Geophysical Research Abstracts
Vol. 18, EGU2016-17148, 2016
EGU General Assembly 2016

Multi-Level Wild Land Fire Fighting Management Support System for an Optimized Guidance of Ground and Air Forces

Alexander Almer, Thomas Schnabel, Roland Perko, Johann Raggam, Armin Köfler, and Richard Feischl
Austria (alexander.almer@joanneum.at)

MULTI-LEVEL "WILD LAND FIRE FIGHTING – MANAGEMENT SUPPORT SYSTEM" FOR AN OPTIMIZED GUIDANCE OF GROUND AND AIR FORCES

Alexander Almer, Thomas Schnabel, Roland Perko,
Johann Raggam, Armin Köfler, Richard Feischl

1. JOANNEUM RESEARCH Forschungsges.m.b.H, Graz, AUSTRIA,
{firstname.lastname}@joanneum.at
2. Ing. Richard Feischl, Gumpoldskirchen, AUSTRIA, richard.feischl@aon.at

ABSTRACT

Climate change will lead to a dramatic increase in damage from forest fires in Europe by the end of this century. In the Mediterranean region, the average annual area affected by forest fires has quadrupled since the 1960s (WWF, 2012). The number of forest fires is also on the increase in Central and Northern Europe. The Austrian forest fire database shows a total of 584 fires for the period 2012 to 2014, while even large areas of Sweden were hit by forest fires in August 2014, which were brought under control only after two weeks of intense fire-fighting efforts supported by European civil protection modules. Based on these facts, the improvements in forest fire control are a major international issue in the quest to protect human lives and resources as well as to reduce the negative environmental impact of these fires to a minimum.
Within this paper the development of a multi-functional airborne management support system within the frame of the Austrian national safety and security research programme (KIRAS) is described. The main goal of the developments is to assist crisis management tasks of civil emergency teams and armed forces in disaster management by providing multi spectral, near real-time airborne image data products. As time, flexibility and reliability as well as objective information are crucial aspects in emergency management, the used components are tailored to meet these requirements. An airborne multi-functional management support system was developed as part of the national funded project AIRWATCH, which enables real-time monitoring of natural disasters based on optical and thermal images. Airborne image acquisition, a broadband line of sight downlink and near real-time processing solutions allow the generation of an up-to-date geo-referenced situation map.
Furthermore, this paper presents ongoing developments for innovative extensions and research activities designed to optimize command operations in national and international fire-fighting missions. The ongoing development focuses on the following topics:

(1) Development of a multi-level management solution to coordinate and guide different airborne and terrestrial deployed firefighting modules as well as related data processing and data distribution activities.

(2) Further, a targeted control of the thermal sensor based on a rotating mirror system to extend the “area performance” (covered area per hour) in time critical situations for the monitoring requirements during forest fire events.
(3) Novel computer vision methods for analysis of thermal sensor signatures, which allow an automatic classification of different forest fire types and situations.

(4) A module for simulation-based decision support for planning and evaluation of resource usage and the effectiveness of performed fire-fighting measures.

(5) Integration of wearable systems to assist ground teams in rescue operations as well as a mobile information system into innovative command and fire-fighting vehicles.

In addition, the paper gives an outlook on future perspectives including a first concept for the integration of the near real-time multilevel forest fire fighting management system into an "EU Civil Protection Team" to support the EU civil protection modules and the Emergency Response Coordination Centre in Brussels.

Keywords: Airborne sensing, multi sensor imaging, near real-time fire monitoring, simulation-based decision support, forest firefighting management, firefighting impact analysis.