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Remote Sensing Solutions for an Efficient Support of Forest Fire Management Phases

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Abstract

Nowadays, dramatic increases in forest fires can be observed worldwide. In order to improve the protection of human lives and resources it is mandatory to support forest firefighting strategies and management solutions with innovative technical developments. The EU has initiated international co-operations and initiatives to provide interoperable systems and information in order to support prevention and firefighting efforts. The main goal is to protect human lives and resources and to reduce the negative environmental impact to a minimum. Different innovative remote sensing technologies allow processing geo-oriented information to enable targeted support of different disaster management phases and time-critical processes (Almer et al., 2017). The ESA offer significant contributions to disaster management, whereby the Copernicus Emergency Management Service (EMS) is an important service in this context is. The EMS provides up-to-date and accurate geospatial thematic information to all actors involved in the management of natural, human-induced disasters and humanitarian crises. The Forest Fire Information System (EFFIS) is one of the components of the EMS Copernicus program. In order to support time-critical phases, information products derived from satellite data lack of the possibility to acquire data on demand and generate information products within short time frames. Several years ago, this drawback led to start the development of an airborne as well as a UAV-borne multi-sensor platform. The goal was to realize efficient and fast data processing chains for acquired optical and thermal image data to enable custom tailored support for first responders within time-critical crisis response tasks. The resulting sensor platform ARGUS-Flex uses a very high-resolution optical camera with 150 MPxl as well as an optimised, forward motion compensated thermal-infrared system with 4 combined thermal sensors. It is designed for equipping planes, helicopters, ultra-light planes and large UAVs. The system allows rapid coverage of large areas with optical and thermal data. A similar but smaller and lighter sensor platform to equip smaller UAVs is developed as part of the project "NRT-COP". Here, an optical camera with 48 Mpxl resolution and two thermal cameras are integrated. Both platform systems utilize powerful GNSS/INS modules, which enables the direct and real-time geo-processing of gathered image data (Almer et al., 2015). With an appropriate data downlink, the first geo-referenced data are available in the management system one minute after taking the images on-board. This near-real-time common operational picture

increases the efficiency of firefighting operations and also the safety of the emergency forces.

Keywords: remote sensing, fire detection, time-critical phases, near-real-time processing, flexible multi-sensor platform

References

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