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Thematic division and tactical analysis of the UAS application supporting forest fire management

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**Abstract**

Introduction: This paper describes many initiatives and shows also practical examples which have happened using Unmanned Aerial Systems to support fire managers in different ways. Since the operation of manned aircraft at forest fires is usually expensive, in many cases managers miss the aerial activity even for reconnaissance however that would be required for the effective intervention. Today more and more experts say Unmanned Aerial Systems can give real alternatives for aerial reconnaissance even if this application is far from manager’s mentality yet. Methods: Author used thematic division of Unmanned Aerial Systems applications; it is based on two key elements, one of them is the time flow of fighting forest fires, the other is its tactical requirements. Research used mainly author’s own experiences in this field, accompanied by function analysis, practical experiments, economic analysis and also expert estimation. Results and discussion: Logically Unmanned Aerial Systems can be used before fire for hot spot detection, before starting the intervention for fire reconnaissance, during the intervention for intervention monitoring and after suppression for post fire monitoring. The method of prescribed fire can also be in the focus of Unmanned Aerial Systems use as a special application for fire prevention.

**Keywords:** Unmanned Aerial Systems (UAS), tactical analysis, forest fire management, fire detection, fire monitoring, prescribed fire

1. **Introduction**

The operation of manned aircraft at forest fires is usually expensive, therefore in many cases managers miss the aerial activity even for reconnaissance or supporting decision making, even if that would be required for the effective intervention. Today’s experiences say Unmanned Aerial Systems¹ (UAS) can give real alternatives of manned aircraft’s operation not just for aerial reconnaissance but even other activities. This paper describes many initiatives and shows also practical examples which have happened using UAS to support fire managers in different ways.

UAS activities regarding forest fire is not new. We can reel off activities using UAS to fight against forest fire in the United States (Ambrosia and Hinkley, 2009), in Croatia (Hucaljuk, 2004; Restas, 2013), in Spain (Ollero, 2004; Pastor, 2008). In Hungary the Szendro Fire Department carried out many activities helping fire management using UAS (Restas, 2004).

This paper gives an approach for thematic division of using UAS at forest fires; it is based on the tactical differences. Logically UAS can be used before fire for hot spot detection, during the intervention helping fire management and after suppression for post fire monitoring. The method of prescribed fire can be also in the focus of UAS use as a special application for fire prevention. (Restas, 2011)

The paper uses the chronological flow of fighting forest fire for thematic divisions, although the last part of this paper, the *UAS generated prescribed fire* can be disputed; it could have been also the first part. As a latest development of this application author found it as the latest place for the best.

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¹ There are other abbreviations like UAV (Unmanned Aerial Vehicle) or RPAS (Remotely Piloted Aircraft Systems) meaning the similar technology as UAS. „Drone” is also used for this technology.