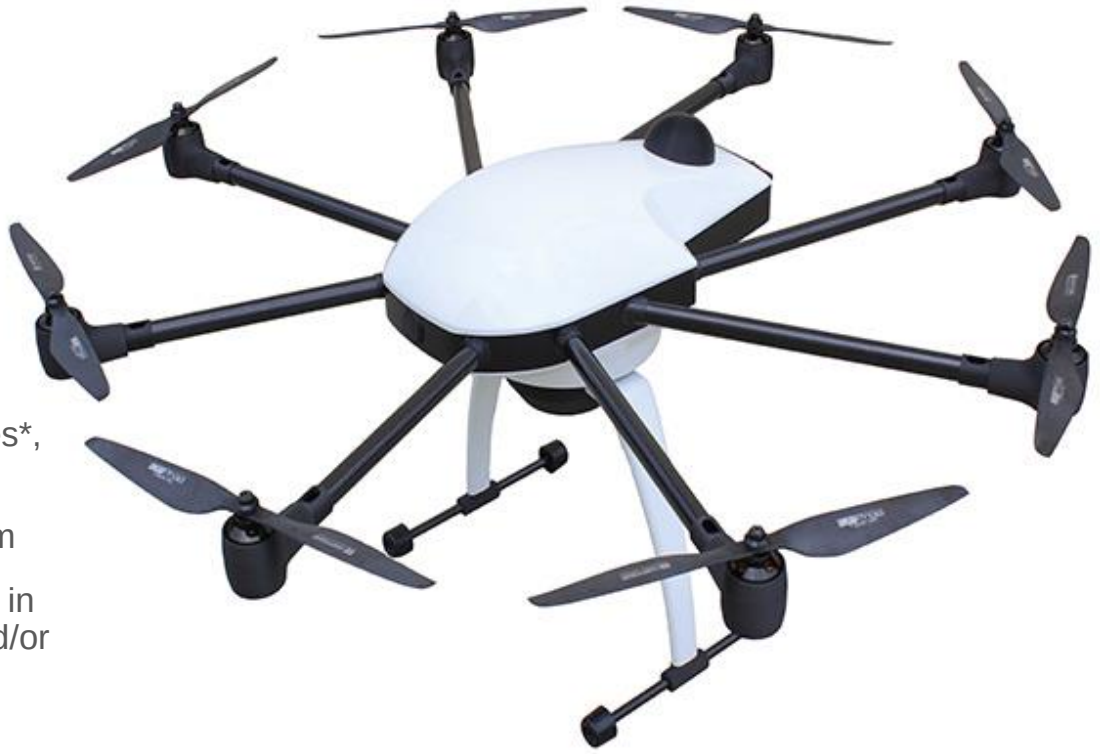
Using Drones In Accident Investigation (Aerial Photography)

Drone used in accident investigation



Technical specifications and performance

- Flat 8 motor configuration
- Size between rotors: 115 cm
- Weight: 4 kg
- Video mount weight: 1000 g
- Battery weight: 2.5 kg
- System weight without video camera: 7.5 kg
- Flight time to a weight of 8 kg: about 40 minutes*, witth a 22000 mAh battery
- Standard range of radiocommunication: 4000 m
- All weather multirotor system: capable of flying in all weather conditions (including rain, snow and/or strong wind)
- Operating temperature: -10 to +45
- GPS maximum accuracy on X-Y: under 1 m

