Contribution for AT-RASC 2015 (session: F-S2)

Contribution for AT-RASC 2015 (session: F-S2) Use of drones to estimate surface roughness for the interpretation of radar images in the context of disaster managment

Laurent Beaudoin[‡] Loïca Avanthey[‡§]

[‡]ESIEA
9 rue Vésale, 75005 Paris, France
{firstname.surname}@esiea.fr

Télécom Paristech CNRS - LTCI
46, rue Barrault - 75013 Paris, France
{firstname.surname}@telecom-paristech.fr

As part of disaster managment, knowledge of spatial information is a critical data for decision makers. Their main need is to obtain an updated map of the damage in a constrained time. This map is derived from the intersection of the map of issues present before the event and the impact zone of the disaster. From this information, the decision makers can optimize their deployment of personnel and resources. Therefore, to manage efficiently the current situation of crisis, it is necessary to regularly update the data on risk areas, before, during and after a disaster.

To obtained the map of the damage, decision makers may use since 2000 the International Charter on Space and Major Disasters. If we analyze the spatial distribution of sites affected by a disaster situation that led to the activation of this charter, we find that all parts of the globe may be affected. Remote sensing, by its ability to image all inhabited areas in a short time, is particularly well suited to provide the data necessary to create both issues map (before the disaster) and damage map (emergency acquisition in less than 24 hours after the beginning of the disaster).

Among the satellites used, we can distinguish those that provide optical data (visible band, IR, multispectral and hyperspectral) and those that provide radar data type. Both data type are complementary. The interpretation and classification is more simple and natural on optical images, but the study area must be cloudless during the observation, which can be a real problem in some areas like the tropics. On the contrary, radar images are always available whatever the conditions of illumination or cloud cover of the observed area.

The complexity of the interpretation of radar images is linked to several parameters such as interference phenomena caused by the lighting of the scene observed by a coherent light or as the sensitivity to moisture or roughness of the soils.

In this paper, we will detail how to measure the roughness parameter and its consequences in the interpretation of radar images from remote sensing. Then we will discuss the benefits of using UAVs to perform these measurements on field from multiple-views stereo. In this context, we will present the 3D reconstruction pipeline developed and some results obtained during a measurement campaign.