

UAV REGULATIONS AND OPERATIONAL POLICIES IN CANADA — AN OVERVIEW

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1. Introduction

The demand for Unmanned Aerial Vehicles (UAVs) is a rapidly diversifying area of technology that continues to generate enthusiasm and imaginative applications in public, private and military sectors. Unmanned systems remove the human form factor of vessel design, allowing many tasks to be accomplished much more efficiently, at a lower cost, and with lower environmental impact. With extensive wilderness areas and long stretches of unprotected, unmonitored coastline, the use of this technology is especially appealing in Canada.

In geomatics, there are already a variety of possible UAV applications, including scientific research, imaging spectrometry, cartography, aerial photography, mineral exploration, emergency and disaster monitoring, weather reconnaissance, agriculture spraying, and many more. The data is collected using different types of sensors, including standard cameras, infrared and near infrared cameras, as well as radar and LIDAR (Light Detection and Ranging) systems. Magnetometers and sensors for other electromagnetic radiation, such as microwave and ultraviolet, are also used.

Unfortunately, the possibility of the geomatics community using UAVs is limited because of the absence of

straightforward UAV policies and regulations, which results in several issues. First and foremost, the issue of safety is fundamental—of people, of private property, and of other aircraft in controlled airspace. Secondly, as UAVs become increasingly used by the public and common, the issue of privacy is emerging and is equally crucial as responsible use. For the most part, safety concerns are related to the operation of UAVs, while privacy concerns are raised with the use of the information they collect with the onboard sensor. Operational policy issues associated with the collection and use of data collected via UAVs also exist, as intellectual property rights must be considered when working with such data. Despite these legal and regulatory restrictions, UAVs have the potential to play an integral role in the future of geomatics as a key data collection platform.

The objective of this paper is to provide a general overview of UAVs as spatial data collection platforms in the geomatics arena. The next section focuses on regulations that apply to UAV platforms, not on onboard sensors, that are used for scientific research and commercial purposes in Canada. It addresses mainly Canada's UAV regulations but also provides an overview of UAV regulations in the United States, the European Union, and Australia. The last section presents privacy and intellectual property rights concerns as well as data processing challenges associated with the use of UAV platforms for spatial data collection.

2. Unmanned Aerial Vehicle

An unmanned aerial vehicle (UAV) or drone is defined as a “power driven aircraft, other than a model aircraft, that is operated without a flight crew member on board” [Transport Canada 2010]. This section addresses Canadian and other countries' UAV regulations with a focus on aircrafts used for scientific research and commercial purposes, excluding model aircrafts, which are dedicated for recreational purposes [Transport Canada 2010].

2.1 Canadian Regulations

With regulations adapted from existing Canadian Aviation Regulations (CARs) in 1996, Canada was one of the first countries in the world to develop and implement conventions for civil drone uses [Gersher 2014]. Transport Canada is the authority for the establishment, management and development of standards and regulations to ensure safety and security in Canadian civil aviation. The regulations enacted by Transport Canada apply to all activities in non-military regulated airspace, including law enforcement, scientific research, and commercial purposes; and govern the use of UAVs