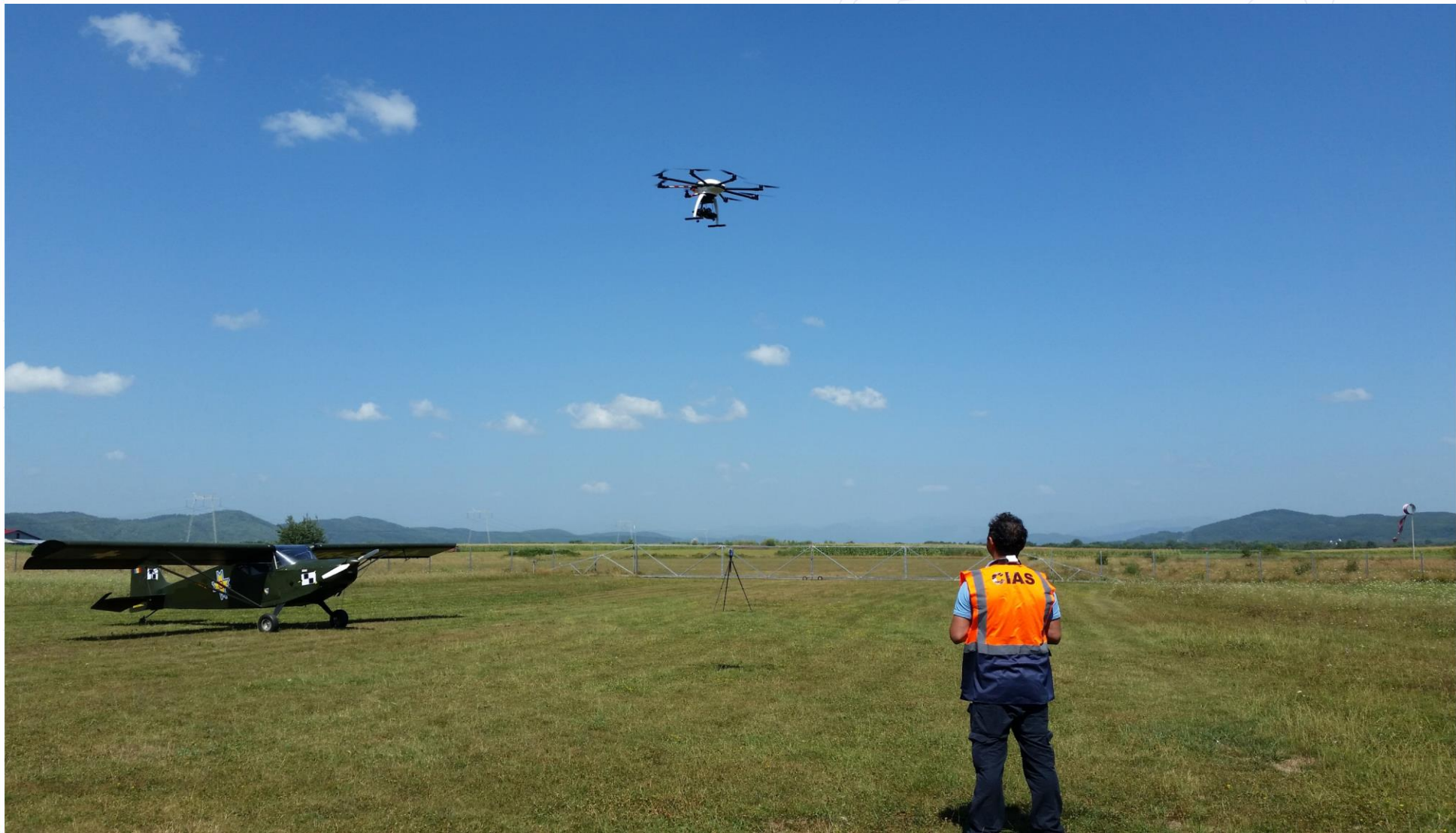


** Flight time can be influenced by weather, wind etc.*

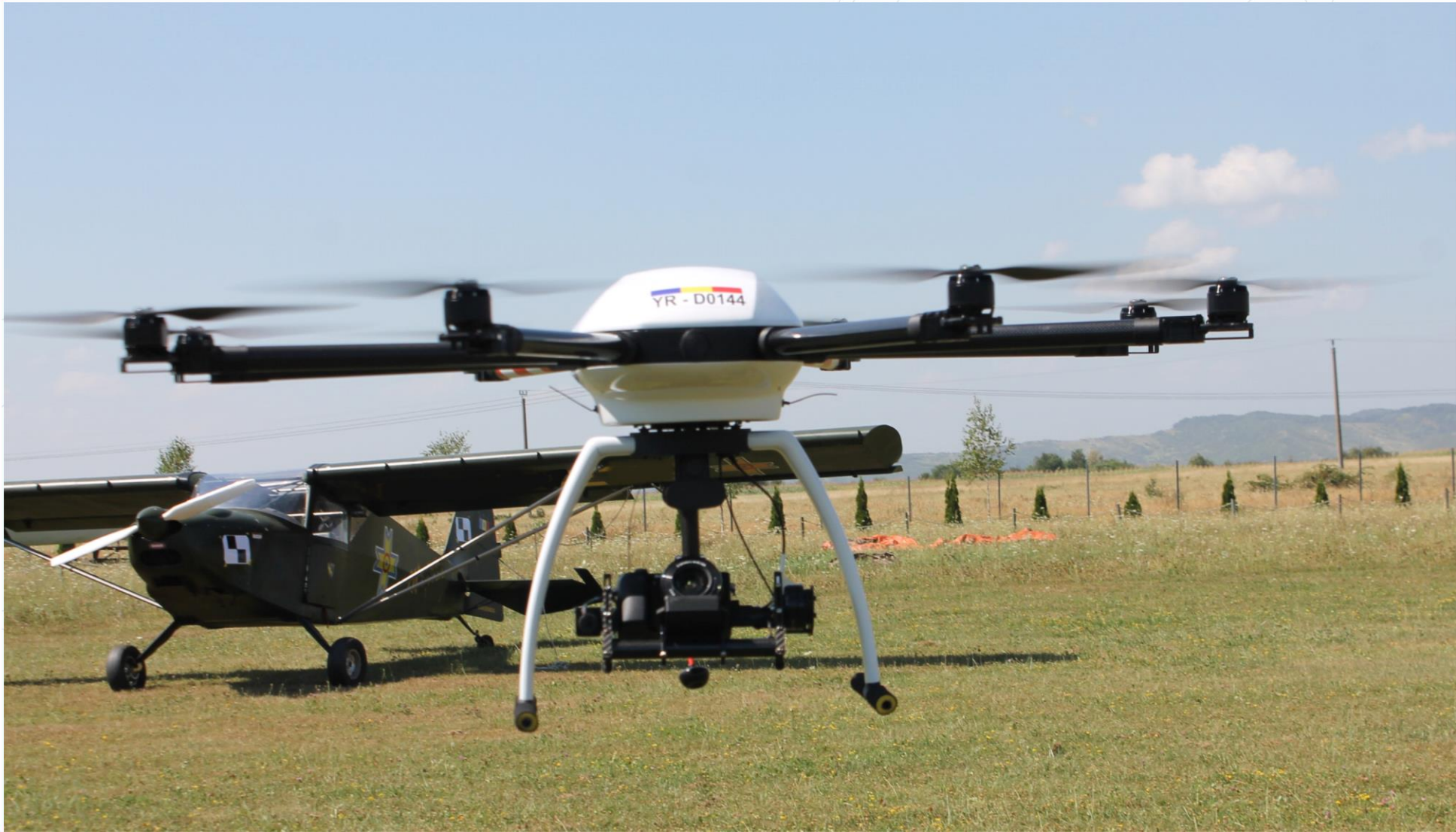
Main functions

- All-weather UAV platform
- Automatic flight stabilization
- Automatic flight altitude control
- Flight to fixed point, GPS automatically assisted
- Automatically return to the take-off point
- Redundancy in the event of failure of one of the engines (the flight platform continues to operate even without 2 of the engines)
- Redundancy in case of failure of one of the regulators that control the motors
- Redundancy in case of failure of the main flight management unit (autopilot). In this situation, the flight is automatically transferred to the secondary autopilot unit
- Redundancy against battery failure (limiting situations due to failure of one of the cells in the battery)
- Automatic navigation based on predefined GPS points
- Data transmission by telemetry on height, compass head, ascending speed, engine temperature (individually for each of the 8), battery level, instantaneous consumption value etc.
- Automatic take-off and landing
- Flight Simplified (When activating this mode, the pilot's controls are simplified to correctly target the UAV)
- Independent operation between the UAV pilot and the video mounting operator

CIAS investigator operating the drone



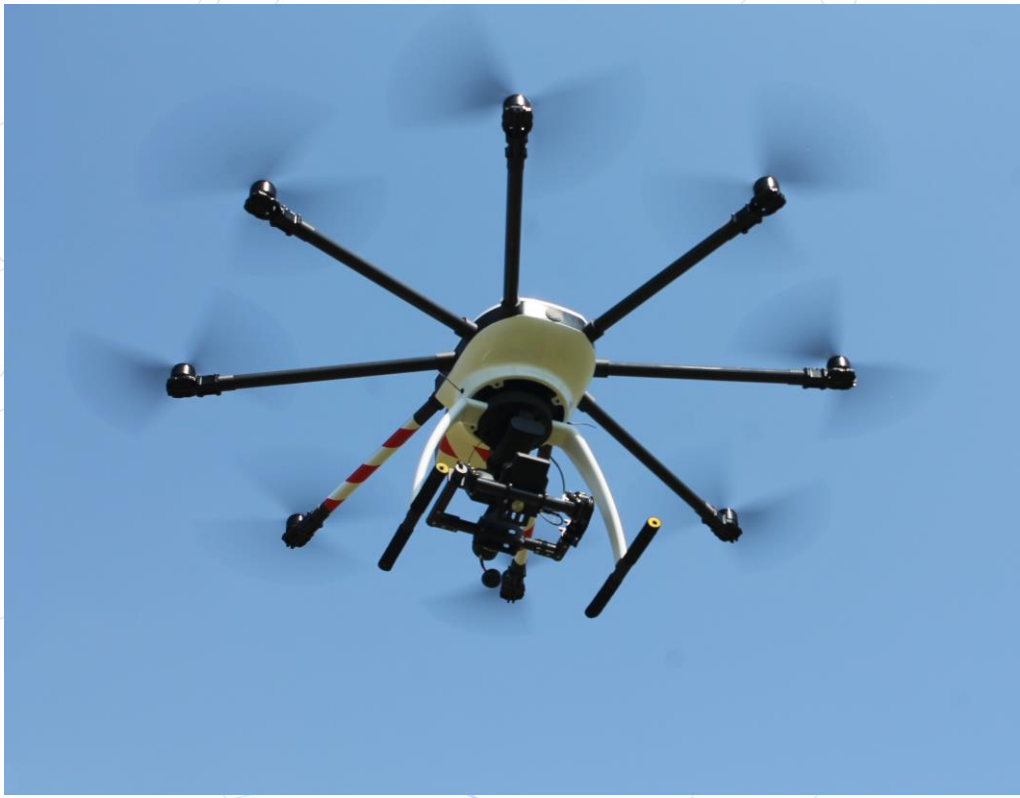
Automatically return to the take-off point, in case of signal loss



Octocopter multi-rotor (1/2)

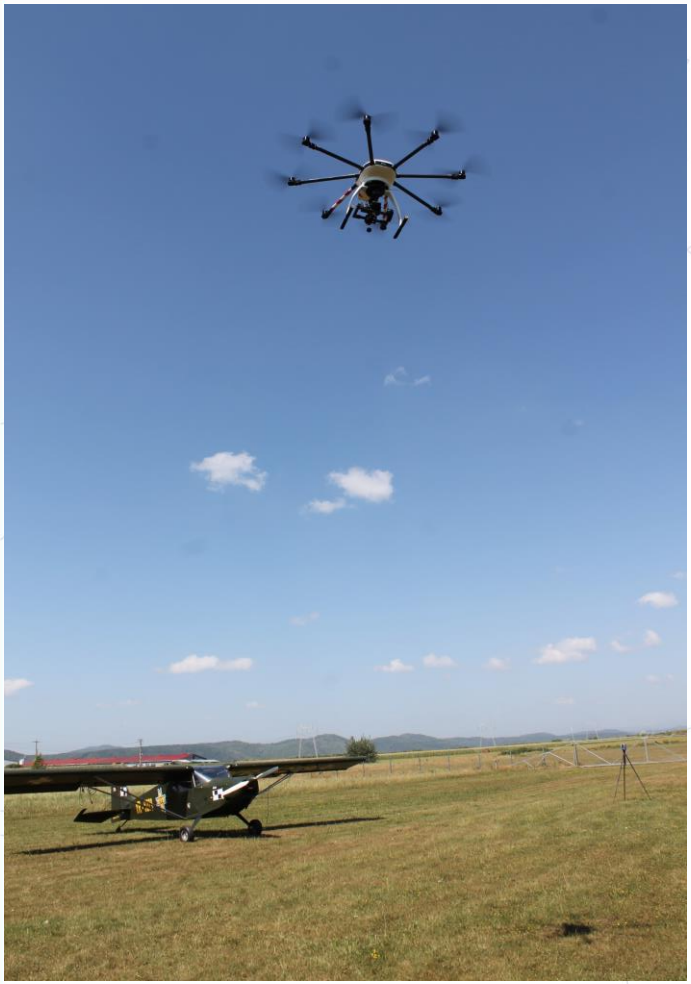
The Octocopter multi-rotor is composed of:

- Carbon frame monocoque
- Carbon arms with removable system and active cooling included
- Flat 8 motor configuration: 8 motors of 400kv, power output of 500w/motor, ceramic bearings
- Mikrokopter V2.5 ME flight controller
- 8 Mikrokopter 60A regulators, double Quadro V3 XL with redundancy
- Mikrokopter navigation system composed of navigation board, GPS, XL GPS antenna
- The navigation system provides 32 autonomous navigation points and a distance of 500 meters for autonomous navigation



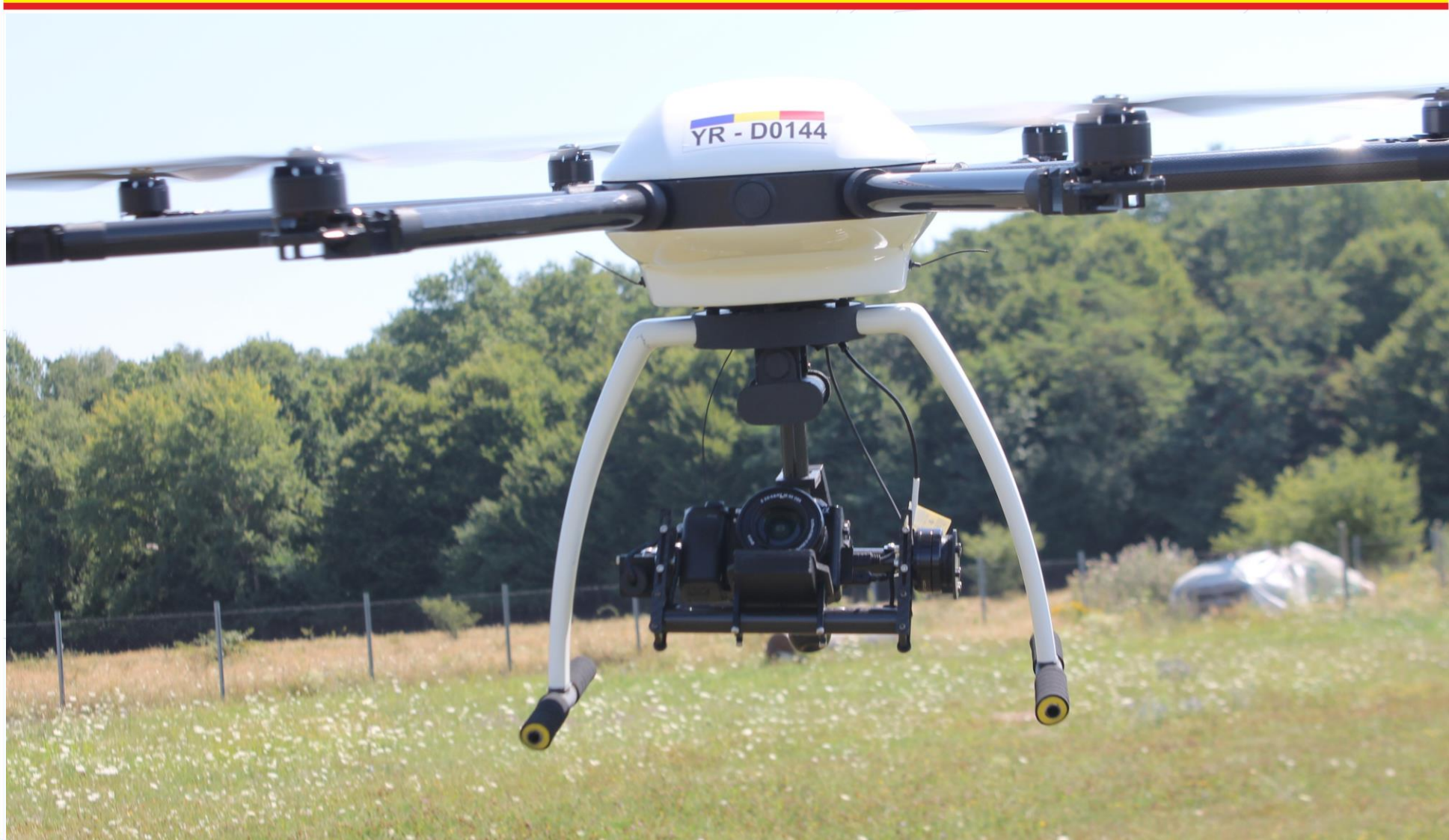
- Downloading flight parameters and georeferenced points at one-second is possible both when autonomous navigation is not enabled but also when activated

Octocopter multi-rotor (2/2)



- Telemetry system that allows real-time viewing of flight parameters, battery consumption, current consumption, distance, altitude, temperature on each ESC, GPS satellites number, compass direction etc.
- “Coming home” and “Fail safe” functions, in case of reception loss
- Possibility to enable “Altitude hold” and “GPS hold” functions, both together and separately
- Redundant system consisting of the second V2.5 ME flight controller and the motherboard binding system
- Anti-vibration system for video mounting included in the carbon monocoque
- Quick release system for fast detachment of the video mount
- Graupner MC 20 radio-control system, consisting of one transmitter and one receiver with 24 channels
- 2 packs of Lithium-Polymer 6S batteries, with a capacity of 22,000 mAh

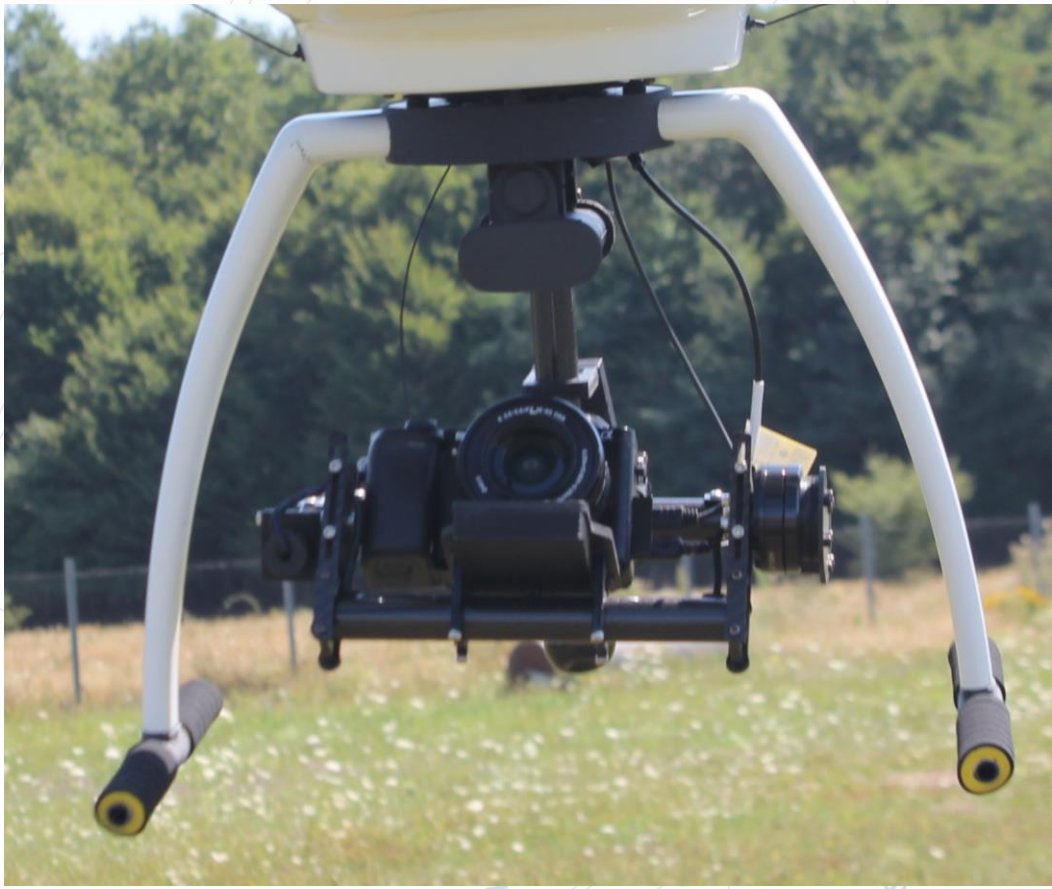
Video instrument case (1/2)



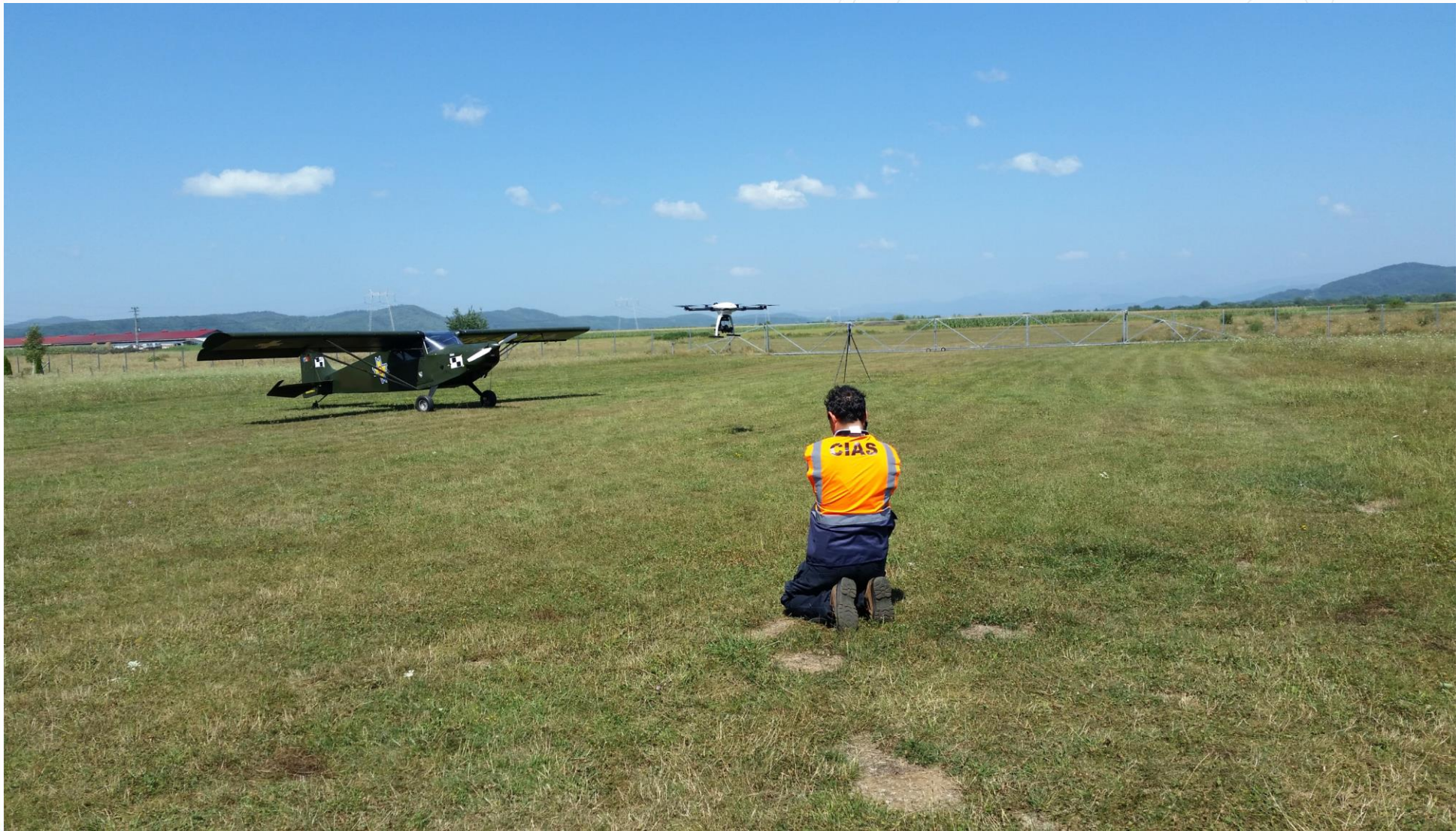
Video instrument case (2/2)

The video instrument case consists of:

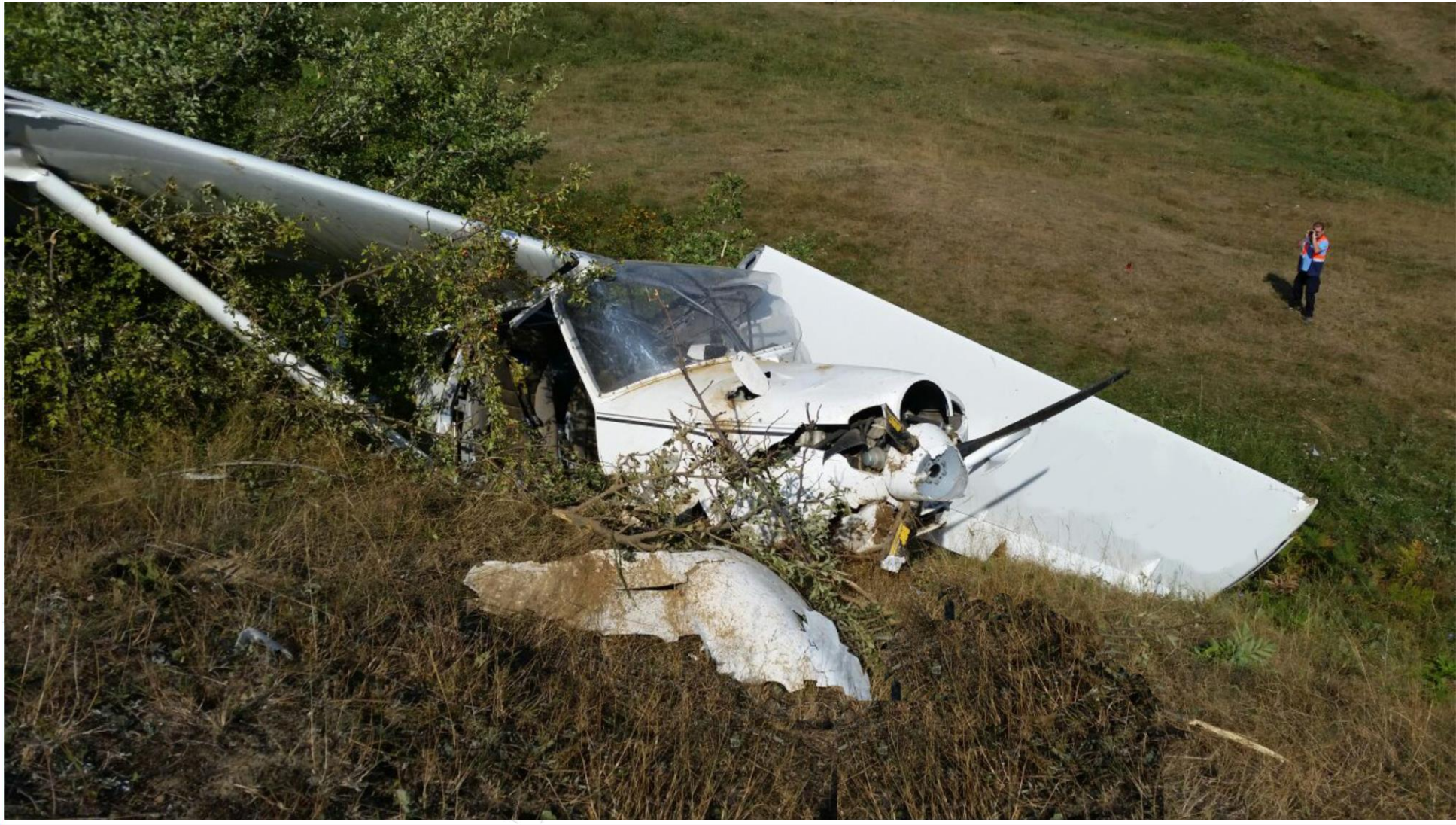
- Camera: Sony Alpha A6000, 24.3MP, APS-C Exmor APS HD CMOS Sensor
- Brushless camera rig, gyroscopic stabilizer and gyroscopic roller, made of carbon with pilot control
- Stabilization controller
- FPV video transmission system in 5.8 Ghz band, 400 mW
- 3 Lithium-Polymer 3S batteries, 1000 mAh
- Camera zoom, video recording and photo shooting controls
- HDMI converter for video output of the camera



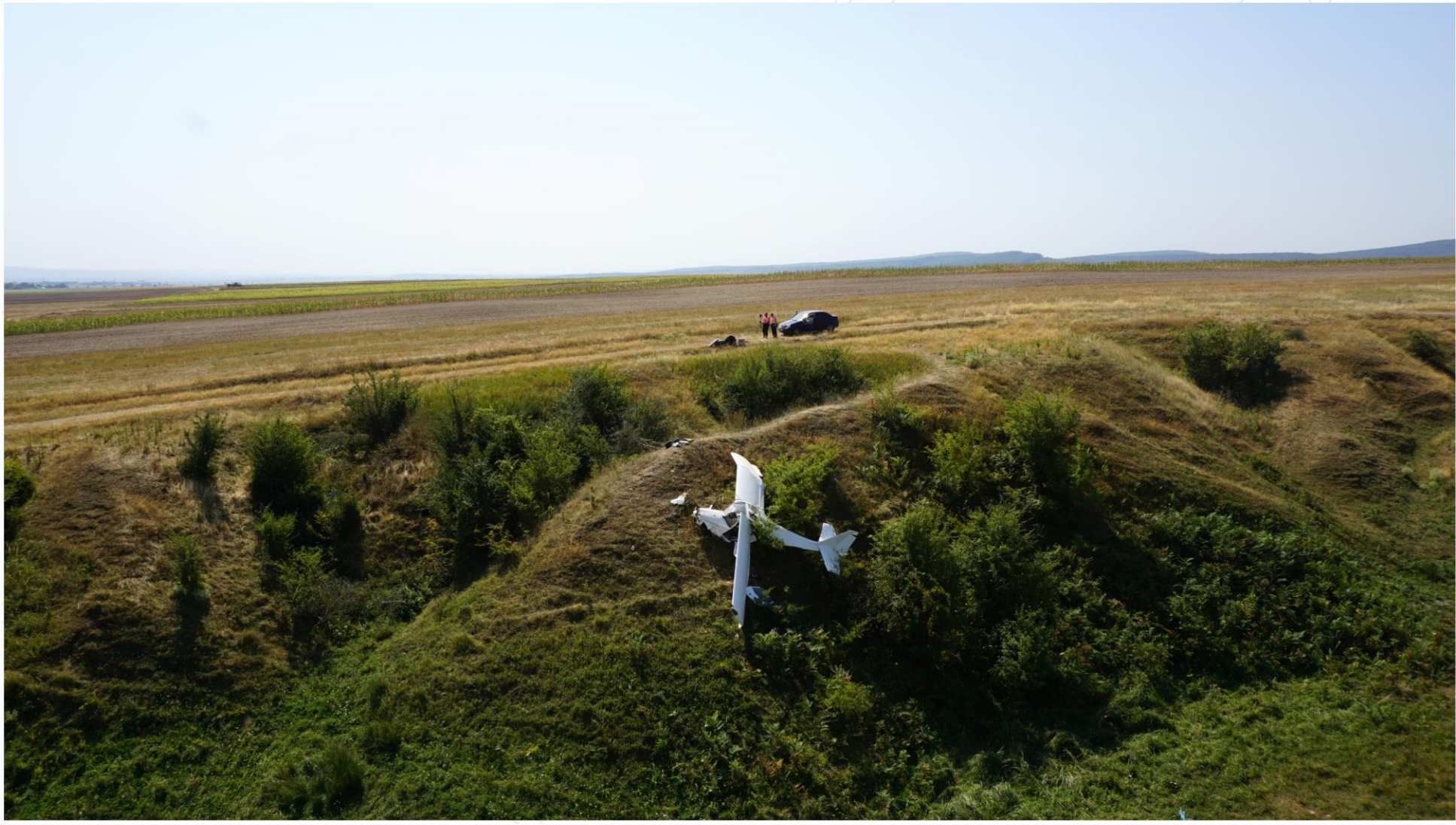
Ground control



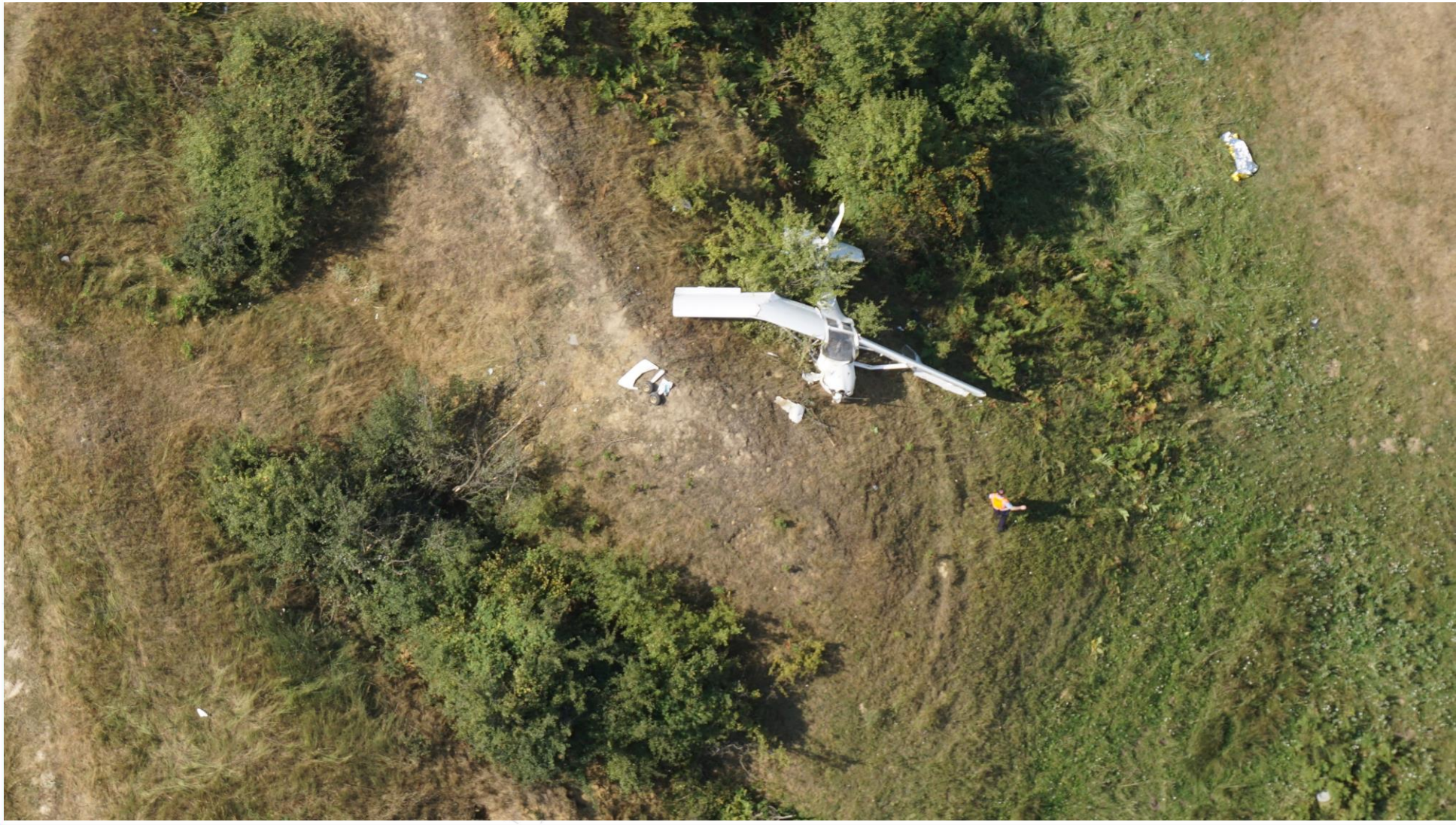
Aerial photography in accident investigation (1/10)



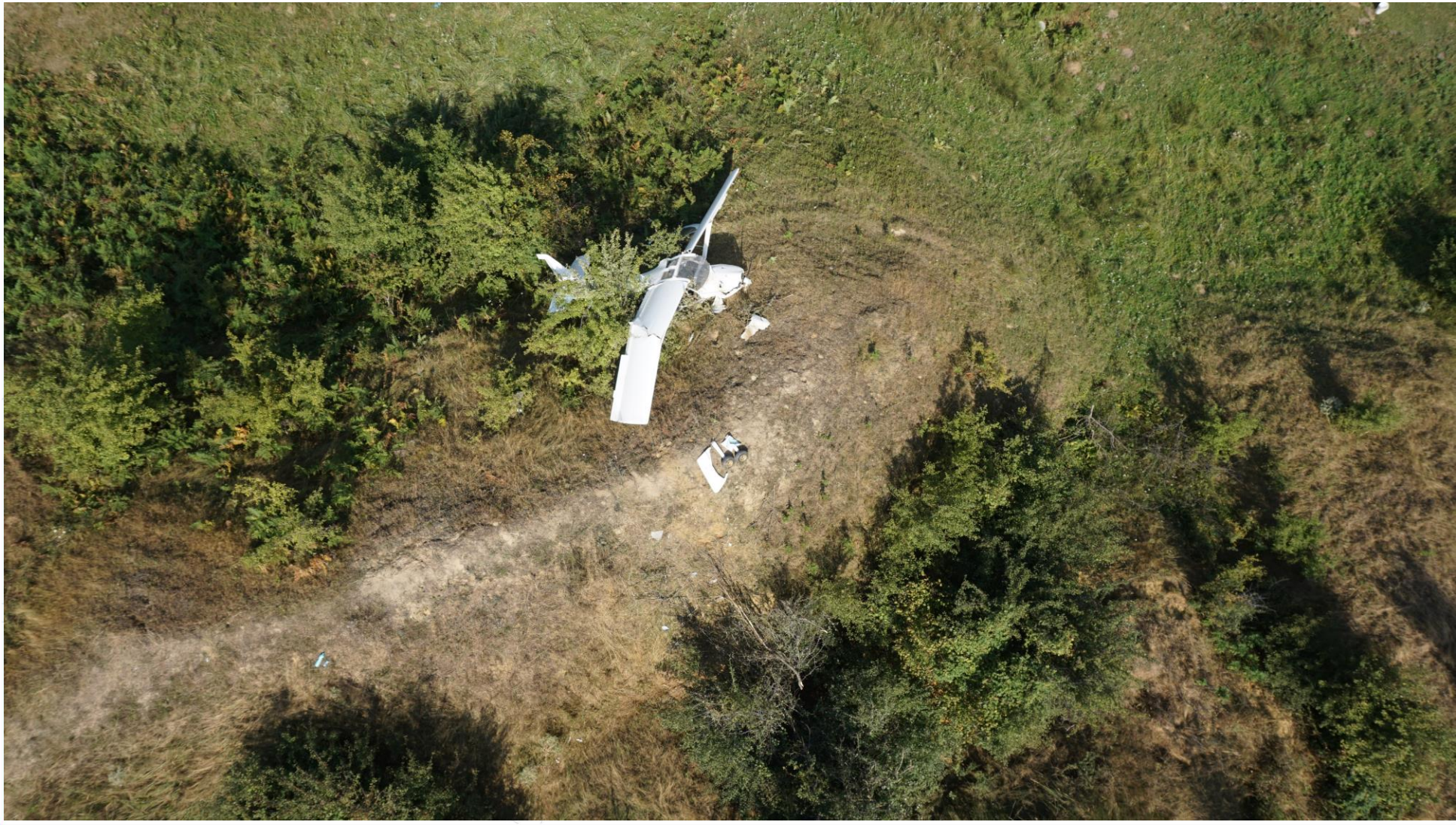
Aerial photography in accident investigation (2/10)



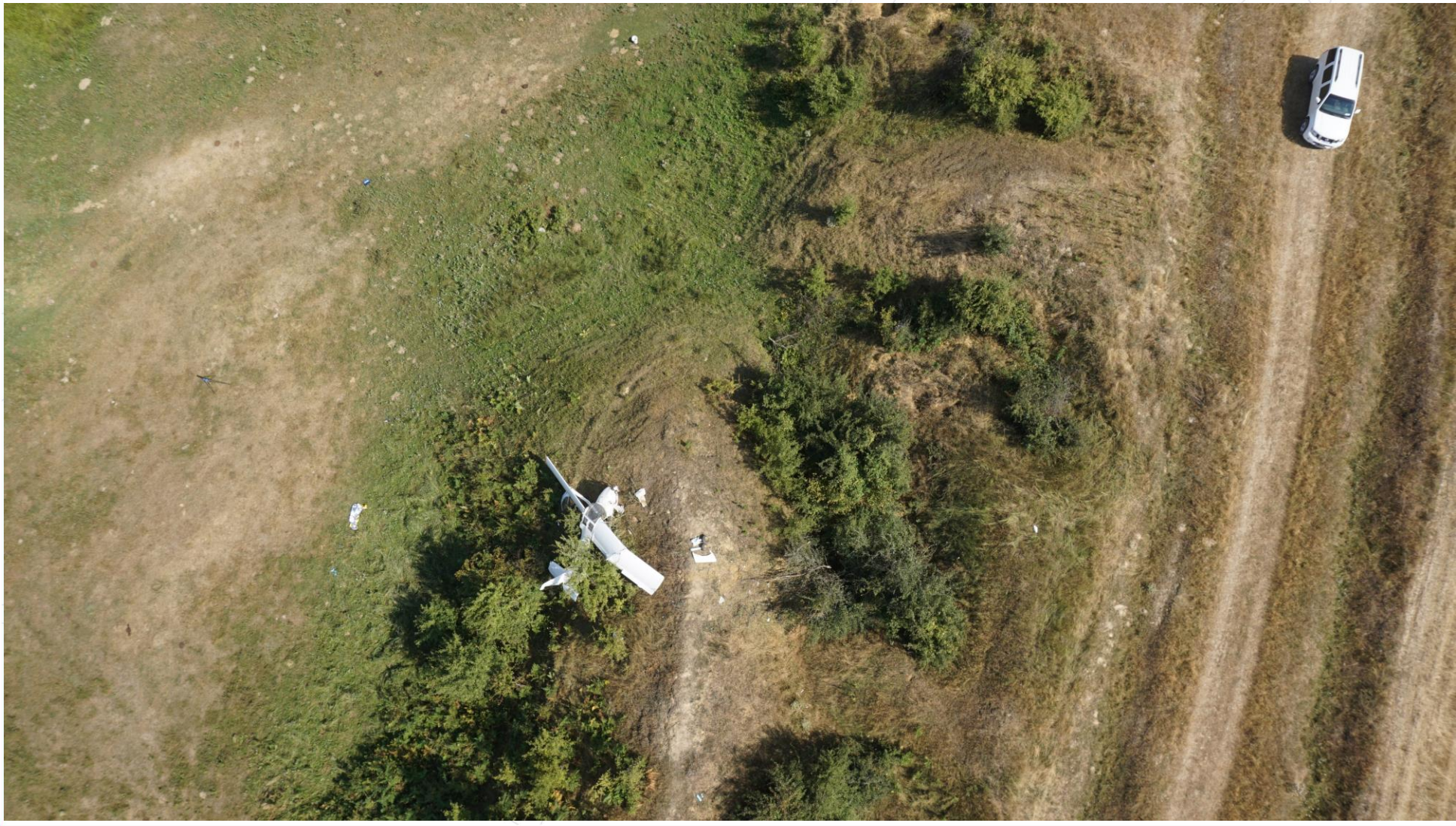
Aerial photography in accident investigation (3/10)



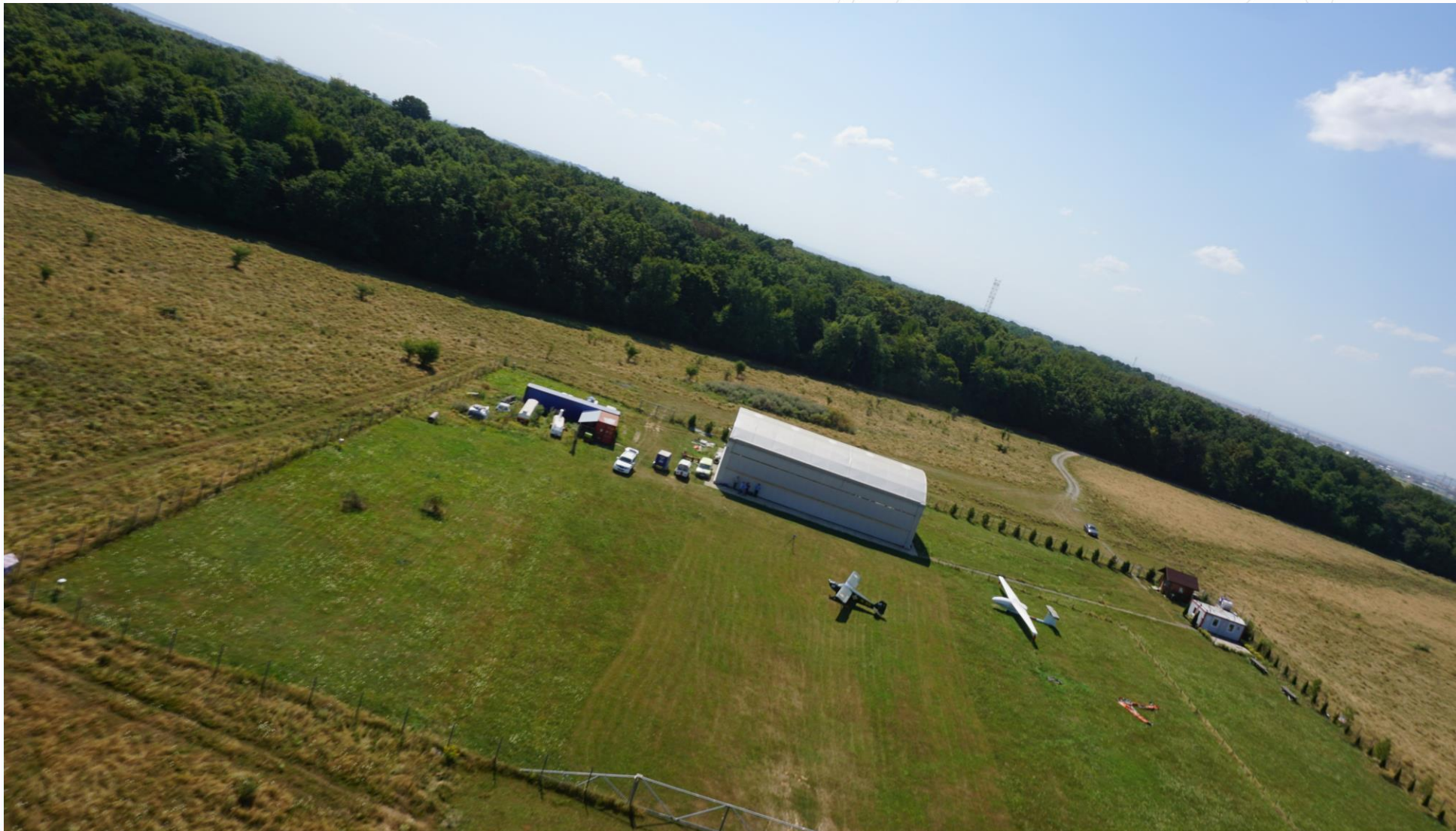
Aerial photography in accident investigation (4/10)



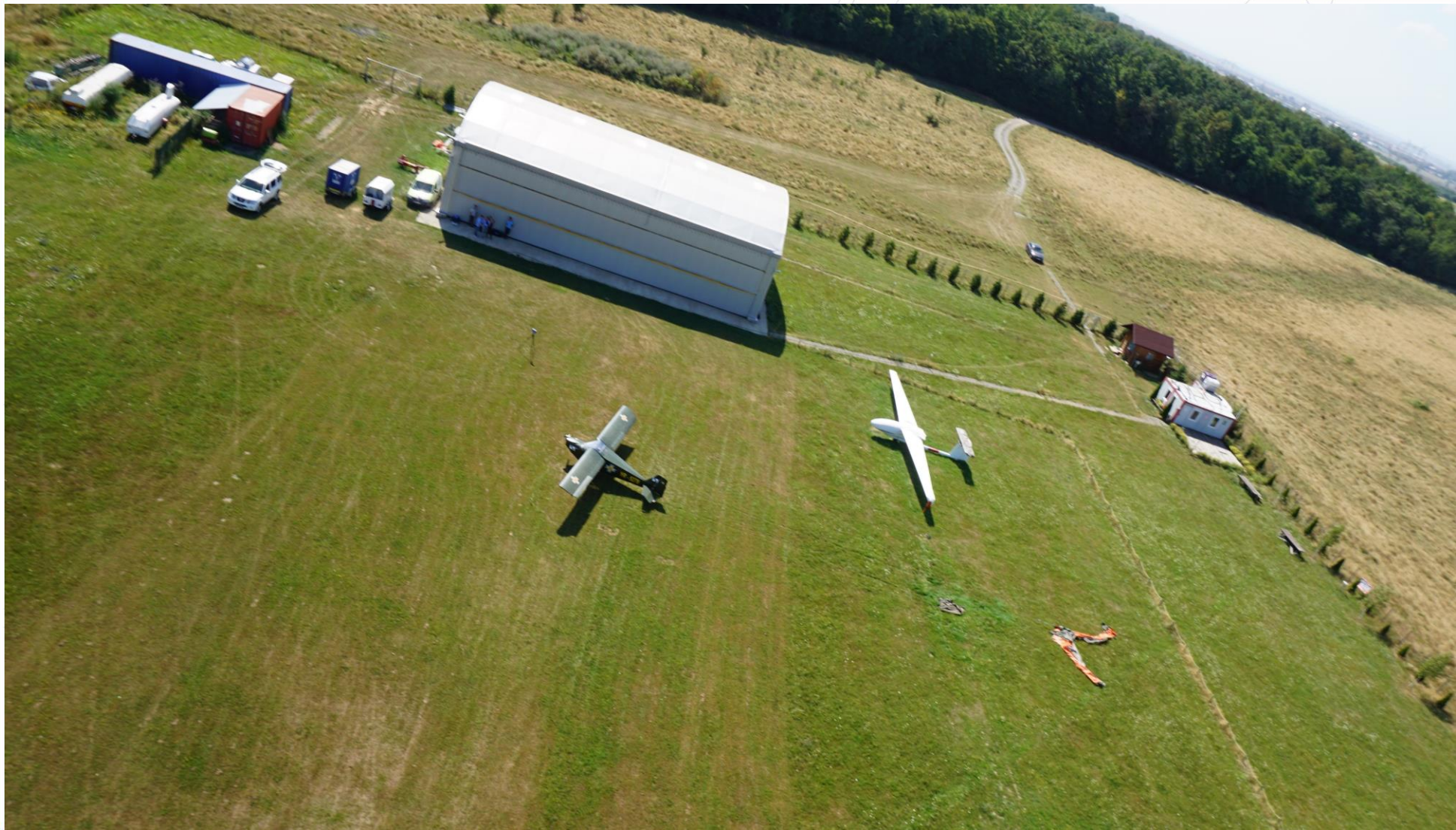
Aerial photography in accident investigation (5/10)



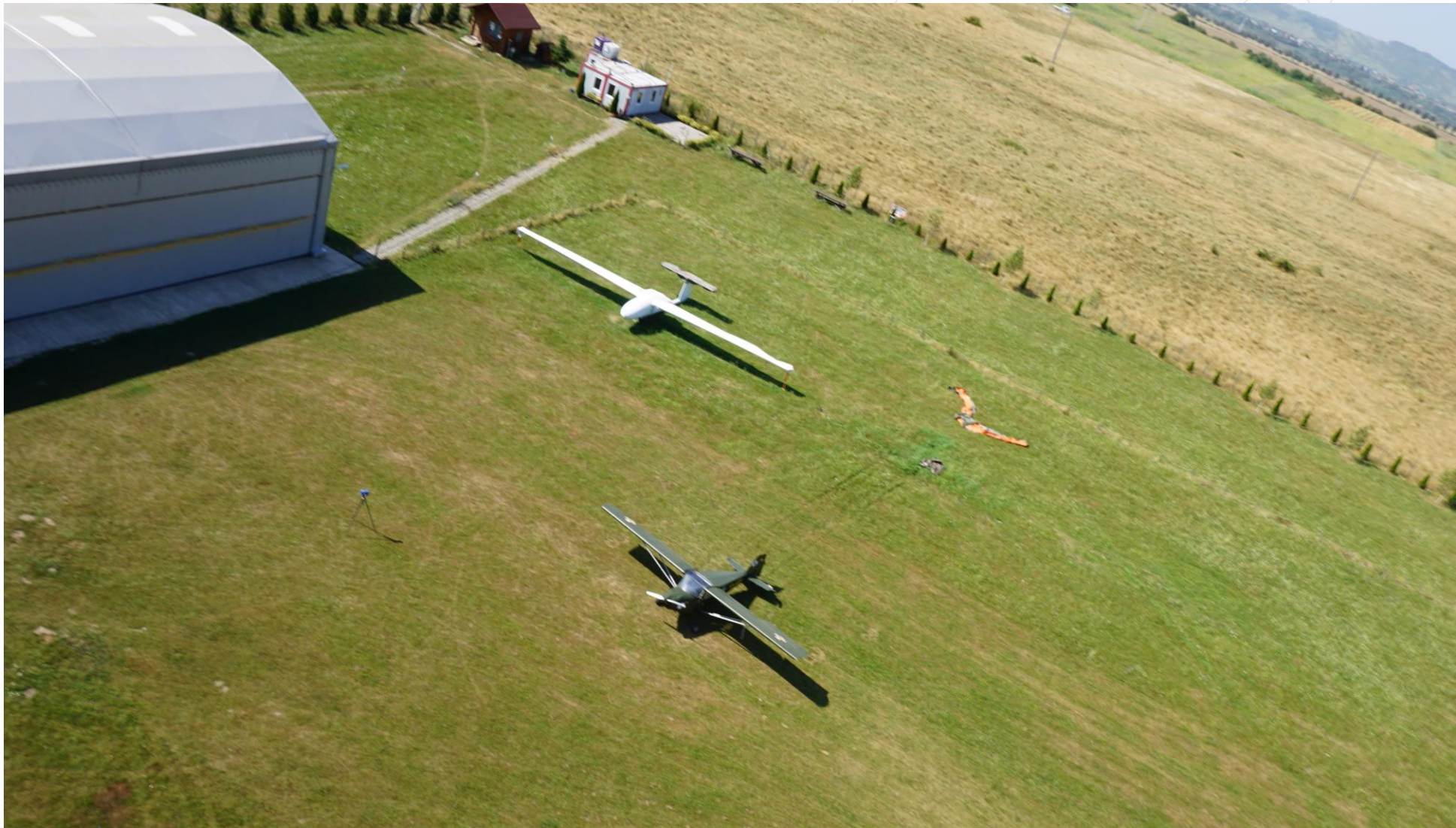
Aerial photography in accident investigation (6/10)



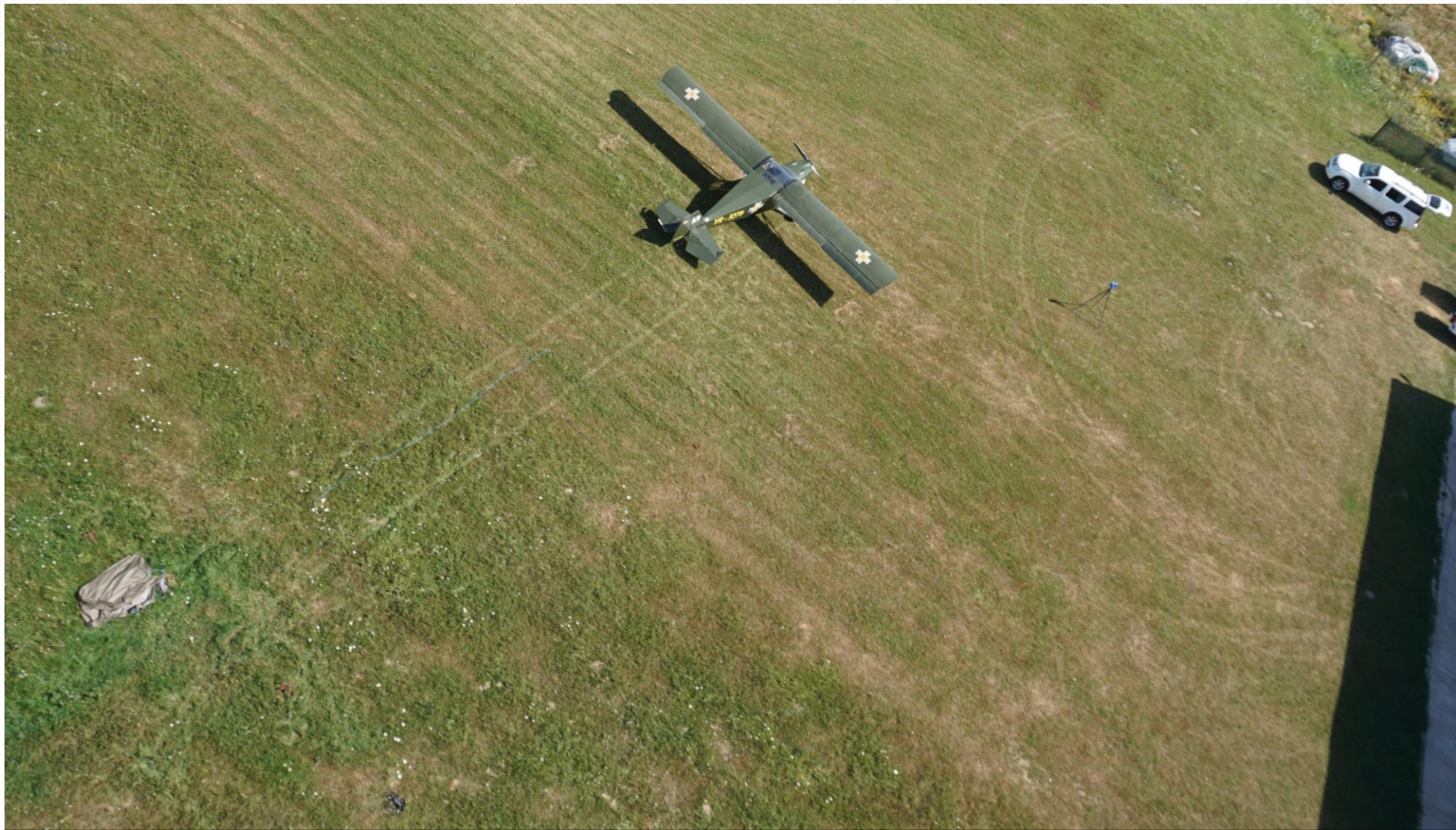
Aerial photography in accident investigation (7/10)



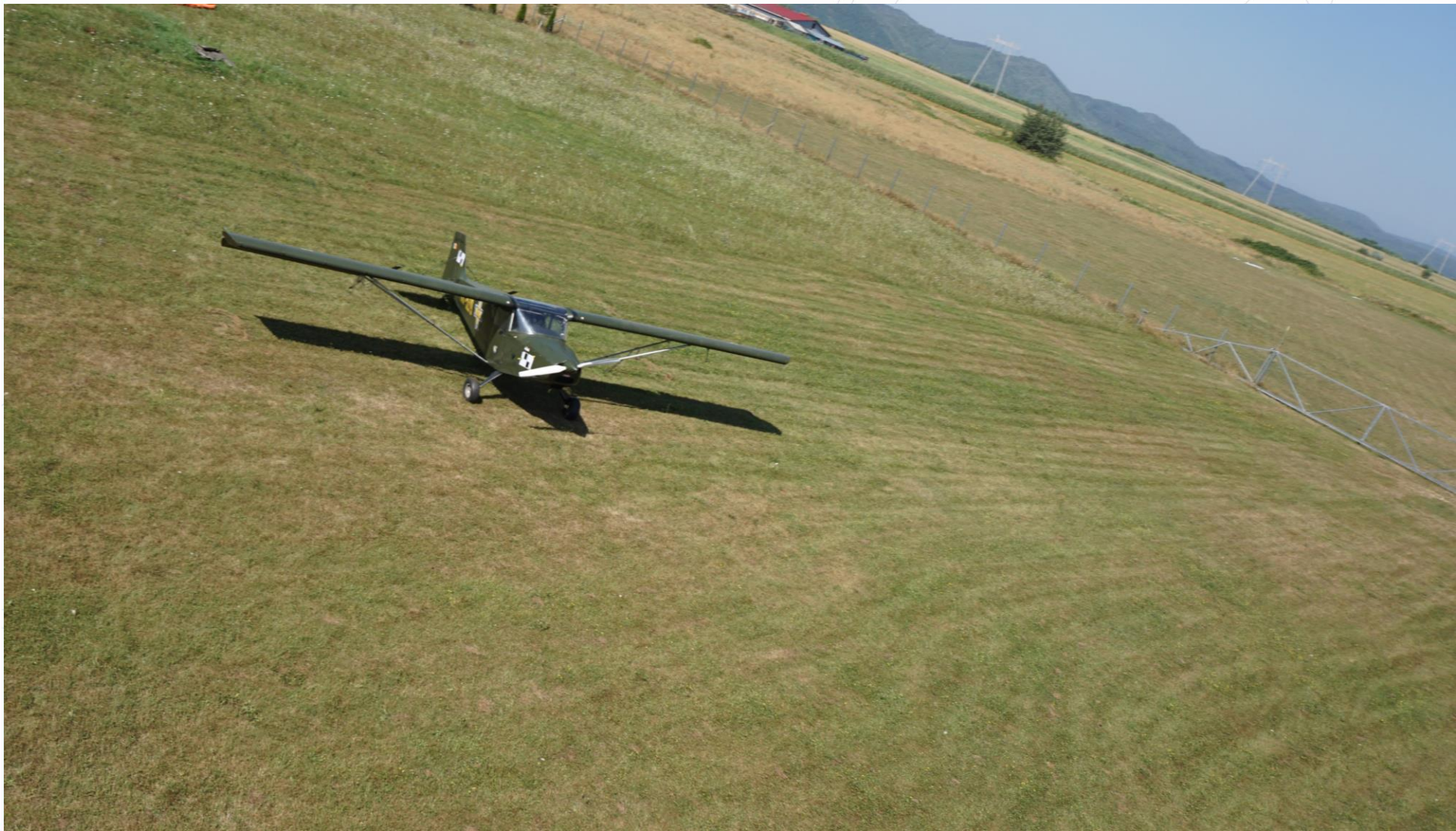
Aerial photography in accident investigation (8/10)



Aerial photography in accident investigation (9/10)



Aerial photography in accident investigation (10/10)



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Thank you!

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